SERVICE MANUAL SECTION

EXHAUST AFTERTREATMENT AND DIESEL PARTICULATE FILTER (DPF) SERVICE MANUAL (PRELIMINARY)

Model: BE Bus, CE Bus, FC Bus, FE Bus, HC Bus, LC Bus, RE Bus, 3200, 3300, CF 500, CF 600, 4100, 4300, 4400, 5500, 5600, 5900, 7300, 7400, 7500, 7600, 7700, 8500, 8600, 9200, 9900, ProStar™, LoneStar®
Start Date: 2007 Emission Engines

S07003

05/20/08

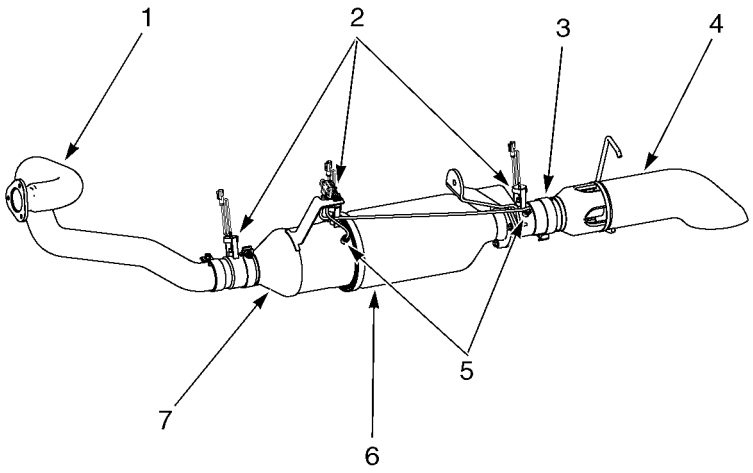
TABLE OF CONTENTS

TABLE OF CONTENTS (CONT.)

1. DESCRIPTION

For 2007 vehicles, the Environmental Protection Agency (EPA) requires a 50% reduction in emissions of nitrogen oxides (NO_X) and a 90% reduction in particulate matter (PM). Oxides of nitrogen are created by the high temperature and speed of combustion. Once in the atmosphere, NO_X emissions result in ground level ozone formation and smog. Emission particulates include unburned fuel and lube oil (liquid hydrocarbons), carbon soot from incomplete combustion (main contributor to smoke), water from combustion, and sulfate from the sulfur in the fuel.

To comply with these new regulations, many changes were made to truck specifications including: ultra low sulfur diesel fuel, the engine, engine oil, vehicle design, and the exhaust system. The new exhaust system treats the engine exhaust and is referred to as an aftertreatment system. Stainless steel tubing, used for heat and corrosion resistance, must be used throughout the system.



1. TURBO PIPE
2. TEMPERATURE SENSORS
3. TAIL PIPE
4. TEMPERATURE CONTROL DEVICE
5. PRESSURE SENSOR PORTS
6. DIESEL PARTICULATE FILTER
7. DIESEL OXIDATION CATALYST

Figure 1 Typical 2007 Exhaust Components

The main components of the aftertreatment system consist of the turbo pipe, diesel oxidation catalyst (DOC), diesel particulate filter (DPF), temperature control device (TDC), sensors, sensor junction box, and wiring. The new exhaust system components, in general, are more fragile and larger.

Aftertreatment exhaust system configurations are categorized by engine type and the horizontal or vertical orientation of the Diesel Particulate Filter (DPF) and tailpipe. For example, when the DPF is mounted horizontally and the tailpipe is mounted vertically, it is referred to as a Horizontal/Vertical system.

DESCRIPTION

Diesel Oxidation Catalyst: The DOC oxidizes carbon monoxide and hydrocarbons and converts NO to NO_2 for regeneration.

Diesel Particulate Filter (DPF): The DPF is a porous ceramic filter, housed in stainless steel, which replaces the muffler. Flow requirements force the inlet and outlet to be on opposite ends. Alternate channels of the filter are plugged, forcing the exhaust gas to flow through the porous wall capturing the soot particles. The DPF burns soot with O_2 and NO_2 and catches the ash from burnt oil. The aftertreatment system monitors the efficiency of the DPF. A self-cleaning function (called regeneration) is used to keep the DPF functioning properly between regular ash clean-out maintenance intervals, which must be performed by Service Technicians. An optimal DPF size was chosen for low back-pressure and to maximize ash storage capacity between periodic cleanings.

Tail Pipe: Every exhaust system does not have a tail pipe because in some cases a new Temperature Control Device or TCD replaces the actual tail pipe. However, some vertical exit systems will have a tail pipe only and some include a TCD. For all horizontal exit configurations a horizontal TCD is included. If a horizontal system has a tail pipe it is located between the DPF and the TCD.

Temperature Control Device (TCD): This component is a device that reduces exhaust gas temperatures as they exit the system. Not all vehicles have a TCD as it is not as critical in vertical tail pipe applications. The TCD is the last component of the exhaust system and is mounted at the end of the exhaust system, after the tail pipe (if equipped). The TCD works on a venturi principal that mixes the exhaust gasses with external air to reduce the overall exit temperature. The TCD is standard on all horizontal exit exhaust systems.

Sensors: There are three temperature sensors located on the aftertreatment system to monitor temperature levels at different points of the system. One pressure sensor, fed by two pressure lines, is used to monitor pressure levels at both ends of the DPF and to determine soot build-up.

Aftertreatment Control Module (ACM): Aftertreatment systems used with the MaxxForce™ 11 and 13 engines are controlled by an additional electronic module. The ACM monitors sensors on the exhaust system and communicates with the Engine Interface Module (EIM) and the Engine Control Module (ECM). When conditions are met or a manual regeneration is requested, the ACM initiates a regeneration cycle. When the conditions required for regeneration are met, or a manual regeneration is requested, the ACM sends a voltage to the Aftertreatment Fuel Injector solenoid valve to open and inject fuel into the turbo exhaust pipe. See the applicable engine manual for diagnostics on the ACM.

1.1. THEORY OF OPERATION

The aftertreatment system, part of the larger exhaust system, processes engine exhaust to meet emissions requirements. The aftertreatment system traps particulate matter (soot) and prevents it from leaving the tailpipe. The soot buildup is monitored and, when required, can be burnt to ash though the regeneration process. The regeneration process is accomplished in different ways and is determined by manufacturers and/or engine type. Refer to the Vehicle Operator's Manual and Engine Operator's Manual for specific regeneration procedures. The DPF will continue to burn soot to ash until it is full. At this point the DPF needs to be removed and cleaned or exchanged for a clean DPF.

MaxxForce™ 5, 7, DT, 9, and 10

These engines use a cylinder enrichment system to regenerate the DPF. Regeneration is controlled by the Engine Control Module. See the applicable engine manual for diagnostics.

MaxxForce™ 11 and 13

The aftertreatment system injects fuel into the exhaust gas to increase the temperature necessary for DPF regeneration. The Aftertreatment Control Module (ACM) receives data from the aftertreatment temperature and pressure sensors to monitor soot buildup. When regeneration is required, the ACM activates the aftertreatment fuel injector and fuel is injected into the exhaust system to increase the temperature and burn the soot to ash. See the applicable engine manual for diagnostics.

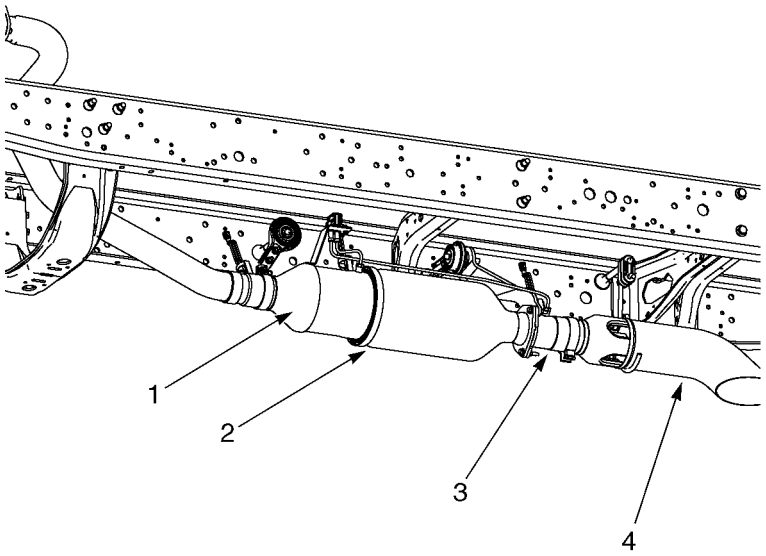
Cummins engines

The Engine Control Module monitors temperature and pressure sensors to determine soot buildup in the DPF system. When soot buildup is detected by the Engine Control Module, a signal is sent to the aftertreatment injector, which then introduces a small amount of fuel into the exhaust stream ahead of the DPF. This increases the temperature of the exhaust system, burning the soot into ash. See the applicable engine manual for diagnostics.

Caterpillar engines

The DPF has a sensor box that utilizes temperature sensors and pressure tubes to monitor soot buildup in the DPF system. When soot buildup is detected by the sensor box, a signal is sent to the Electronic Control Module and the regeneration process is activated. The system injects fuel behind the turbocharger and electrically ignites the fuel using a spark plug, sending a flame into the DPF and burning out accumulated soot. See the applicable engine manual for diagnostics.

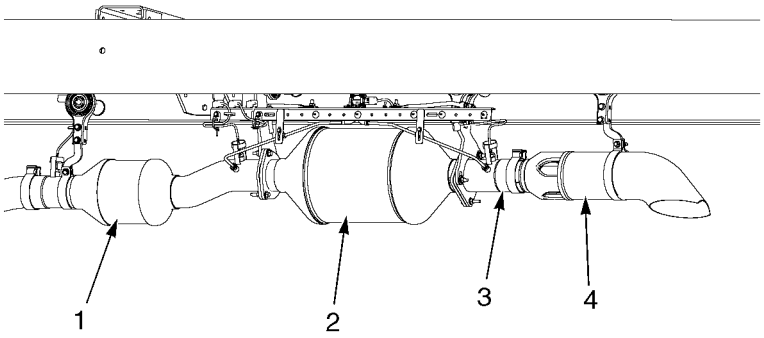
1.2. SINGLE HORIZONTAL/HORIZONTAL



1. DIESEL OXIDATION CATALYST
2. DIESEL PARTICULATE FILTER
3. TAILPIPE
4. TEMPERATURE CONTROL DEVICE

Figure 2 Single Horizontal/Horizontal One-Can System

The single horizontal/horizontal exhaust system consists of a horizontal diesel particulate filter and a horizontal tail pipe. There are several variations of single horizontal/horizontal exhaust systems on different series of trucks. All of the variations have the same components and removal/installation procedures are similar for the different variations.



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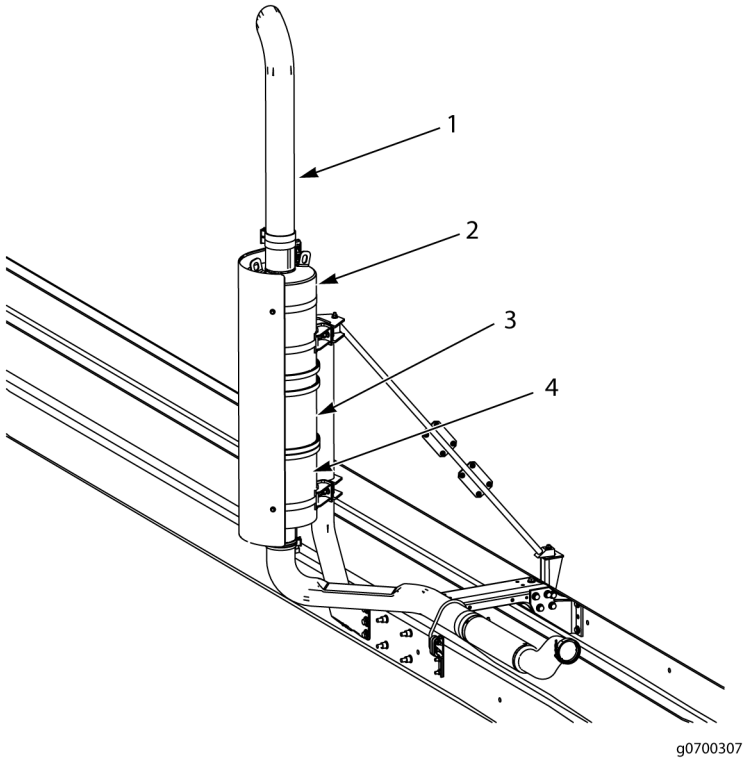
1. DIESEL OXIDATION CATALYST
2. DIESEL PARTICULATE FILTER
3. TAIL PIPE
4. TEMPERATURE CONTROL DEVICE

Figure 3 Single Horizontal/Horizontal Two-Can System

There are two types of single horizontal/horizontal exhaust systems. The one-can system (Figure 2) has the diesel oxidation catalyst mounted directly on the diesel particulate filter. The two-can system (Figure 3) uses two separate cans for the diesel oxidation catalyst and the diesel particulate filter.

1.3. SINGLE VERTICAL/VERTICAL

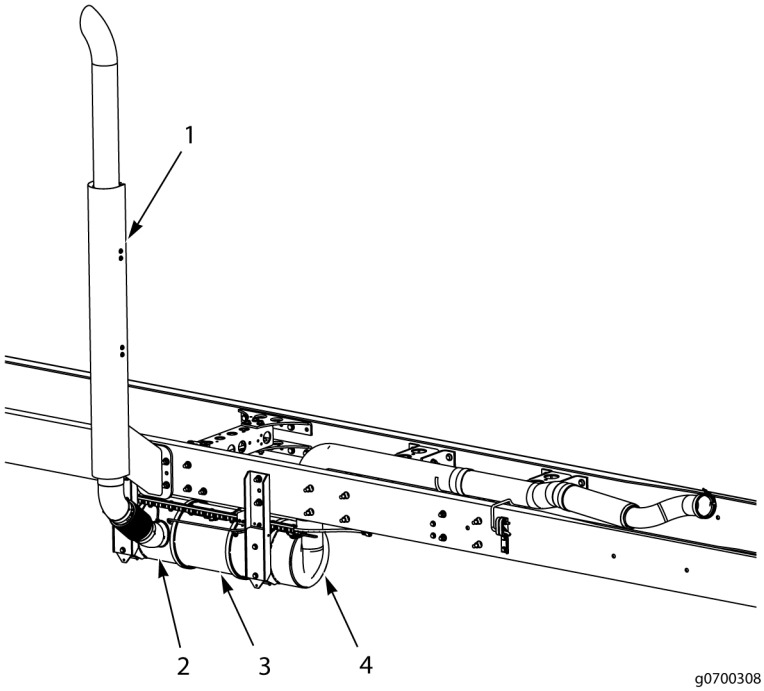


1. TAIL PIPE
2. OUTPUT EXHAUST CAN
3. DIESEL PARTICULATE FILTER
4. DIESEL OXIDATION CATALYST

Figure 4 Single Vertical/Vertical Exhaust System

The single vertical/vertical exhaust system consists of a vertical diesel particulate filter and a vertical tail pipe. There are several variations of single vertical/vertical exhaust systems on different series of trucks. All of the variations have the same components and the removal/installation procedures are similar for the different variations.

1.4. SINGLE HORIZONTAL/VERTICAL

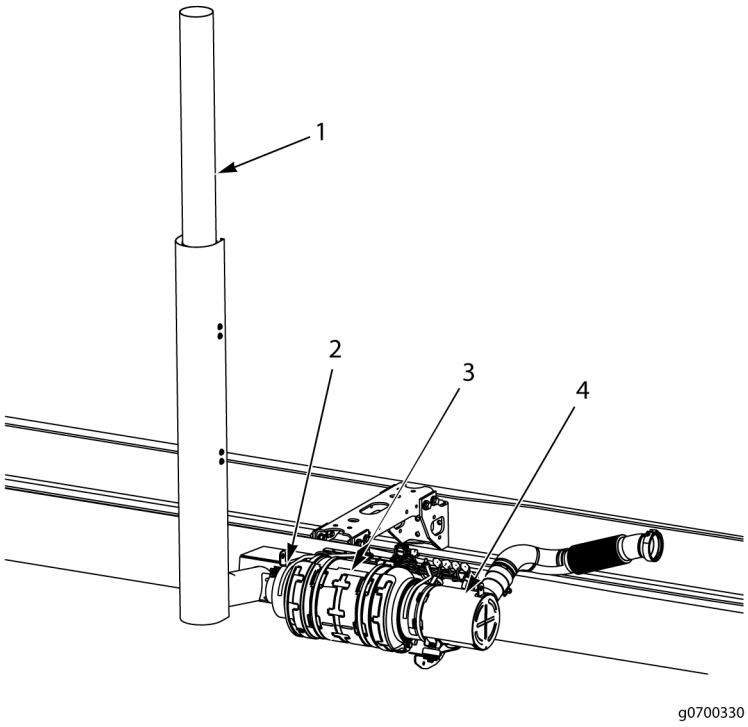


1. TAIL PIPE
2. OUTPUT EXHAUST CAN
3. DIESEL PARTICULATE FILTER
4. DIESEL OXIDATION CATALYST

Figure 5 Single Horizontal/Vertical Exhaust System

The single horizontal/vertical exhaust system consists of a horizontal diesel particulate filter and a vertical tail pipe. There are several variations of single horizontal/vertical exhaust systems on different series of trucks. All of the variations have the same components and the removal/installation procedures are similar for the different variations.

1.5. SINGLE UNDER CAB HORIZONTAL/VERTICAL



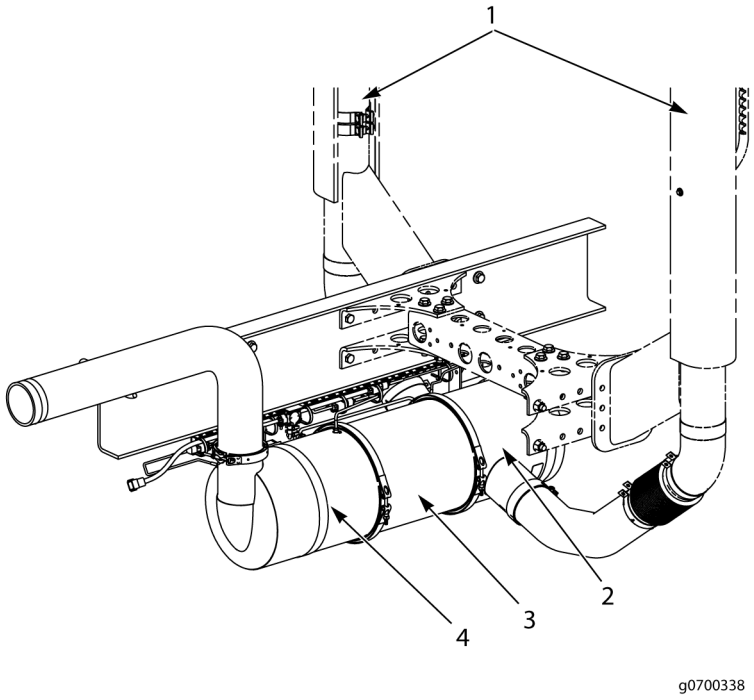
1. TAIL PIPE
2. OUTPUT EXHAUST CAN
3. DIESEL PARTICULATE FILTER
4. DIESEL OXIDATION CATALYST

Figure 6 Single Under Cab Horizontal/Vertical Exhaust System

The single under cab horizontal/vertical exhaust system consists of a horizontal diesel particulate filter and a vertical tail pipe. There are several variations of single under cab horizontal/vertical exhaust systems on different series of trucks. All of the variations have the same components and the removal/installation procedures are similar for the different variations.

These systems are similar to the single horizontal/vertical exhaust system with the main difference being that the diesel particulate filter is mounted under the cab.

1.6. SINGLE HORIZONTAL/DUAL VERTICAL



1. TAIL PIPE
2. OUTPUT EXHAUST CAN
3. DIESEL PARTICULATE FILTER
4. DIESEL OXIDATION CATALYST

Figure 7 Single Horizontal/Dual Vertical Exhaust System

The single horizontal/dual vertical exhaust system consists of a horizontal diesel particulate filter and dual vertical tail pipes. There are several variations of single horizontal/dual vertical exhaust systems on different series of trucks. All of the variations have the same components and the removal/installation procedures are similar for the different variations.

These systems are similar to the single horizontal/vertical exhaust system. One main difference is that the exhaust is split into two tail pipes behind the diesel particulate filter.

2. GENERAL SERVICE INFORMATION

WARNING

To prevent vehicle damage, personal injury, or possible death, park the vehicle on a flat, level surface. Make sure the engine ignition is in the off position and the transmission is in neutral or in the park position if the vehicle is equipped with an automatic transmission. Set the parking brake, chock the wheels, and disconnect the batteries at the negative terminal before doing any service procedures on the engine or vehicle.

WARNING

Before working on the exhaust system allow sufficient time for cool down. Working on the exhaust system and DPF while hot can result in burns and serious personal injury.

WARNING

The diesel particulate filter is heavy and contains a ceramic "brick" that is sensitive to shocks and impacts. Use a suitable device for support and removal of the diesel particulate filter to prevent damage and/or personal injury.

CAUTION

Care must be taken when removing any diesel particulate filter not to damage the sensors and other components of the system. Failure to comply may result in unnecessary damage to sensors and other components of the system.

NOTE – Aftertreatment exhaust systems are designed with flex pipes to allow for removal of the diesel particulate filter without the need of disconnecting the exhaust pipes. In some cases, however, it may be necessary to disconnect these exhaust pipes from the output exhaust can prior to removing the diesel particulate filter.

IMPORTANT – Before performing any work on the exhaust components, be sure to perform these basic procedures:

1. Park the chassis on a flat, level surface.
2. Place transmission in neutral (or park, if automatic transmission).
3. Set the parking brake.
4. Turn off ignition.
5. Install wheel chocks.
6. Disconnect the batteries.

2.1. EXHAUST SYSTEM MODIFICATIONS

Proper long-term operation of the aftertreatment emissions control devices requires controlling exhaust stream temperatures and the exhaust flow pattern throughout the system. This controls the required location of the components as well as the insulation of the various parts of the system Navistar, Inc. will ensure correct factory installation of aftertreatment systems for compliance with the certification requirements.

Modified systems could void the warranty coverage and violate emissions requirements as well as damage the engine, aftertreatment system and other truck systems. For this reason, application guidelines for aftertreatment installations are much more complex and restrictive for vehicles incorporating these systems. Modifications to any part of the exhaust system must be approved by Navistar, Inc.

In comparison to vehicles produced prior to 2007, exhaust component surface temperatures and exhaust gas temperatures will be considerably higher. As a result of the increased temperatures, clearances to exhaust components need to be increased by typically 40% to ensure that body and/or chassis parts are not damaged by heat.

- No equipment should be mounted within 8 inches (200 mm) of the exhaust pipe outlet to avoid damage from hot exhaust gases.
- Maintain other clearances as shown in the table below.

Table 1 Minimum Clearance Between Exhaust System Components and Other Chassis Components.

Component	Minimum Clearance, In. (mm)
Electric Harness	6 (150)
Electric Harness (with heat guard)	4 (100)
Mechanical Cable	2 (50)
Fuel Tube, Metal	6 (150)
Fuel Tube, Rubber or Plastic	6 (150)
Brake Tube, Metal	4 (100)
Brake Tube, Rubber or Plastic	4 (100)
Tire	4 (100)
Fuel Tank	4 (100)

2.2. DIESEL PARTICULATE FILTER CLEANING

At some point in time, the DPF will fill with ash to the point where it is plugged. When this occurs the DPF will need to be removed and cleaned or exchanged for a clean filter. This requires special handling techniques and cleaning equipment that may or may not be available at the service site. If available, follow the instructions for the specific cleaning machine.

CAUTION

Do not attempt to clean the diesel particulate filter with a pressure washer or compressed air. Failure to comply will result in damage to the diesel particulate filter.

NOTE – Do not attempt to clean the diesel particulate filter without proper training.

NOTE – The ash contained within the diesel particulate filter is considered a hazardous waste. Disposal should be in accordance with all local laws and regulations. Refer to http://www.epa.gov for more information.

For those dealers that wish to purchase their own cleaning equipment, Donaldson is the recommended supplier for the two-stage diesel particulate filter cleaning systems. Dealers wishing to purchase cleaning equipment should purchase both machines.

1. Stage 1 – Diesel Particulate Filter Pulse Cleaner (for ash removal)
2. Stage 2 – Thermal Regeneration (for plugged filter cleaning)

For sites not having the appropriate diesel particulate filter cleaning machines, a diesel particulate filter exchange program is available for diesel particulate filters installed with MaxxForce™ engines.

Caterpillar and Cummins aftertreatment devices should be treated as part of the engine and will be handled through their respective dealers/distributors.

IMPORTANT – All diesel particulate filters will be tracked and are identified with a specific serial number. If a replacement diesel particulate filter is installed, you must record the serial numbers of both the original and the replacement on the warranty report and in ISIS.

Diesel Particulate Filter and Diesel Oxidation Catalyst Inspection

NOTE – Once the diesel particulate filter and diesel oxidation catalyst have been removed from the exhaust system, an inspection of these components must be completed to determine if the components are still serviceable.

- The diesel particulate filter and diesel oxidation catalyst housings must be free of dents.
- Mounting flanges must be free of dents, cracks, or gouges to seal properly with gaskets.
- Replace any oil- , fuel- , water- , or coolant-soaked diesel particulate filter and/or diesel oxidation catalyst.
- Replace the diesel particulate filter if there are gouges on the inlet or outlet faces of the internal brick material.
- On the DPF, at least every other hole in the inlet and outlet faces of the internal filter brick must be plugged. If plugs are missing, replace the diesel particulate filter. Additional plugs are allowed.
- If the inlet face of the filter is totally plugged with soot, there is a chance the filter brick material may have been forced to shift in the diesel particulate filter. A diesel particulate filter, with a shifted brick, must be replaced.

2.3. EXCHANGE PROGRAM

Navistar Parts will have all necessary replacement components in the Parts Distribution Centers available for order when you need them.

Navistar Parts will also have refurbished units available as core availability permits. In order to support the collection and refurbishment of filter modules, Navistar needs to collect the engine serial number and the DPF/DOC serial numbers of the core module and the replacement module being installed onto the vehicle. A form is included to use in providing this information with each replacement module.

When replacing a DPF or DOC module, please record the engine serial number and the DPF/DOC serial number of the core and replacement units on both the work order sticker and the core return form. The work order sticker should be attached to the work order to allow for entry of this information into ISIS, and the core return form attached to the core return documentation to allow for proper refurbishment of the core.

Simply fill in the information on the work order sticker and attach it to the work order. Fill in the information on the core return instruction form and return it with the core unit following the replacement.

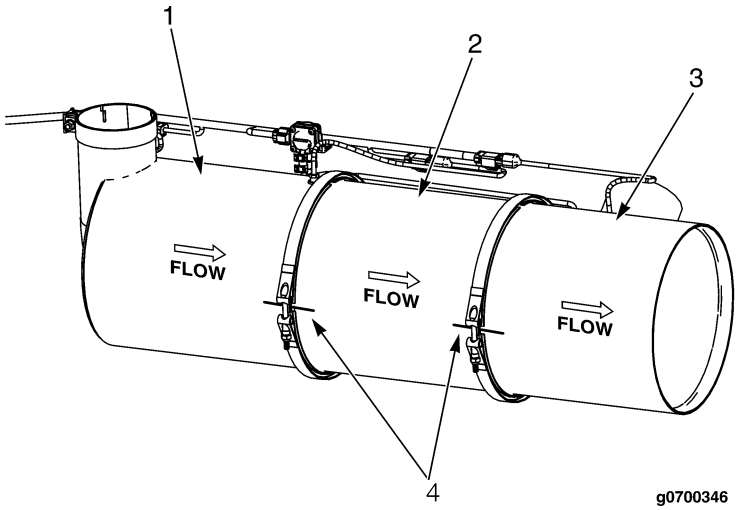
Summary of exchange program;

- Navistar Parts Distribution Centers will stock all sizes and configurations of Navistar engine diesel particulate filters
- Caterpillar and Cummins diesel particulate filters will be handled through their dealers/distributors and should be treated as part of the engine
- All Navistar diesel particulate filters will be replaceable through a filter exchange program regardless of the filter failure mode
- Special packaging and handling will be required for shipping cores.

2.4. GASKETS AND FASTENERS

Always use new gaskets and thoroughly clean the mating surfaces when replacing aftertreatment system components. The bolts and nuts used in these systems are special and it is recommended that they also be replaced when reinstalling aftertreatment components.

2.5. DIESEL PARTICULATE FILTER INDEXING



1. DIESEL OXIDATION CATALYST
2. DIESEL PARTICULATE FILTER
3. OUTPUT EXHAUST CAN
4. INDEX MARKS

Figure 8 Indexing

IMPORTANT – Before removing a diesel particulate filter, that will be cleaned and reinstalled, the components must be indexed and marked to show direction of exhaust flow, to ensure proper installation after the filter has been cleaned.

To index and mark direction of flow on the diesel particulate filter, place a permanent index mark on all components to show how they should line up and draw an arrow showing flow direction . This important function will ensure that the diesel particular filter is properly installed during the installation procedures.

2.6. SERVICE TOOLS

These tools are recommended for removing and installing the diesel particulate filter:

- The horizontal diesel particulate filter handler (part number ZTSE4859) is used to remove/install all horizontal diesel particulate filters.
- The vertical diesel particulate filter handler (part number ZTSE4860) is used to remove/install all vertical diesel particulate filters.

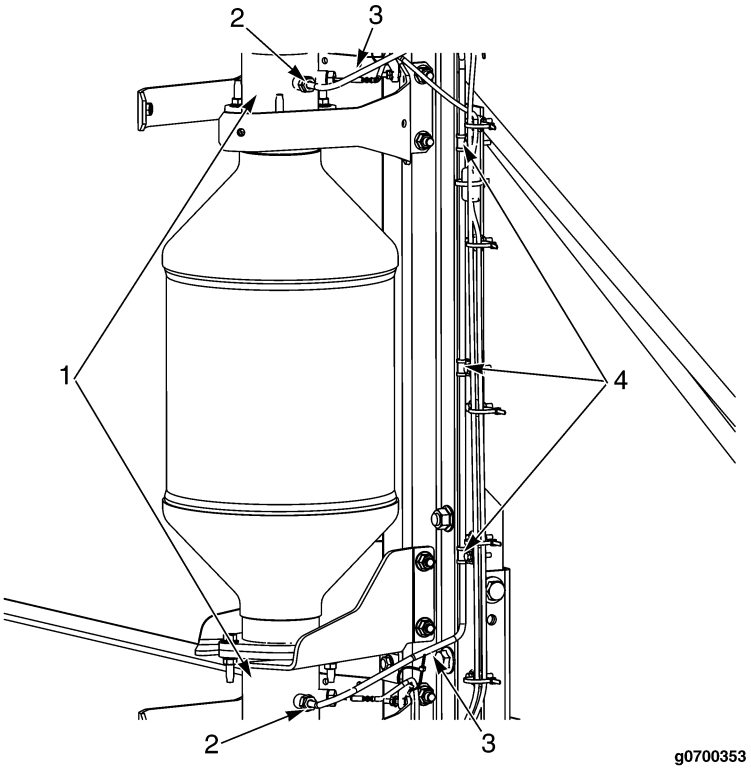
3. COMPONENT REPLACEMENT

NOTE – It may be necessary to remove the heat shield from the system prior to removing and components. If needed, refer to the proper diesel particulate filter removal procedures for the configuration you are working on to remove the heat shield.

3.1. MAXXFORCE™ 5, 7, DT, OR 10 SYSTEMS

These removal and installation procedures show a typical exhaust system for the MaxxForce™ 5, 7, DT, and 10 engines. Although some configurations may vary, the removal and installation of these components will be similar.

Pressure Sensor and Pressure Tubes – Removal

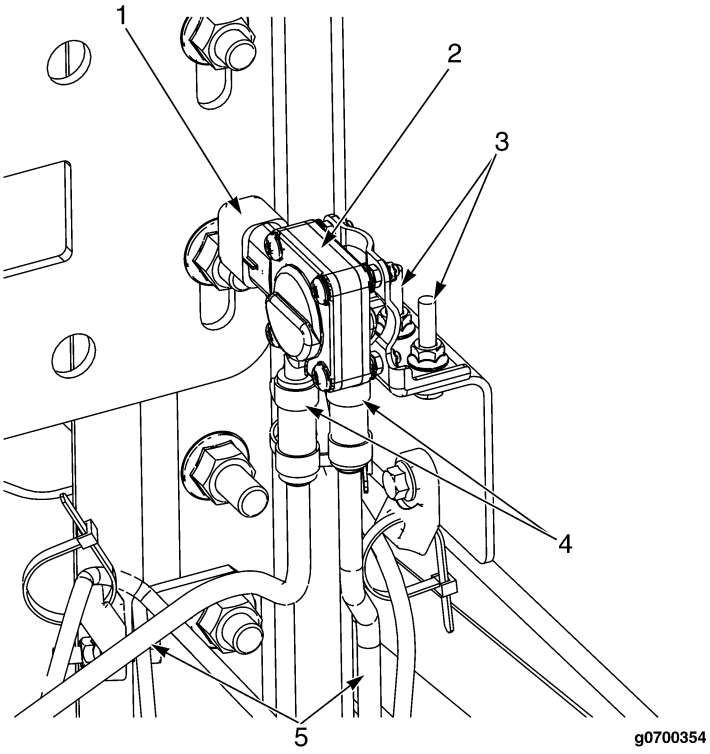


1. EXHAUST PIPES
2. PRESSURE NUT
3. PRESSURE TUBE
4. BOLT, NUT, AND P-CLAMP

Figure 9 Pressure Sensor and Pressure Tubes

1. Remove three bolts, nuts and P-clamps from the pressure tube.

2. Remove two pressure nuts from the exhaust pipes.



1. ELECTRICAL CONNECTOR
2. PRESSURE SENSOR
3. NUT AND BOLT
4. HOSE CLAMP AND HOSE
5. PRESSURE TUBES

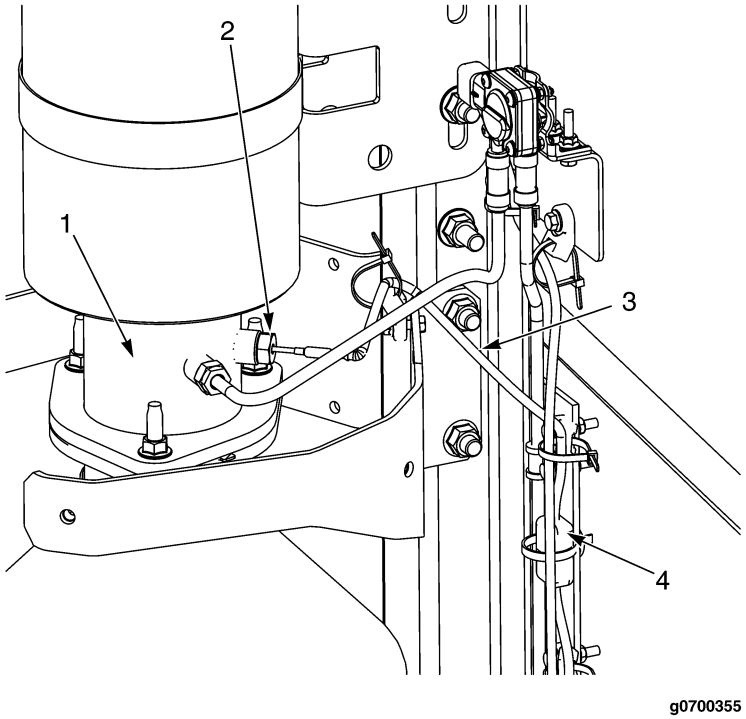
Figure 10 Pressure Sensor

3. Disconnect the electrical connector from the pressure sensor.
4. Remove hose clamps and hoses from the pressure sensor and remove pressure tubes.
5. Remove two nuts and bolts from the pressure sensor.
6. Remove the pressure sensor.

Pressure Sensor and Tube – Installation

1. Install the pressure sensor and secure with two nuts and bolts (Figure 10, Items 2 and 3). Torque bolts to 7 to 8 lbf-ft (9 to 11 N•m).
2. Align the pressure tubes and secure to the pressure sensor with hoses and hose clamps (Figure 10, Items 2, 4, and 5).
3. Connect the electrical connector to the pressure sensor (Figure 10, Items 1 and 2).
4. Install two pressure tubes on the exhaust pipes and secure with two pressure nuts (Figure 9, Items 1, 2, and 3). Torque pressure nuts to 12 lbf-ft ± 3 lbf-ft (16 N•m ± 4 N•m).
5. Secure the longest pressure tube with three bolts, nuts, and P-clamps (Figure 9, Items 3 and 4). Torque bolts to 7 to 8 lbf-ft (9 to 11 N•m).

Temperature Sensor – Removal



1. EXHAUST PIPE
2. TEMPERATURE SENSOR
3. WIRING
4. ELECTRICAL CONNECTOR

Figure 11 Temperature Sensor

1. Disconnect the electrical connector.
2. Remove wire ties as needed from wiring.
3. Remove temperature sensor from the exhaust pipe.

Temperature Sensor – Installation

1. Apply antiseize compound (part number PTX77124) to the bottom three threads of the temperature sensor.
2. Install temperature sensor on the exhaust pipe (Figure 11, Items 1 and 2). Torque temperature sensor to 18 to 30 lbf-ft (24 to 41 N•m).

CAUTION

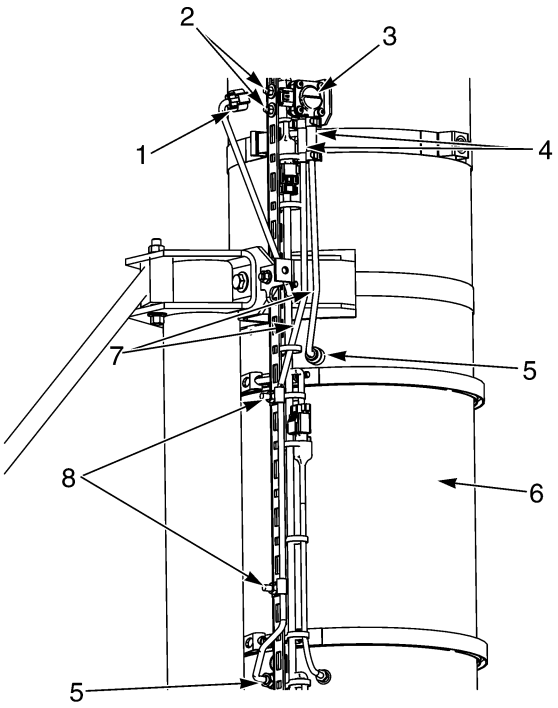
When securing the temperature sensor wiring, ensure that the wiring is not pulled tight or has excessive slack at the temperature sensor. Failure to comply could result in damage to temperature sensor or wiring.

3. Connect the electrical connector (Figure 11, Item 4).
4. Secure wiring as needed with wire ties (Figure 11, Item 3).

3.2. CUMMINS SYSTEMS, MAXXFORCE™ 11 OR 13 SYSTEM

These removal and installation procedures show a typical exhaust system for the Cummins, MaxxForce™ 11, and 13 engines. Although some configurations may vary, the removal and installation of these components will be similar.

Pressure Sensor and Pressure Tubes – Removal



1. ELECTRICAL CONNECTOR
2. NUT AND BOLT
3. PRESSURE SENSOR
4. HOSE CLAMP AND HOSE
5. PRESSURE NUT
6. DIESEL PARTICULATE FILTER
7. PRESSURE TUBE
8. BOLT, NUT, AND P-CLAMP

Figure 12 Pressure Sensor and Pressure Tubes

1. Disconnect the electrical connector from the pressure sensor.
2. Remove nuts and P-clamps from pressure tubes, as needed.
3. Remove wire ties from pressure tubes, as needed.
4. Remove two pressure nuts and disconnect pressure tubes.
5. Remove hose clamps and hoses from the pressure sensor and remove pressure tubes.
6. Remove two nuts, bolts, and the pressure sensor.

Pressure Sensor and Tubes – Installation

1. Install the pressure sensor and secure with two nuts and bolts (Figure 12, Items 2 and 3). Torque bolts to 7 to 8 lbf-ft (9 to 11 N•m).

2. Align the pressure tubes and secure to the pressure sensor with hoses and hose clamps (Figure 12, Items 3, 4, and 7).

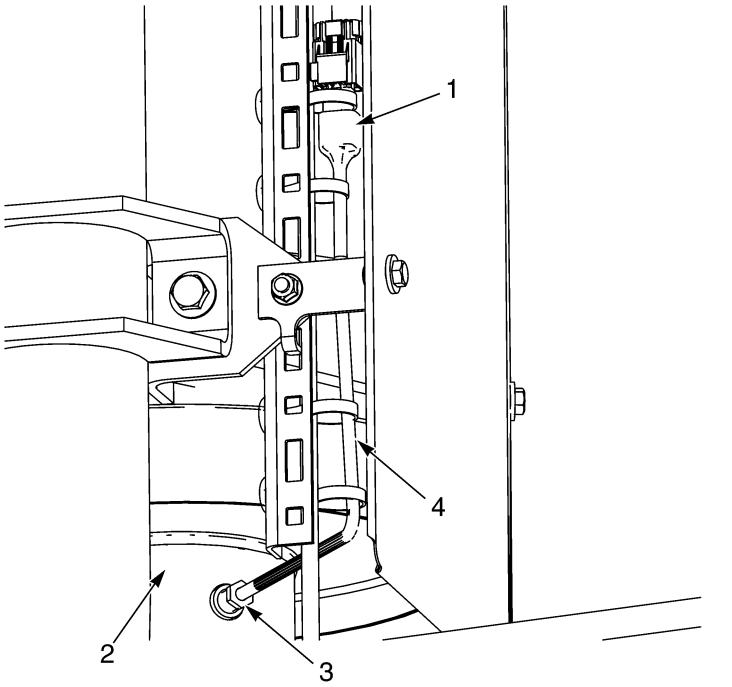
3. Secure two pressure tubes with two pressure nuts (Figure 12, Items 5 and 7). Torque pressure nuts to 23 lbf-ft ± 4 lbf-ft (31 N•m ± 5 N•m).

4. Secure pressure tube as needed with bolts, nuts and P-clamps (Figure 12, Items 7 and 8). Torque bolts to 7 to 8 lbf-ft (9 to 11 N•m).

5. Connect the electrical connector to the pressure sensor (Figure 12, Items 1 and 3).

6. Install wire ties, as needed, to pressure tubes and wiring.

Temperature Sensor – Removal



1. ELECTRICAL CONNECTOR
2. DIESEL OXIDATION CATALYST
3. TEMPERATURE SENSOR

Figure 13 Temperature Sensor

1. Disconnect the electrical connector.
2. Remove wire ties, as needed, from wiring.
3. Remove temperature sensor from the diesel oxidation catalyst.

Temperature Sensor – Installation

1. Apply antiseize compound (part number PTX77124) to the bottom three threads of the temperature sensor.
2. Install the temperature sensor on the diesel oxidation catalyst (Figure 13, Items 2 and 3). Torque temperature sensor to 22 lbf-ft ± 4 lbf-ft (30 N•m ± 5 N•m).

CAUTION

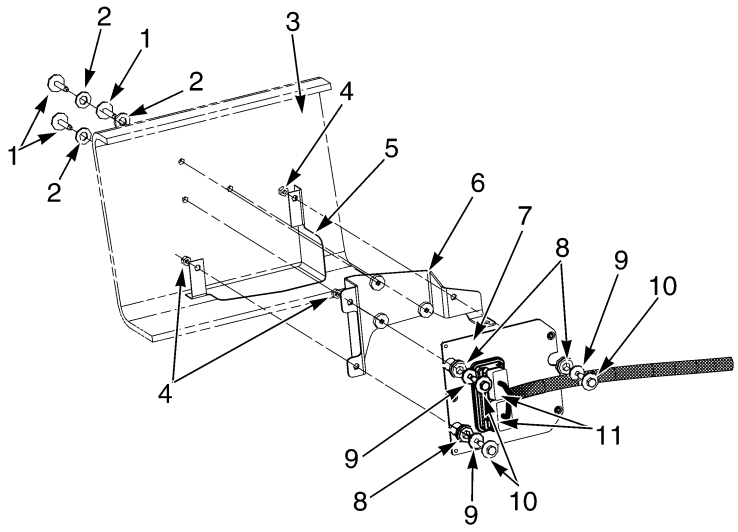
When securing the temperature sensor wiring, ensure that the wiring is not pulled tight or has excessive slack at the temperature sensor. Failure to comply could result in damage to temperature sensor or wiring.

3. Connect the electrical connector (Figure 13, Item 1).
4. Secure wiring, as needed, with wire ties (Figure 13, Item 4).

Aftertreatment Control Module – Removal

NOTE – The aftertreatment control module is part of the MaxxForce™ 11 and 13 aftertreatment system only. The aftertreatment control module is located on the inside of the left frame rail directly in front of the rear engine mount.

NOTE – Refer to the engine Diagnostic/Troubleshooting Manual, EGES-420, for Aftertreatment Control Module diagnostic and troubleshooting information.



g0700350

1. BOLT
2. WASHER
3. FRAME RAIL
4. NUT
5. SUPPORT BRACKET
6. MOUNTING BRACKET
7. AFTERTREATMENT CONTROL MODULE
8. GROMMET
9. SMALL WASHER
10. MOUNT BOLT
11. ELECTRICAL CONNECTOR

Figure 14 Aftertreatment Control Module

IMPORTANT – The aftertreatment control module mounting hardware is hard to access while the aftertreatment control module is mounted to the frame rail. The mounting bracket should be removed from the frame rail before performing the removal procedures.

1. Disconnect two electrical connectors from the aftertreatment control module.
2. Remove three bolts and washers from the frame rail and mounting bracket.
3. Remove the aftertreatment control module from the left frame rail.

4. Remove three mount bolts, small washers, grommets, and nuts from the aftertreatment control module, mounting bracket, and support bracket.

Aftertreatment Control Module – Installation

IMPORTANT – If a new aftertreatment control module is being installed, programming is required after replacement. See the applicable engine manual for programming instructions.

1. Secure the aftertreatment control module to the mounting bracket and support bracket with three nuts, grommets, small washers, and mount bolts (Figure 14). Torque bolts to 7 lbf-ft (9 N•m).

2. Align the mounting bracket on the frame rail and secure with three washers and bolts (Figure 14). Torque bolts to 15 lbf-ft (20 N•m).

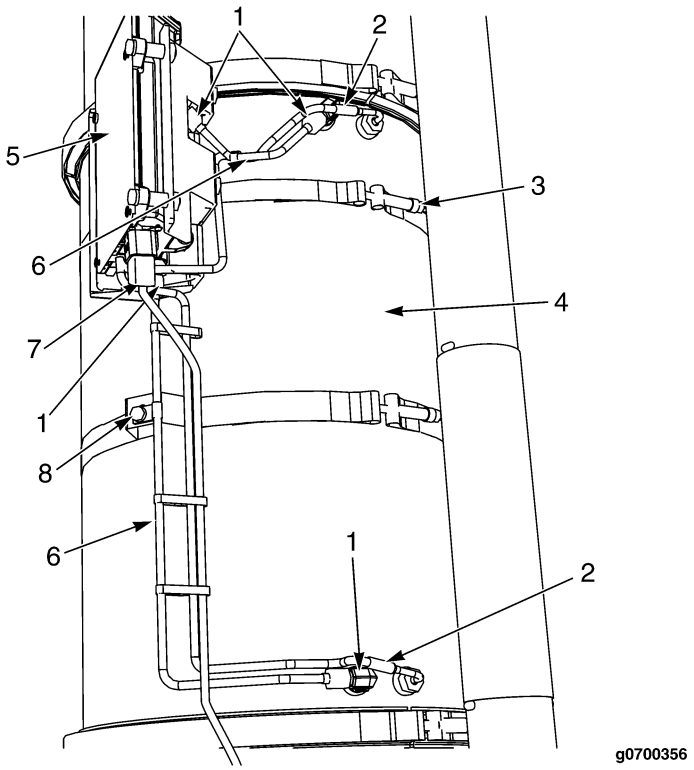
3. Connect two electrical connectors to the aftertreatment control module (Figure 14, Items 7 and 11).

3.3. CATERPILLAR SYSTEMS

These removal and installation procedures show a typical exhaust system for the Caterpillar engines. Although some configurations may vary, the removal and installation of these components will be similar.

Sensor Box and Pressure Tubes – Removal

NOTE – Mark the location of the sensor box mount bracket on the diesel particulate filter before performing the removal procedures. This will aid in the installation procedures and help to line up the pressure tubes.



1. PRESSURE NUT
2. SENSOR ELECTRICAL CONNECTOR
3. MOUNT BAND
4. DIESEL PARTICULATE FILTER
5. SENSOR BOX
6. PRESSURE TUBE
7. ELECTRICAL CONNECTOR
8. BOLT, NUT, AND P-CLAMP

Figure 15 Sensor Box and Pressure Tubes

1. Disconnect the electrical connector from the sensor box.
2. Disconnect two sensor electrical connectors.
3. Remove bolt, nut, and P-clamp from the pressure tube.
4. Remove wire ties, as needed, from the pressure tubes and wiring.
5. Remove pressure nuts from each end of two pressure tubes.

6. Remove two pressure tubes from the diesel particulate filter and sensor box.

7. Disconnect mount band and remove the sensor box.

8. Transfer the mount bracket and fittings to the new sensor box (if applicable).

Sensor Box and Pressure Tubes – Installation

1. Align the sensor box on the diesel particulate filter, as marked, in the removal procedures and secure the mount band (Figure 15, Items 3, 4, and 5). Torque mount clamp to 75 lbf-in ± 10 lbf-in (8 N•m ± 1 N•m).

2. Install two pressure tubes on the diesel particulate filter and sensor box (Figure 15, Items 4, 5, and 6).

3. Secure pressure tubes by tightening the pressure nut on each end of the pressure tubes (Figure 15, Items 1 and 6). Torque pressure tubes to 18 lbf-ft ± 1 lbf-ft (24 N•m ± 2 N•m).

4. Install bolt, nut, and P-clamp on the pressure tube (Figure 15, Items 6 and 8). Torque bolt to 7 to 8 lbf-ft (9 to 11 N•m).

CAUTION

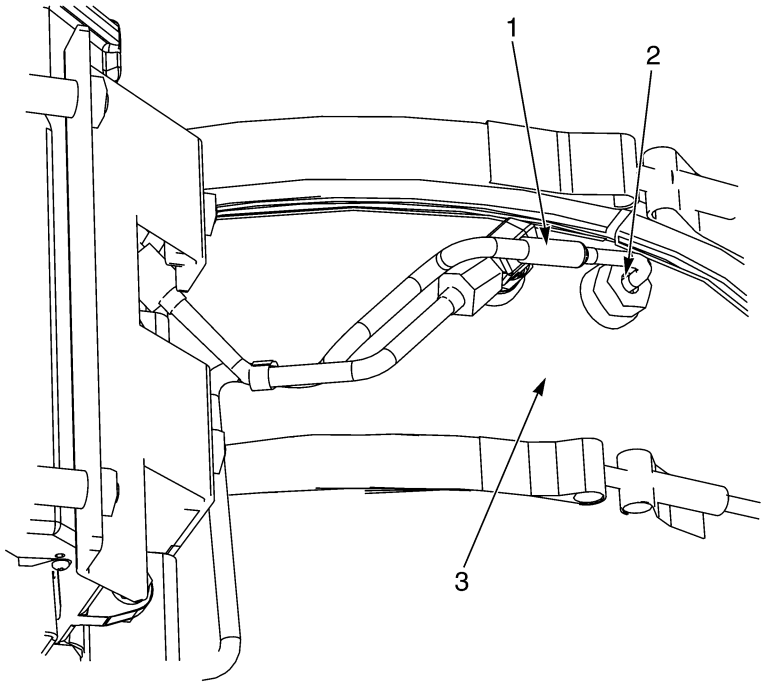
When securing the temperature sensor wiring, ensure that the wiring is not pulled tight or has excessive slack at the temperature sensor. Failure to comply could result in damage to temperature sensor or wiring.

5. Connect two sensor electrical connectors (Figure 15, Item 2).

6. Connect the electrical connector to the sensor box (Figure 15, Items 5 and 7).

7. Install wire ties, as needed, to secure the pressure tubes and wiring.

Temperature Sensor – Removal



1. ELECTRICAL CONNECTOR
2. TEMPERATURE SENSOR
3. DIESEL PARTICULATE FILTER

Figure 16 Temperature Sensor

1. Disconnect the electrical connector.
2. Remove wire ties, as needed, from the wiring.
3. Remove temperature sensor from the diesel particulate filter.

Temperature Sensor – Installation

1. Apply antiseize compound (part number PTX77124) to the bottom three threads of the temperature sensor.
2. Install temperature sensor on the diesel particulate filter (Figure 16, Items 2 and 3). Torque temperature sensor to 33 lbf-ft ± 4 lbf-ft (45 N•m ± 5 N•m)

CAUTION

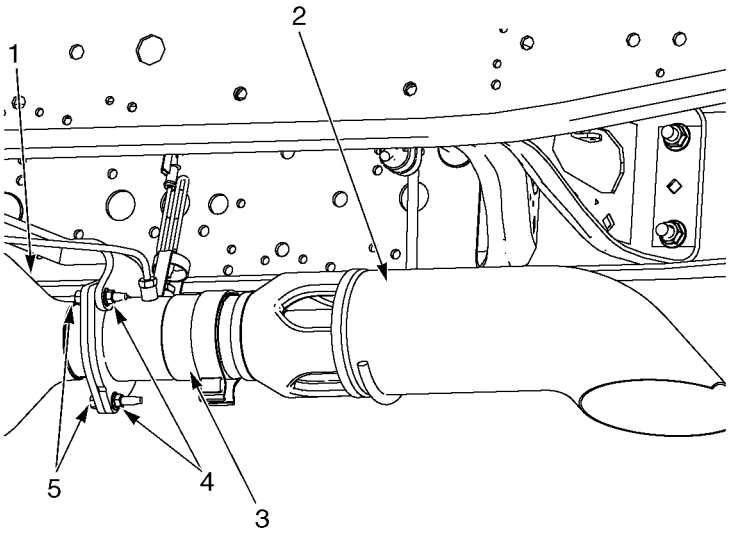
When securing the temperature sensor wiring, ensure that the wiring is not pulled tight or has excessive slack at the temperature sensor. Failure to comply could result in damage to temperature sensor or wiring.

3. Connect the electrical connector (Figure 16, Item 1).
4. Install wire ties, as needed, to wiring.

4. SINGLE HORIZONTAL/HORIZONTAL

4.1. MAXXFORCE™ 5, 7, DT, OR 10 ENGINE

Diesel Particulate Filter (One-Can System) – Removal

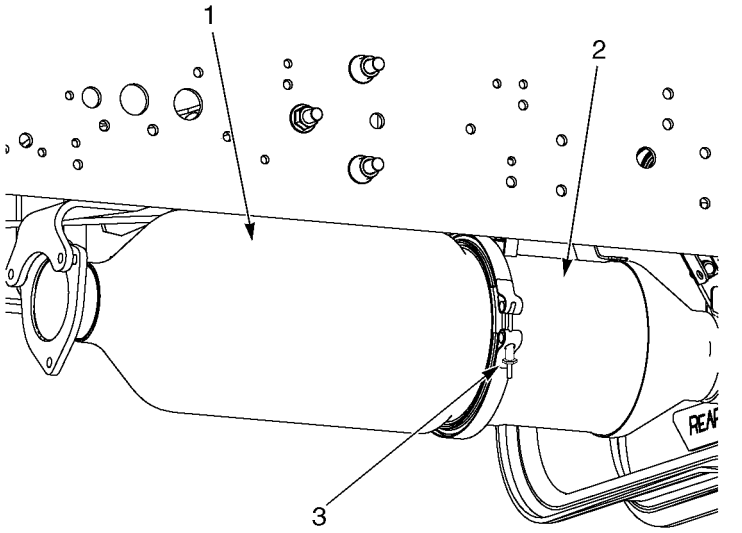


g0700302

1. DIESEL PARTICULATE FILTER
2. TEMPERATURE CONTROL DEVICE
3. TAIL PIPE
4. NUTS
5. MOUNT BOLTS

Figure 17 Horizontal/Horizontal (One-Can)

1. Remove heat shields from the diesel particulate filter (if applicable).
2. Support the diesel particulate filter with an appropriate floor jack.
3. Remove three mount bolts and nuts from the diesel particulate filter and tail pipe.
4. Disconnect the tail pipe and temperature control device from the diesel particulate filter.



1. DIESEL PARTICULATE FILTER
2. DIESEL OXIDATION CATALYST
3. V-CLAMP

Figure 18 Diesel Particulate Filter (One-Can)

IMPORTANT – Place an index mark along the diesel particulate filter and the diesel oxidation catalyst to help align the components during installation procedures.

5. Loosen the V-clamp securing the diesel particulate filter to the diesel oxidation catalyst.

6. Slide the diesel particulate filter towards the rear of the vehicle, approximately one inch (25 mm), and remove the diesel particulate filter.

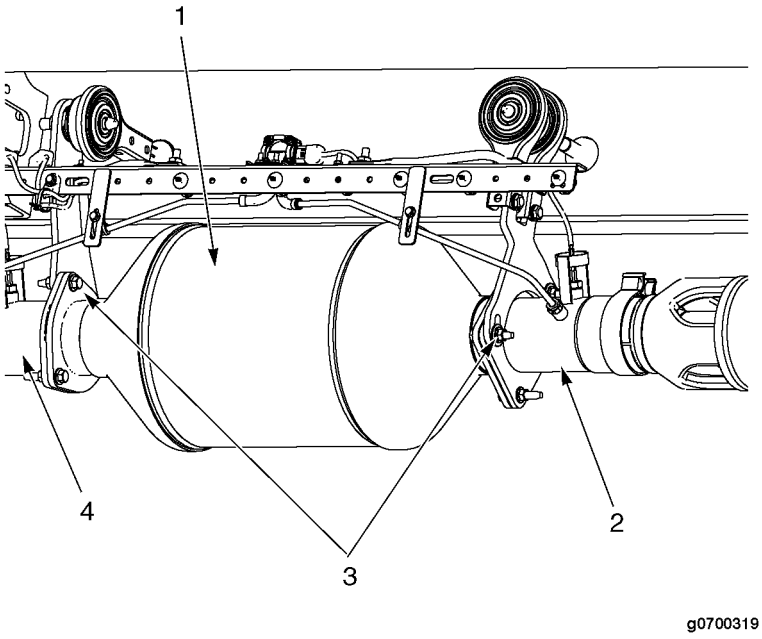
7. Remove two gaskets, one from each end of the diesel particulate filter. Discard gaskets.

Diesel Particulate Filter (One-Can System) – Installation

NOTE – Use the index marks that were made during the removal procedures to align the diesel oxidation catalyst and diesel particulate filter during installation.

1. Install a new gasket on the front of the diesel particulate filter.
2. Using an appropriate floor jack, align the diesel particulate filter on the diesel oxidation catalyst (Figure 18, Items 1 and 2).
3. Secure the V-clamp on the diesel particulate filter and diesel oxidation catalyst (Figure 18, Items 1, 2, and 3). Torque V-clamp to 44 to 89 lbf-in (5 to 10 N•m).
4. Install a new gasket on the rear of the diesel particulate filter.
5. Install the temperature control device and tail pipe on the back of the diesel particulate filter and secure with three mount bolts and nuts (Figure 17). Torque mount bolts to 65 to 80 lbf-ft (88 to 108 N•m).
6. Install heat shields that were removed (if applicable).
7. Start the engine and check the exhaust system for leaks.

Diesel Particulate Filter (Two-Can System) – Removal



1. DIESEL PARTICULATE FILTER
2. TAIL PIPE
3. BOLTS AND NUTS
4. INLET PIPE

Figure 19 Diesel Particulate Filter (Two-Can)

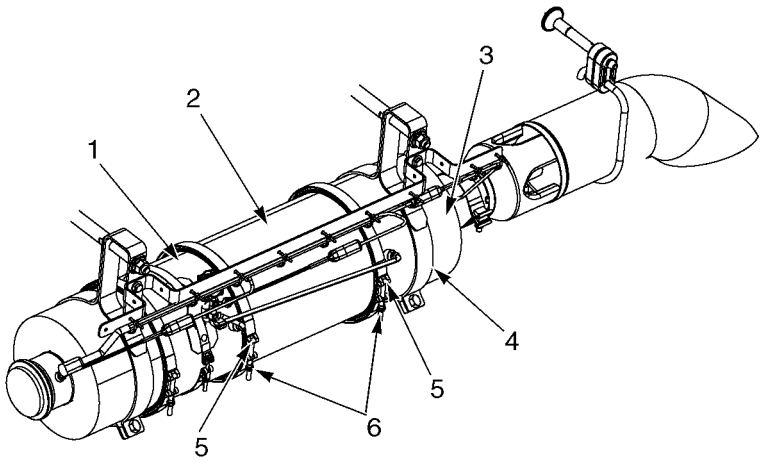
1. Support the diesel particulate filter with an appropriate floor jack.
2. Remove three bolts and nuts from the rear of the diesel particulate filter and tail pipe.
3. Remove three bolts and nuts from the front of the diesel particulate filter and inlet pipe.
4. Carefully remove the diesel particulate filter from the vehicle.
5. Remove two gaskets, one from each end of the diesel particulate filter. Discard gaskets.

Diesel Particulate Filter (Two-Can System) – Installation

1. Using an appropriate floor jack, align the diesel particulate filter on the inlet pipe (Figure 19, Items 1 and 4).
2. Install a new gasket on the front of the diesel particulate filter.
3. Secure the diesel particulate filter to the inlet pipe with three bolts and nuts (Figure 19, Items 1, 3, and 4). Torque bolts to 65 to 80 lbf-ft (88 to 108 N•m).
4. Install a new gasket on the rear of the diesel particulate filter.
5. Align the tail pipe on the diesel particulate filter and secure with three bolts and nuts (Figure 19, Items 1, 2, and 3). Torque bolts to 65 to 80 lbf-ft (88 to 108 N•m).
6. Start the engine and check the exhaust system for leaks.

4.2. CUMMINS, MAXXFORCE 11 OR 13 ENGINE

Diesel Particulate Filter – Removal



1. DIESEL OXIDATION CATALYST
2. DIESEL PARTICULATE FILTER
3. OUTPUT EXHAUST CAN
4. MOUNT BAND
5. V-CLAMP
6. NUT

Figure 20 Diesel Particulate Filter

IMPORTANT – Place an index mark along the diesel oxidation catalyst, diesel particulate filter, and the output exhaust can to help align the components during installation procedures.

1. Support the diesel particulate filter with an appropriate floor jack.
2. Loosen the mount band on the output exhaust can.
3. Loosen two nuts and remove the V-clamp on each end of the diesel particulate filter.
4. Slide the output exhaust can rearward, approximately one inch (25 mm), to allow clearance for removal of the diesel particulate filter.
5. Remove the diesel particulate filter.
6. Remove two gaskets, one from each end of the diesel particulate filter. Discard gaskets.

Diesel Particulate Filter – Installation

NOTE – Use the index marks that were made during the removal procedures to align the diesel oxidation catalyst, diesel particulate filter, and the output exhaust can during installation.

1. Using an appropriate floor jack, align the diesel particulate filter on the diesel oxidation catalyst (Figure 20, Items 1 and 2).

2. Install two new gaskets, one on each end of the diesel particulate filter.

3. Secure the V-clamp on the diesel particulate filter and diesel oxidation catalyst and secure the nut (Figure 20). Torque V-clamp to 44 to 89 lbf-in (5 to 10 N•m).

4. Align the output exhaust can on the diesel particulate filter and secure with the V-clamp and nut (Figure 20). Torque nut to 44 to 89 lbf-in (5 to 10 N•m).

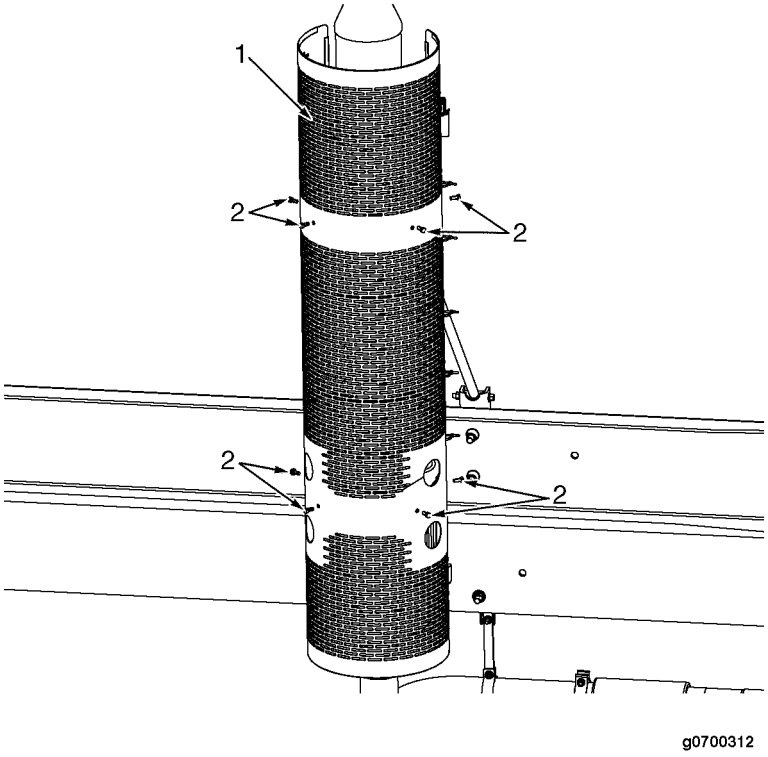
5. Tighten the mount band on the output exhaust can (Figure 20, Items 3 and 4). Torque mount band to 65 to 80 lbf-ft (88 to 108 N•m).

6. Start the engine and check the exhaust system for leaks.

5. SINGLE VERTICAL/VERTICAL

5.1. MAXXFORCE 5, 7, DT, OR 10 ENGINE

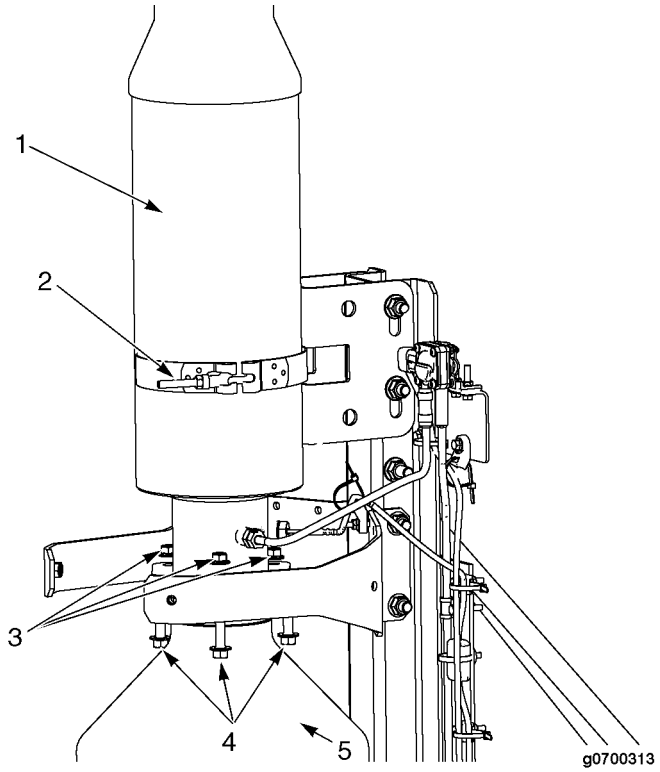
Diesel Particulate Filter – Removal



1. HEAT SHIELD
2. BOLTS AND WASHERS

Figure 21 Heat Shield

1. Remove eight bolts, washers, and the heat shield from the exhaust system.

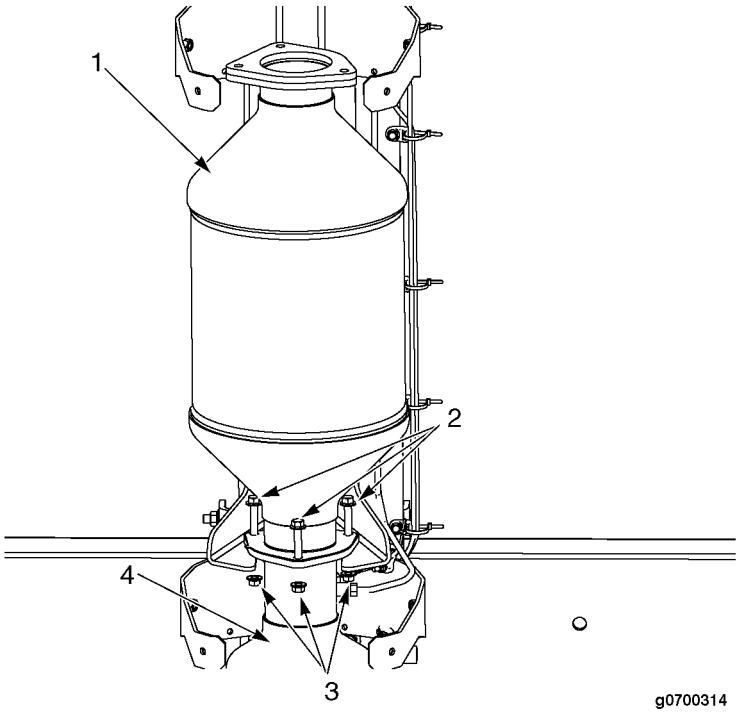


1. TEMPERATURE CONTROL DEVICE
2. MOUNT BAND
3. NUT
4. MOUNT BOLT
5. DIESEL PARTICULATE FILTER

Figure 22 Temperature Control Device

2. Remove three mount bolts and nuts from the tail pipe and the diesel particulate filter.

3. Loosen the mount band on the temperature control device, raise the temperature control device approximately one inch (25 mm), and tighten the mount band.



1. DIESEL PARTICULATE FILTER
2. MOUNT BOLT
3. NUT
4. DIESEL OXIDATION CATALYST

Figure 23 Diesel Particulate Filter

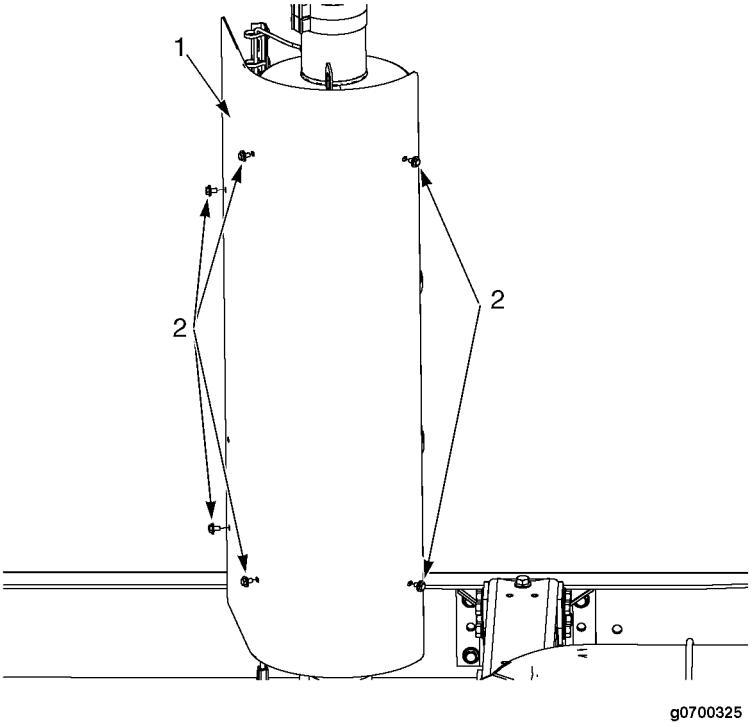
4. Support the diesel particulate filter with an appropriate lifting device.
5. Remove three mount bolts and nuts from the diesel particulate filter and the diesel oxidation catalyst.
6. Carefully remove the diesel particulate filter from the diesel oxidation catalyst.
7. Remove two gaskets, one from each end of the diesel particulate filter. Discard gaskets.

Diesel Particulate Filter – Installation

1. Install a new gasket on the bottom of the diesel particulate filter.
2. Using an appropriate lifting device, install the diesel particulate filter on the diesel oxidation catalyst (Figure 23, Items 1 and 4).
3. Secure the diesel particulate filter to the diesel oxidation catalyst with three mount bolts and nuts (Figure 23). Torque bolts to 65 to 80 lbf-ft (88 to 108 N•m).
4. Install a new gasket on the top of the diesel particulate filter.
5. Loosen the mount band on the temperature control device, align the temperature control device on the diesel particulate filter, and secure with three mount bolts and nuts (Figure 22). Torque bolts to 65 to 80 lbf-ft (88 to 108 N•m).
6. Tighten the mount band on the temperature control device (Figure 22, Items 1 and 2). Torque bolts to 35 to 46 lbf-ft (47 to 62 N•m).
7. Install the heat shield on the exhaust system and secure with six bolts and washers (Figure 21, Items 1 and 2).
8. Start the engine and check the exhaust system for leaks.

5.2. CUMMINS, MAXXFORCE™ 11 OR 13 ENGINE

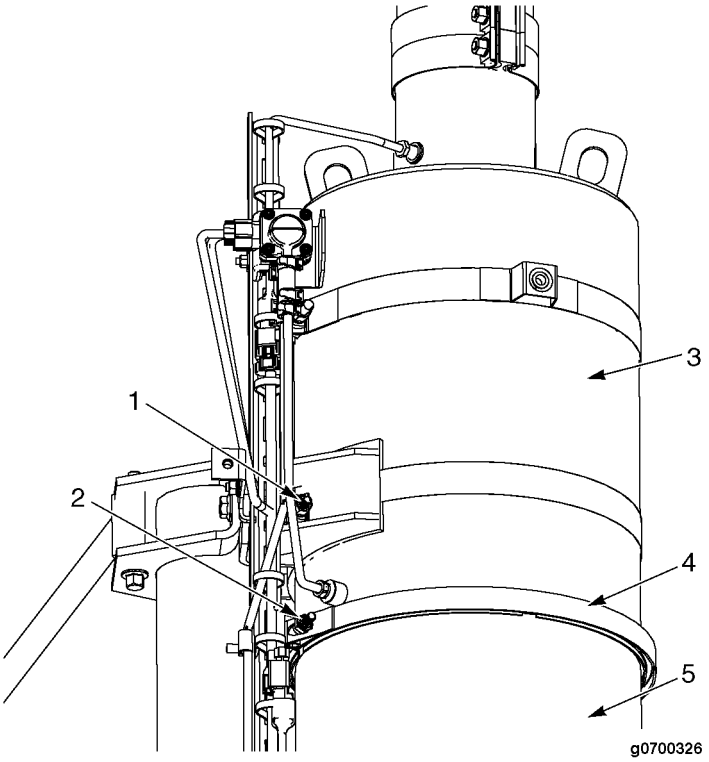
Diesel Particulate Filter – Removal



1. HEAT SHIELD
2. BOLT AND WASHER

Figure 24 Heat Shield

1. Remove six bolts, washers, and the heat shield from the exhaust system.



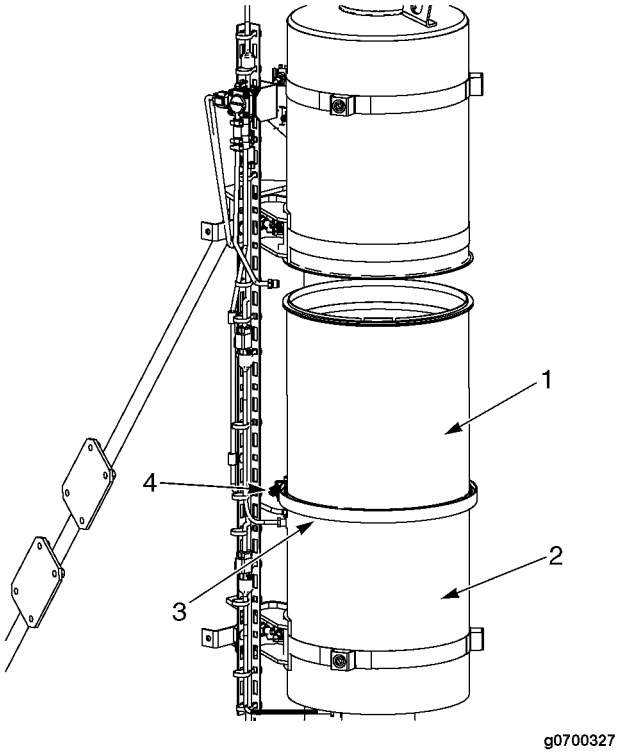
1. MOUNT BAND NUT
2. NUT
3. OUTPUT EXHAUST CAN
4. V-CLAMP
5. DIESEL PARTICULATE FILTER

Figure 25 Output Exhaust Can

IMPORTANT – Place an index mark along the diesel oxidation catalyst, diesel particulate filter, and the output exhaust can to help align the components during installation procedures.

2. Remove the nut and V-clamp from the diesel particulate filter and output exhaust can.

3. Loosen the mount band nut on the output exhaust can, raise the output exhaust can approximately one inches (25 mm), and tighten the mount band nut to hold the output exhaust can in the raised position.



1. DIESEL PARTICULATE FILTER
2. DIESEL OXIDATION CATALYST
3. V-CLAMP
4. NUT

Figure 26 Diesel Particulate Filter

4. Remove the nut and V-clamp from the diesel particulate filter and diesel oxidation catalyst.

5. Using the proper lifting device, carefully remove the diesel particulate filter from the diesel oxidation catalyst.

6. Remove two gaskets, one from each end of the diesel particulate filter. Discard gaskets.

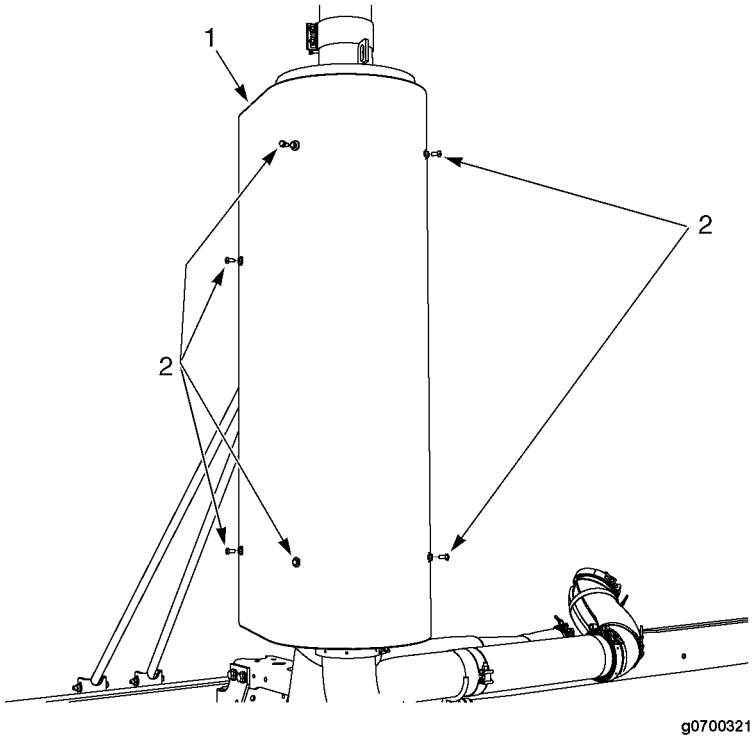
Diesel Particulate Filter – Installation

NOTE – Use the index marks that were made during the removal procedures to align the diesel oxidation catalyst, diesel particulate filter, and the output exhaust can during installation.

1. Install two new gaskets, one on each end of the diesel particulate filter.
2. Using the proper lifting device, carefully align the diesel particulate filter on the diesel oxidation catalyst (Figure 26, Items 1 and 2).
3. Install the V-clamp on the diesel particulate filter and diesel oxidation catalyst and secure with nut (Figure 26). Torque nut to 44 to 89 lbf-in (5 to 10 N•m).
4. Loosen the mount band nut securing the raised output exhaust can and align the output exhaust can on the diesel particulate filter (Figure 25, Items 1 and 3). Torque mount band nut to 65 to 80 lbf-ft (88 to 108 N•m).
5. Secure the V-clamp to the output exhaust can and diesel particulate filter (Figure 25, Items 3, 4, and 5). Torque V-clamp to 44 to 89 lbf-in (5 to 10 N•m).
6. Install the heat shield on the exhaust system and secure with six bolts and washers (Figure 24, Items 1 and 2).
7. Start the engine and check the exhaust system for leaks.

5.3. CATERPILLAR ENGINE

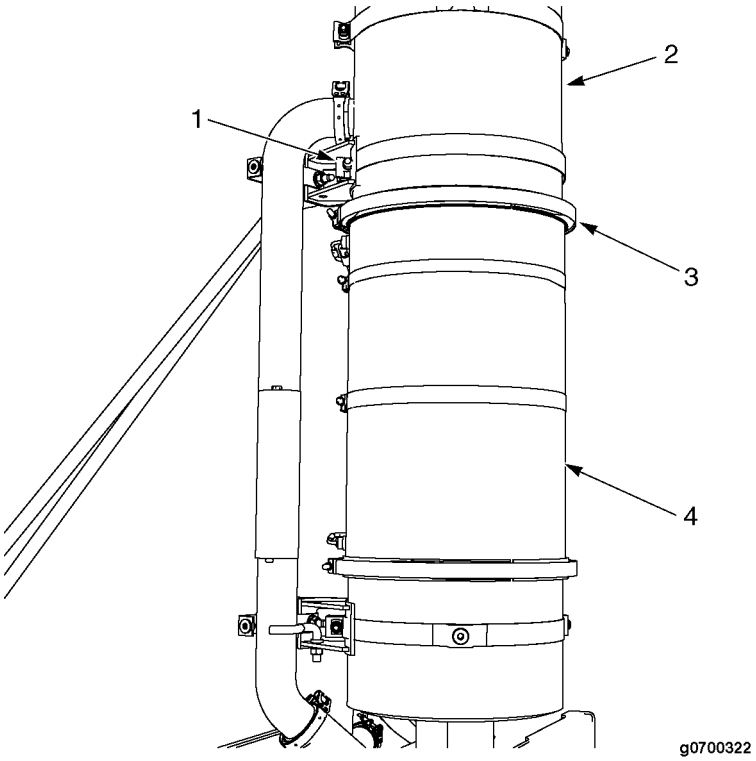
Diesel Particulate Filter – Removal



1. HEAT SHIELD
2. BOLT AND WASHER

Figure 27 Heat Shield

1. Remove six bolts, washers, and the heat shield from the exhaust system.



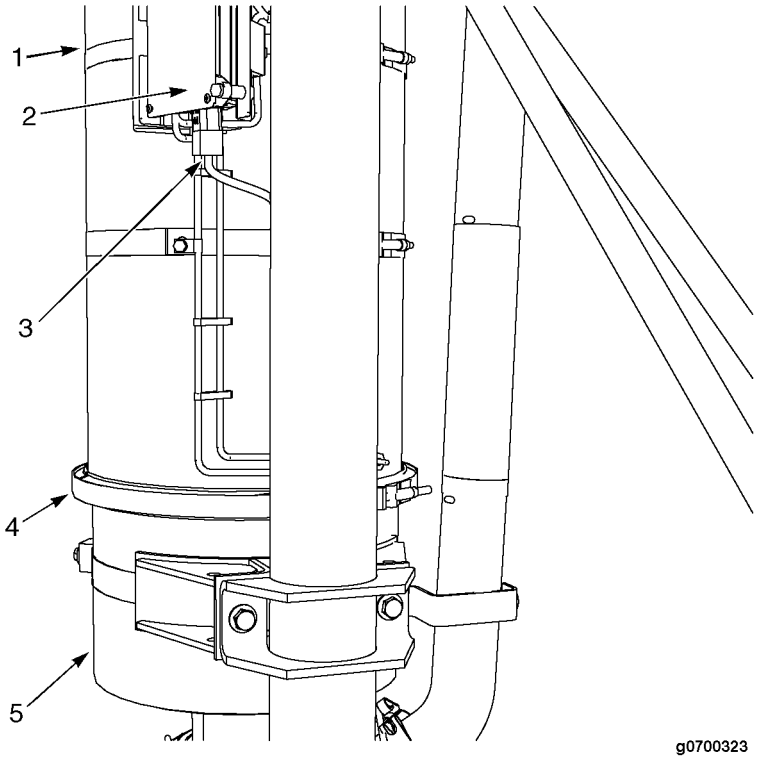
1. MOUNT BAND NUT
2. OUTPUT EXHAUST CAN
3. V-CLAMP
4. DIESEL PARTICULATE FILTER

Figure 28 Output Exhaust Can

IMPORTANT – Place an index mark along the diesel oxidation catalyst, diesel particulate filter, and the output exhaust can to help align the components during installation procedures.

2. Remove the V-clamp from the diesel particulate filter and output exhaust can.

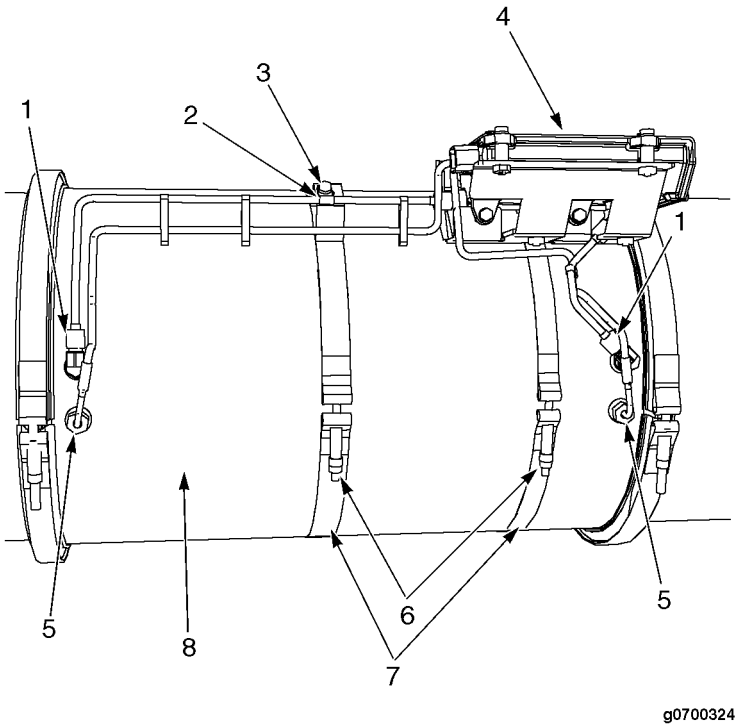
3. Loosen the mount band nut on the output exhaust can, raise the output exhaust can approximately one inch (25 mm), and tighten the mount band nut to hold the output exhaust can in the raised position.



1. DIESEL PARTICULATE FILTER
2. SENSOR BOX
3. WIRING HARNESS CONNECTOR
4. V-CLAMP
5. DIESEL OXIDATION CATALYST

Figure 29 Diesel Particulate Filter

4. Disconnect the wiring harness connector from the sensor box.
5. Remove the V-clamp from the diesel particulate filter and diesel oxidation catalyst.
6. Using the proper lifting device, carefully remove the diesel particulate filter from the diesel oxidation catalyst.
7. Remove two gaskets, one from each end of the diesel particulate filter. Discard gaskets.



1. PRESSURE TUBE
2. P-CLAMP
3. BOLT
4. SENSOR BOX
5. TEMPERATURE SENSOR
6. NUT
7. MOUNT BAND
8. DIESEL PARTICULATE FILTER

Figure 30 Sensor Unit

8. Remove the bolt and P-clamp securing the pressure tube to the mount band.

9. Remove two pressure tubes and temperature sensors from the diesel particulate filter. Cap and plug pressure lines and diesel particulate filter.

10. Remove two mount bands and the sensor box from the diesel particulate filter.

Diesel Particulate Filter – Installation

NOTE – Use the index marks that were made during the removal procedures to align the diesel oxidation catalyst, diesel particulate filter, and the output exhaust can during installation.

1. Install two mount bands and the sensor box on the diesel particulate filter (Figure 30, Items 4, 7, and 8). Torque mount clamp to 75 lbf-in ± 10 lbf-ft (8 N•m ± 1 N•m).

2. Install two pressure tubes on the diesel particulate filter (Figure 30, Items 1 and 8). Torque pressure tubes to 18 lbf-ft ± 1 lbf-ft (24 N•m ± 1 N•m).

3. Apply antiseize compound (part number PTX77124) to the bottom three threads of the temperature sensor.

4. Install two temperature sensors on the diesel particulate filter (Figure 30, Items 5 and 8). Torque temperature sensors to 33 lbf-ft ± 4 lbf-ft (45 N•m ± 5 N•m)

5. Secure the pressure tubes to the mount band with the P-clamp and bolt (Figure 30, Items 2, 3, and 7). Torque bolts to 7 to 8 lbf-ft (9 to 11 N•m).

6. Install two new gaskets, one on each end of the diesel particulate filter.

7. Using the proper lifting device, carefully align the diesel particulate filter on the diesel oxidation catalyst (Figure 29, Items 1 and 5).

8. Install the V-clamp on the diesel particulate filter and diesel oxidation catalyst (Figure 29, Items 1, 4, and 5). Torque V-clamps to 100 lbf-in ± 10 lbf-in (11 N•m ± 1 N•m).

9. Connect the wiring harness connector on the sensor box and secure wiring as needed with wire ties (Figure 29, Items 2 and 3).

10. Loosen the mount band nut securing the raised output exhaust can and align the output exhaust can on the diesel particulate filter (Figure 28, Items 1, 2, and 4).

11. Secure the V-clamp to the output exhaust can and diesel particulate filter (Figure 28, Items 2, 3, and 4). Torque V-clamps to 100 lbf-in ± 10 lbf-in (11 N•m ± 1 N•m).

12. Secure the mount band nut on the output exhaust can (Figure 28, Items 1 and 2). Torque mount band nut to 65 to 80 lbf-ft (88 to 108 N•m).

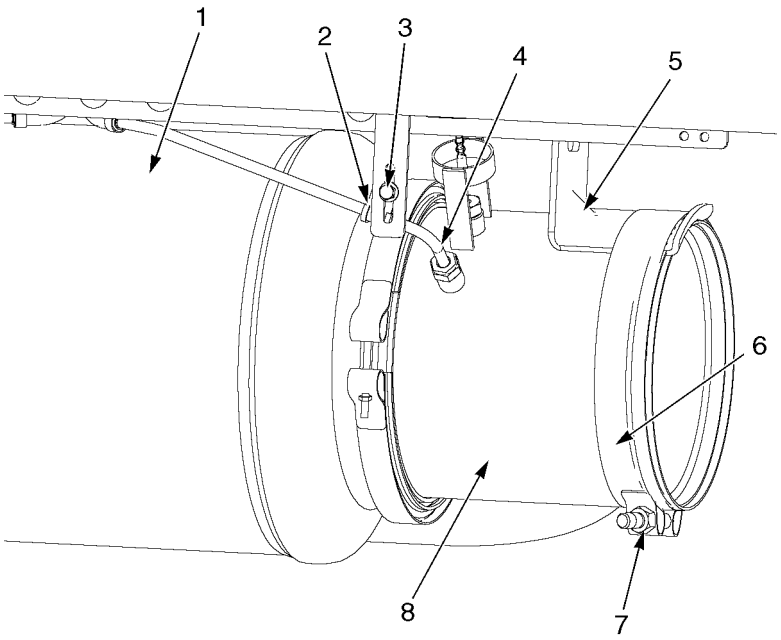
13. Install the heat shield on the exhaust system and secure with six bolts and washers (Figure 27, Items 1 and 2).

14. Start the engine and check the exhaust system for leaks.

6. SINGLE HORIZONTAL/VERTICAL

6.1. MAXXFORCE™ 5, 7, DT, OR 10 ENGINE

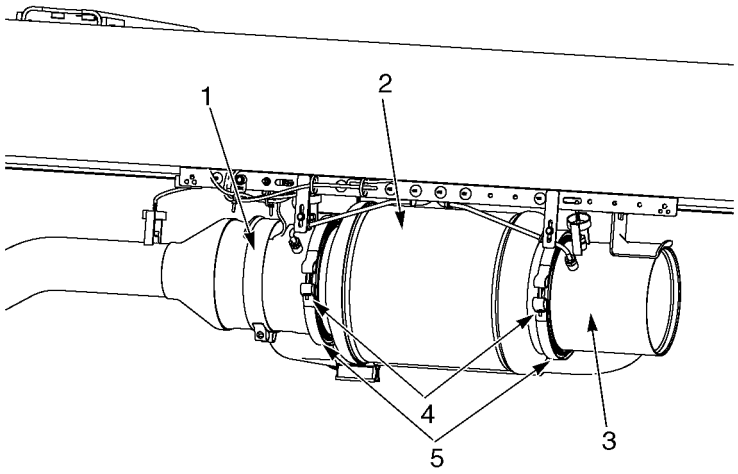
Diesel Particulate Filter – Removal



1. DIESEL PARTICULATE FILTER
2. P-CLAMP
3. BOLT AND NUT
4. PRESSURE TUBE
5. HANGER BRACKET
6. MOUNT BAND
7. NUT
8. OUTPUT EXHAUST CAN

Figure 31 Output Exhaust Can

1. Support the diesel particulate filter with an appropriate floor jack.
2. Remove bolt, nut, and P-clamp from the pressure tube.
3. Loosen the nut and mount band from the hanger bracket and output exhaust can.



1. DIESEL OXIDATION CATALYST
2. DIESEL PARTICULATE FILTER
3. OUTPUT EXHAUST CAN
4. NUT
5. V-CLAMP

Figure 32 Diesel Particulate Filter

IMPORTANT – Place an index mark along the diesel oxidation catalyst, diesel particulate filter, and the output exhaust can to help align the components during installation procedures.

4. Support the diesel particulate filter with an appropriate floor jack.
5. Remove two nuts and V-clamps from the diesel particulate filter.
6. Slide the output exhaust can rearward, approximately one inch (25 mm), to allow clearance for removal of the diesel particulate filter.
7. Remove the diesel particulate filter from the diesel oxidation catalyst.
8. Remove two gaskets, one from each end of the diesel particulate filter. Discard gaskets.

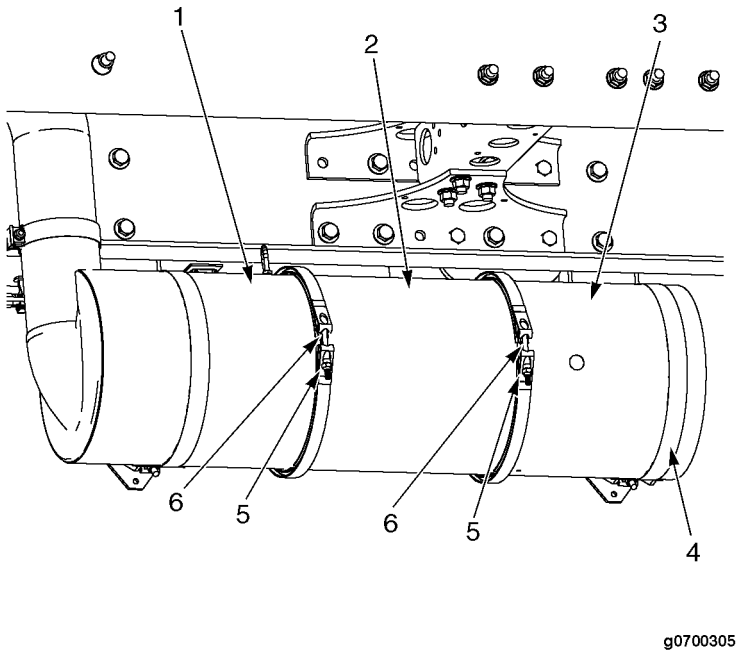
Diesel Particulate Filter – Installation

NOTE – Use the index marks that were made during the removal procedures to align the diesel oxidation catalyst, diesel particulate filter, and the output exhaust can during installation.

1. Install a new gasket on the front of the diesel particulate filter.
2. Using an appropriate floor jack, align the diesel particulate filter on the diesel oxidation catalyst (Figure 32, Items 1 and 2).
3. Install the V-clamp on the diesel particulate filter and diesel oxidation catalyst and secure the nut (Figure 32). Torque V-clamp to 44 to 89 lbf-in (5 to 10 N•m).
4. Install a new gasket on the rear of the diesel particulate filter and align the output exhaust can with the diesel particulate filter (Figure 32, Items 2 and 3).
5. Install the V-clamp on the diesel particulate filter and output exhaust can and secure with the nut (Figure 32). Torque V-clamp to 44 to 89 lbf-in (5 to 10 N•m).
6. Secure the hanger bracket to the output exhaust can with the mount band and tighten the nut (Figure 31). Torque mount band to 35 to 46 lbf-in (47 to 62 N•m).
7. Install the bolt, nut, and P-clamp on the pressure tube (Figure 31, Items 2, 3, and 4). Torque bolts to 7 to 8 lbf-ft (9 to 11 N•m).
8. Start the engine and check the exhaust system for leaks.

6.2. CUMMINS, MAXXFORCE™ 11 OR 13 ENGINE

Diesel Particulate Filter – Removal



1. DIESEL OXIDATION CATALYST
2. DIESEL PARTICULATE FILTER
3. OUTPUT EXHAUST CAN
4. MOUNT BAND
5. NUT
6. V-CLAMP

Figure 33 Diesel Particulate Filter

IMPORTANT – Place an index mark along the diesel particulate filter, output exhaust can, and the diesel oxidation catalyst to help align the components during installation procedures.

1. Support the diesel particulate filter with an appropriate floor jack.
2. Loosen the mount band on the output exhaust can.
3. Loosen two nuts and remove the V-clamp on each end of the diesel particulate filter.
4. Slide the output exhaust can rearward, approximately one inch (25 mm), to allow clearance for removal of the diesel particulate filter.
5. Remove the diesel particulate filter from the diesel oxidation catalyst.
6. Remove two gaskets, one from each end of the diesel particulate filter. Discard gaskets.

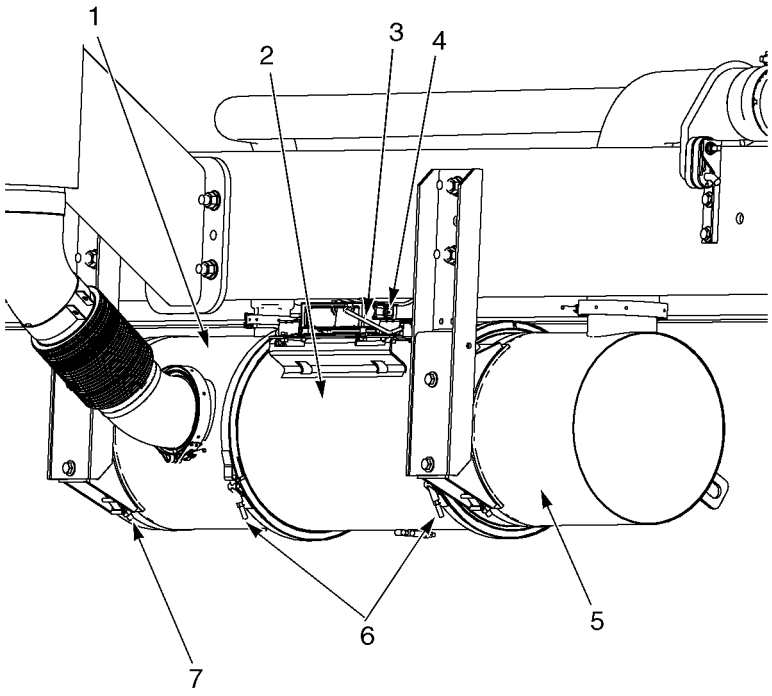
Diesel Particulate Filter – Installation

NOTE – Use the index marks that were made during the removal procedures to align the diesel oxidation catalyst, diesel particulate filter, and the output exhaust can during installation.

1. Install two new gaskets, one on each end of the diesel particulate filter.
2. Using an appropriate floor jack, align the diesel particulate filter on the diesel oxidation catalyst (Figure 33, Items 1 and 2).
3. Slide the output exhaust can forward onto the diesel particulate filter (Figure 33, Items 2 and 3).
4. Secure the V-clamps at each end of the diesel particulate filter and tighten two nuts (Figure 33, Items 2, 5, and 6). Torque nuts to 44 to 89 lbf-in (5 to 10 N•m)
5. Secure the mount band on the output exhaust can (Figure 33, Items 3 and 4). Torque nut to 65 to 80 lbf-ft (88 to 108 N•m).
6. Start the engine and check the exhaust system for leaks.

6.3. CATERPILLAR ENGINE

Diesel Particulate Filter – Removal



1. OUTPUT EXHAUST CAN
2. DIESEL PARTICULATE FILTER
3. SENSOR UNIT
4. WIRING HARNESS CONNECTOR
5. DIESEL OXIDATION CATALYST
6. V-CLAMP
7. MOUNT BAND

Figure 34 Horizontal/Vertical

1. Disconnect the wiring harness connector from the sensor unit and remove wire ties as needed.

IMPORTANT – Place an index mark along the diesel particulate filter, output exhaust can, and the diesel oxidation catalyst to help align the components during installation procedures.

2. Support the diesel particulate filter with an appropriate floor jack.

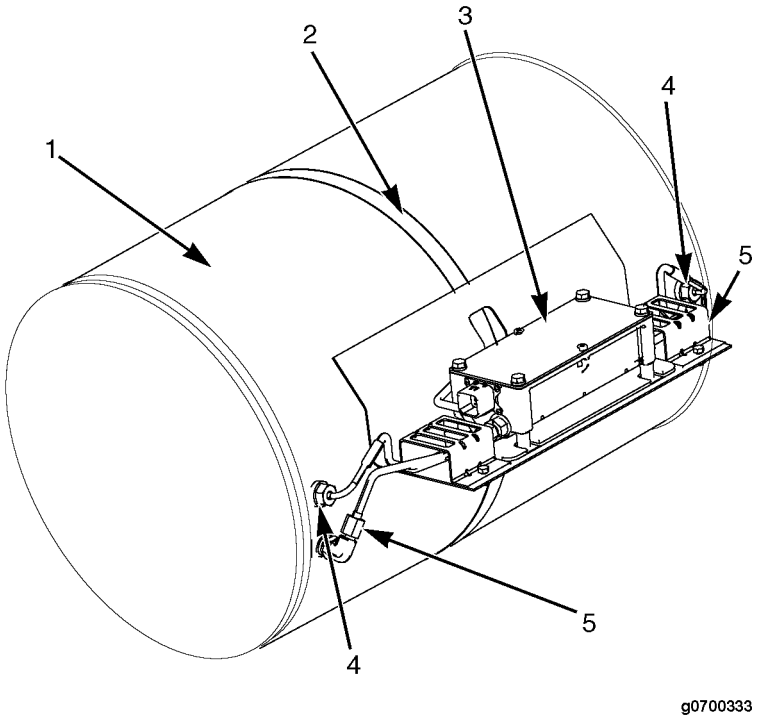
3. Loosen the mount band on the output exhaust can.

4. Remove the V-clamp on each end of the diesel particulate filter.

5. Slide the output exhaust can rearward, approximately one inches (25 mm), to allow clearance for removal of the diesel particulate filter.

6. Remove the diesel particulate filter from the diesel oxidation catalyst.

7. Remove two gaskets, one from each end of the diesel particulate filter. Discard gaskets.



1. DIESEL PARTICULATE FILTER
2. MOUNT BAND
3. SENSOR BOX
4. TEMPERATURE SENSOR
5. PRESSURE TUBES

Figure 35 Sensor Box

8. Remove two pressure lines and two temperature sensors from the diesel particulate filter. Cap and plug pressure lines, temperature sensors, and the diesel particulate filter.

9. Remove the mount band and the sensor box from the diesel particulate filter.

Diesel Particulate Filter – Installation

NOTE – Use the index marks that were made during the removal procedures to align the diesel oxidation catalyst, diesel particulate filter, and the output exhaust can during installation.

1. Install the mount band and the sensor box on the diesel particulate filter (Figure 35, Items 1, 2, and 3). Torque mount clamp to 75 lbf-in ± 10 lbf-in (8 N•m ± 1 N•m).

2. Install two pressure tubes on the diesel particulate filter and the sensor box (Figure 35, Items 1, 3, and 5). Torque pressure tubes to 18 lbf-ft ± 1 lbf-ft (24 N•m ± 1 N•m).

3. Install two temperature sensors on the diesel particulate filter (Figure 35, Items 1 and 4). Torque temperature sensors to 33 lbf-ft ± 4 lbf-ft (45 N•m ± 5 N•m)

4. Install two new gaskets, one on each end of the diesel particulate filter.

5. Using an appropriate floor jack, align the diesel particulate filter on the diesel oxidation catalyst (Figure 34, Items 2 and 5).

6. Slide the output exhaust can forward onto the diesel particulate filter (Figure 34, Items 1 and 2).

7. Secure the V-clamps at each end of the diesel particulate filter and tighten two nuts (Figure 34, Items 2 and 6). Torque V-clamps to 100 lbf-in ± 10 lbf-in (11 N•m ± 1 N•m).

8. Secure the mount band on the output exhaust can (Figure 34, Items 1 and 7). Torque mount band to 65 to 80 lbf-ft (88 to 108 N•m).

9. Connect the wiring harness connector on the sensor unit and secure wiring as needed with wire ties (Figure 34, Items 3 and 4).

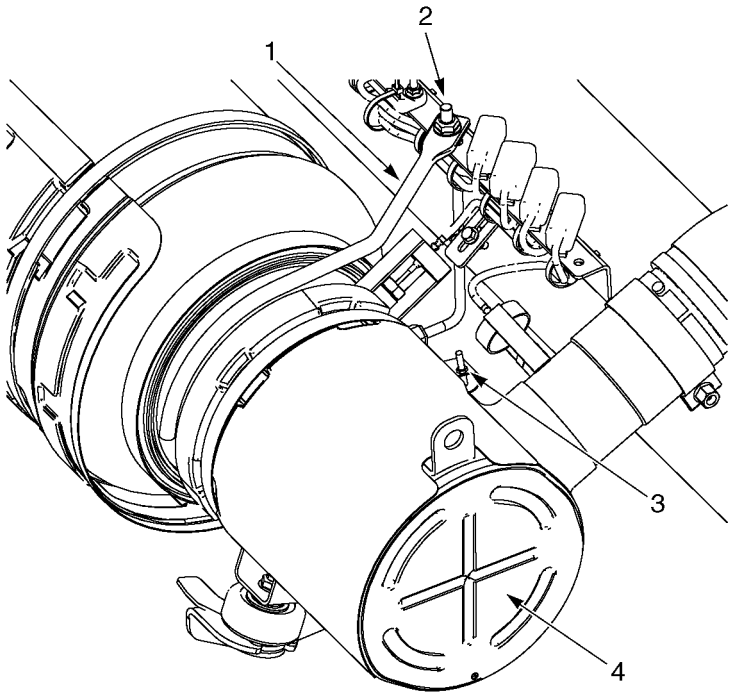
10. Start the engine and check the exhaust system for leaks.

7. UNDER CAB HORIZONTAL/VERTICAL

NOTE – There are several configurations for the single under cab horizontal/vertical exhaust system. The different configurations have different access panels and steps that must be removed prior to beginning this procedure and reinstalled upon completion of these procedures.

7.1. MAXXFORCE™ 5, 7, DT, OR 10 ENGINE

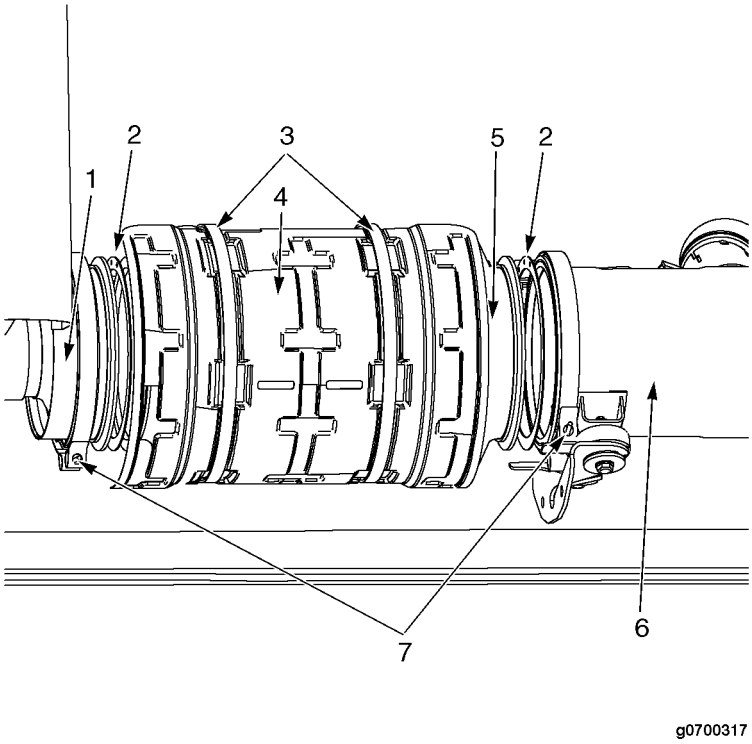
Diesel Particulate Filter – Removal



1. SUPPORT BRACKET
2. BOLT AND NUT
3. MOUNT BAND
4. DIESEL OXIDATION CATALYST

Figure 36 Diesel Oxidation Catalyst

1. Loosen mount bolt, nut, and support bracket from the diesel oxidation catalyst.
2. Loosen the mount band from the diesel oxidation catalyst.



1. OUTPUT EXHAUST CAN
2. GASKET
3. BAND STRAPS
4. HEAT SHIELD
5. DIESEL PARTICULATE FILTER
6. DIESEL OXIDATION CATALYST
7. V-CLAMP

Figure 37 Diesel Particulate Filter

IMPORTANT – Place an index mark along the diesel particulate filter, output exhaust can, and the diesel oxidation catalyst to help align the components during installation procedures.

3. Support the diesel particulate filter with an appropriate lifting device.
4. Remove the V-clamp at the diesel particulate filter and diesel oxidation catalyst . Reposition the V-clamp forward on the diesel oxidation catalyst.
5. Remove the V-clamp at the diesel particulate filter and output exhaust can. Reposition the V-clamp rearward on the output exhaust can.
6. Slide the diesel oxidation catalyst forward, approximately one inch (25 mm), from the diesel particulate filter.
7. Remove the diesel particulate filter from the output exhaust can.
8. Remove two gaskets, one from each end of the diesel particulate filter. Discard gaskets.
9. Remove two band straps and the heat shield from the diesel particulate filter.

Diesel Particulate Filter – Installation

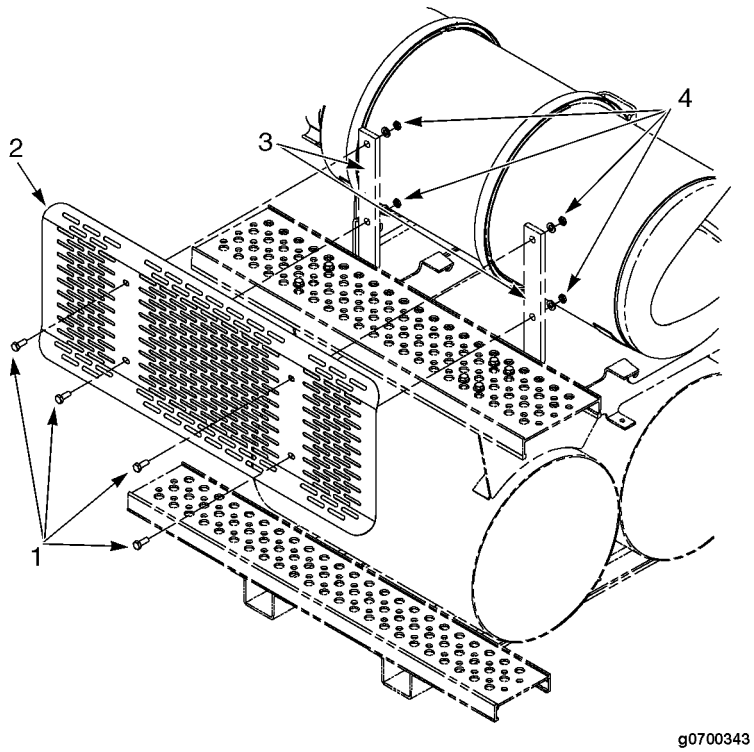
NOTE – Use the index marks that were made during the removal procedures to align the diesel oxidation catalyst, diesel particulate filter, and the output exhaust can during installation.

1. Install the heat shield and two mount straps on the diesel particulate filter (Figure 37, Items 3, 4, and 5).
2. Install two new gaskets, one on each end, of the diesel particulate filter.
3. Using an appropriate lifting device, align the diesel particulate filter on the output exhaust can (Figure 37, Items 1 and 5).
4. Secure the V-clamp on the output exhaust can and the diesel particulate filter (Figure 37, Items 1, 5, and 7). Torque V-clamp to 44 to 89 lbf-in (5 to 10 N•m).
5. Align the diesel oxidation catalyst on the diesel particulate filter (Figure 37, Items 5 and 6).
6. Secure the V-clamp on the diesel oxidation catalyst and the diesel particulate filter (Figure 37, Items 5, 6, and 7). Torque V-clamp to 44 to 89 lbf-in (5 to 10 N•m).
7. Tighten the mount band on the diesel oxidation catalyst (Figure 36, Items 3, and 4). Torque mount band nut to 35 to 46 lbf-ft (47 to 62 N•m).
8. Tighten the support bracket, nut, and bolt on the diesel oxidation catalyst (Figure 36, Items 1, 2, and 4).
9. Start the engine and check the exhaust system for leaks.

7.2. CUMMINS, MAXXFORCE™ 11 OR 13 ENGINE

NOTE – There are several configurations for the single under cab horizontal/vertical exhaust system. The different configurations have different access panels and steps that must be removed prior to beginning this procedure and reinstalled upon completion of these procedures.

Diesel Particulate Filter – Removal

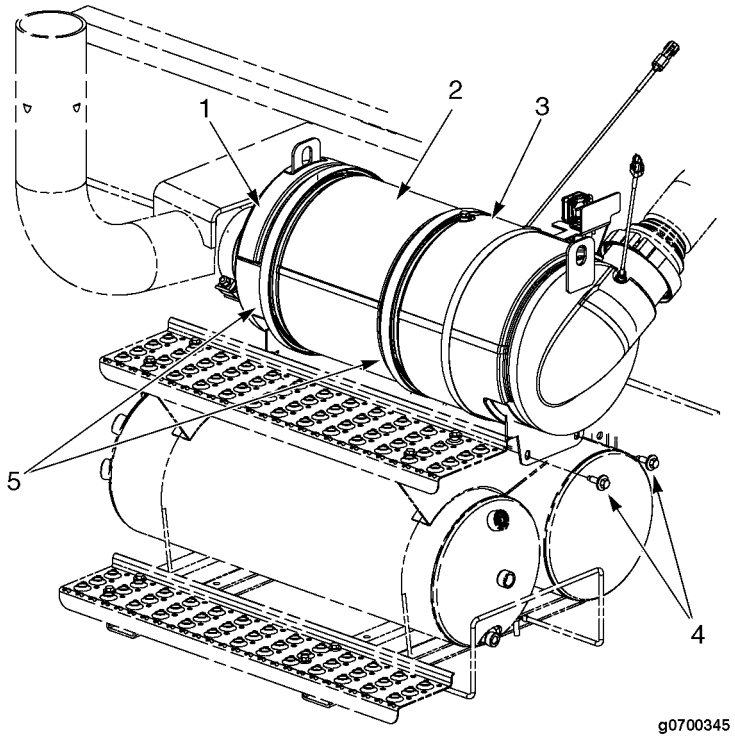


1. BOLTS
2. ACCESS PANEL
3. MOUNT BRACKETS
4. NUTS AND WASHERS

Figure 38 Access Panel

1. Remove four bolts, washers, and nuts from the access panel and mount brackets.
2. Remove the access panel from the mount brackets.

NOTE – Any heat shields that are mounted on the exhaust components will need to be removed before continuing.



1. OUTPUT EXHAUST CAN
2. DIESEL PARTICULATE FILTER
3. DIESEL OXIDATION CATALYST
4. MOUNT BOLTS
5. V-CLAMPS

Figure 39 Diesel Particulate Filter

IMPORTANT – Place an index mark along the diesel particulate filter, output exhaust can, and the diesel oxidation catalyst to help align the components during installation procedures.

3. Support the diesel particulate filter with an appropriate lifting device.
4. Loosen two mount bolts from the bottom of the diesel oxidation catalyst.
5. Remove the V-clamp from the diesel particulate filter and diesel oxidation catalyst.
6. Slide the diesel oxidation catalyst forward, approximately one inch (25 mm), to allow clearance for removal of the diesel particulate filter.
7. Remove the V-clamp from the diesel particulate filter and output exhaust can.
8. Remove the diesel particulate filter from the output exhaust can.
9. Remove two gaskets, one from each end of the diesel particulate filter. Discard gaskets.

Diesel Particulate Filter – Installation

NOTE – Use the index marks that were made during the removal procedures to align the diesel oxidation catalyst, diesel particulate filter, and the output exhaust can during installation.

1. Install two new gaskets, one on each end of the diesel particulate filter.
2. Using an appropriate lifting device, align the diesel particulate filter on the output exhaust can (Figure 39, Items 1 and 2).
3. Secure the V-clamp on the output exhaust can and the diesel particulate filter (Figure 39, Items 1, 2, and 5). Torque V-clamp to 44 to 89 lbf-in (5 to 10 N•m).
4. Align the diesel oxidation catalyst on the diesel particulate filter (Figure 39, Items 2 and 3).
5. Secure the V-clamp to the diesel oxidation catalyst and the diesel particulate filter (Figure 39, Items 2, 3, and 5). Torque V-clamp to 44 to 89 lbf-in (5 to 10 N•m).
6. Tighten two mount bolts on the bottom of the diesel oxidation catalyst (Figure 39, Items 3 and 4).
7. Align the access panel on the mount brackets and secure with four bolts, washers, and nuts (Figure 38).
8. Start the engine and check the exhaust system for leaks.

7.3. CATERPILLAR ENGINE

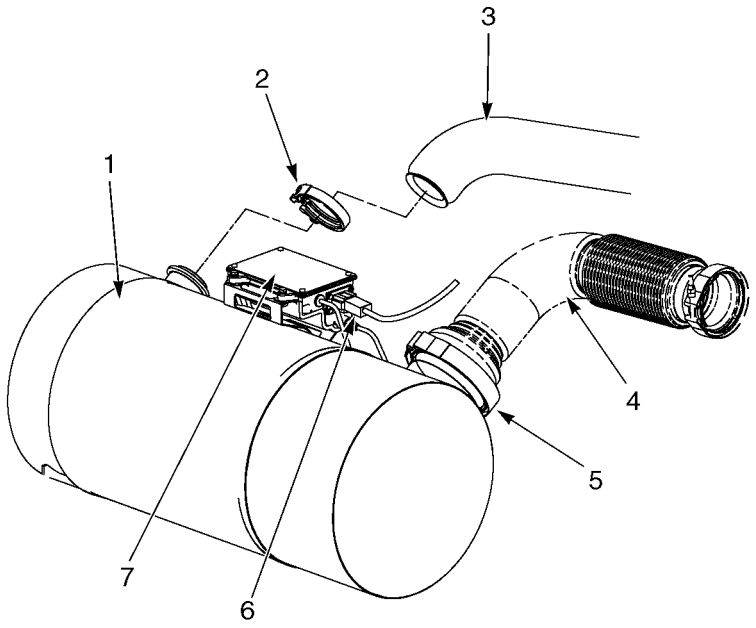
NOTE – There are several configurations for the single under cab horizontal/vertical exhaust system. The different configurations have different access panels and steps that must be removed prior to beginning this procedure and reinstalled upon completion of these procedures.

NOTE – The diesel oxidation catalyst, diesel particulate filter, and output exhaust can are welded together as one component on the Caterpillar single under cab horizontal/vertical exhaust system.

Single Diesel Particulate Filter – Removal

1. Remove four bolts, washers, and nuts from the access panel and mount brackets (Figure 38).

2. Remove the access panel from the mount brackets (Figure 38, Items 2 and 3).



g0700347

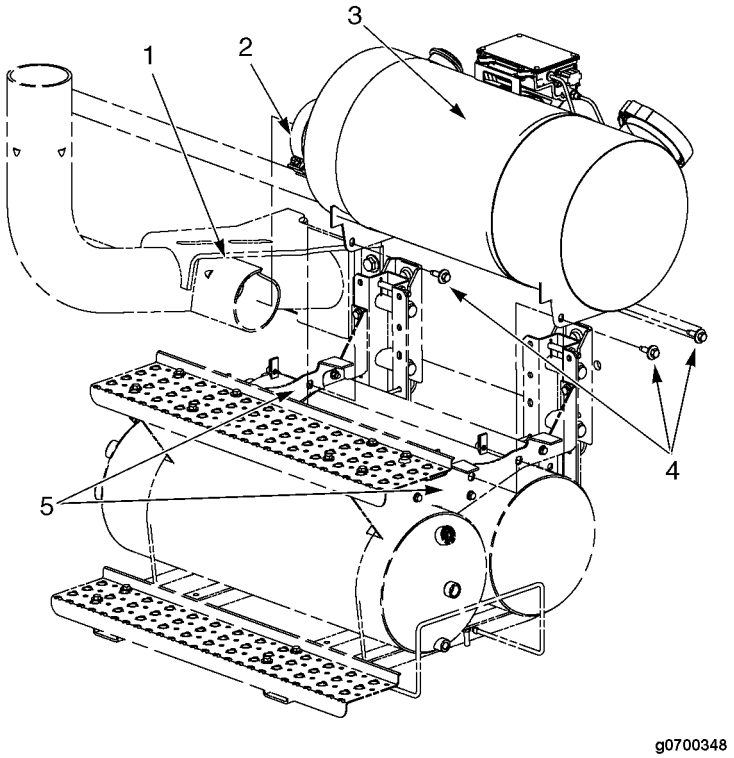
1. DIESEL PARTICULATE FILTER
2. MOUNT CLAMP
3. CLEAN AIR PIPE
4. INLET EXHAUST PIPE
5. MOUNT CLAMP
6. TEMPERATURE SENSOR ELECTRICAL CONNECTOR
7. SENSOR BOX

Figure 41 Single Under Cab Horizontal/Vertical

3. Disconnect the wiring harness connector from the sensor box and remove wire ties as needed.

4. Remove the mount clamp and clean air pipe from the diesel particulate filter.

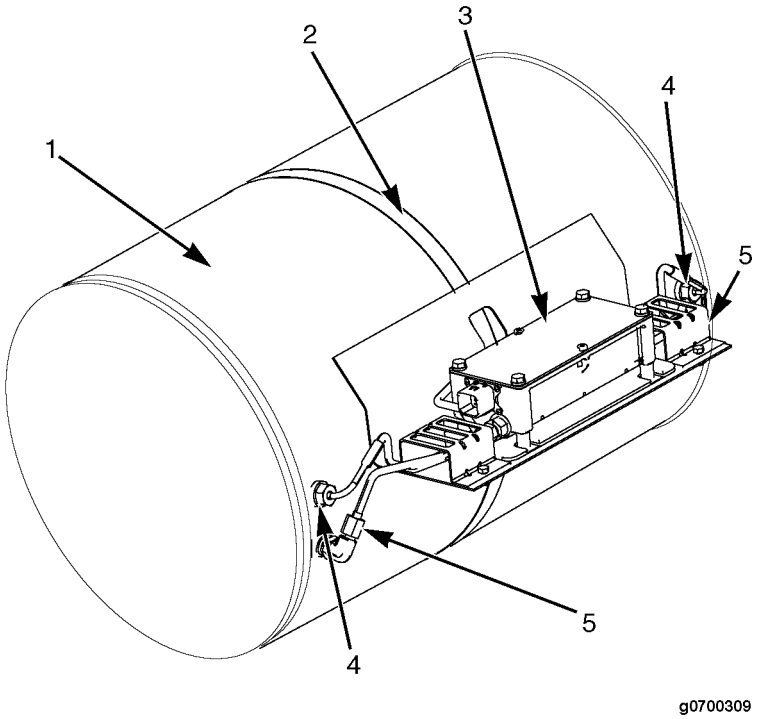
5. Remove the mount clamp and inlet exhaust pipe from the diesel particulate filter.



1. EXHAUST OUTLET PIPE
2. MOUNT CLAMP
3. DIESEL PARTICULATE FILTER
4. BOLTS
5. MOUNT BRACKETS

Figure 42 Diesel Particulate Filter

6. Remove the mount clamp from the diesel particulate filter and exhaust outlet pipe.
7. Support the diesel particulate filter with an appropriate lifting device.
8. Remove four bolts from the diesel particulate filter and mount brackets.
9. Carefully remove the diesel particulate filter.



1. DIESEL PARTICULATE FILTER
2. MOUNT BAND
3. SENSOR BOX
4. TEMPERATURE SENSOR
5. PRESSURE TUBES

Figure 43 Sensor Box

10. Remove two pressure tubes and two temperature sensors from the diesel particulate filter. Cap and plug pressure tubes and diesel particulate filter.

11. Remove the mount band and sensor box from the diesel particulate filter.

Single Diesel Particulate Filter – Installation

1. Install the mount band and the sensor box on the diesel particulate filter (Figure 43, Items 1, 2, and 3). Torque mount clamp to 75 lbf-in ± 10 lbf-in (8 N•m ± 1 N•m).

2. Install two pressure tubes on the diesel particulate filter and the sensor box (Figure 43, Items 1, 3, and 5). Torque pressure tubes to 18 lbf-ft ± 1 lbf-ft (24 N•m ± 1 N•m).

3. Apply antiseize compound (part number PTX77124) to the bottom three threads of the temperature sensor.

4. Install two temperature sensors on the diesel particulate filter (Figure 43, Items 1 and 4). Torque temperature sensors to 33 lbf-ft ± 4 lbf-ft (45 N•m ± 5 N•m)

5. Using the proper lifting device, carefully align the diesel particulate filter on the mount brackets and outlet exhaust pipe (Figure 42, Items 1, 3, and 5).

6. Install four bolts on the diesel particulate filter and mount brackets (Figure 42, Items 3, 4, and 5).

7. Install the mount clamp on the diesel particulate filter and outlet exhaust pipe (Figure 42, Items 1, 2, and 3). Torque mount clamp to 35 to 46 lbf-ft (47 to 62 N•m).

8. Install the inlet exhaust pipe on the diesel particulate filter and secure the mount clamp (Figure 41, Items 1, 4, and 5). Torque mount clamp to 44 to 89 lbf-in (5 to 10 N•m).

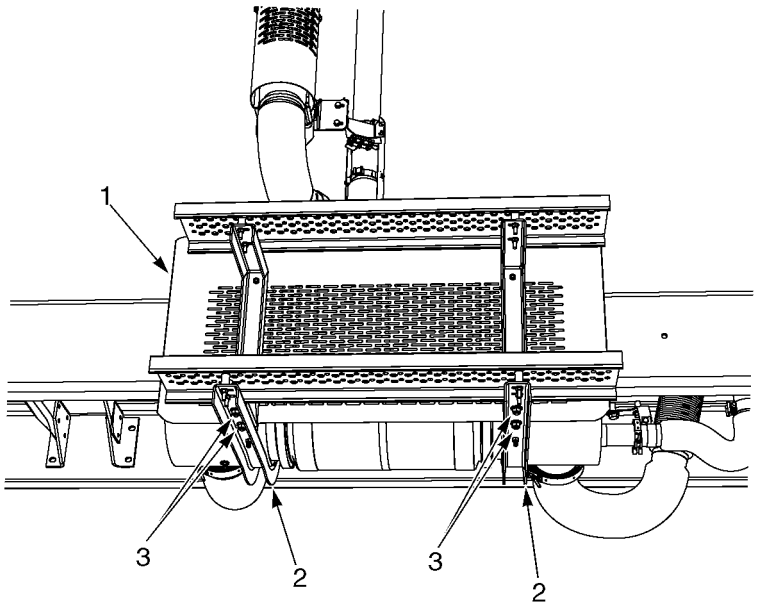
9. Install the clean air pipe on the diesel particulate filter and secure the mount clamp (Figure 41, Items 1, 2, and 3). Torque mount clamp to 44 to 89 lbf-in (5 to 10 N•m).

10. Connect the wiring harness connector on the sensor box and secure wiring as needed with wire ties (Figure 41, Items 6 and 7).

11. Align the access panel on the mount brackets and secure with four bolts, washers, and nuts (Figure 38).

12. Start the engine and check the exhaust system for leaks.

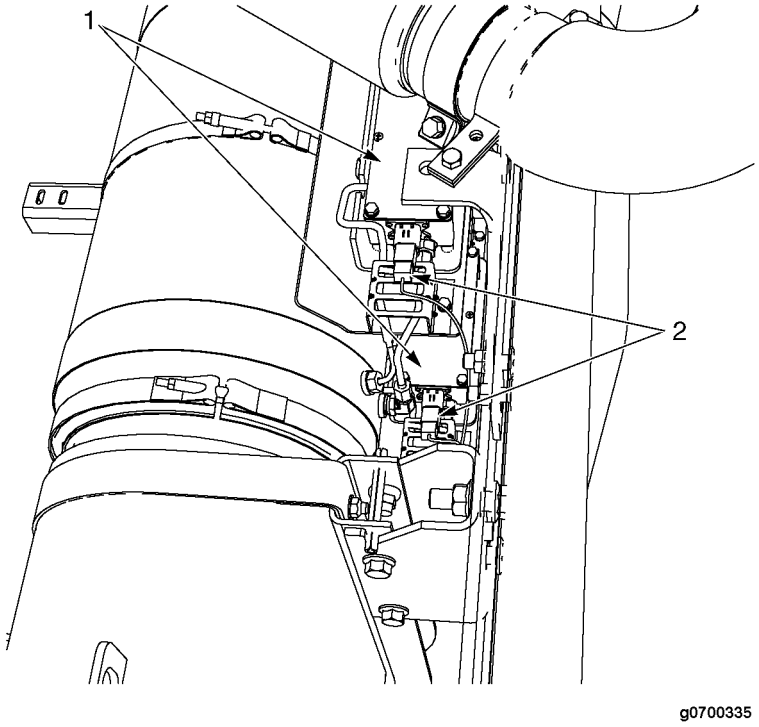
Dual Diesel Particulate Filter – Removal



1. STEP AND HEAT SHIELD ASSEMBLY
2. STEP BRACE
3. BOLT AND NUT

Figure 44 Step and Heat Shield Assembly

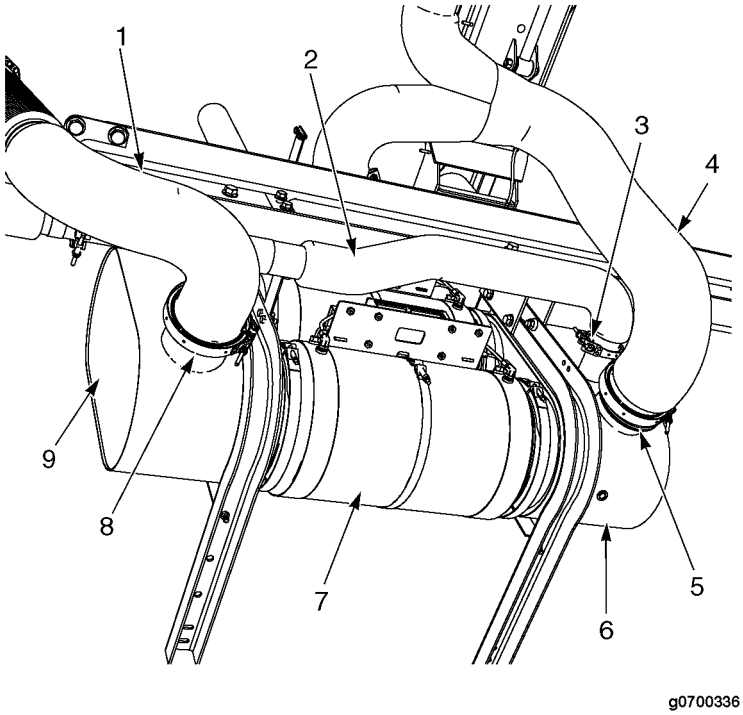
1. Remove four bolts and nuts from the step braces and remove the step and heat shield assembly.



1. SENSOR BOX
2. WIRING HARNESS CONNECTOR

Figure 45 Wiring Connectors

2. Disconnect two wiring harness connectors from the sensor boxes.



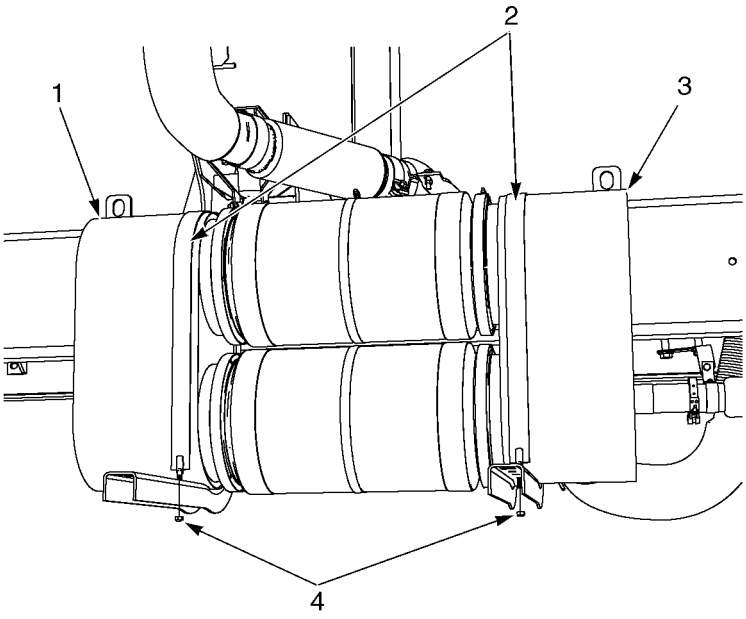
1. EXHAUST INLET PIPE
2. CLEAN AIR PIPE
3. MOUNT CLAMP
4. EXHAUST OUTLET PIPE
5. MOUNT CLAMP
6. OUTPUT EXHAUST CAN
7. DIESEL PARTICULATE FILTER
8. MOUNT CLAMP
9. DIESEL OXIDATION CATALYST

Figure 46 Exhaust Pipes

3. Remove the mount clamp from the clean air pipe and position the clean air pipe away from the output exhaust can.

4. Remove the mount clamp securing the exhaust outlet pipe to the output exhaust can.

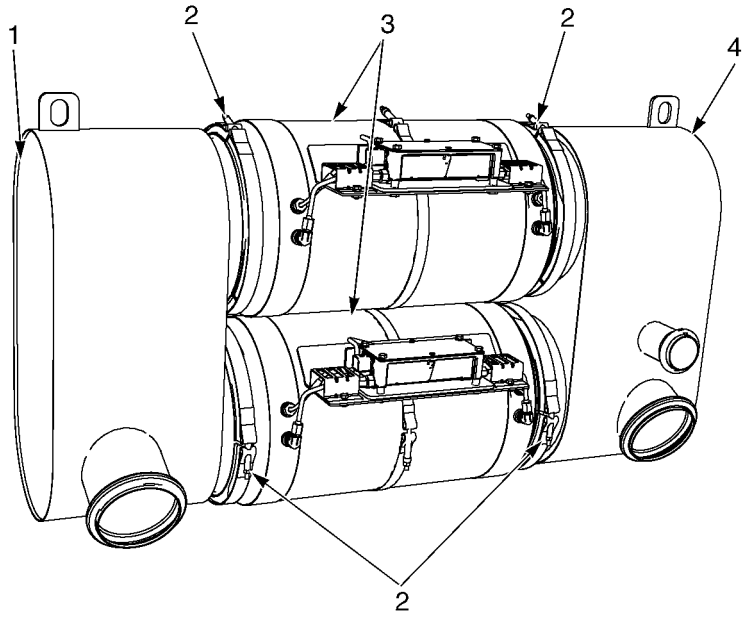
5. Remove the mount clamp securing the exhaust inlet pipe to the diesel oxidation catalyst.



1. OUTPUT EXHAUST CAN
2. MOUNT STRAP
3. DIESEL OXIDATION CATALYST
4. NUT

Figure 47 Mount Straps

6. Support the diesel particulate filter with an appropriate lifting device.
7. Remove two nuts from the mount straps securing the output exhaust can and diesel oxidation catalyst.
8. Using the proper lifting device, carefully move the diesel particulate filter assembly away from the vehicle and properly support it for further disassembly.



1. DIESEL OXIDATION CATALYST
2. V-CLAMP
3. DIESEL PARTICULATE FILTER
4. OUTPUT EXHAUST CAN

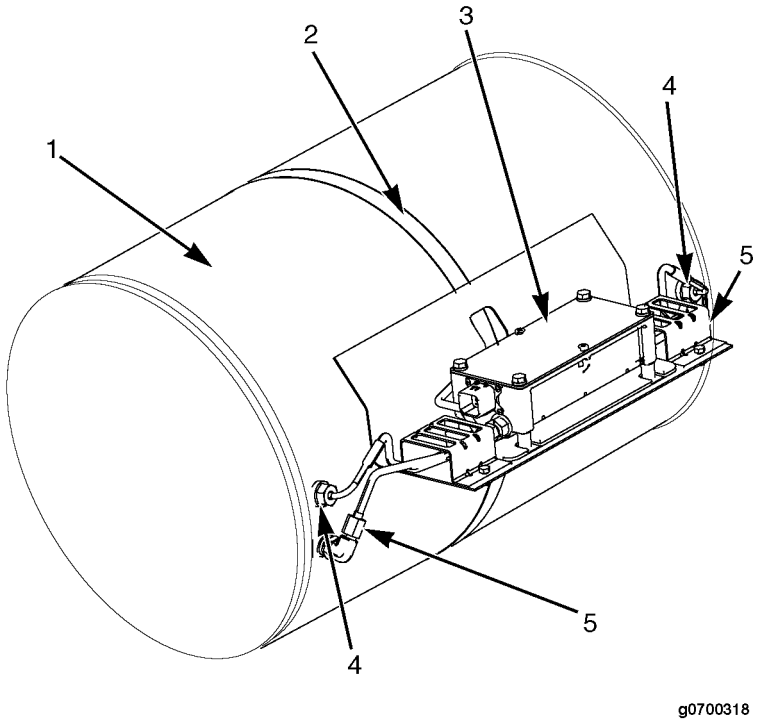
Figure 48 Dual Diesel Particulate Filters

IMPORTANT – Place an index mark along the diesel oxidation catalyst, diesel particulate filters, and the output exhaust can to help align the components during installation procedures.

9. Remove two V-clamps securing the diesel oxidation catalyst to the diesel particulate filters. Separate the diesel oxidation catalyst from the diesel particulate filters.

10. Remove two V-clamps securing the output exhaust can to the diesel particulate filters. Separate the output exhaust can from the diesel particulate filters.

11. Remove two gaskets from each diesel particulate filter. Discard gaskets.



1. DIESEL PARTICULATE FILTER
2. MOUNT BAND
3. SENSOR BOX
4. TEMPERATURE SENSOR
5. PRESSURE TUBES

Figure 49 Sensor Box

12. Remove two pressure tubes and two temperature sensors from each diesel particulate filter. Cap and plug pressure tubes and diesel particulate filters.

13. Remove the mount band and sensor box from each diesel particulate filter.

Dual Diesel Particulate Filter – Installation

NOTE – Use the index marks that were made during the removal procedures to align the diesel oxidation catalyst, diesel particulate filter, and the output exhaust can during installation.

1. Install the mount band and the sensor box on each diesel particulate filter (Figure 49, Items 1, 2, and 3). Torque mount clamp to 75 lbf-in ± 10 lbf-in (8 N•m ± 1 N•m).

2. Install two pressure tubes on each diesel particulate filter (Figure 49, Items 1, 3, and 5). Torque pressure tubes to 18 lbf-ft ± 1 lbf-ft (24 N•m ± 1 N•m).

3. Apply antiseize compound (part number PTX77124) to the bottom three threads of the temperature sensor.

4. Install two temperature sensors on each diesel particulate filter (Figure 49, Items 1 and 4). Torque temperature sensors to 33 lbf-ft ± 4 lbf-ft (45 N•m ± 5 N•m)

5. Install four new gaskets, two on each diesel particulate filter.

6. With the aid of an assistant, align both diesel particulate filters on the output exhaust can and secure with two V-clamps (Figure 48, Items 2, 3, and 4). Torque V-clamps to 100 lbf-in ± 10 lbf-in (11 N•m ± 1 N•m).

7. With the aid of an assistant, position both diesel particulate filters on the diesel oxidation catalyst and secure with two V-clamps (Figure 48, Items 1, 2, and 3). Torque V-clamps to 100 lbf-in ± 10 lbf-in (11 N•m ± 1 N•m).

8. Using the appropriate lifting device, carefully install the diesel particulate filter assembly on the vehicle.

9. Position two mount straps on the output exhaust can and diesel oxidation catalyst. Install two nuts on the mount straps (Figure 47). Torque nuts to 65 to 80 lbf-ft (88 to 108 N•m).

10. Install the exhaust inlet pipe on the diesel oxidation catalyst and secure the mount clamp (Figure 46, Items 1, 8, and 9). Torque mount clamp to 44 to 89 lbf-in (5 to 10 N•m).

11. Install the exhaust outlet pipe on the output exhaust can and secure the mount clamp (Figure 46, Items 4, 5, and 6). Torque mount clamp to 44 to 89 lbf-in (5 to 10 N•m).

12. Position the clean air pipe on the output exhaust can and secure the mount clamp (Figure 46, Items 2, 3, and 6). Torque mount clamp to 44 to 89 lbf-in (5 to 10 N•m).

13. Connect two wiring harness connections to the sensor boxes (Figure 45, Items 1 and 2).

14. Install the step and heat shield assembly on the step braces and secure with four bolts and nuts (Figure 44, Items 1, 2, and 3).

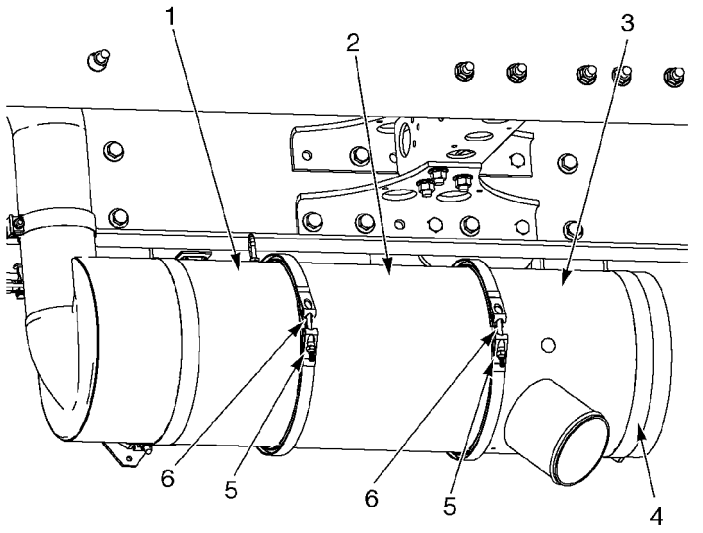
15. Start the engine and check the exhaust system for leaks.

8. SINGLE HORIZONTAL/DUAL VERTICAL

8.1. CUMMINS, MAXXFORCE™ 11 OR 13 ENGINE

Diesel Particulate Filter – Removal

1. Support the diesel particulate filter with an appropriate floor jack.



1. DIESEL OXIDATION CATALYST
2. DIESEL PARTICULATE FILTER
3. OUTPUT EXHAUST CAN
4. MOUNT BAND
5. NUT
6. V-CLAMP

Figure 50 Single Horizontal/Dual Vertical

IMPORTANT – Place an index mark along the diesel particulate filter, output exhaust can, and the diesel oxidation catalyst to help align the components during installation procedures.

2. Loosen the mount band on the output exhaust can.

3. Loosen two nuts and remove the V-clamp on each end of the diesel particulate filter.

4. Slide the output exhaust can rearward, approximately one inch (25 mm), to allow clearance for removal of the diesel particulate filter.

5. Remove the diesel particulate filter from the diesel oxidation catalyst.

6. Remove two gaskets, one from each end of the diesel particulate filter. Discard gaskets.

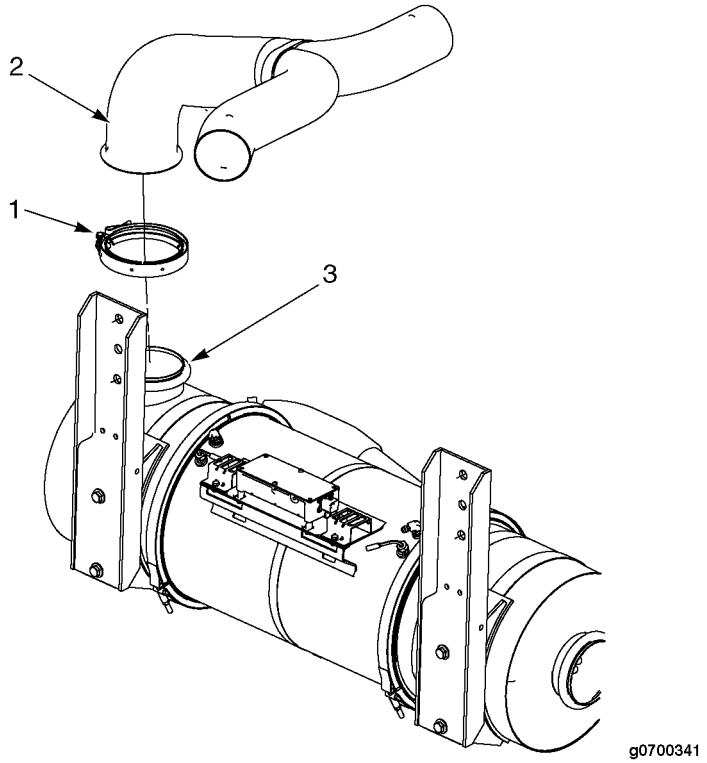
Diesel Particulate Filter – Installation

NOTE – Use the index marks that were made during the removal procedures to align the diesel oxidation catalyst, diesel particulate filter, and the output exhaust can during installation.

1. Install two new gaskets, one on each end, of the diesel particulate filter.
2. Using an appropriate floor jack, align the diesel particulate filter on the diesel oxidation catalyst (Figure 50, Items 1 and 2).
3. Slide the output exhaust can forward onto the diesel particulate filter (Figure 50, Items 2 and 3).
4. Secure the V-clamps at each end of the diesel particulate filter and tighten two nuts (Figure 50, Items 2, 5, and 6). Torque nuts to 44 to 89 lbf-in (5 to 10 N•m).
5. Secure the mount band on the output exhaust can (Figure 50, Items 3 and 4). Torque mount band nut to 65 to 80 lbf-ft (88 to 108 N•m).
6. Start the engine and check the exhaust system for leaks.

8.2. CATERPILLAR ENGINE

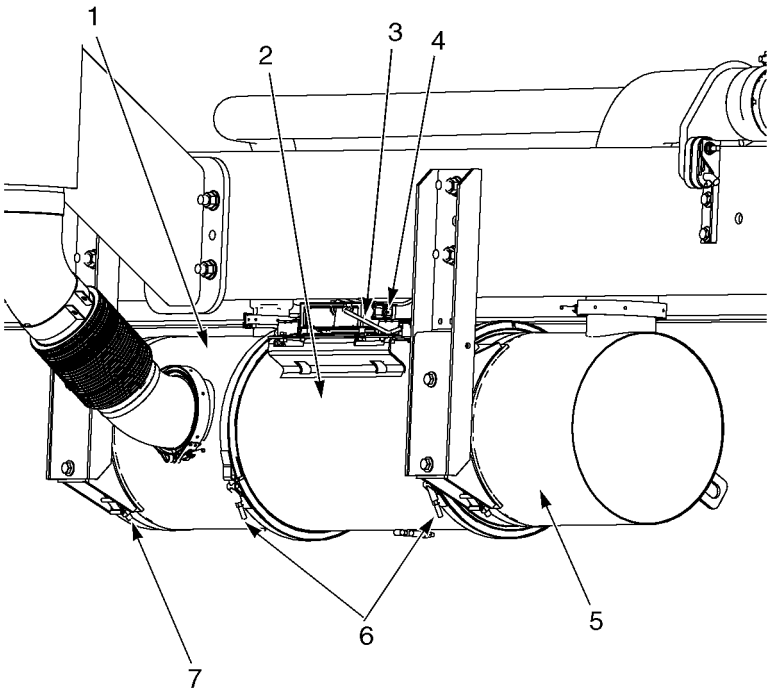
Diesel Particulate Filter – Removal



1. MOUNT CLAMP
2. EXHAUST T-PIPE
3. OUTPUT EXHAUST CAN

Figure 51 Single Horizontal/Dual Vertical

1. Remove the mount clamp and exhaust T-pipe from the output exhaust can.



1. OUTPUT EXHAUST CAN
2. DIESEL PARTICULATE FILTER
3. SENSOR BOX
4. WIRING HARNESS CONNECTOR
5. DIESEL OXIDATION CATALYST
6. V-CLAMP
7. MOUNT BAND

Figure 52 Diesel Particulate Filter

IMPORTANT – Place an index mark along the diesel particulate filter, output exhaust can, and the diesel oxidation catalyst to help align the components during installation procedures.

2. Disconnect the wiring harness connector from the sensor box and remove wire ties as needed.

3. Support the diesel particulate filter with an appropriate floor jack.

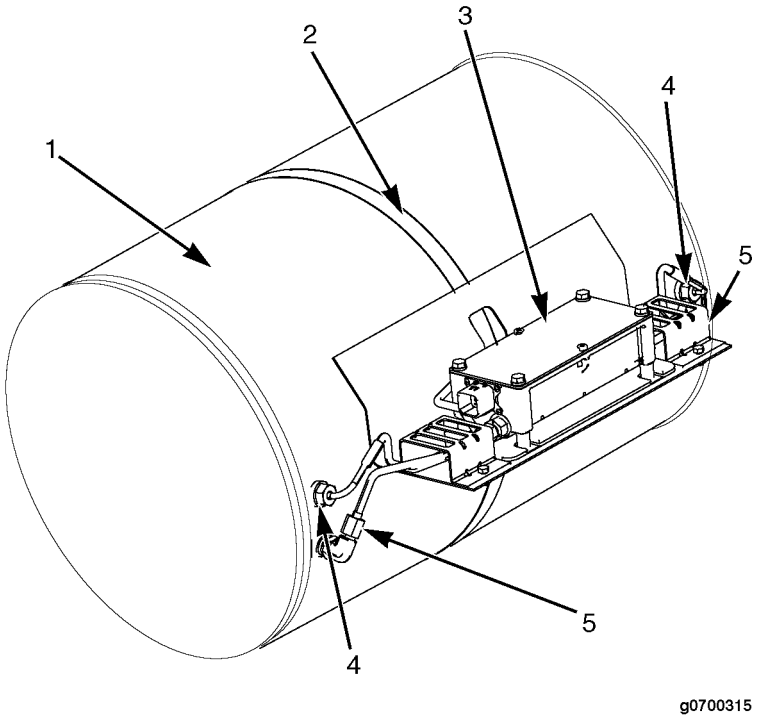
4. Loosen the mount band on the output exhaust can.

5. Remove the V-clamps on each end of the diesel particulate filter.

6. Slide the output exhaust can rearward, approximately one inch (25 mm), to allow clearance for removal of the diesel particulate filter.

7. Remove the diesel particulate filter from the diesel oxidation catalyst.

8. Remove two gaskets, one from each end of the diesel particulate filter. Discard gaskets.



1. DIESEL PARTICULATE FILTER
2. MOUNT BAND
3. SENSOR BOX
4. TEMPERATURE SENSOR
5. PRESSURE TUBES

Figure 53 Sensor Box

9. Remove two pressure lines and two temperature sensors from the diesel particulate filter. Cap and plug pressure lines, temperature sensors, and the diesel particulate filter.

10. Remove the mount band and the sensor box from the diesel particulate filter.

Diesel Particulate Filter – Installation

NOTE – Use the index marks that were made during the removal procedures to align the diesel oxidation catalyst, diesel particulate filter, and the output exhaust can during installation.

1. Install the mount band and the sensor box on the diesel particulate filter (Figure 53, Items 1, 2, and 3). Torque mount clamp to 75 lbf-in ± 10 lbf-in (8 N•m ± 1 N•m).

2. Install two pressure tubes on the diesel particulate filter and the sensor box (Figure 53, Items 1, 3, and 5). Torque pressure tubes to 18 lbf-ft ± 1 lbf-ft (24 N•m ± 1 N•m).

3. Apply antiseize compound (part number PTX77124) to the bottom three threads of the temperature sensor.

4. Install two temperature sensors on the diesel particulate filter (Figure 53, Items 1 and 4). Torque temperature sensors to 33 lbf-ft ± 4 lbf-ft (45 N•m ± 5 N•m)

5. Install two new gaskets, one on each end of the diesel particulate filter.

6. Using an appropriate floor jack, align the diesel particulate filter on the diesel oxidation catalyst (Figure 52, Items 2 and 5).

7. Slide the output exhaust can forward onto the diesel particulate filter (Figure 52, Items 1 and 2).

8. Secure the V-clamps at each end of the diesel particulate filter and tighten two nuts (Figure 52, Items 2 and 6). Torque V-clamps to 100 lbf-in ± 10 lbf-in (11 N•m ± 1 N•m).

9. Secure the mount band on the output exhaust can (Figure 52, Items 1 and 7). Torque mount band to 65 to 80 lbf-ft (88 to 108 N•m).

10. Connect the wiring harness connector on the sensor box and secure wiring as needed with wire ties (Figure 52, Items 3 and 4).

11. Install the exhaust T-pipe on the output exhaust can and secure the mount clamp (Figure 51, Items 1, 2, and 3). Torque mount clamp to 44 to 89 lbf-in (5 to 10 N•m).

12. Start the engine and check the exhaust system for leaks.

TORQUE

Table 2 Torque Chart

Figure No. (Item No.)	Location	Lbf-ft/Lbf-in	N•m
MaxxForce™ 5, 7, DT, or 10 Systems			
Figure 9 (Item 2)	Pressure Nuts on Pressure Tubes	12 ± 3 lbf-ft	16 ± 4
Figure 9 (Item 4) Figure 31 (Item 3)	P-clamp Mount Bolts	7 to 8 lbf-ft	9 to 11
Figure 10 (Item 3)	Pressure Sensor Mount Bolts	7 to 8 lbf-ft	9 to 11
Figure 11 (Item 2)	Temperature Sensor	18 to 30 lbf-ft	24 to 41
Figure 17 (Item 5) Figure 19 (Item 3) Figure 22 (Item 4) Figure 23 (Item 2)	Diesel Particulate Filter Mount Bolts	65 to 80 lbf-ft	88 to 108
Figure 18 (Item 3) Figure 32 (Item 4) Figure 37 (Item 7)	Diesel Particulate Filters V-clamp Nut	44 to 89 lbf-in	5 to 10
Figure 22 (Item 2) Figure 31 (Item 7) Figure 36 (Item 3)	Exhaust Mount Band Nut	35 to 46 lbf-ft	47 to 63
Cummins System, MaxxForce™ 11 or 13 System			
Figure 12 (Item 2)	Pressure Sensor Mount Bolts	7 to 8 lbf-ft	9 to 11
Figure 12 (Item 5)	Pressure Nuts on Pressure Tubes	23 ± 4 lbf-ft	31 ± 5
Figure 12 (Item 8)	P-clamp Mount Bolts	7 to 8 lbf-ft	9 to 11
Figure 13 (Item 3)	Temperature Sensor	22 ± 4 lbf-ft	30 ± 5
Figure 14 (Item 10)	Aftertreatment Control Module Mount Bracket Bolts	7 lbf-ft	9
Figure 14 (Item 10)	Aftertreatment Control Module to Frame Mount Bolts	15 lbf-ft	20
Figure 20 (Item 4) Figure 25 (Item 1) Figure 33 (Item 4) Figure 50 (Item 4)	Exhaust Mount Band	65 to 80 lbf-ft	88 to 108
Figure 20 (Item 6) Figure 25 (Item 2) Figure 26 (Item 4) Figure 33 (Item 5) Figure 39 (Item 5) Figure 50 (Item 5)	Diesel Particulate Filters V-clamp Nut	44 to 89 lbf-in	5 to 10

Table 2 Torque Chart (cont.)

Figure No. (Item No.)	Location	Lbf-ft/Lbf-in	N•m
Caterpillar System			
Figure 15 (Item 1) Figure 30 (Item 1) Figure 35 (Item 5) Figure 43 (Item 5) Figure 49 (Item 5) Figure 53 (Item 5)	Pressure Nuts on Pressure Tubes	18 ± 1 lbf-ft	24 ± 1
Figure 15 (Item 3) Figure 30 (Item 7) Figure 35 (Item 2) Figure 43 (Item 2) Figure 49 (Item 2) Figure 53 (Item 2)	Sensor Box Mount Band	75 ± 10 lbf-in	8 ± 1
Figure 15 (Item 8) Figure 30 (Item 3)	P-clamp Mount Bolt	7 to 8 lbf-ft	9 to 11
Figure 16 (Item 2) Figure 30 (Item 5) Figure 35 (Item 4) Figure 43 (Item 4) Figure 49 (Item 4) Figure 53 (Item 4)	Temperature Sensor	33 ± 4 lbf-ft	45 ± 5
Figure 28 (Item 1) Figure 34 (Item 7) Figure 52 (Item 7)	Exhaust Mount Band	65 to 80 lbf-ft	88 to 108
Figure 28 (Item 3) Figure 29 (Item 4) Figure 34 (Item 6) Figure 48 (Item 2) Figure 52 (Item 6)	Diesel Particulate Filters V-clamp Nut	100 ± 10 lbf-in	11 ± 1
Figure 41 (Item 2) Figure 46 (Item 3)	Clean Air Pipe Mount Clamp	44 to 89 lbf-in	5 to 10
Figure 41 (Item 5) Figure 46 (Item 8)	Inlet Exhaust Pipe Mount Clamp	44 to 89 lbf-in	5 to 10
Figure 42 (Item 2) Figure 46 (Item 5) Figure 51 (Item 1)	Outlet Exhaust Pipe Mount Clamp	44 to 89 lbf-in	5 to 10
Figure 47 (Item 4)	Dual Diesel Particulate Filter Mount Strap Nuts	65 to 80 lbf-ft	88 to 108