



Owner's Manual
Family of Diesel Oxidation
Catalyst (DOC) Mufflers



E M I S S I O N S

Donaldson®

Thank you for purchasing the Donaldson DOC Muffler to reduce diesel particulate emissions.

This owner's manual includes pre-installation requirements, installation instructions, warranty activation procedures and maintenance procedures.

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Read each section carefully prior to installing your Donaldson DOC Muffler. To highlight important topics or steps regarding the installation, operation and maintenance, pay special attention to the call outs in the NOTE and CAUTION boxes.

Example:

NOTE	Regulations Requirement
Regulations require a product identification tag be installed on the engine in a clear, visible location.	

Example:

	CAUTION! Rust, Corrosion & Soot on Existing Exhaust Tubing
If you see any evidence of rust or corrosion on existing tubing between the turbocharger and DOC muffler inlet, replace with new aluminized steel tubing. If reusing existing exhaust tubing, banging and tapping on the tubing may dislodge soot. Be sure to clean out any pipes prior to installing new components.	

Consult your Donaldson distributor, dealer or Donaldson if you have questions regarding the installation or warranty.

Introduction

Donaldson's DOC Muffler is designed to reduce harmful emissions from in-use diesel engines. Besides reducing diesel particulate matter emissions by 15-30%, diesel oxidation catalysts (DOC's) are also effective at reducing hydrocarbon emissions. California has classified several hydrocarbon emissions as toxic air contaminants.

DOC Mufflers are extremely reliable, cost-effective and easy to apply and provide substantial benefits in air quality. DOC Mufflers are also maintenance-free with normal operation. Expanded use of DOC technology on a retrofit basis is expected during the next decade.

For optimum performance, follow Donaldson's simple installation recommendations.

NOTE	Follow installation requirements
Installations must meet Donaldson requirements to obtain full warranty coverage.	

Pre-Installation Requirements

Your Donaldson DOC Muffler includes the following parts:

Qty.	Description
1	DOC Muffler
1	Documentation package that includes this owner's manual, a warranty registration card, warranty statement and engine tag (for CARB requirement).

Donaldson's pre-installation requirements are provided below. In order to maximize DOC muffler performance and life, installation must meet these requirements.

NOTE	Engine Must Meet OEM Specifications
The engine must be inspected by a qualified mechanic to verify the engine is operating within the engine OEM's specifications. If the engine does not meet specifications, necessary repairs must be made prior to DOC Muffler installation. The mechanic must document compliance on the warranty registration form. Failure to comply may void the warranty. The warranty and warranty registration card are separate documents in the documentation package.	

Selecting the Right DOC Muffler

Be sure you have selected the proper DOC Muffler model. Application of the wrong model will affect exhaust system backpressure. Failure to apply the proper model may cause engine damage and void the warranty. If engine horsepower exceeds the rating of a single DOC Muffler, dual DOC Mufflers will be required.

Inspect Mounting Hardware

DOC Mufflers weigh approximately 50% more than traditional OEM truck mufflers (45 lbs. vs. 30 lbs. [20.4 kg vs 13.6 kg]). Inspect any mounting system hardware intended for reuse to ensure it is in good condition and can adequately support the added weight. Look for signs of rust, corrosion or fatigue. Do not reuse suspect components. Heavy-duty components should be used.

NOTE	Inspect DOC Muffler Mounting Hardware
A DOC Muffler weighs approximately 50% more than a traditional OEM truck muffler. The mounting system should be inspected to ensure it is in good condition and can adequately support the added weight. Inspect all hardware intended for reuse for rust, corrosion or fatigue. Replace all questionable components with heavy-duty components.	

Minimize Exhaust Tubing Lengths


The catalyst temperature has an affect on emissions reduction performance. To optimize emissions reduction, the DOC Muffler inlet must be less than 15 ft. (4.6m) downstream from the turbocharger outlet flange when measured along the piping center line. Placement beyond 15 ft. (4.6m) may result in a plugged catalyst and void the warranty.

The catalyst should be mounted as close to the engine as possible, but must be isolated from engine vibration. Do not hard-mount the DOC Muffler directly to the engine.

NOTE	Mount the DOC Muffler Less than 15 ft. (4.6m) from the turbocharger
Mount the DOC Muffler less than 15 Ft. (4.6m) downstream from the turbocharger outlet. Mounting the DOC Muffler beyond this distance may cause plugging and void the warranty.	

Minimize Exhaust Leaks and Plugging

To maximize emission aftertreatment effectiveness, exhaust tubing should be structurally sound and leak-free. Inspect the exhaust tubing for leaks due to damage or corrosion, and replace defective components. Also look for flaking due to corrosion and/or soot build-up. Loose contaminants can be blown onto the catalyst face and cause plugging, increased backpressure and degraded engine performance.

	CAUTION! Rust, Corrossion and Soot on Existing Exhaust Tubing
<p>If you see any evidence of rust or corrosion on existing tubing between the turbocharger and DOC muffler inlet, replace with new aluminized steel tubing. If reusing existing exhaust tubing, banging and tapping on the tubing may dislodge soot. Be sure to clean out any pipes prior to installing new components. Operate engine at high idle to blow out exhaust pipes prior to the installation of the DOC Muffler. Protect yourself and others from loud straight pipe noise.</p>	

DOC Muffler Warranty

The statement of warranty for the DOC Muffler can be found in the documentation package.

Activating the Warranty

A Warranty Registration Card is included in the documentation package. Fill in all the information requested and answer all the questions immediately after completing the installation and return the card to Donaldson via the postage-paid card. Failure to return the warranty registration card within 30 days of installation may void the warranty.

NOTE	Submit Warranty Information
<p>Failure to complete the warranty information requested by Donaldson within 30 days of installation of the emission control system may void this warranty.</p>	

DOC Muffler Installation

The following section includes separate procedures for vertical and horizontal installations. Please use the procedure that matches your current muffler orientation.

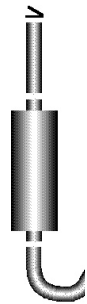
Make sure to review all pre-installation requirements before proceeding with the installation.

NOTE
<p>DOC Mufflers may plug if the engine is not properly maintained. This is especially true when operated under low-load or low ambient temperature conditions, idled for extended periods of time or if the engine is not properly calibrated for the specific fuel-type being used. To prevent the occurrence of plugging, engine problems must be resolved prior to installing a DOC Muffler.</p>

Vertical Installation


Remove the Existing Muffler

- (1) Loosen stack clamp at muffler outlet (top). Remove stack and clamp.
- (2) Loosen tubing clamp at muffler inlet (bottom).
- (3) Loosen clamps on flex tubing. Remove clamps, flex and elbow.
- (4) Remove muffler and heat shield mounting bands.



Install the DOC Muffler

- (1) Inspect the mounting brackets, bands, supports and/or stanchion for any damage, cracks or corrosion. Mounting components must be strong enough to adequately support the additional 15 lbs. (7 kg) weight. Replace any existing mounting parts that appear rusted, damaged or of questionable strength with heavy-duty parts.
- (2) Place muffler/heat shield mounting bands on DOC Muffler body and finger-tighten. Locate DOC Muffler on mast in position of original muffler. Secure on mast with muffler mounting bands.


	CAUTION! Do Not Overtighten Bands or Clamps on Muffler Body
<p>The catalytic core inside could be damaged if you deform the muffler body by overtightening clamps.</p>	

- (3) Position flex tubing and clamps onto exhaust tube. Do not tighten clamps until all tubing is assembled.

- (4) Position inlet elbow and muffler inlet clamp. Locate flex tube so that there are equal lengths of rigid tubing (within the flex) on both ends. Tighten clamps to secure flex tubing and inlet elbow.

NOTE
Excessive force on the inlet and outlet piping in conjunction with vehicle vibration can result in stress cracking where the pipe or pipe supports contact the DOC muffler inlet. Failures caused by excessive force are a result of improper installation and may not be covered under the warranty.

- (5) Position clamp over DOC Muffler outlet tube. Insert stack into the muffler outlet and tighten securely. Install a rain cap on all applications to prevent water damage.

	CAUTION! Water from Rain and Truck Washing Can Poison the Catalyst
Water can also damage the catalyst core retention material in the DOC Muffler. Vertical tail pipes must be fitted with rain cap or curved outlets.	

- (6) Install heat shield. Ensure DOC Muffler/heat shield mounting bands are secure.
- (7) Verify that all bolts and fasteners have been sufficiently tightened.
- (8) Operate vehicle and check for exhaust leaks. Repair any leaks.
- (9) Turn off the engine.
- (10) To meet CARB requirements, permanently attach the product identification tag (supplied in documentation package) in a clearly visible location on the engine. CARB regulations require a product identification tag be permanently installed on the engine in a clear, visible location. Application of the engine tag is not necessary for U.S. EPA regulations.

NOTE	CARB Requirement
California ARB regulations require a product identification tag be permanently installed on the engine in a clear, visible location.	

- (1) Fill out and return the Warranty Registration Card (included in the documentation package in the DOC Muffler box). Failure to return the warranty registration card within 30 days of installation may void the warranty.



Horizontal Installation

Remove the Existing Muffler

- (1) Loosen clamp at muffler outlet. Remove clamp and tailpipe.
- (2) Remove clamp at muffler inlet.
- (3) Loosen muffler mounting bands and remove muffler.

Install the DOC Muffler


- (1) Inspect the mounting brackets, bands, hangers, and supports for any damage, cracks or corrosion. Mounting components must be strong enough to adequately support the additional 15 lbs. (6.8 kg) weight. Replace any existing mounting parts that appear rusted, damaged or of questionable strength with heavy-duty parts.

NOTE	Mounting System Space Allowance
Allow 1" (25mm) space for engine movement and thermal expansion around the DOC Muffler.	


- (2) If the application uses a vertical tailpipe, drill a 1/4" (6mm) drain hole 12-18" (305-452mm) from the outlet end of the DOC Muffler.

NOTE	Drain Hole Required on Horizontal Mount with a Vertical Tailpipe
Horizontally-mounted DOC Mufflers with a vertical tailpipe must have a 0.25" (6mm) diameter drain hole drilled through the lowest point of the body, 12-18" (305-452mm) from the outlet end of the DOC Muffler. Rain and truck wash water can poison the catalyst, reducing emission performance. Water can also damage the catalyst core retention material in the DOC Muffler. Vertical tail pipes should be fitted with rain caps or curved outlets.	

- (3) Position the DOC Muffler in the mounting bands on muffler and mount in position. Position DOC Muffler so drain hole is at the bottom. Be sure the mounting bands do not cover the drain hole.
- (4) Tighten clamp on muffler inlet.

	CAUTION! Do Not Overtighten Bands or Clamps on Muffler Body
The catalytic core inside could be damaged if you deform the muffler body by overtightening clamps.	

- 5.) Install tailpipe and secure clamp on muffler outlet/ tailpipe joint.

	CAUTION! Avoid Rigid Mounting of the DOC Muffler
The original equipment muffler should have flexible hangers installed to allow for thermal expansion. If your system does not have flexible hangers they should be installed.	

- (6) Verify that all bolts and fasteners have been sufficiently tightened.
- (7) Operate vehicle and check for exhaust leaks. Repair any leaks.
- (8) Turn off the engine.
- (9) To meet CARB requirements, permanently attach the product identification tag (supplied in documentation package) in a clearly visible location on the engine. CARB regulations require a product identification tag be permanently installed on the engine in a clear, visible location. Application of the engine tag is not necessary for U.S. EPA regulations.

NOTE	CARB Requirement
California ARB regulations require a product identification tag be permanently installed on the engine in a clear, visible location.	

- (10) Fill out and return the Warranty Registration Card (included in the documentation package in the DOC Muffler box). Failure to return the warranty registration card within 30 days of installation may void the warranty.

Activating the Warranty

A Warranty Registration Card is included in the documentation package. Fill in all the information requested and answer all the questions immediately after completing the installation and return the card to Donaldson via the postage-paid card.

NOTE	Complete Warranty Registration Card
Failure to complete the warranty information requested by Donaldson within 30 days of installation of the emission control system may void this warranty.	

Please contact Donaldson, at the phone number provided on the back cover, with installation questions or problems.

Operation, Maintenance and Service Guide for DOC Mufflers

Operation

Donaldson DOC Mufflers are designed and verified for use on most medium- and heavy-duty truck and bus applications. To ensure proper functioning of these products, Donaldson preventive maintenance and service procedures must be incorporated into your regular vehicle maintenance routines.


Maintenance and Service

Preventive maintenance recommendations during normally scheduled vehicle maintenance

- (1) Inspect the DOC Muffler exhaust piping and mounting brackets.
- (2) Look for leaks, structural failures (cracks) and loose or missing fasteners.
- (3) Repair or replace defective parts, as appropriate.

NOTE	Do Not Use Fuels Blended with Lube Oil
Engine oil must not be blended with the engine's fuel since the oil may cause reduced emissions performance and deposits in the catalyst that may cause higher backpressure, plugging and reduced engine performance and void the warranty.	

NOTE	For Electronically Controlled Engines
Electronically controlled engines are certified with a specific fuel and electronic program based on engine configuration and model year. Use only the fuel and electronic program specified for your engine. Using the incorrect fuel and/or electronic program may cause excessive soot generation and catalyst plugging and may void the warranty.	

	CAUTION!
Certain components found in engine lube oil can poison catalysts. To protect against catalyst failure and/or plugging, ensure that the engine is not consuming oil at a rate higher than specified by the engine manufacturer. Use low ash oils, when possible. Do not use fuel blended with lube oil. Check with your local Donaldson dealer to review additives before use.	

Conditions That May Plug A DOC Muffler

- Engine operation at low load or idling for extended periods of time
- Improper engine maintenance
- Improper engine calibration for the specific fuel type being used

If plugging is suspected because of a noticeable loss of performance or fuel economy, you may want to measure the exhaust system backpressure.

How to Check for a Plugged Catalyst

- (1) Weld a ¼"-18 NPT pipe coupling in the exhaust pipe near the DOC muffler inlet and drill 1/8" (3mm) diameter in center of coupling and install a manometer or backpressure gauge with a range of 0-80" H₂O or 0-6" Hg.
- (2) Operate the engine until thoroughly warm, run at high idle, no load for 2-3 minutes.
- (3) Record backpressure with the engine at high idle running at the no load condition.

If backpressure is less than 40" H₂O or 3" Hg, it is unlikely the DOC Muffler is involved. Continue to operate the DOC Muffler without further maintenance.

If backpressure is greater than 40" H₂O or 3" Hg, follow the DOC Muffler Clean-Out Instructions.

How to Prevent the DOC Muffler from Plugging

To prevent the DOC Muffler from plugging, the engine must be properly maintained and calibrated and idling must be minimized. Performance concerns about operating conditions must be resolved before operating again with a cleaned DOC Muffler.

DOC Muffler Clean-Out Instructions

Operate the vehicle with a high engine load (e.g., maximum highway speed, uphill or on a chassis dynamometer) for 10-15 minutes and recheck the high idle, no load backpressure by repeating steps 2 and 3 of How to Check Backpressure Instructions.

If backpressure is less than 40" H₂O or 3" Hg, continue to operate the converter without further maintenance.


If backpressure is greater than 40" H₂O or 3" Hg, contact Donaldson.

If the DOC Muffler has a mid-section within two v-band clamps, the DOC may be cleaned and re-used.


DOC Cleaning Equipment

The following items are required to perform the cleaning process.

- (1) A source of compressed dry air with a standard shop air gun (80-100 psi/550-670 kPa)
- (2) Dust mask, gloves and safety glasses
- (3) An industrial vacuum cleaner or a dust/ash collecting unit

	CAUTION! Safety Precaution!
A dust mask, gloves and safety glasses should be worn while performing the cleaning process.	

DOC Cleaning Instructions

	CAUTION! Do not use STEAM or DETERGENTS to clean the DOC.
Donaldson does not recommend cleaning the DOC with steam and/or other detergents. Use of these products may damage and/or deactivate the DOC.	

- (1) Loosen the two body clamps and remove the DOC from the DOC Muffler body.
- (2) Using compressed air on the outlet side and a vacuum on the inlet side, blow air through the DOC while capturing ash and particulate in the vacuum cleaner.
- (3) Avoiding direct contact of the air nozzle with the DOC surface, slowly move the air nozzle across the face of the DOC directing the air into each individual cell. Continue this process until all cells of the DOC are visibly clear. Cleaning time depends on the size of the DOC surface. DOCs larger than 10.5 (267mm) may require longer cleaning time.
- (4) Reinstall the DOC in the reverse direction in from which it was removed.
- (5) Place the DOC in the center of the DOC Muffler and re-tighten the body clamps.

Reset the Backpressure Monitor (if applicable)

After cleaning, reset the backpressure monitor, if either light is on.

- (1) Turn on vehicle ignition
- (2) Press and hold down the reset button on the Electronic Control Unit (ECU) for several seconds.

Record DOC Service

Regulatory agencies require that you maintain the following service and cleaning records:

- Date of installation
- Vehicle mileage at the time of installation
- Part number
- Serial number
- Date of cleaning
- Mileage at each cleaning

Ash Disposal

Disposal of ash and particulate should be in accordance with all local laws and regulations.

DOC Muffler Disposal Information

DOC Mufflers use a precious metal catalyst to reduce carbon monoxide, hydrocarbons and diesel particulate matter emissions. Typical metals include platinum, palladium and rhodium. These materials can be recycled from damaged or deactivated DOC Mufflers. Please dispose of DOC Mufflers in accordance with local regulations and laws; recycle when possible.

Actions and Improper Maintenance That May Void Your Warranty

The following conditions are considered to be abuse, neglect or improper maintenance that may void your warranty.

- Misapplication or improper installation of the DOC Muffler (failure to adhere to the Donaldson owners manual)
- Failures or damage caused by mounting system failures
- Modifications, alterations or attempted repair of the DOC Muffler
- The use of fuels not consistent with EPA/CARB regulations, fuel other than that for which the engine is calibrated or fuels blended with used lube oil
- Damage to the catalyst or plugging caused by water entry
- Operating conditions that result in plugged and/or poisoned catalysts
- Physical damage caused by misuse, abuse or road hazards including (but not limited to) dents, cuts or fractures to the exterior or interior of the DOC Muffler
- Failure to return the warranty registration card within 30 days of installation



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