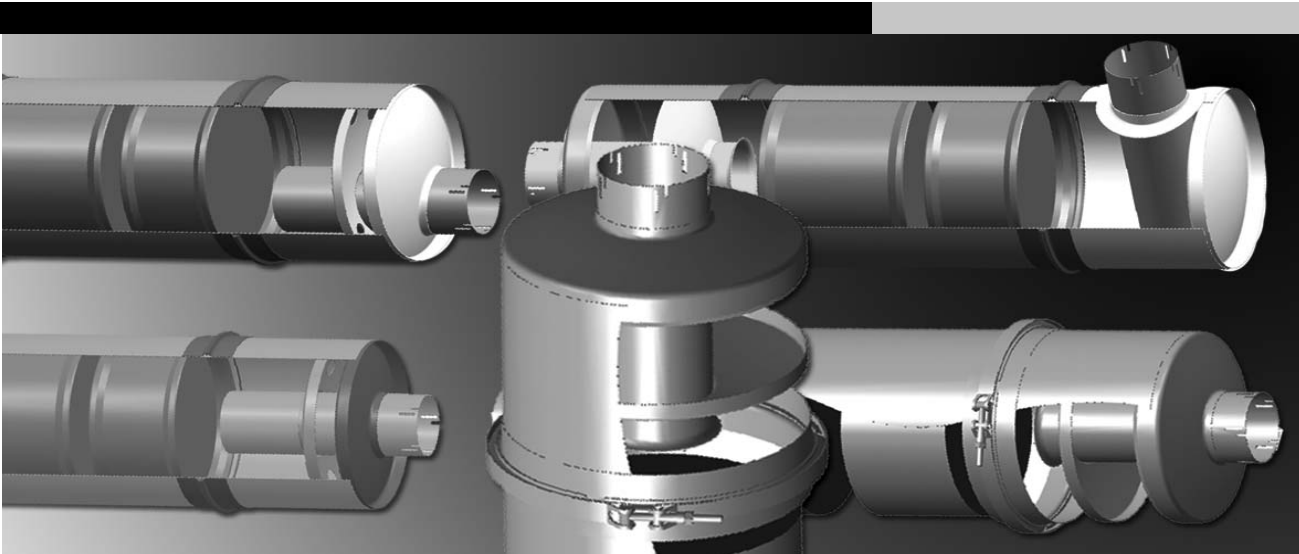


Diesel Multi-stage Filter (DMF) Muffler Installation, Operation & Maintenance Manual



**Thank you for purchasing the
Donaldson DMF 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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Through out this manual statements indicating precautions necessary to avoid equipment failure are referenced as a NOTE. Statements indicating potential hazards that could result in personal injury or property damage are referenced in CAUTION! boxes.

Examples:

NOTE

Comments highlighting concerns that may result in vehicle or equipment damage OR used to call-out important application steps or procedures.



CAUTION!

Comments highlighting personal safety, injury or equipment damaged are considered warning statements and are called out as CAUTION with the triangle symbol.

Introduction

Donaldson's DMF Muffler is designed to reduce harmful emissions from in-use diesel engines. Besides reducing diesel particulate matter emissions more than 70% , the DMF muffler is also effective at reducing hydrocarbon emissions. California has classified several hydrocarbon emissions as toxic air contaminants.

DMF Mufflers are extremely reliable, easy to apply and provide substantial benefits in air quality.

For optimum performance of your DMF Muffler, 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 DMF Muffler includes the following parts:

Qty.	Description
1	DMF 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 DMF 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 DMF 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 DMF Muffler

Be sure you have selected the proper DMF 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 DMF Muffler, dual DMF Mufflers will be required.

Inspect Mounting Hardware

DMF Mufflers weigh approximately twice as much as a traditional OEM truck mufflers (60 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 DMF Muffler Mounting Hardware
A DMF Muffler is double the weight compared to 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 filter temperature has an affect on emissions reduction performance. To optimize emissions reduction, the DMF 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 filter should be mounted as close to the engine as possible, but must be isolated from engine vibration. Do not hard-mount the DMF Muffler directly to the engine.

NOTE	Mount the DMF Muffler Less than 15 ft. (4.6m) from the turbocharger
Mount the DMF Muffler less than 15 Ft. (4.6m) downstream from the turbocharger outlet. Mounting the DMF 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 filter face and cause plugging, increased backpressure and degraded engine performance.

NOTE	Check Existing Exhaust Tubing for Rust, Corrosion and Soot
<p>If you see any evidence of rust or corrosion on existing tubing between the turbocharger and DMF 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 DMF Muffler. Protect yourself and others from loud straight pipe noise.</p>	

DMF 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	Existing Engine Problems Must be Resolved Prior to DMF Muffler Installation
<p>DMF 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 DMF 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 DMF 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 **30 lbs (13.6 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 DMF Muffler body and finger-tighten. Locate DMF 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 filtering substrate 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.

	CAUTION! Avoid Excessive Force on Pipe or Pipe Supports.
<p>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 DMF Muffler inlet. Failures caused by excessive force are a result of improper installation and may not be covered under the warranty.</p>	

5. Position clamp over DMF 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 Filter.
<p>Water can also damage the filter retention material in the DMF Muffler. Vertical tail pipes must be fitted with rain cap or curved outlets.</p>	

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 DMF 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 DMF 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 30 lbs. (13.6 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 DMF 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 DMF Muffler.

NOTE	Drain Hole Required on Horizontal Mount with a Vertical Tailpipe
Horizontally-mounted DMF 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 DMF Muffler. Rain and truck wash water can poison the filter, reducing emission performance. Water can also damage the filter retention material in the DMF Muffler. Vertical tail pipes should be fitted with rain caps or curved outlets.	

3. Position the DMF Muffler in the mounting bands on muffler and mount in position. Position DMF 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 filter 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 DMF 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.	

- Fill out and return the Warranty Registration Card (included in the documentation package in the DMF 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

Operation

Donaldson DMF 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

- Inspect the DMF Muffler exhaust piping and mounting brackets.
- Look for leaks, structural failures (cracks) and loose or missing fasteners.

- 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 filter 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 filter plugging and may void the warranty.	

	CAUTION! Use Low Ash Engine Oil
Certain components found in engine lube oil can poison catalysts. To protect against filter 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.	

Filter Service and Cleaning

The filtering device is located in the center body of the DMF muffler. If the filter becomes plugged, it will need to be cleaned. Filter plugging is a rare occurrence.

NOTE	No Routine Maintenance
The DMF Muffler does not typically require or need routine service during its life. Service will only be needed if it is misapplied or poor engine conditions increase soot output to an abnormally high level. Cleaning instructions are listed for reference in the event the filter becomes plugged.	

How to Prevent the DMF Muffler from Plugging

To prevent the DMF 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 DMF Muffler.

How to Check for a Plugged Filter

1. Weld a ¼"-18 NPT pipe coupling in the exhaust pipe near the DMF 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 DMF Muffler is involved. Continue to operate the DMF Muffler without further maintenance.

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

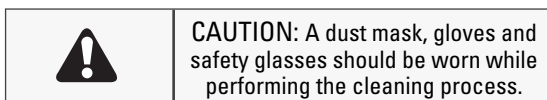


Proper original equipment manufacturer engine maintenance procedures must be followed to ensure proper DMF Muffler filter operation. Oil consumption that exceeds the original engine manufacturer's specifications will increase the required cleaning frequency.

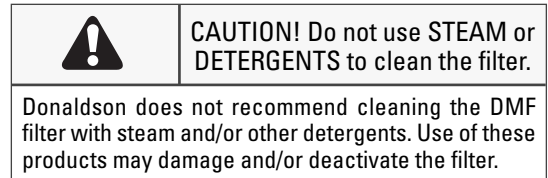
Filter Cleaning Equipment

The following three items are required to perform the filter cleaning process:

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



Filter Cleaning Instructions



1. Loosen the two body clamps and remove the center body from the DMF Muffler body.
2. Using compressed air on the outlet side and a vacuum on the inlet side, blow air through the filter while capturing the ash in the vacuum cleaner.
3. Avoiding direct contact of the air nozzle with the filter surface, slowly move the air nozzle across the face of the filter, directing air into each individual cell. Using a soft bristled brush, brush the surface of the filter until it's free of soot.
4. Reinstall the cleaned filter (center body) and tighten the two body clamps.
5. If vehicle is equipped with filter service monitor, you may need to reset the device.

Record Filter Service

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

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

DMF Muffler Disposal Information

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

Actions and Improper Maintenance That May Void Your Warranty

Prior to installing any DMF Muffler unit, a vehicle profile sheet must be completed by the equipment owner and approved by Donaldson. Failure to obtain this approval may void this warranty.

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

- Failure to follow Original Equipment Manufacturer (OEM) maintenance and operating procedures. Proper OEM maintenance and operating procedures are understood to be those procedures recommended by the OEM to ensure engine longevity and operation.
- Excessive particulate emissions due to poor engine operation and maintenance.
- Misapplication of the DMF unit to an engine model or to a duty cycle other than that for which the DMF unit is designed and approved
- Improper installation of the DMF unit (strict adherence to the Donaldson owners manual is required).
- Alterations or attempted repairs.
- Progressive engine failure that allows lube oil, fuel or coolant to be present in the engine exhaust, in excess of OEM specifications.
- Use of fuel:
 - (a) other than that for which the engine is calibrated or other than recommended by Donaldson.
 - (b) containing other than ultra low sulfur diesel or not approved in writing by Donaldson, or fuel other than that which is specifically required to achieve the emissions required by the DMF unit.
 - (c) blended fuel with lube oil, kerosene, fuel additives or other materials not approved in writing by Donaldson.
- Excessive lube oil consumption.
- Physical damage caused by misuse, abuse or road hazards including (but not limited to) dents, cuts or fractures of the DMF unit.
- Damage caused by improper cleaning procedures (failure to adhere to Donaldson recommended cleaning guidelines).
- Failures or damage caused by mounting system failures.
- Damage to the catalyst or plugging caused by water entry.
- Failure to return the warranty registration card within 30 days of installation.



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