

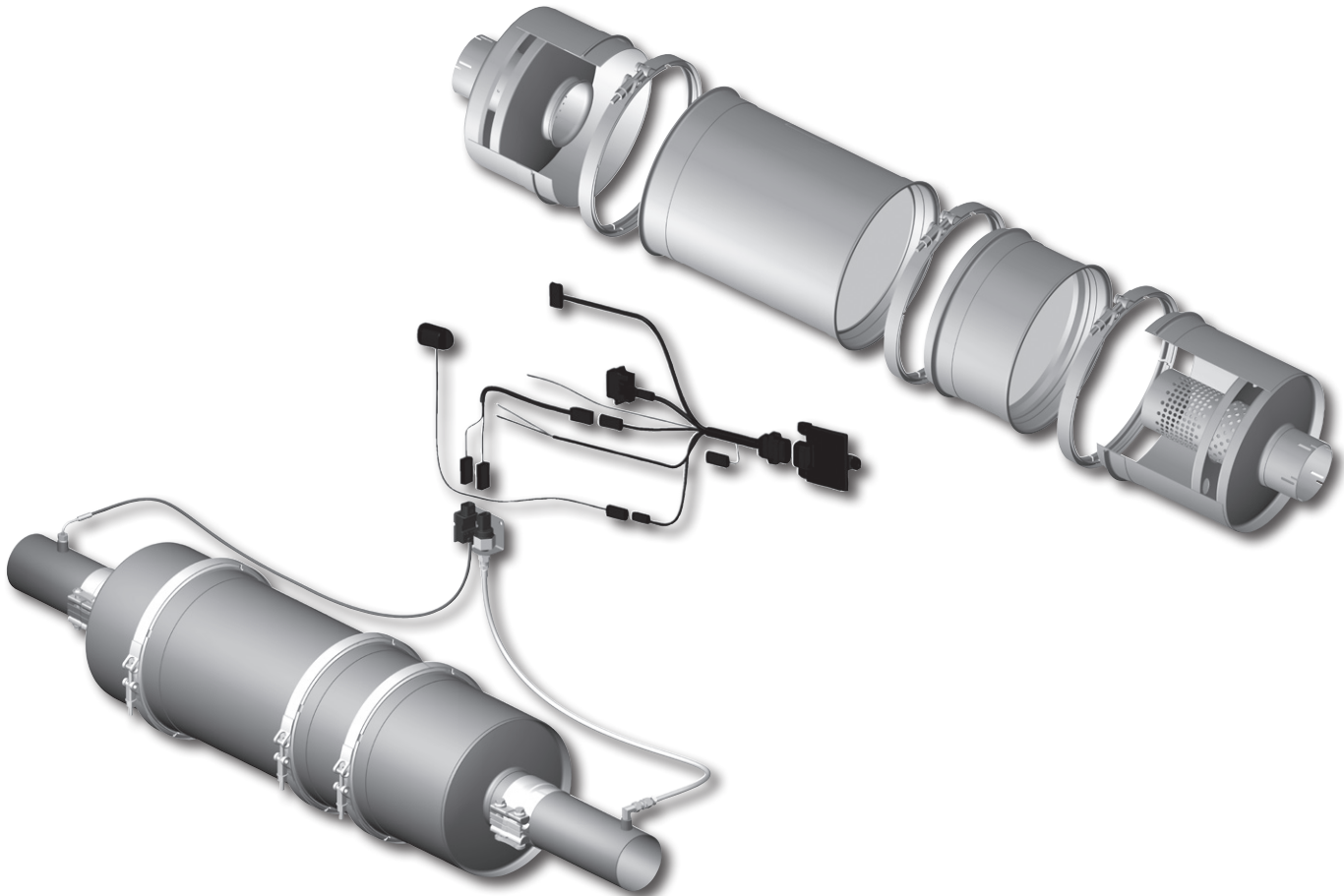


OWNER'S MANUAL

Installation, Operation, Maintenance and Warranty Information

LNF (Low NO₂ Filter) MUFFLER and LXF (Low NO_x Filter) MUFFLER

Manual Number P484796 Rev 4



This manual is property of the owner. It should be left with the unit when installation and start-up are complete. Donaldson Company, Inc. reserves the right to change design and specifications without prior notice.

Do not make any system modifications or adjustments that would alter the original retrofit installation. Modifications may not meet California Air Resources Board (ARB) Executive Order requirements, be considered illegal devices and may result in denial of warranty coverage or fines.

Consult your Donaldson certified emissions dealer if you have questions regarding the installation, operation, maintenance or warranty.

Illustrations are for reference only as actual product may vary.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

The LNF and LXF Mufflers are passive DPF systems designed to capture diesel PM and eliminate gaseous emissions. This manual includes pre-installation requirements, installation instructions, warranty activation procedures, maintenance recommendations, troubleshooting and your limited warranty.

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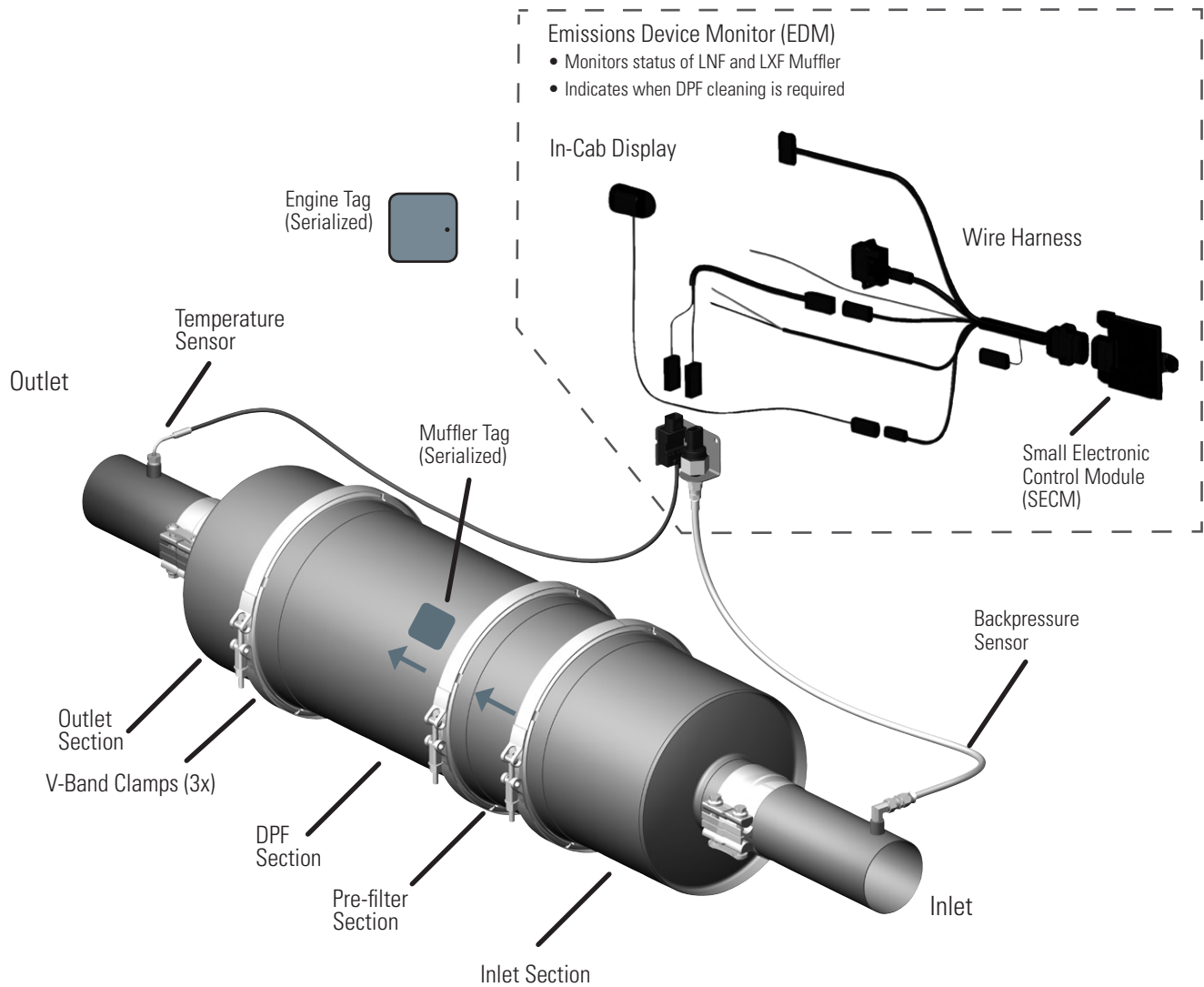
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LNF or LXF Muffler Kit Illustration



NOTE

For original part numbers and warrantable parts, please review the LNF/LXF sales brochure, No. F111248.

Introduction

The Donaldson LNF and LXF Mufflers are passive, catalyzed Diesel Particulate Filters (DPFs) designed to reduce Particulate Matter (PM) emissions from in-use diesel engines. These retrofit emissions solutions reduce diesel particulate matter emissions by over 85% and are effective at reducing carbon monoxide and hydrocarbon emissions.

LNF and LXF Mufflers are reliable and provide substantial benefits in air quality, but require routine DPF cleaning. The LNF and LXF Mufflers consist of a pre-filter and DPF section along with inlet and outlet sections. Removable V-band clamps provide easy access to the DPF for annual ash cleaning.

The LNF and LXF Muffler Kit includes an Emissions Device Monitor (EDM) that detects exhaust restriction created during vehicle operation. The monitor provides visual alerts to the vehicle operator to indicate when DPF cleaning is required or if the DPF experiences a high heat condition that could damage the DPF.



CAUTION! Follow Donaldson Installation Guidelines

Installers must follow Donaldson installation guidelines to ensure full warranty coverage. For optimum performance, follow all the installation, operation and maintenance recommendations covered in this manual.

LNF or LXF Muffler Kit Contents (including Duals)

Qty.	Description
1	LNF or LXF Muffler Assembly
1	Emissions Device Monitor (EDM) with installation and operation manual.
1	Documentation package that includes this owner's manual, LNF and LXF Muffler Warranty, a warranty registration worksheet and a Diesel Emissions Control Strategy (DECS) engine tag (ARB requirement).

Pre-Installation Requirements

Donaldson's pre-installation requirements are provided below. In order to maximize the diesel emissions control system's performance and life, the installation must meet these requirements. Failure to follow these instructions may void the warranty and could lead to device failure. Failure to maintain the pre-assessment conditions throughout the life of the retrofit may void the warranty and lead to device failure.

LNF and LXF Muffler Pre-Installation

Application Pre-Assessment

A copy of the Donaldson Application Pre-Assessment can be found at www.Donaldson.com or by contacting Donaldson Engineering.

1. Verify that the application PASSED the Donaldson Application Pre-Assessment conducted by a Certified Emissions Dealer. A basic assessment of the engine must also be performed no more than 15 days prior to installation. The pre-assessment worksheet and opacity test results need to be forwarded to Donaldson upon warranty registration.
2. The application pre-assessment confirms the following:
 - The engine family number (EFN) for the vehicle is included in the California Air Resources Board (ARB) -Approved Engine Family Numbers on the Executive Order.
 - Vehicle and engine have been properly maintained
 - Vehicle passed the pre-assessment visual system inspection
 - Opacity test results collected meet Donaldson requirements (based on SAE J1667 test specification)
 - Vehicle engine duty cycle meets the application temperature criteria.
3. Vehicle must be data-logged prior to application of the Donaldson LNF/LXF Muffler Kit to ensure the engine duty cycle meets the application criteria. Follow Donaldson data logging requirements. Alternate data logging approaches may not provide an accurate picture of operating temperature and may result in unsatisfactory operation. Contact Donaldson Engineering to review compatibility of data logging approaches.
4. Retain the Donaldson data logging response letter and data log to confirm compliance with application criteria. A copy of these documents will be required at the time of warranty registration and should be kept in the vehicle as they may be requested by California ARB or other enforcement staff.

5. Only apply an LNF/LXF Muffler when approved by Donaldson or a Donaldson certified dealer in writing via a formal data logging response letter. Applying an LNF/LXF Muffler to a vehicle that does not meet exhaust gas temperature (EGT) criteria in the California ARB Executive Order would be an illegal device.
6. Be sure to plug the welded fitting where the thermocouple was installed after data logging to prevent exhaust leakage.

Applying an LNF or LXF Muffler

These LNF or LXF Mufflers have been verified by California ARB for specific engine families. Prior to installing, make sure the engine on the vehicle being retrofitted is listed on the California ARB Executive Order attachment.

Application of the LNF or LXF Muffler on an engine model other than those approved is considered an illegal device and may result in denial of warranty coverage or fines.

Verify that the LNF or LXF Muffler model selected is sized appropriately for your engine and best matches your existing muffler configuration. (See the Donaldson LNF/LXF Muffler Brochure F111248 for available styles and configurations).

NOTE

Engine Must Meet OEM Specifications

The engine must be inspected by a qualified technician 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 LNF or LXF Muffler installation. The technician must document compliance on the Donaldson warranty registration web site.

Fuel Requirement

The LNF and LXF Mufflers require the use of ULSD Fuel (15 ppm or less sulfur content) that meets ASTM D975. B20 BioULSD (20% biodiesel/80% ULSD) per ASTM D6751 diesel fuel specifications may also be used. Fuel additives are not permitted and may void your warranty.

Fuel Penalty

The effect of an LNF/LXF System on fuel consumption is negligible. SAE Paper 810858 – 'Fuel Efficient Exhaust Systems' outlines fuel consumption of a turbocharged diesel engine with respect to backpressure. It states that fuel consumption will increase 0.5% for every 1" Hg backpressure over the manufacturer's specification. The LNF/LXF System will increase backpressure on the engine compared to a stock muffler. However, the expected increase will be less than 1" Hg

on average. Thus, the expected fuel consumption increase will be ~0.5%. Given the vast differences in duty cycles for on-road vehicles, this would not be a measurable difference.

Inspect Mounting Hardware

An LNF or LXF Muffler weighs considerably more than a traditional OEM truck muffler (80 lbs. vs. 30 lbs. [35 kg vs. 13.6 kg]). Dual LNF/LXF weigh even more (9.5" model is 144 lbs. [65.3 kg]; 10.5" model is 173.5 lbs. [78.6 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. New heavy-duty components should be used. The body mounting clamps are provided with the dual LNF/LXF.

NOTE

Inspect Mounting Hardware

LNF or LXF Mufflers are two to six times heavier than a traditional OEM truck muffler (depending on configuration). 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.

Backpressure Increase

The LNF/LXF System could increase the nominal engine backpressure by 20" H₂O (1.46" Hg) compared to stock exhaust system. When the LNF/LXF Muffler is loaded with soot, the engine backpressure can increase to 100" H₂O (7.36" Hg) or 127" H₂O (9.34" Hg).

Noise Level Control

Expected noise level of the LNF/LXF System will be equal to or less than the stock exhaust system.

Engine Lube Oil Requirement

The LNF and LXF Mufflers require the use of engine lube oil that meets CJ-4 specifications (low ash). The engine must NOT be consuming oil higher than a rate of 0.5% of oil to fuel ratio or 1 quart/500 miles, whichever is lower.

Avoid Vibration

The LNF or LXF Muffler should be mounted as close to the engine as possible, but must be isolated from engine vibration. If not isolated properly, vibration may damage the exhaust system or the retrofit muffler. Do not hard-mount the muffler assembly directly to the engine or install where the device can be subject to vehicle or equipment vibration.

Minimize Exhaust Tubing Lengths

The engine EGT has an affect on emissions performance. To optimize performance, the LNF or LXF Muffler inlet must be installed within 6" (152 mm) from where the temperature probe was installed during preliminary temperature data logging to ensure the EGTs are representative of what the LNF or LXF Muffler will see. It is also a good idea to minimize the distance from the turbo to the emissions device inlet.

NOTE	Mount the LNF or LXF Muffler within 6" (152mm) from temperature probe
To optimize performance, the inlet on the new DPF must be installed within 6" (152 mm) from where the temperature probe was installed during preliminary data logging. Mounting the LNF or LXF Muffler beyond this distance may cause frequent cleaning intervals and may result in unsatisfactory / unreliable performance or plugging.	


Vertical Tailpipe Support

Vertical tailpipes over 4 ft. (1.2 m) require additional support. Tailpipes at this length, over time will start to vibrate and cause unwanted stress on the outlet section. To prevent this failure, support the outlet stack appropriately.

Inspect Tubing

To maximize effectiveness, exhaust and flex tubing should be structurally sound and leak-free. Inspect the exhaust tubing for 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 DPF face and cause increased backpressure and degraded engine performance.

NOTE	Rust, Corrosion and Soot on Existing Exhaust Tubing
If you see any evidence of rust or corrosion on existing tubing between the turbocharger and LNF or LXF 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 emissions device. Protect yourself and others from loud noise and flying debris.	

	CAUTION! Do Not Install Mounting Brackets Over Pre-filter or DPF Sections
To avoid damage or deformation to the pre-filter and DPF Section of the muffler, apply mounting brackets to inlet and outlet sections only.	

Installation

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

Review and meet all pre-installation requirements before proceeding with the installation.

NOTE	Engine Problems Must be Resolved PRIOR to Installing the LNF or LXF Muffler
LNF and LXF 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 the LNF or LXF Muffler. Ensure the engine meets OEM specs.	

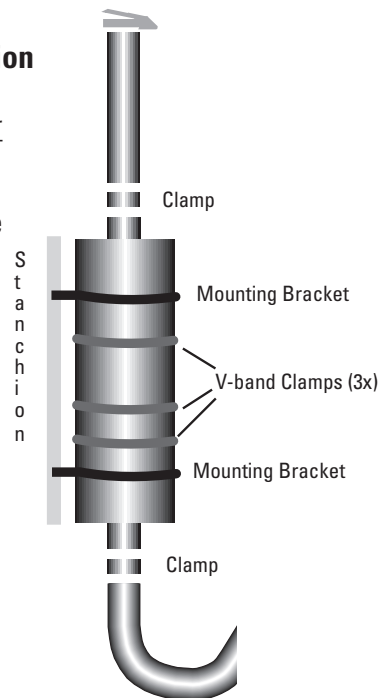
Install Tip	Save Install Time if Disposing of the Old Muffler and Components
It's not a good idea to reuse old exhaust components on new retrofit emissions installations. So, if your installation plan is to discard the old components, reduce install time by using a Sawzall® to cut the muffler and old clamps out of the exhaust system.	

Sawzall® is a registered trademark of the Milwaukee Electric Tool Company

Vertical Muffler 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 heat shield mounting brackets.
5. Loosen muffler and remove. Dispose of or recycle old muffler.



Install the LNF or LXF Muffler

1. Inspect the mounting brackets, bands, supports and/or stanchion for any damage, cracks or corrosion. Replace any existing mounting parts that appear rusted, damaged or of questionable strength with heavy-duty parts. Mounting components must be strong enough to support the LNF or LXF Muffler, which weigh roughly 80 lbs. (35 kg). Dual LNF/ LXF's weigh considerably more (9.5" model is 144 lbs. [65.3 kg]; 10.5" model is 173.5 lbs. [78.6 kg]). Donaldson offers many components designed specifically to handle the added weight of emissions retrofit devices (excluding dual LNF/ LXF).
2. Ensure the LNF or LXF Muffler is installed so that flow arrows match the exhaust flow direction. Place muffler/heat shield mounting brackets around the LNF or LXF Muffler body and finger-tighten. Rotate LNF or LXF Muffler so ARB emissions device tag is visible. Tighten (snug fit) mounting bracket bolts to hold the LNF or LXF Muffler in place.



CAUTION! Do Not Overtighten Bands or Clamps on Muffler Body

The pre-filter and DPF inside could be damaged if you deform the muffler body by overtightening the clamps.

3. Position tubing and clamps (i.e., SealClamp™) onto exhaust tube. Do not tighten clamps until all tubing is assembled.

NOTE

Flex is not approved in all locations. Check local ordinances or retrofit program rules.

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 to the emissions device inlet section.

NOTE

Avoid Excessive Force on Inlet and Outlet Piping!

Excessive force on the inlet and outlet piping in conjunction with vehicle vibration can result in stress cracking on the pipe or the emissions device inlet. Failures caused by excessive force are a result of improper installation and are not covered by warranty.

5. Position clamp over outlet tube on the LNF or LXF Muffler outlet section. Insert the stack into the muffler outlet and tighten securely. Vertical tailpipes over 4 ft. (1.2 m) require additional support. Install a rain cap or rain resistant stack.

NOTE

Water from Rain and Truck Washing Can Damage the DPF

Water can also damage the DPF retention material inside the device. Vertical tail pipes must be fitted with rain caps or rain resistant stack.

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. Permanently attach the DECS engine tag (supplied in documentation package) onto the engine using high-temp RTV or a screw. ARB regulations require the DECS engine tag be installed in a location clearly visible to Enforcement staff.

Application of the engine tag is necessary for all retrofit programs.

NOTE

Permanently affix DECS Engine Tag onto Engine

California ARB regulations require a DECS engine tag be permanently installed on the engine in a clear, visible location. Use high-temp RTV or screw.

10. Install Emissions Device Monitor (EDM). Installation instructions will be included with the monitor (manual P484891).

Horizontal Muffler Installation

Remove the Existing Muffler

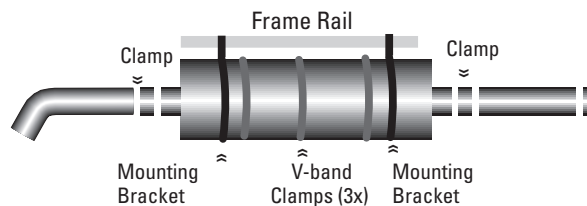
Install Tip

Save Install Time Use a Come-Along Winch to Remove Muffler

On horizontal muffler installations, a come-along winch can be used to pull the OEM outlet piping back far enough to remove the existing muffler. This same tool is also helpful when installing the new LNF or LXF Muffler.

1. Loosen clamp at muffler outlet. Remove clamp and tailpipe.
2. Remove clamp at muffler inlet.
3. Loosen muffler mounting bracket and remove muffler.
4. Dispose of or recycle old muffler.

Install the LNF or LXF Muffler



1. Inspect the mounting brackets, bands, and supports for any damage, cracks or corrosion. Mounting components must be strong enough to adequately support the LNF or LXF Muffler which weighs roughly 80 lbs. (35 kgs). Dual LNF/LXF's weigh considerably more (9.5" model is 144 lbs. [65.3 kg]; 10.5" model is 173.5 lbs. [78.6 kg]). Replace any existing mounting parts that appear rusted, damaged or of questionable strength with heavy-duty parts. Donaldson offers many components designed specifically to handle the added weight of emissions retrofit devices.



CAUTION! Avoid Rigid Mounting of the New Emissions Device

The original equipment muffler should have flexible hangers installed to allow for thermal expansion. If your system does not have flexible hangers, appropriate hangers should be used.

NOTE

Mounting System Clearance

Allow 1" (25mm) clearance around the LNF or LXF Muffler for movement and thermal expansion.

2. On vehicles with a vertical tailpipe, drill a 1/4" (6mm) drain hole 6" (152 mm) from the outlet end of the LNF or LXF Muffler. Install a raincap or rain resistant stack to the outlet.

NOTE

Drain Hole Required on Horizontal Mount Mufflers with Vertical Tailpipe(s)

Horizontally-mounted mufflers with vertical tailpipe systems must have a 0.25" (6mm) diameter drain hole drilled through the lowest point of the emissions device outlet section 6" (152mm). Rain and truck wash water can damage the DPF, reducing emissions performance. Water can also damage the DPF retention material in the unit. Vertical tailpipes must be fitted with rain caps or rain resistant stacks. Damaged caused by water may result in denial of warranty coverage.

3. Install mounting brackets over the LNF or LXF Muffler inlet/outlet sections and finger tighten. Position the drain hole at the bottom and mount in position. Be sure the mounting brackets do not cover the drain hole. Rotate muffler so ARB emissions device tag is visible. Ensure the LNF or LXF Muffler is installed so that flow arrows match the exhaust

flow direction. Tighten (snug fit) mounting band bolts to hold the emissions device in place.

4. Install the inlet piping to the LNF or LXF Muffler inlet section and tighten the clamp (i.e., SealClamp). Ensure the LNF or LXF Muffler is installed so that flow arrows match the exhaust flow direction.



CAUTION! Do Not Overtighten Brackets or Clamps on the Muffler Body

The pre-filter and DPF section could be damaged if you deform the muffler body by overtightening the clamps.

5. Install tailpipe and secure clamp (i.e., SealClamp) on emissions device outlet section. Vertical tailpipes over 4 ft. (1.2 m) require additional support. Install rain cap if vehicle has a vertical tailpipe.
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. Permanently attach the DECS engine tag (supplied in documentation package) onto the engine using high-temp RTV or a screw. ARB regulations require the DECS engine tag be installed in a location clearly visible to Enforcement staff.

NOTE

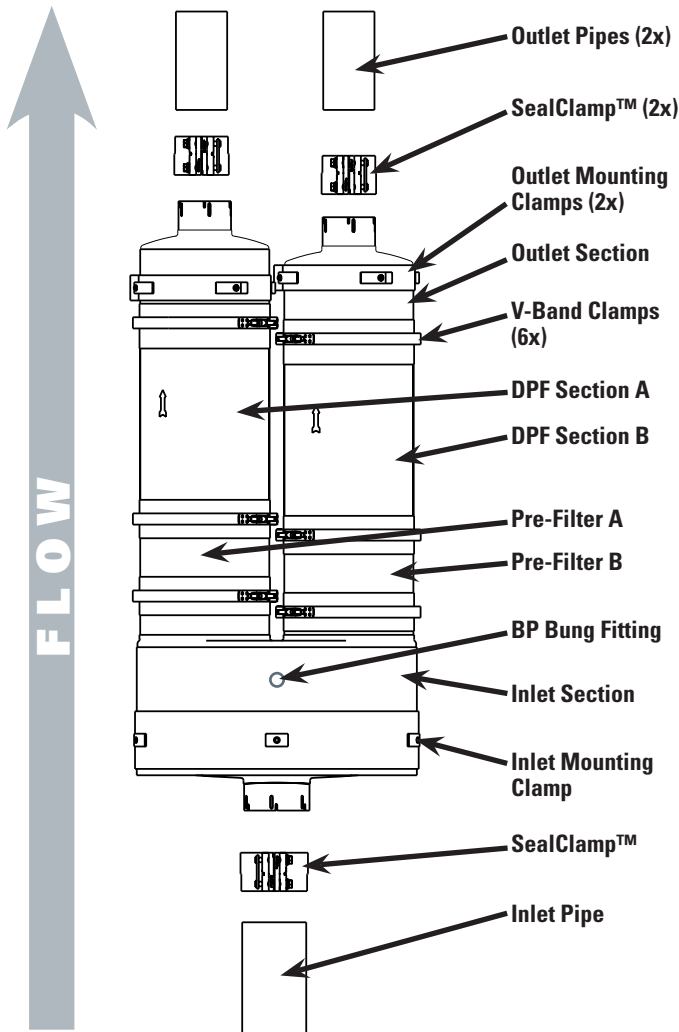
Permanently affix DECS Engine Tag onto Engine

California ARB regulations require a DECS engine tag be permanently installed on the engine in a clear, visible location. Use high-temp RTV or screw.

10. Install Emissions Device Monitor (EDM). Installation instructions will be included with the monitor (manual P484891).

Dual LNF/LXF Installation

Prior to installing an LNF/LXF Dual Muffler, please review the 'Horizontal Muffler Installation' or 'Vertical Muffler Installation' procedures. The requirements, suggestions, warnings and notes will also apply to the LNF/LXF Dual installation. The inlet and outlet mounting clamps are provided and are designed by Donaldson specifically for LNF/LXF Dual installations.

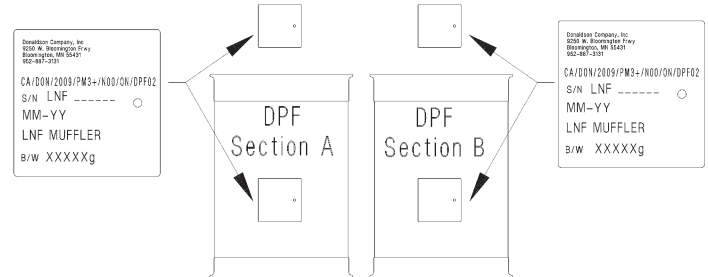


LNF/LXF Dual Muffler Part Description

To prevent unintended heat exposure, heat shields may be required for some applications and mounting provisions are included with the inlet and outlet mounting clamps. Contact your installer for appropriate heat shield options.

Each LNF/LXF Dual Muffler will be manufactured and shipped with two separate sets of identification tags. Each set will be specific to the DPF section of the LNF/LXF Dual Muffler. Each DPF section will have its own serialized tag. An identical

tag will be shipped as well, for each DPF section, that should be installed on the engine per the directions in the 'Horizontal Muffler Installation' or 'Vertical Muffler Installation' sections. Refer to the 'Device Identification' section for more information.



Device Identification

Donaldson Retrofit Devices have two identification tags/numbers. The first, center body identification, can be found near the inlet side of the DPF Section. Each number/code on the DPF Section is identified in the diagram below:

P232374 = Size A
P232536 = Size A
P232375 = Size B
P232376 = Size C
P232377 = Size D
P233536 = Size E

DPF Section P/N

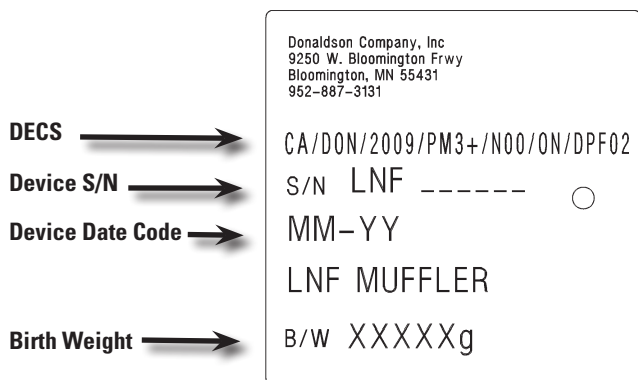
Manufacturing Code



Lot Code

Date Code "WW-YY"

The second, the device tag, can be found welded on the DPF Section or the engine tag. This contains information for the complete LNF/LXF Muffler. The information on this tag is described below:



In the event that the original device or engine tag is damaged, destroyed or missing, a replacement tag must be requested from an authorized installer or Donaldson Company.

Installation Checklist

LNF or LXF Muffler

- ☐ LNF or LXF Muffler is mounted in proper exhaust flow direction
- ☐ All LNF or LXF Muffler mounting hardware and clamps are tightened
- ☐ New hardware and clamps installed per this manual or CHP drawing (school bus only)
- ☐ No visible exhaust leaks in the system
- ☐ Vertical tailpipes over 4 ft. (1.2 m) require additional support
- ☐ Device tag is visible
- ☐ Emission Device Monitor (EDM) installed per EDM IOM
- ☐ DPF Sections are accessible for service
- ☐ Rain cap or rain resistant stack installed

Program Compliance

- ☐ Activate your warranty
- ☐ ARB engine tag permanently affixed to the engine with RTV silicone or screw in a visible location
- ☐ End user has warranty document, preliminary temperature data log, Donaldson response letter and this manual for their records.

Authorized Installer Qualifications

All authorized Donaldson Retrofit Emissions Installers are required to follow all terms and conditions of the Donaldson Dealer contract. Some of the key requirements are highlighted below.

- Be capable and competent to pre-assess, select and install the proper device, provide training, sales support and service to all Donaldson VDECS as prescribed in the Installation, Operation, and Maintenance Manuals
- Provide sales and support of the product locally
- Maintain all required compliance documents

Failure of all or any one of the items listed above or in the dealer contract will result in revocation of Donaldson authorized installer status.

Activate the Warranty

For regulatory reporting and warranty registration purposes, Donaldson Company requires the installer/dealer to complete and submit the warranty for the vehicle or equipment owner on our Warranty Registration web site.

A Warranty Registration Worksheet is included in the documentation packet. Register the new installation within 30 days using our on-line warranty registration site at: <http://pwww.donaldson.com>

Emissions Retrofit Documentation

Retain all emissions retrofit documentation on each vehicle, including:

- Vehicle temperature data / profile form
- Donaldson response letter that approved the retrofit application
- Date of installation
- Mileage / hours at install
- Installation and owner information
- Part number
- Serial number
- DPF service and cleaning records

Operation

The LNF and LXF Mufflers are passive DPF systems, meaning they rely on the heat (EGT) from the engine to catalytically burn diesel PM or soot. These DPFs incorporate a two-stage filtration design, using a metallic pre-filter mounted in front of

a ceramic DPF. This combination provides several performance advantages and permits soot burning at a wider range of engine duty cycles.

During vehicle operation, exhaust enters the emissions device inlet section and is evenly distributed across the catalyzed pre-filter. The pre-filter captures and burns roughly one third of the incoming soot, reducing the load on the DPF. It also creates NO₂ for oxidation of the soot captured in the DPF. Minimum exhaust temperatures must be maintained to ensure consistent and reliable soot burning. Data logging is used to assess the duty cycle and to ensure the exhaust temperatures are sufficient for passive regeneration.

Ash created from burned lube oil is also captured in the DPF. Over time, the ash build-up increases the restriction of the exhaust system. The DPF must be serviced periodically to remove the ash and prevent degraded engine performance.

NOTE

See EDM Manual P484893 for details on the In-Cab Display Alerts & Actions

Maintenance and Service

To ensure proper functioning of these products, Donaldson preventative maintenance and service procedures must be incorporated into your regular vehicle maintenance routines.

Your Right to Maintenance Information

The California Air Resources Board requires that Donaldson provide detailed maintenance information for the diesel emission control system upon delivery to the end-user pursuant to section 2706(h), Title 13, California Code of Regulations, at no additional cost to the owner. If you do not already have this information, contact Donaldson at 1-866-817-8733 or emissions@donaldson.com.

The Importance of Engine Maintenance

Proper engine maintenance is critical for the proper functioning of your diesel emission control strategy. Failure to document proper engine maintenance, including oil consumption records, may be grounds for denial of a warranty claim for a failed component of a diesel emissions control strategy.

The Importance of Properly Maintaining a Diesel Emissions Control Strategy

Proper maintenance is critical for the diesel control strategy to function as intended. Failure to document proper diesel

emission control strategy maintenance, including cleaning and/or ash removal of the system, replacement of consumables, and the replacement of broken/failed parts, may be grounds for denial of a warranty claim for a failed component of a diesel emission control strategy.

DPF Section Service Records

Donaldson requires that accurate and thorough records be maintained of any service and cleaning performed on your LNF or LXF Muffler.



CAUTION! Maintain Proper Maintenance Records!

Donaldson LNF and LXF Mufflers are regulated emissions control devices. Failure to show accurate and thorough service records upon request of regulator agency compliance inspections may result in warnings, fines or vehicle shut-down.

To ensure compliance, you are required to maintain the following information at the completion of any service occurrence:

- Date and mileage and/or hours when DPF Section is cleaned or serviced in any manner
- LNF or LXF Muffler serial number
- LNF or LXF Muffler Kit number
- Weight of DPF Section before and after cleaning. Use a precision scale that detects small weight changes.
- Backpressure (restriction) test readings of DPF Section from pulse cleaner before and after cleaning.
- EDM download from service date.

Routine Inspections During Vehicle Service

The following preventive maintenance recommendations should be conducted during normally scheduled vehicle maintenance.

1. Inspect the emissions device, exhaust piping and mounting brackets.
2. Look for leaks, structural failures (cracks) and loose or missing fasteners.
3. Review the EDM Installation using the EDM Installation and Owner's Manual P484893.
4. Repair or replace defective parts, as appropriate.


CAUTION! Do Not Use Fuels Blended with Lube Oil or Additives

Engine oil must not be blended with the engine's fuel. Fuel blended with oil may cause deposits in the DPF that increase backpressure, reduced engine performance and may result in denial of warranty coverage. The use of an unapproved additive may result in denial of warranty coverage.


CAUTION! Do Not Modify 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 DPF plugging and may result in denial of warranty coverage.


CAUTION! Monitor Lube Oil Consumption

Certain components found in engine lube oil can poison catalysts. To protect against DPF 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 (CJ-4). Do not use fuel blended with lube oil. Fuel additives may not be used without written approval from Donaldson. The use of an unapproved additive may result in denial of warranty coverage.

DPF Section Cleaning Interval

The DPF section of the LNF or LXF Muffler must be ash cleaned whenever any one of the following conditions are reached (whichever comes first):

- every 12 months,
- at 50,000 miles,
- at 1,800 hours of operation, or
- when the EDM in-cab display signals a warning light.



Some applications; including older, higher PM emitting engines, may require more frequent cleaning, as indicated by the EDM indicator lights.

Executing the following ash removal (DPF cleaning) guidelines will maintain DPF performance, proper operation and durability. Failure to follow the procedure may damage the DPF section and result in a denial of warranty coverage.


CAUTION! Follow Ash Cleaning Guidelines

Failure to follow the ash removal (DPF cleaning) guidelines may damage the DPF and result in denial of warranty coverage.

Light Actions and Descriptions


Display	Lights Action	Description
Start-up (Current Systems)	All LEDs Illuminate Steady	A self-test is performed at start-up and all lights illuminate steady for a three seconds. When done, the In-Cab Display will reveal any fault condition activated prior to shutdown.
Service Soon 	Steady Yellow	Filter requires service within 8 hours. This light will stay on for the duration of the key cycle. This light will turn off after key cycle.
Service Now 	Steady Red	Service the filter within 2 hours of operation or before the next work shift. Reset Service Now light after Filter service.
Temp Alarm	Flashing Red	Safely stop engine immediately. An engine situation has caused elevated exhaust temperatures. Visually inspect the filter for physical damage. If okay, service filter and reinstall. If not, filter will need to be replaced. Reset Temp Alarm light after the filter service.
Service Soon & Service Now	Alternate Flashing	This action indicates a problem with the wiring or connections or the filter could be missing. To diagnose, connect the EDM to a laptop using the computer link-up cable or use the Diagnostic Reset Tool to retrieve specific fault codes for troubleshooting.

Conditions That May Prematurely Plug an LNF or LXF Muffler

The conditions below, if not corrected, may result in denial of the LNF/LXF warranty:

- Improper engine maintenance
- Engine operation at low load or idling for extended periods of time
- Engine failures that increase PM emissions including, leaking or failed injectors, leaking turbocharger seals and/or intake manifold leaks
- Engine failures that emit contaminants that may foul the pre-filter or DPF
- Improper engine calibration for the specific fuel type being used

The above conditions may face-plug the pre-filter. To clean the pre-filter, use a shop vacuum with a bristle attachment to gently clean the face. The pre-filter does NOT require regular service during its life under normal operating conditions. The DPF section in the LNF or LXF Muffler will need routine service.

	CAUTION! DO NOT Pulse Clean the PRE-FILTER
The pre-filter does NOT require regular service during its life under normal operating conditions. Pulse cleaning the metal pre-filter may result in damage and denial of warranty coverage.	

Birth Weight

To meet ARB Objective Cleaning Requirements, a birth weight has been added to the muffler/device tag. This weight will be used to determine if a filter has been effectively cleaned. If the value below is greater than 20%, further cleaning is needed.

$$\frac{\text{Weight of Filter}_{\text{dirty}} (\text{g}) - \text{Weight of Filter}_{\text{clean}} (\text{g})}{\text{Weight of Filter}_{\text{dirty}} (\text{g}) - \text{Weight of Filter}_{\text{birth}} (\text{g})} \leq 20\%$$


EDM Download


An EDM download must be taken before the filter is removed for cleaning. This file should be reviewed and stored for future use.


DPF Section Cleaning Method and Process


The LNF and LXF Muffler DPF Section must be cleaned using the Donaldson Pulse Cleaner and Thermal Regenerator or a Donaldson approved DPF cleaning system. Failure to use Donaldson or Donaldson-approved methods may result in denial of warranty coverage.

Do not use any wet or liquid type cleaning system to clean the DPF.

	CAUTION! Do not use STEAM or LIQUID DETERGENTS to clean the DPF Section
Donaldson does not recommend cleaning the DPF Section with steam and/or other detergents. Use of these products may damage and/or deactivate the DPF and may result in denial of warranty coverage.	

	CAUTION! DO NOT Pulse Clean a HOT DPF Section
The DPF inlet/outlet surface must be below 200°F (93°C) before placing into the unit. Pulse cleaning a HOT DPF may result in fire leading to personal injury and/or property damage.	

	CAUTION! DO NOT Pulse Clean a DPF Section with Compressed Air > 70 psi!
Do not clean the DPF section with compressed air greater than 70 psi. Doing so may damage the DPF section and result in denial of warranty coverage.	

	CAUTION! Do Not Regenerate Fuel/Oil Soaked Cores
Regenerating fuel/oil soaked cores will damage the DPF section. Contact Donaldson Technical Services for further information.	

	Caution!
DO NOT operate until you read and understand the instructions and warnings in the Installation Operation and Maintenance Manual.	
DO NOT Insert Filter Soaked with Oil or Fuel	
	
Inserting a filter into this unit may result in fire leading to personal injury or property damage.	
Label No. P000000	

The recommended method and process to clean the DPF Section includes these steps:

Before Cleaning

- Measure and record weight of DPF Section
- Test and record backpressure of DPF Section in DPF Pulse Cleaner


DPF Section Cleaning

- Pulse clean in Donaldson Pulse Cleaner (removes ash and soot)
- Bake (thermally regenerate) in Donaldson Thermal Regenerator
- Pulse clean DPF Section when cool (removes additional ash created during the regeneration cycle)

After Cleaning

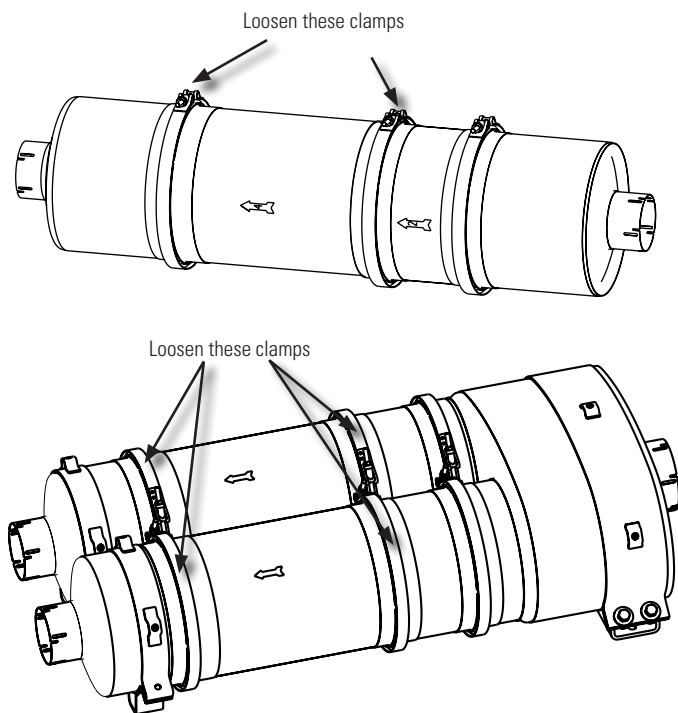
- Test and record backpressure of DPF Section in DPF Pulse Cleaner
- To measure cleaning efficiency, measure and record weight of DPF Section. LNF/LXF should be within 20% of the birth weight.

Procedure to Remove/Install DPF Section for Cleaning

	CAUTION! Wear Protective Gear During Cleaning
A dust mask, gloves and safety glasses should be worn while performing the cleaning process.	

1. Before removing the DPFs for cleaning, make note of the airflow direction arrow on the DPF Section. After cleaning, you must reinstall the DPF in the same exhaust flow direction.

2. Apply a brush-type, anti-seize material to the screw threads on the two V-band clamps.



3. Loosen the V-band clamps and remove the DPF Section from the muffler assembly. Replace V-band clamps if damaged. The DPF section is heavy, so ensure that it is supported properly during removal.

	CAUTION! Lifting Hazard
The DPF section is heavy. Support the DPF section properly during removal to avoid personal injury.	

4. Inspect the outlet face. If the outlet face (downstream side) is black from soot, the DPF has been damaged and must be replaced. Inspect further to ensure there is not a leaking weld.
5. Measure and record weight of DPF Section before cleaning.

NOTE	Measure and Record the DPF Section Weight
To measure the BEFORE and AFTER cleaning weight of the DPF Section, use a precision scale that detects small weight changes.	

6. Clean the DPF Section using the 'pulse-bake-pulse' process and procedures outlined in the Donaldson DPF Pulse Cleaner (Doc. No. P480801 or P487308) and Donaldson Thermal Regenerator (Doc. No. P480802) manuals. See 'Methods & Process' on the preceding page.
7. Measure and record weight of DPF Section after cleaning.
8. Reinstall the DPF section into the LNF or LXF Muffler. Ensure the DPF section is installed so that flow arrow matches the direction of the flow through the emissions device. The DPF section has been designed to prevent improper (or reverse) installation. Apply additional anti-seize to the threads on the V-band clamp, if needed. Re-tighten V-band clamps (torque to 200 in-lbs.).
9. Reset the EDM, if required (directions supplied with the EDM).

Disposal Information

The DPF Section in the LNF or LXF Muffler contains precious metal catalysts that reduce carbon monoxide, hydrocarbons and diesel particulate matter emissions. Typical catalyst metals may include platinum, palladium and rhodium. These materials can be recycled from damaged or deactivated DPFs. Please dispose of the LNF or LXF Muffler in accordance with all applicable Federal, State, and local regulations and laws. Recycle when possible.

Spare Parts

LNF/LXF Muffler Service Parts

Core Size	DPF Replacement Section ⁽³⁾		V-Band Clamps
	LNF Muffler	LXF Muffler	
A	X009814 (10")	X009980 (10")	P227750
A	X009816 (11")	X009979 (11")	P212925
B	X009818	X009978	P212925
C	X009820	X009977	P212925
D	X009822	X009976	P229851
E	X010946	X010947	P235305
DUAL A	X009814	X009980	P227750
DUAL B	X009818	X009978	P212925

Replacement DPF Tags

LNF Muffler X009646
LXF Muffler X009975

LNF / LXF Device Troubleshooting

Issue	Problem	Corrective Actions
Frequent DPF service needed as indicated by the EDM	Misapplication	Verify engine family number versus the approved Executive Order requirements
		Verify DPF sizing from Donaldson brochures.
		Verify the use of ASTM certified ULSD with NO additives
		Verify the use of CJ-4 oil
	Duty Cycle/Temperature	Check the preliminary data log
		Duty cycle may have changed, if so re-data log
		Change (or rotate) the vehicle onto tougher duty cycles with another vehicle
	Excessive idling	Ensure the driver is using anti-idling techniques
	Installation	Check all exhaust piping and connections for possible obstructions
		Inspect DPF face for possible debris blocking the face
	False EDM light	Verify the pressure sensor and line are installed correctly with no dips as per the "install checklist"
		Troubleshoot EDM
		Download backpressure history to check legitimacy of light
	Ineffective cleaning	Clean using the Donaldson recommended cleaning process
		Check the DPF weight as compared to its new weight for total soot removal.
	Engine issues causing high soot output	Check with OEM for most up to date ECU flashes
		Check fuel injectors for fuel leaks
		Check air filter for excessive plugging or restriction
		Check turbocharger for damage or wear
		Check fuel pressure to ensure it is in spec
		Check injector timing to ensure it is in spec
		Check turbocharger seals for oil leaks into the intake or exhaust stream
Soot coming out of tailpipe or on outlet of DPF Section	Cracked DPF Section	If DPF Section outlet is soot covered, the DPF has an internal crack and must be replaced. Contact your certified emissions dealer for DPF Section replacement.
	Incomplete weld	If the soot is highly concentrated near the outer edge, the weld on the inlet has a leak. Reweld the affected area on the inlet side of the DPF or submit a warranty claim through Donaldson.
Soot leaking around V-band clamps	V-band clamp loose	Re-torque V-band clamp to 200 in-lbs. and tap with a soft hammer around the installed clamp
	Flange damaged	Inspect flange perimeter for dents or irregularities and correct or replace defective part(s)
Soot leaking at an external weld	Pinhole leak in weld	Close pinhole using a MIG welder
		Replace defective components

Swapping and Re-designation

Before You Begin

Moving any component of a verified device from one vehicle/engine to another is subject to regulatory compliance requirements. 'Swapping' is the exchange of an existing DECS subcomponent with an identical subcomponent.

'Re-designation' is the movement of an entire DECS from one vehicle/engine to another and is also subject to regulatory compliance requirements. Specific requirements for 'swapping' and 're-designation' are found within the rules and regulations of the California 'Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines'.

Before 'swapping' an LNF or LXF device component or accomplishing 're-designation' of the entire device, conduct the following:

- Review the Donaldson Company 'Swapping and Re-designation Policy' provided on the California Air Resources Board website for the Diesel Emission Control Strategy (DECS) device considered for swapping or re-designation. All terms and conditions of the policy must be met. Failure to meet all of the terms and conditions of the policy may result in a non-compliance condition and/or may void the warranty of the device.
- Review the most current Executive Order available on the ARB website for the device considered for swapping or re-designation. Any and all actions taken to accomplish swapping or re-designation must ensure that all terms and conditions of the DECS device Executive Order are met.

All other applicable Donaldson Company Policies and Procedures for 'Swapping and Redesignation' of devices must be followed. Contact Donaldson Company (or your Authorized Dealer) for instructions to accomplish proper swapping or re-designation of a DECS device.

Note: Certain information reporting and record keeping is required by regulatory agencies for compliance. Failure to track and report swapping or re-designation activity information may result in non-compliance. Follow all Donaldson requirements for tracking and information reporting.

- Download the EDM data and plot the log file data. Donaldson Engineering can assist in interpreting this log file to determine if the filter is subject to an engine upset condition or is a valid swapping candidate.

In addition, this manual contains certain instructions and requirements to support 'Swapping and Redesignation' for LNF and LXF devices.

Instructions for Assessing the System or DPF Section Still Meets its Verified Emissions Reductions (PM)

The procedure outlined below is valid for testing a core or entire LNF or LXF System.

1. Download and inspect the EDM log file data. Review the LNF/LXF System backpressure/temperature data to ensure the device has been operating properly.
2. Complete a Donaldson Pre-Assessment on the suspect engine/application.

Component Swapping

For the instructions that follow the DPF Section on the vehicle/engine before the start of swapping activity will be referred to as 'core A'. The DPF Section to be **temporarily** exchanged with core A and installed on the vehicle/engine will be referred to as 'core B'. Note - core B must be a DPF section dedicated to swapping activity over its entire useful life.

System components approved for swapping:

- LNF System DPF Section
- LXF System DPF Section

Note: Donaldson allows only temporary swapping of the DPF Section and then ONLY for the purpose of providing routine cleaning service of the DPF Section originally installed on the vehicle/engine (i.e. core A). The engine/vehicle participating in swapping of the DPF Section must be operating properly and in a good state of maintenance. **Swapping a DPF Section for the purpose of engine troubleshooting is not permitted since a malfunctioning engine may damage the DPF Section.**

Confirmation Process to Ensure the Appropriate Core is Used for Swapping

1. Confirm whether core A is from an LXF System or LNF System. Core B must be of the same DECS number. You may confirm the appropriate DECS number by referencing the most current verification listed on the ARB website. The DECS number can be found on either the device or engine tag. (Reference the 'Device Identification' Section of this manual for further information.)
2. Confirm that the Engine Family Name is listed in Attachment 1 of the applicable LNF or LXF Executive Order

as determined in Step 1 above. The engine family name must be listed in the Executive Order of the technology to proceed.

3. Obtain an appropriate DPF Section to install on the vehicle/engine as core B. Core B must have the same DECS number as Core A (LNF or LXF) as described in Step 1.
 - a) Core B must be a DPF Section dedicated to swapping activity over its entire useful life and be labeled as "SPARE". Core B must be cleaned per Donaldson cleaning requirements every 200 to 300 hours of operation, or when EDM backpressure warnings indicate service is required, whichever comes first. (See 'DPF Section Cleaning Method & Process' contained in the 'Maintenance and Service' Section of this manual.)
 - b) Core B must be the same physical size as core A in both length and diameter and with the same flange connection.

Installation and Re-installation Practices

Failure to follow these instructions may result in a non-compliant system installation, damage to the LNF/LXF System, and may void the warranty of the system.

4. Remove core A from the vehicle/engine. Follow removal steps of the 'Procedure to Remove/Install DPF Section for Cleaning' contained in the 'Maintenance and Service' Section of this manual.
 - a) Core A must be cleaned per the 'DPF Section Cleaning Method & Process' contained in the 'Maintenance and Service' section of this manual, and then reinstalled **only** on the vehicle/engine from which it came.
5. Install core B on the vehicle/engine. Follow installation steps of the 'Procedure to Remove/Install DPF Section for Cleaning' contained in the 'Maintenance and Service' section of this manual.
6. Return the vehicle to service (if required) for no longer than 30 days of operation then remove core B and reinstall core A. Follow installation steps of the 'Procedure to Remove/Install DPF Section for Cleaning' contained in the 'Maintenance and Service' section of this manual.
7. Record all cleaning, vehicle, engine, and device swapping information and report as required. Failure to report the required information may result in a non-compliant system installation and may void the warranty of the system.

System Re-designation

For the instructions that follow, the vehicle/engine from which the LNF/LXF System will be removed will be referred to as the 'donor vehicle/engine'. The vehicle/engine to receive the LNF/LXF System from the donor vehicle/engine will be referred to as the 'recipient vehicle/engine'.

Re-designation of a LNF/LXF System from a donor vehicle is treated as a new application with regard to the recipient vehicle/engine. Application of the LNF/LXF System to the recipient vehicle/engine must meet all terms and conditions of the applicable Executive Order and Donaldson pre-assessment processes.

Failure to follow this procedure may result in a non-compliant system installation and may void the warranty of the system.

System components approved for re-designation:

- LNF Muffler Assembly. The Muffler Assembly consists of an Inlet Section, Pre-filter Section, DPF Section and Outlet Section. See 'LNF & LXF Muffler Kit' section of this manual.
- LXF Muffler Assembly. The Muffler Assembly consists of an Inlet Section, Pre-filter Section, DPF Section and Outlet Section. See 'LNF & LXF Muffler Kit' section of this manual.

System components not approved for re-designation:

- Emissions Device Monitor (EDM). A new EDM or re-flashed SECM/MM must be installed when an LNF or LXF system is re-designated.

Confirmation Process to Ensure the Appropriate LNF/LXF Muffler is Used for Re-designation

1. Confirm whether the DECS system is from an LXF or LNF System. The recipient vehicle/engine must be approved for the particular DECS system and must occur within the same common ownership fleet. You may confirm the appropriate DECS and approved engine family numbers by referencing the most current verification listed on the ARB website. The DECS number can be found on either the engine or device tag. (Please see the 'Device Identification' section of this manual for more information.)
2. The LNF/LXF System to be re-designated must be less than 10 years old.
 - a) Determine the date of manufacture by the MM-YY date code on the DPF Core Assembly where 'MM' is a 2-digit number representing the month of manufacture, and 'YY' is a 2-digit number representing the year of manufacture. If the date code indicates a device age of 10 years or greater the system cannot be re-designated.

- b) If a date code is not present or visible, contact Donaldson with the serial number of the device to determine the original manufacturing date and age of the device.
 - c) If the age of the device cannot be determined, it cannot be re-designated.
3. Confirm that the Engine Family Name is listed in Attachment 1 of the applicable LNF or LXF Executive Order as determined in Step 1. The engine family name must be listed in the Executive Order of the technology to proceed.
4. The recipient vehicle/engine must meet all the requirements of the Executive Order and Donaldson's pre-assessment process to proceed.
 - a) The owner must receive an approval letter from Donaldson in order to proceed with the order and re-designation process.

Installation and Re-installation Practices

Failure to follow these instructions may result in a non-compliant system installation, damage to the LNF/LXF System and may void the warranty of the system.

1. Determine system installation requirements of the recipient vehicle/engine and obtain all system components and hardware required to install the LNF/LXF System on the recipient vehicle/engine. Contact your Donaldson Dealer for assistance. Components include, but are not limited to:
 - A new EDM or re-flashed SECM/MM - required for the recipient vehicle/engine
 - V-band clamps - replace all clamps on the Muffler Assembly coming from the donor vehicle/engine
 - A new replacement device label and new replacement engine label - required, available from Donaldson
2. Remove the LNF/LXF Muffler Assembly from the donor vehicle/engine.
3. Remove the LNF/LXF System engine label from the donor vehicle/engine.
 - a) This label must be destroyed by cutting into pieces no larger than ½" by 2".
 - b) If the donor vehicle/engine will be returned to service it must first be made compliant with all applicable rules and regulations for emission control. This may include installing a new retrofit device or returning the vehicle/engine exhaust system to its original certified

configuration. Contact your local regulatory agency for appropriate remedies.

4. The DPF Section from the donor vehicle/engine must be cleaned per Donaldson Company requirements and specifications prior to installation of the Muffler assembly on the recipient vehicle/engine. See 'DPF Section Cleaning Method & Process' contained in the 'Maintenance and Service' section of this manual.
5. Follow all requirements and procedures of this manual to install the Muffler Assembly and EDM kit on the recipient vehicle/engine.
 - a) Remove label from the DPF Core Assembly and attach a new replacement label obtained in step 1c). Spot weld the new tag to the DPF Section in the same location where the original DECS tag was removed from. Ensure a secure tack weld on all four corners.
 - b) Install the engine label per this manual.
6. Record all vehicle, engine and device re-designation information and report as required. Failure to report the required information may result in a non-compliant system installation.
7. Return the recipient vehicle/engine to service.

Swapping and Re-designation Warranty

Per California Code of Regulations (CCR) Title 13. Division 3. Chapter 14. Section 2707, the manufacturer will honor the original installation warranty and warranty period.

If the installer of either a swapped component or re-designated diesel emission control strategy is not the same as the installer who did the original installation of the diesel emission control strategy, the new installer must assume the installation warranty responsibilities defined in section 2707 for the remainder of the original warranty period or until another installer swaps the component or re-designates the diesel emission control strategy. If the original installation warranty has expired or has less than one year remaining, the installer must issue a new warranty to guard against potential installation defects. The new installation warranty must meet the requirements of section 2707 except that the minimum period is reduced to one year from the date of installation. Any transfer of a diesel emission control strategy or component by an installer that does not offer this installation warranty is not considered a valid installation.

Limited Warranty

Both the installer and owner should retain a copy of the warranty in their records for the specific vehicle.

Your Warranty Rights and Obligations

Donaldson must warrant the diesel emissions control system in the application for which it is sold or leased to be free from defects in design, materials, workmanship or functionality which cause the diesel emission control system to fail to conform to the emission control performance level it was verified to, or to the requirements in the California Code of Regulations, Title 13, Sections 2700 to 2706, and 2710, for the periods of time listed below, provided there has been no abuse, neglect, or improper maintenance of your diesel emission control system, vehicle or equipment, as specified in the owner's manuals. Where a warrantable condition exists, this warranty also covers the engine from damage caused by the diesel emission control system, subject to the same exclusions for abuse, neglect or improper maintenance of your vehicle or equipment. Please review your owner's manual for other warranty information. Your diesel emission control system may include a core part (e.g., particulate filter, diesel oxidation catalyst, selective catalytic reduction converter) as well as hoses, connectors, a back pressure monitor (if applicable) and other emission-related assemblies. Where a warrantable condition exists, Donaldson will repair or replace your diesel emission control system at no cost to you including diagnosis, parts, and labor.

Warranty Coverage

Warranty coverage begins on the date and mileage when the LNF or LXF Muffler Kit is installed by the user and expires when the specified number of years, miles or hours have passed, whichever occurs first.

Medium Heavy-Duty 5 years or 100,000 miles
(170-250 hp / GVWR from 19,500-33,000 lbs.)

Heavy Heavy-Duty 5 years or 150,000 miles
(Exceeds 250 hp / GVWR exceeds 33,000 lbs.)

Heavy Heavy-Duty 2 years, unlimited miles
(Exceeds 250 hp / GVWR exceeds 33,000 lbs. and the truck is (1) typically driven over 100,000 miles per year and, (2) has less than 300,000 miles on the odometer at the time of installation.)

Off-Road Use 5 years or 4,200 hours
(At or above 50 hp)

If any emissions-related part of your diesel emissions control system is defective in design, materials, workmanship or operation of the diesel emissions control system thus causing the diesel emissions control system to fail to conform to the emissions control performance level it was verified to or to the requirements in the California Code of Regulations, Title 13, Sections 2700 to 2706, and 2710, within the warranty period as defined above, Donaldson will repair or replace the diesel emission control system, including parts and labor.

In addition, Donaldson will replace or repair the engine components to the condition they were in prior to the failure, including parts and labor, for damage to the engine proximately caused by the verified diesel emissions control strategy. This also includes those relevant diagnostic expenses in the case in which a warranty claim is valid. Donaldson may, at its option, instead pay the fair market value of the engine prior to the time the failure occurs.

Installation Warranty Responsibility

The Donaldson authorized installer must furnish the owner with a copy of the following statement.

Your Warranty Rights and Obligations

(Installer's name) warrants that the installation of a diesel emission control system is free from defects in workmanship or materials which cause the diesel emission control system to fail to conform to the emission control performance level it was verified to, or to the requirements in the California Code of Regulations, Title 13, Sections 2700 to 2706. The warranty period and the extent of the warranty coverage provided by the installer must be the same as the warranty provided by the product manufacturer, and the same exclusions must apply.

Owner's Warranty Responsibility

As the vehicle, engine or equipment owner, you are responsible for presenting your vehicle, engine, or equipment and diesel emission control system to your Donaldson authorized installer as soon as a problem with the installation is detected. If you have questions regarding your warranty rights and responsibilities, you should contact

_____ (installer's contact)
at _____ (installer's toll-free phone)

or the California Air Resources Board at 9528 Telstar Avenue, El Monte, California 91731, or (800) 363-7664, or electronic mail: helpline@arb.ca.gov.

As the vehicle, engine or equipment owner, you are responsible for performing the required maintenance described in your owner's manual. Donaldson recommends that you retain all maintenance records and receipts for maintenance expenses for your vehicle, engine, or equipment, and diesel emissions control system. If you do not keep your receipts or fail to perform all scheduled maintenance, Donaldson may have grounds to deny warranty coverage. You are responsible for presenting your vehicle, equipment or engine, and diesel emissions control system to a Donaldson dealer as soon as a problem is detected. The warranty repair or replacement should be completed in a reasonable amount of time, not to exceed 30 days. If a replacement is needed, this may be extended to 90 days should a replacement not be available, but must be performed as soon as a replacement becomes available.

If you have any questions regarding your warranty rights and responsibilities, you should contact Donaldson Emissions Retrofit Technical Support toll-free at (866) 817-8733 or emissions@donaldson.com or the California Air Resources Board at 9528 Telestar Avenue, El Monte, California 91731, or (800) 363-7663, or electronic mail: helpline@arb.ca.gov.

Actions and Improper Maintenance That May Result in Denial of Your Warranty Coverage

The following conditions are considered to be abuse, neglect or improper maintenance that may result in denial of warranty coverage:

- 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 to an engine model or to a duty cycle other than that which it is designed and approved.
- Improper installation (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.
 - (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.
 - 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 DPF Section or plugging caused by water entry.



Donaldson
FILTRATION SOLUTIONS

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