

Fastener Tightening Specifications

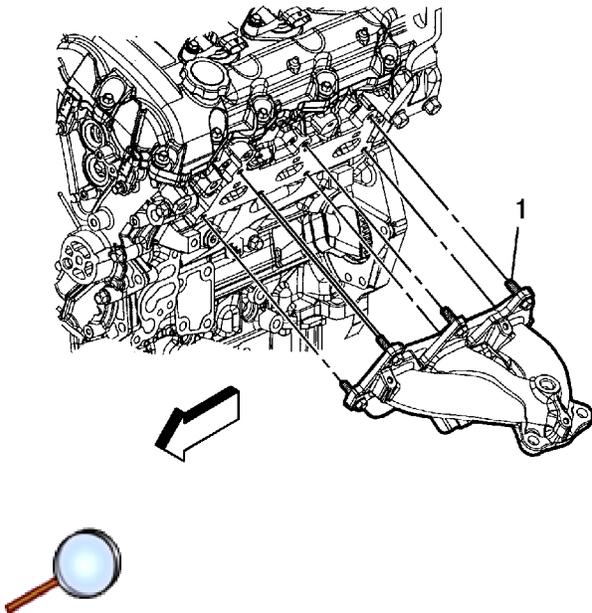
Application	Specification	
	Metric	English
Catalytic Converter Brace Bolt	41 N·m	30 lb ft
Catalytic Converter Hanger Clamp Nut	18 N·m	13 lb ft
Catalytic Converter to Exhaust Flexible Pipe Nut	28 N·m	21 lb ft
Catalytic Converter to Exhaust Manifold Nut	50 N·m	37 lb ft
Exhaust Flexible Pipe to Three-Way Converter Nut	50 N·m	37 lb ft
Exhaust Manifold Bolt	20 N·m	15 lb ft
Exhaust Manifold Heat Shield Bolt	10 N·m	89 lb in
Exhaust Manifold Lower Heat Shield Bolt (Small Bolt)	10 N·m	89 lb in
Exhaust Manifold Lower Heat Shield Bolt (Large Bolt)	50 N·m	37 lb ft
Exhaust Muffler Heat Shield Nut	9 N·m	80 lb in
Three-Way Catalytic Converter to Muffler Assembly Nut	50 N·m	37 lb ft

Exhaust Manifold Replacement - Left Side

Removal Procedure

Warning: Refer to [Exhaust Service Warning](#) in the Preface section.

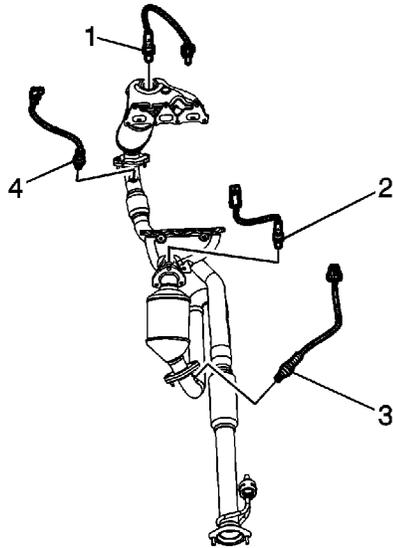
Warning: Refer to [Protective Goggles and Glove Warning](#) in the Preface section.



1. Remove the exhaust manifold heat shield. Refer to [Exhaust Manifold Heat Shield Replacement - Left Side](#).
2. Remove the oil level indicator. Refer to [Oil Level Indicator and Tube Replacement](#).
3. Remove the catalytic converter. Refer to [Catalytic Converter Replacement - Left Side](#).
4. Remove the exhaust manifold bolts (1).

Note: Do not reuse the gasket.

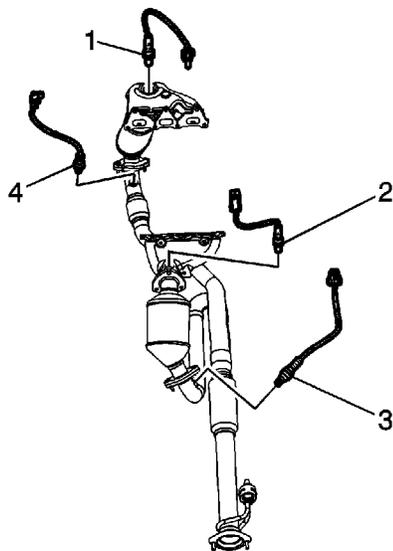
5. Remove the exhaust manifold and gasket. Discard the gasket.



6. Remove the heated oxygen sensor (1) from the exhaust manifold.

Installation Procedure

Note: A special anti-seize compound is used in the HO₂S threads. The compound consists of liquid graphite and glass beads. The graphite tends to burn away, but the glass beads remain, making the sensor easier to remove. New, or service replacement sensors have the compound applied to the threads. If the sensor is removed from an exhaust component and if for any reason the sensor is to be reinstalled, the threads must have anti-seize compound applied before the reinstallation.



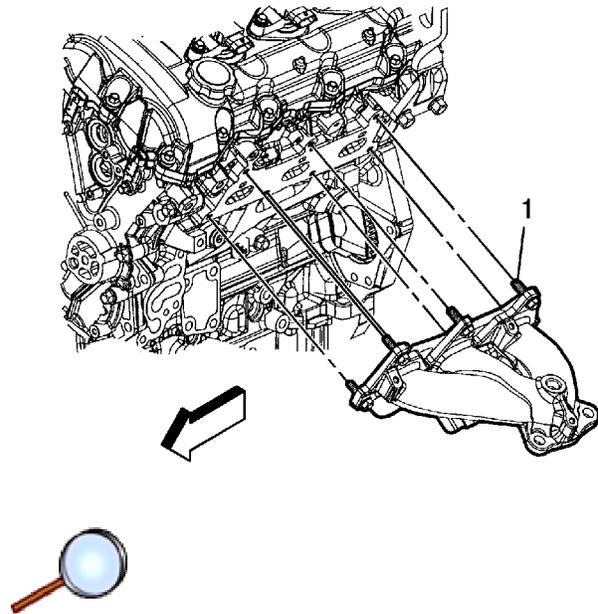
1. If reinstalling the old sensor, coat the threads with anti-seize compound GM P/N 12377953, or equivalent.

Caution: Refer to [Fastener Caution](#) in the Preface section.

2. Install the HO2S (1) to the exhaust manifold.

Tighten

Tighten the sensor to 42 N·m (31 lb ft).



3. Install one exhaust manifold bolt (1) to the exhaust manifold.
4. Install the NEW exhaust manifold gasket onto the exhaust manifold and bolt.
5. Install the exhaust manifold (with gasket) to the cylinder head and the catalytic converter.
6. Install the remaining exhaust manifold bolts.

Tighten

Tighten the bolts to 20 N·m (15 lb ft).

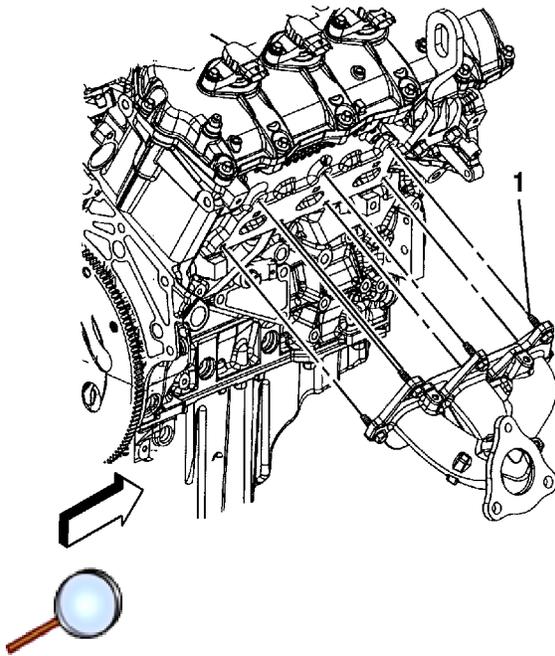
7. Install the catalytic converter. Refer to [Catalytic Converter Replacement - Left Side](#).
8. Install the oil level indicator. Refer to [Oil Level Indicator and Tube Replacement](#).
9. Install the exhaust manifold heat shield. Refer to [Exhaust Manifold Heat Shield Replacement - Left Side](#).

Exhaust Manifold Replacement - Right Side

Removal Procedure

Warning: Refer to [Exhaust Service Warning](#) in the Preface section.

Warning: Refer to [Protective Goggles and Glove Warning](#) in the Preface section.

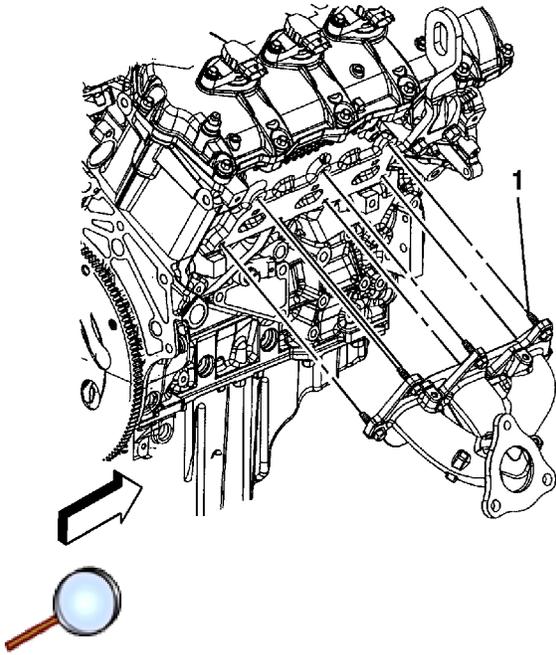


1. Remove the catalytic converter. Refer to [Catalytic Converter Replacement - Right Side](#).
2. Remove the exhaust manifold heat shield. Refer to [Exhaust Manifold Heat Shield Replacement - Right Side](#).
3. Remove the exhaust manifold bolts (1).

Note: Do not reuse the gasket.

4. Remove the exhaust manifold and gasket out from vehicle. Discard the gasket.

Installation Procedure



1. Install one exhaust manifold bolt (1) to the exhaust manifold.
2. Install the NEW exhaust manifold gasket onto the cylinder head and bolt.
3. Install the exhaust manifold (with gasket) to the catalytic converter and the cylinder head.

Caution: Refer to [Fastener Caution](#) in the Preface section.

4. Install the exhaust manifold bolts.

Tighten

Tighten the bolts to 20 N·m (15 lb ft).

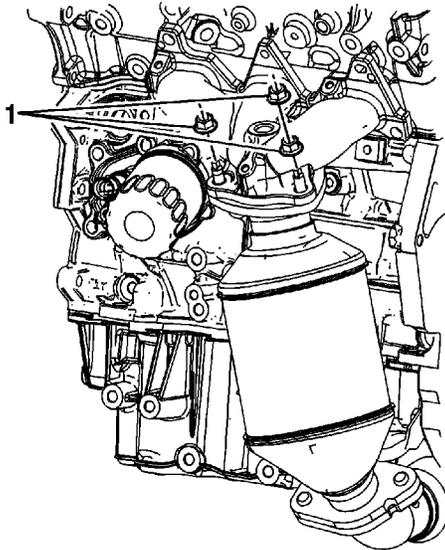
5. Install the exhaust manifold heat shield. Refer to [Exhaust Manifold Heat Shield Replacement - Right Side](#).
6. Install the catalytic converter. Refer to [Catalytic Converter Replacement - Right Side](#).

Catalytic Converter Replacement - Left Side

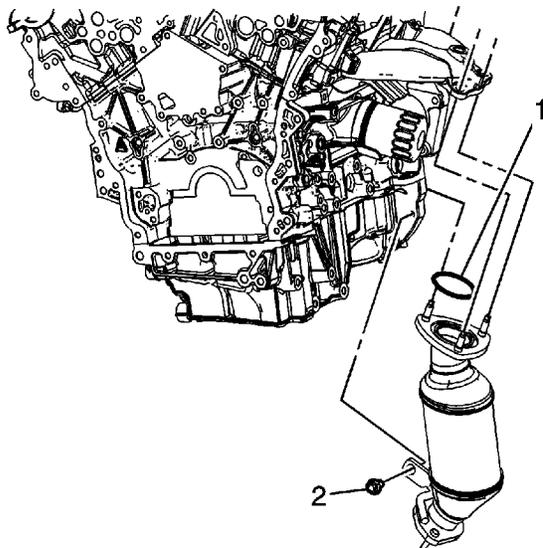
Removal Procedure

Warning: Refer to [Exhaust Service Warning](#) in the Preface section.

Warning: Refer to [Protective Goggles and Glove Warning](#) in the Preface section.



1. Remove the exhaust manifold heat shield. Refer to [Exhaust Manifold Heat Shield Replacement - Left Side](#).
2. Remove the catalytic converter to exhaust manifold nuts (1).
3. Remove the exhaust flexible pipe. Refer to [Exhaust Flexible Pipe Replacement](#).

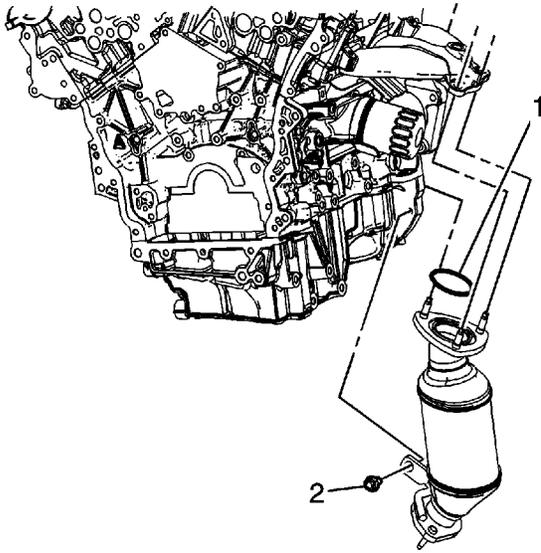


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4. Remove the catalytic converter brace bolt (2).
5. Remove the catalytic converter from the exhaust manifold.
6. Remove and discard the catalytic converter to exhaust manifold seal (1).

Installation Procedure



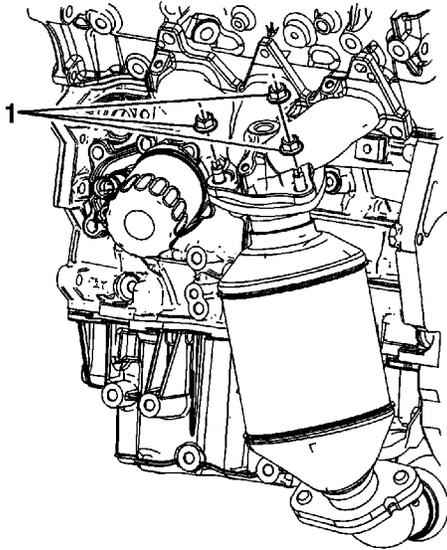
1. Install a NEW exhaust manifold seal (1) onto the catalytic converter.
2. Install the catalytic converter to the exhaust manifold.

Caution: Refer to [Fastener Caution](#) in the Preface section.

3. Install the catalytic converter brace bolt (2).

Tighten

Tighten the bolt to 41 N·m (30 lb ft).



4. Install the exhaust flexible pipe. Refer to [Exhaust Flexible Pipe Replacement](#).
5. Install the catalytic converter to exhaust manifold nuts (1).

Tighten

Tighten the nuts to 50 N·m (37 lb ft).

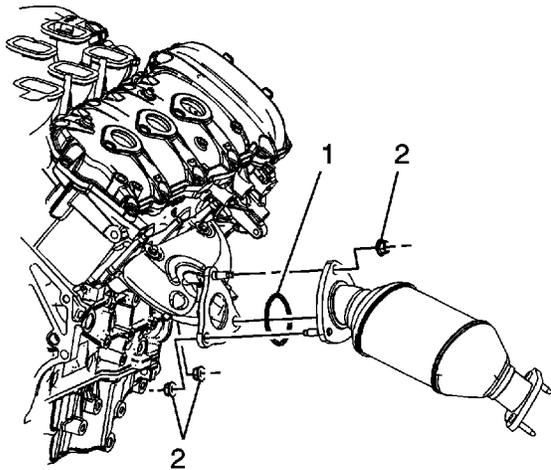
6. Install the exhaust manifold heat shield. Refer to [Exhaust Manifold Heat Shield Replacement - Left Side](#).

Catalytic Converter Replacement - Right Side

Removal Procedure

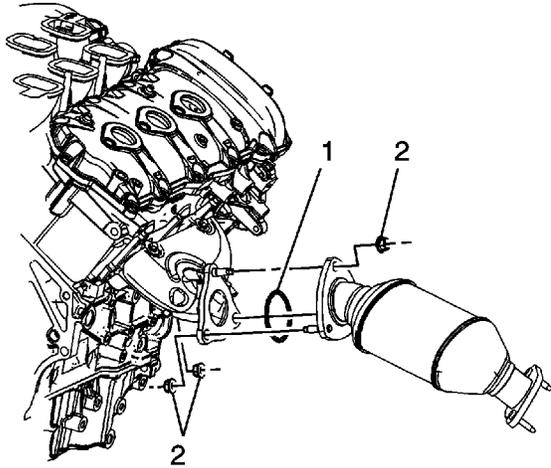
Warning: Refer to [Exhaust Service Warning](#) in the Preface section.

Warning: Refer to [Protective Goggles and Glove Warning](#) in the Preface section.



1. Remove the exhaust flexible pipe. Refer to [Exhaust Flexible Pipe Replacement](#).
2. Remove the catalytic converter to exhaust manifold nuts (2).
3. Remove the catalytic converter from the exhaust manifold.
4. Remove and discard the catalytic converter to exhaust manifold seal (1).

Installation Procedure



1. Install a NEW catalytic converter to exhaust manifold seal (1) onto the catalytic converter.
2. Install the catalytic converter to the exhaust manifold.

Caution: Refer to [Fastener Caution](#) in the Preface section.

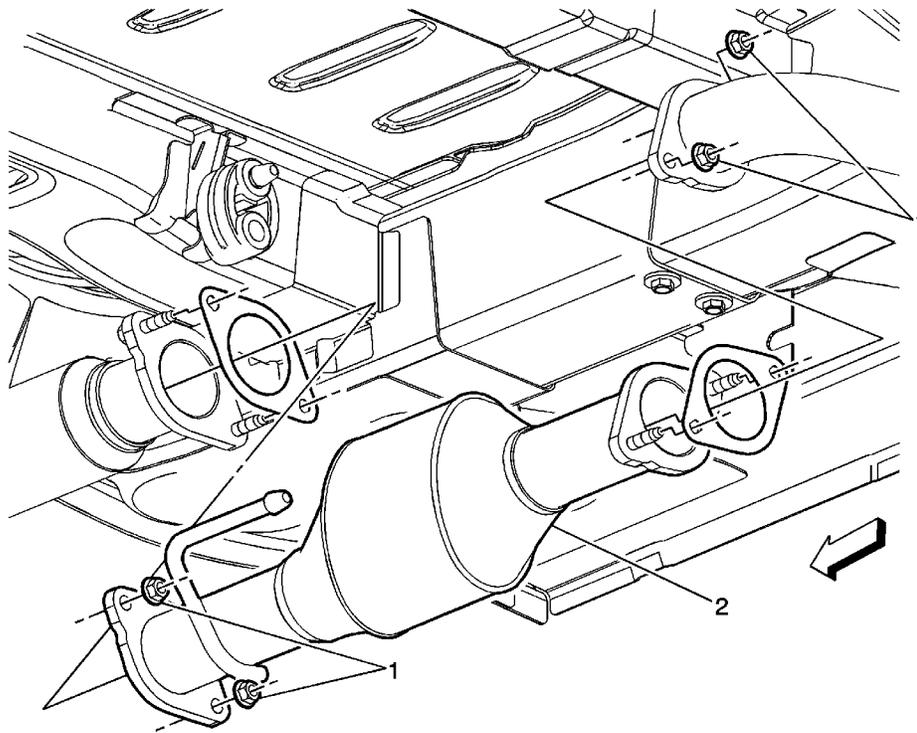
3. Install the catalytic converter to exhaust manifold nuts (2).

Tighten

Tighten the nuts to 50 N·m (37 lb ft).

4. Install the exhaust flexible pipe. Refer to [Exhaust Flexible Pipe Replacement](#).

Three-Way Catalytic Converter Replacement (With LLT)

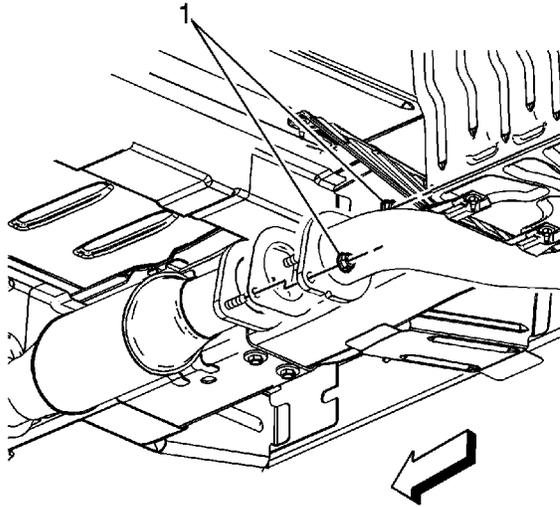


Callout	Component Name
<p>Preliminary Procedure</p>	
<p>Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.</p>	
<p>1</p>	<p>Nut (Qty: 4)</p> <p>Caution: Refer to Fastener Caution in the Preface section.</p> <p>Tighten 50 N·m (37 lb ft)</p>
<p>2</p>	<p>Three Way Catalytiv Converter</p> <p>Procedure</p> <ol style="list-style-type: none"> 1. Disengage the hanger. 2. Remove and discard the gaskets.

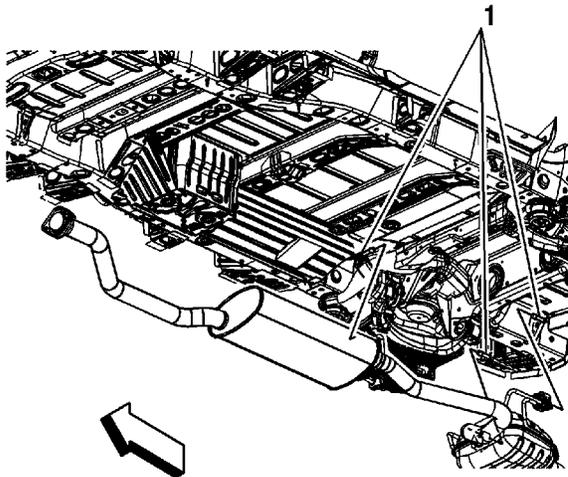
Exhaust Muffler Replacement (With NB5)

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).



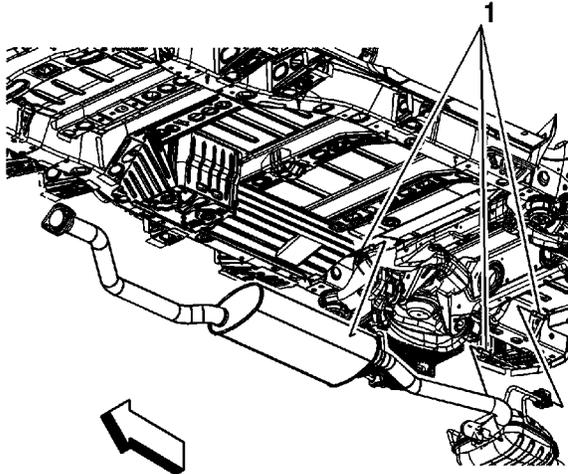
2. Remove the three way catalytic converter to muffler pipe nuts (1).



3. With the aid of an assistant, separate the rubber insulators from the exhaust underbody hangers (1).
4. With the aid of an assistant, remove the muffler assembly from exhaust flexible pipe and the vehicle.

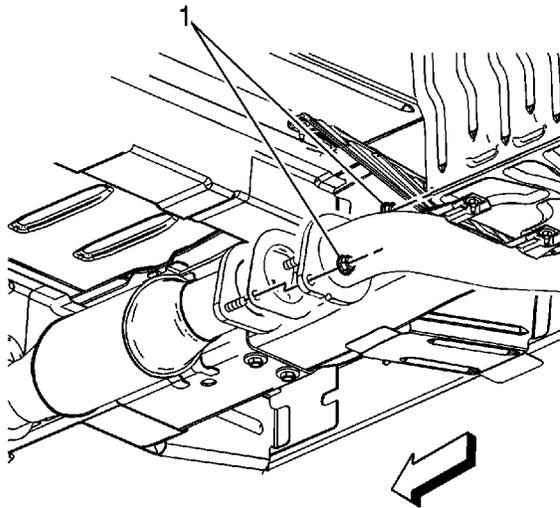
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Installation Procedure



1. With the aid of an assistant, install the muffler assembly to the vehicle and the exhaust flexible pipe.
2. With the aid of an assistant, install the rubber insulators to the exhaust underbody hangers (1).

Caution: Refer to [Fastener Caution](#) in the Preface section.



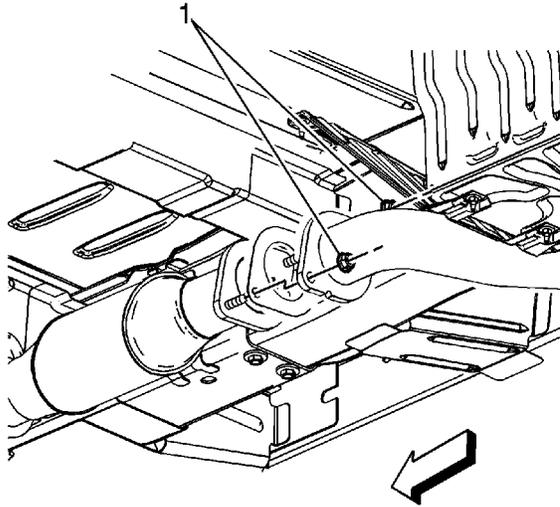
3. Install the three way catalytic converter to muffler piper nuts (1) and tighten to **50 N·m (37 lb ft)**.

4. Lower the vehicle.

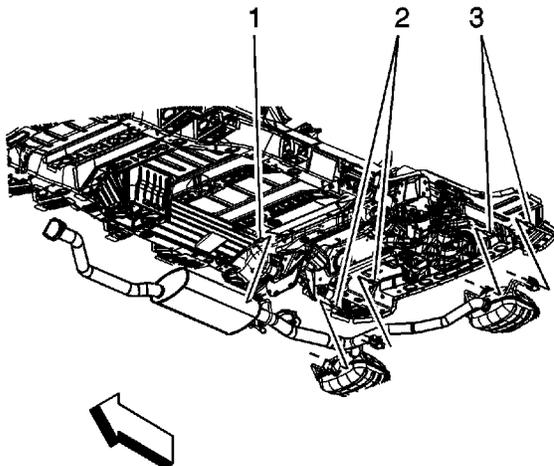
Exhaust Muffler Replacement (With NEA or NEB)

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).



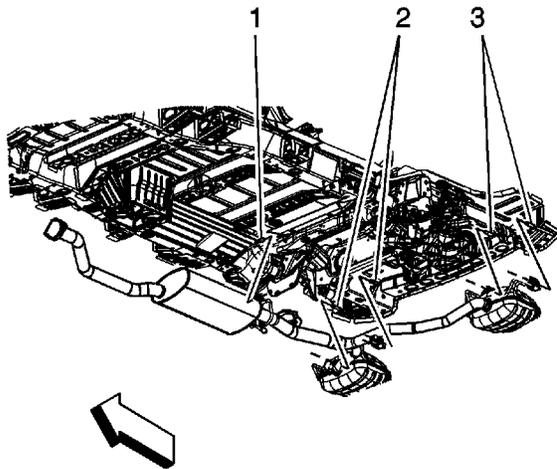
2. Remove the three way catalytic converter to muffler pipe nuts (1).



3. With the aid of an assistant, separate the rubber insulators from the exhaust underbody hangers (1, 2, and 3).
4. With the aid of an assistant, remove the muffler assembly from exhaust flexible pipe and the vehicle.

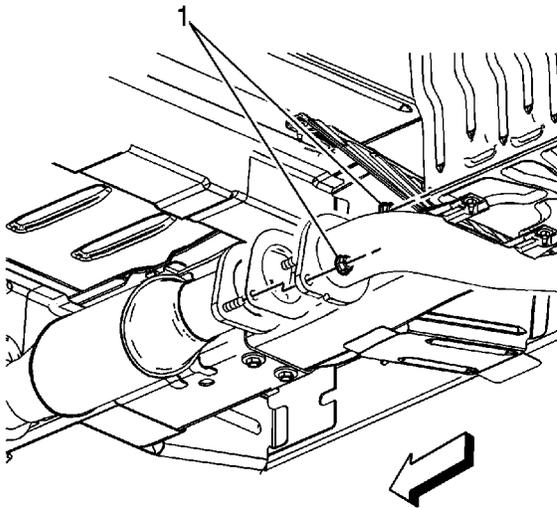
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Installation Procedure



1. With the aid of an assistant, install the muffler assembly to the vehicle and the exhaust flexible pipe.
2. With the aid of an assistant, install the rubber insulators to the exhaust underbody hangers (1, 2, and 3).

Caution: Refer to [Fastener Caution](#) in the Preface section.



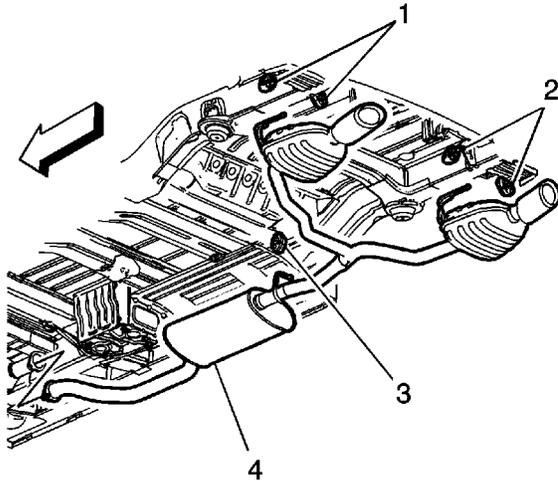
3. Install the three way catalytic converter to muffler pipe nuts (1) and tighten to **50 N·m (37 lb ft)**.

4. Lower the vehicle.

Exhaust Muffler Replacement (With LLT)

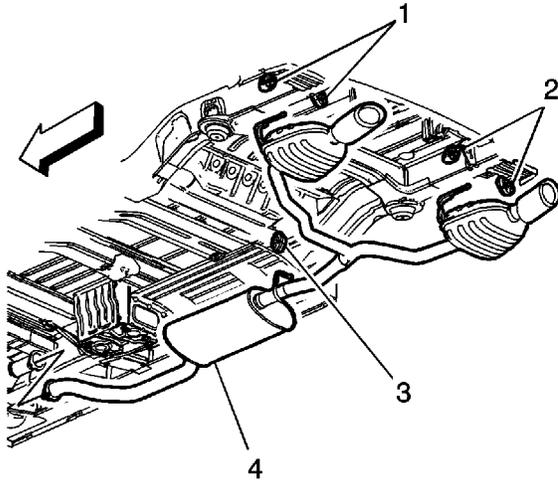
Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the three way catalytic converter to muffler nuts.



3. With the aid of an assistant, separate the rubber insulators from the exhaust underbody hangers (1, 2, and 3).
4. With the aid of an assistant, remove the muffler assembly from exhaust flexible pipe and the vehicle.

Installation Procedure

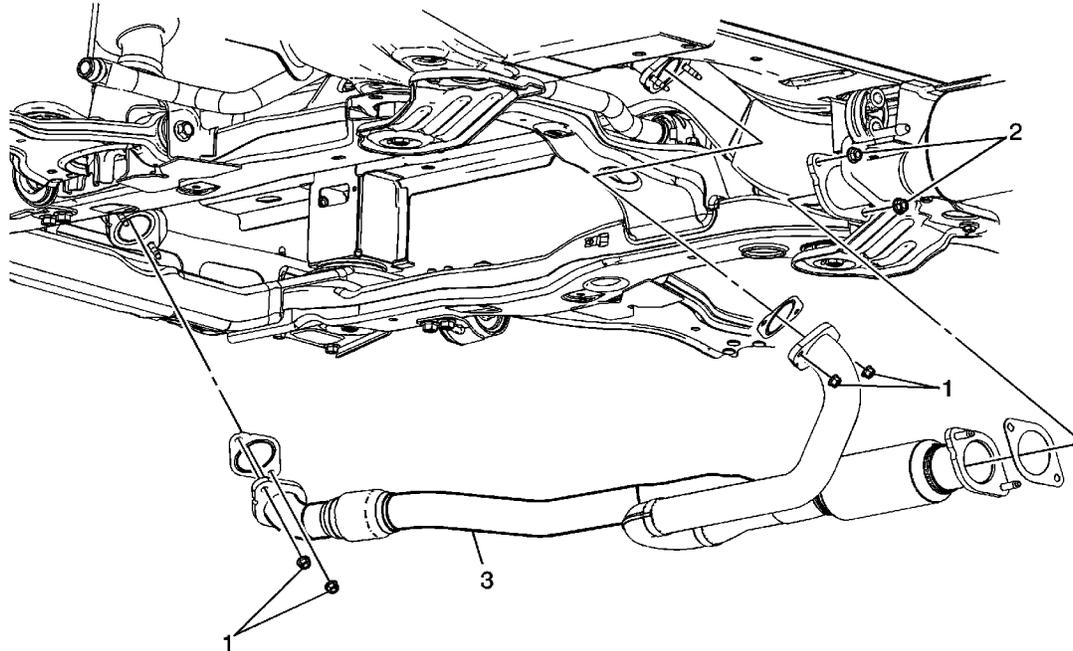


1. With the aid of an assistant, install the muffer assembly to the vehicle and the exhaust flexible pipe.
2. With the aid of an assistant, install the rubber insulators to the exhaust underbody hangers (1, 2, and 3).

Caution: Refer to [Fastener Caution](#) in the Preface section.

3. Install the three way catalytic converter to muffer nuts and tighten to **50 N·m (37 lb ft)**
4. Lower the vehicle.

Exhaust Flexible Pipe Replacement



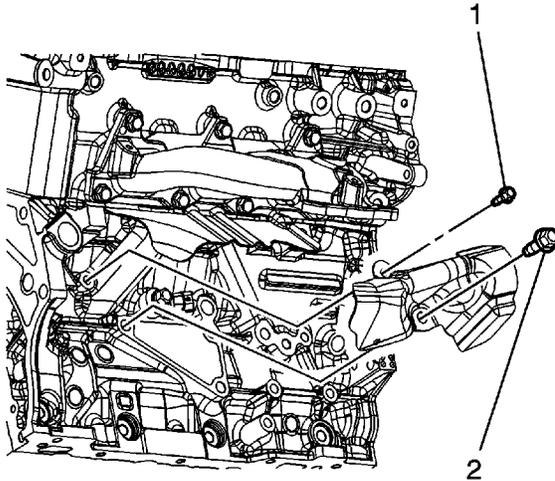
Callout	Component Name
<p>Preliminary Procedure</p> <ol style="list-style-type: none"> 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle. 2. Remove the frame brace. Refer to Frame Brace Replacement. 3. Remove the heated oxygen sensors. Refer to Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 and Heated Oxygen Sensor Replacement - Bank 2 Sensor 2. 	
1	<p>Nut (Qty: 4)</p> <p>Caution: Refer to Fastener Caution in the Preface section.</p> <p>Tighten 28 N·m (21 lb ft)</p>
2	<p>Nut (Qty: 2)</p> <p>Tighten 50 N·m (37 lb ft)</p>
3	<p>Exhaust Flex Pipe Assembly</p> <p>Procedure</p>

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Remove and discard the gaskets.

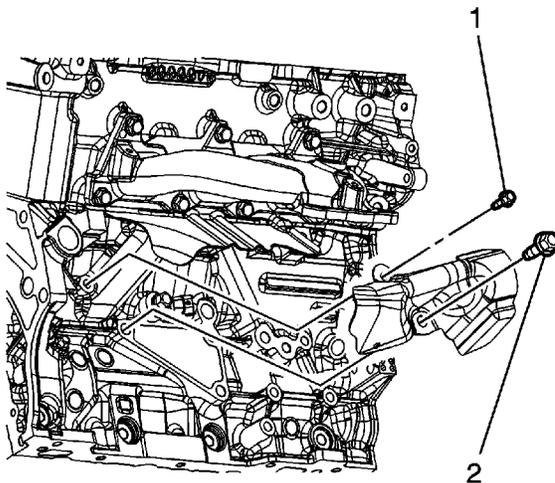
Exhaust Manifold Lower Heat Shield Replacement

Removal Procedure



1. Raise and suitably support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the exhaust manifold lower heat shield bolts (1, 2).
3. Remove the exhaust manifold lower heat shield.

Installation Procedure





1. Position the exhaust manifold lower heat shield to the engine.

Caution: Refer to [Fastener Caution](#) in the Preface section.

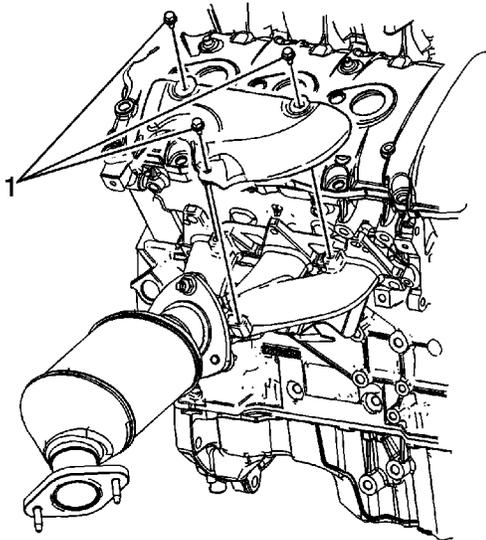
2. Install the exhaust manifold lower heat shield bolts (1, 2). Tighten bolt (1) to **10 N·m (89 lb in)** and tighten bolt (2) to **50 N·m (37 lb ft)**.
3. Lower the vehicle.

Exhaust Manifold Heat Shield Replacement - Right Side

Removal Procedure

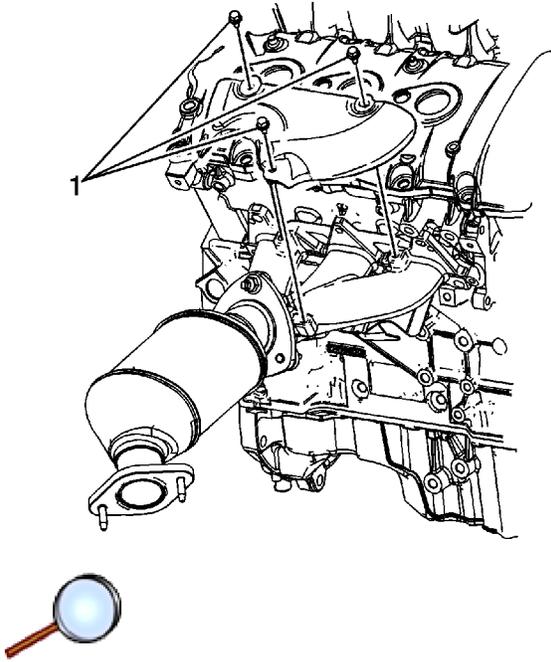
Warning: Refer to [Protective Goggles and Glove Warning](#) in the Preface section.

Warning: Refer to [Exhaust Service Warning](#) in the Preface section.



1. Remove the heated oxygen sensor (HO2S). Refer to [Heated Oxygen Sensor Replacement - Bank 1 Sensor 1](#).
2. Remove the exhaust flexible pipe. Refer to [Exhaust Flexible Pipe Replacement](#).
3. Remove the exhaust manifold heat shield bolts (1).
4. Remove the exhaust manifold heat shield.

Installation Procedure



1. Install the exhaust manifold heat shield.

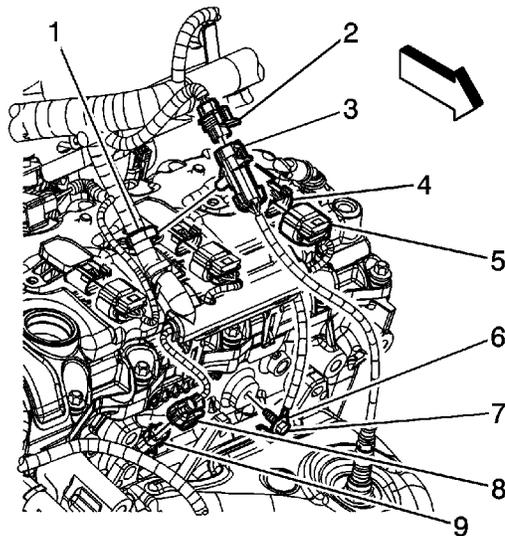
Caution: Refer to [Fastener Caution](#) in the Preface section.

2. Install the exhaust manifold heat shield bolts (1) and tighten to **10 N·m (89 lb in)**.
3. Install the exhaust flexible pipe. Refer to [Exhaust Flexible Pipe Replacement](#).
4. Install the HO2S. Refer to [Heated Oxygen Sensor Replacement - Bank 1 Sensor 1](#).

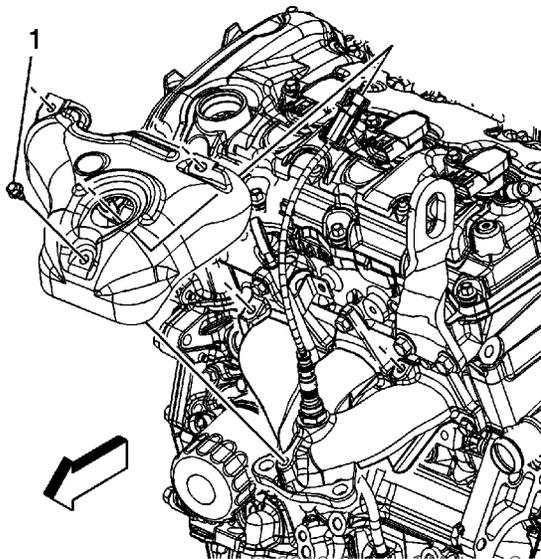
Exhaust Manifold Heat Shield Replacement - Left Side Removal Procedure

Warning: Refer to [Protective Goggles and Glove Warning](#) in the Preface section.

Warning: Refer to [Exhaust Service Warning](#) in the Preface section.



1. Remove the fuel injector sight shield. Refer to [Fuel Injector Sight Shield Replacement](#).
2. Disconnect the engine wiring harness electrical connector (2) from the heated oxygen sensor (HO2S) electrical connector (3).
3. Remove the HO2S electrical connector retainer from the engine wiring harness clip (1).

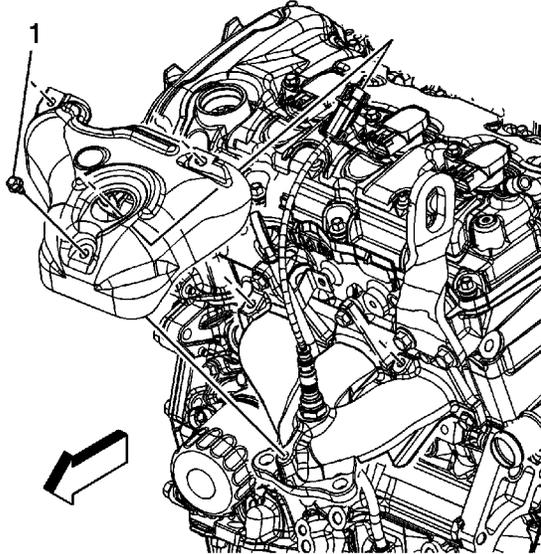


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4. Remove the exhaust manifold heat shield bolts (1).
5. Remove the exhaust manifold heat shield, sliding the shield up over the HO2S pigtail.

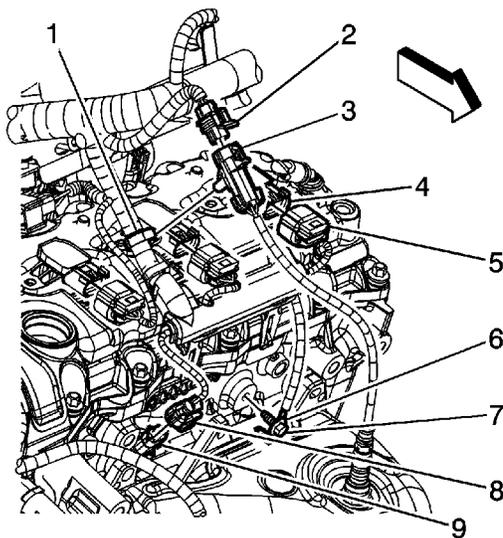
Installation Procedure



1. Install the exhaust manifold heat shield, sliding the shield down over the HO2S pigtail.

Caution: Refer to [Fastener Caution](#) in the Preface section.

2. Install the exhaust manifold heat shield bolts (1) and tighten to **10 N·m (89 lb in)**.

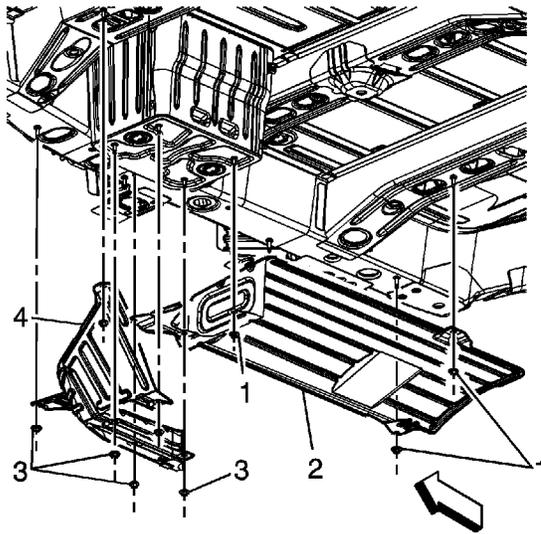




3. Connect the engine wiring harness electrical connector (2) to the HO2S electrical connector (3).
4. Install the HO2S electrical connector retainer to the wiring harness clip (1).
5. Install the fuel injector sight shield. Refer to [Fuel Injector Sight Shield Replacement](#).

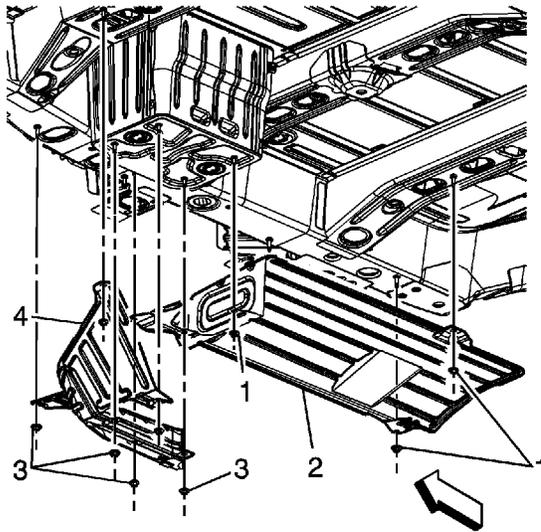
Exhaust Muffler Heat Shield Replacement

Removal Procedure



1. Remove the muffler assembly. Refer to [Exhaust Muffler Replacement](#).
2. Remove the exhaust muffler front heat shield nuts (3).
3. Remove the exhaust muffler front heat shield (4).
4. Remove the exhaust muffler heat shield nuts (1).
5. Remove the exhaust muffler heat shield (2).

Installation Procedure



1. Position the exhaust muffler heat shield (2) to the floor panel.

Caution: Refer to [Fastener Caution](#) in the Preface section.

2. Install the exhaust muffler heat shield nuts (1).

Tighten

Tighten the nuts to 9 N·m (80 lb in).

3. Position the exhaust muffler front heat shield (4) to the floor panel.
4. Install the exhaust muffler front heat shield nuts (3).

Tighten

Tighten the nuts to 9 N·m (80 lb in).

5. Install the muffler assembly. Refer to [Exhaust Muffler Replacement](#).