

26 - EXHAUST SYSTEM, EMISSION CONTROLS

MUFFLER

Muffler, assembly overview

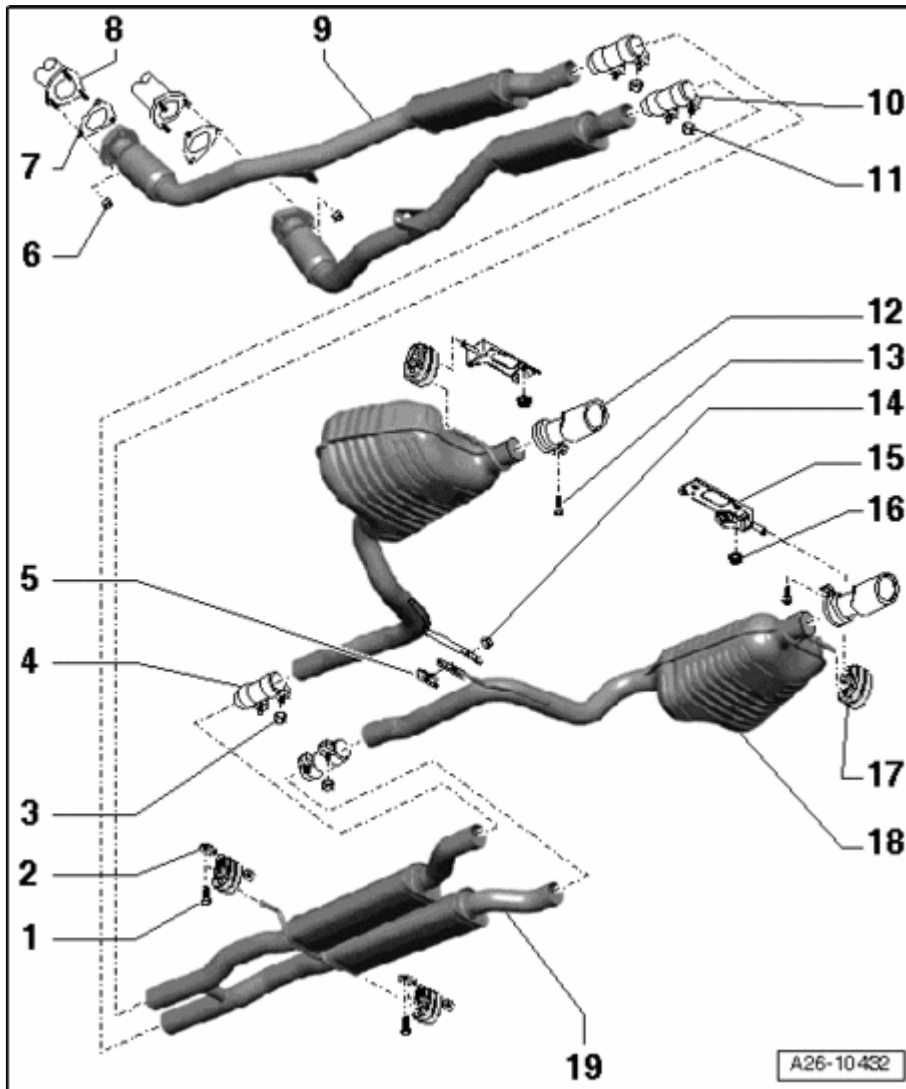


Fig. 531: Muffler, Assembly Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Bolt

- 23 Nm

2 - Suspended mount

- Replace if damaged

3 - Nut

- 23 Nm

4 - Rear clamping sleeve

- For individual replacement of center and rear mufflers
- Installed location **Installed position of rear double clamps**
- Before tightening, align exhaust system tension-free --> **Exhaust system, installing free of tension**
- Tighten threaded connections evenly.

5 - Clamping piece

6 - Nut

- 23 Nm

7 - Gasket

- Replace

8 - Exhaust manifold with catalytic converter

- Protect from shocks and impact stress
- Removing and installing: Left --> **Left exhaust manifold with catalytic converter, removing and installing** , right --> **Right exhaust manifold with catalytic converter, removing and installing**

9 - Front muffler

- With flex joint

CAUTION: Risk of damaging decoupling elements in front muffler.

- **Do not bend decoupling elements in front muffler more than 10°.**
- Removing and installing: Left --> **Left front muffler, removing and installing** , right --> **Right front muffler, removing and installing**
- Install exhaust system free of stress --> **Exhaust system, installing free of tension**

10 - Front clamping sleeve

- Installed location **Installed position of front double clamps**
- Before tightening, align exhaust system tension-free --> **Exhaust system, installing free of tension**
- Tighten threaded connections evenly.

11 - Nut

- 23 Nm

12 - End pipe

- Original equipment as one unit with rear muffler. For repairs, replace each separately.
- Separating point --> **End pipe, replacing**
- Aligning --> **Tail pipes, aligning**

13 - Bolt

- 23 Nm

14 - Nut

- Replace
- 23 Nm

15 - Suspended mount

16 - Nut

- 23 Nm

17 - Suspended mount

- Replace if damaged

18 - Rear muffler

- Original equipment as one unit with center muffler. For repairs, replace each separately.
- Separating point --> **Fig. 546**
- Install exhaust system free of stress --> **Exhaust system, installing free of tension**

19 - Center muffler

- Original equipment as one unit with rear muffler. For repairs, replace each separately.
- Separating point --> **Fig. 546**
- Install exhaust system free of stress --> **Exhaust system, installing free of tension**

Installed position of front double clamps

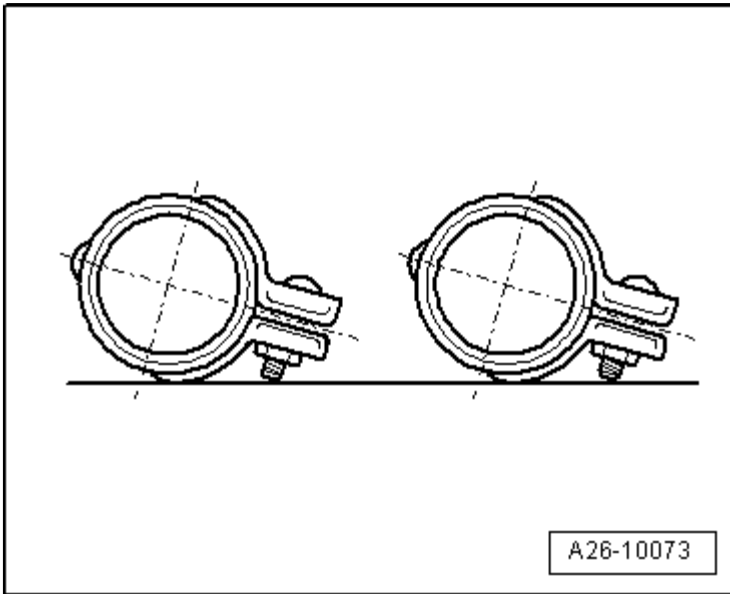


Fig. 532: Installed Position Of Front Double Clamps
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- When installing double clamps, ensure that the bolt ends do not project beyond lower edge of double clamp.
- Threaded connections point toward right.

Installed position of rear double clamps

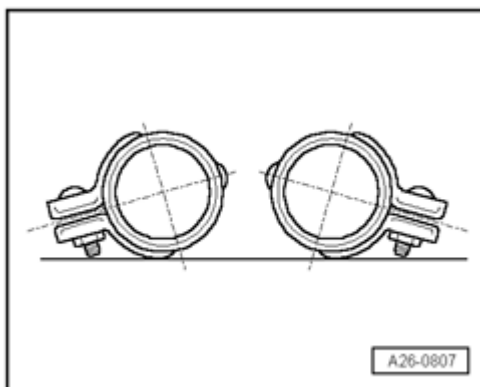


Fig. 533: Installed Position Of Rear Double Clamps
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install double clamps so that the bolt ends do not project over lower edge of double clamp.
- Threaded connections point toward outside.

Individual components of center bracket mounting for front muffler

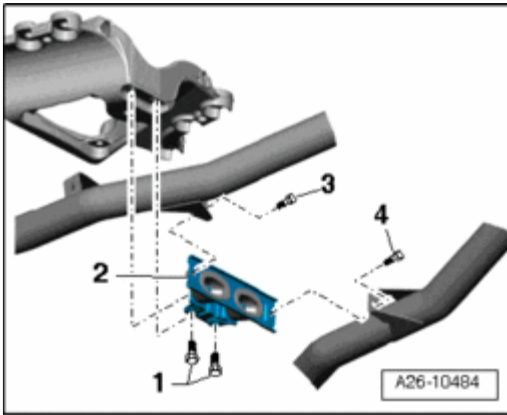


Fig. 534: Individual Components Of Center Bracket Mounting For Front Muffler
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

1. Bolt, 23 Nm
2. Bracket
3. Bolt, 23 Nm
4. Bolt, 23 Nm

Left front muffler, removing and installing

Removing

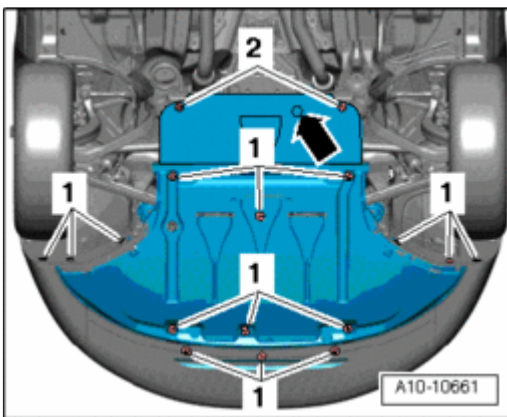


Fig. 535: Identifying Noise Insulation And Mountings
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove rear sound insulation by loosening securing pieces - **2 and arrow** -.

NOTE:

- Ignore - 1 -.

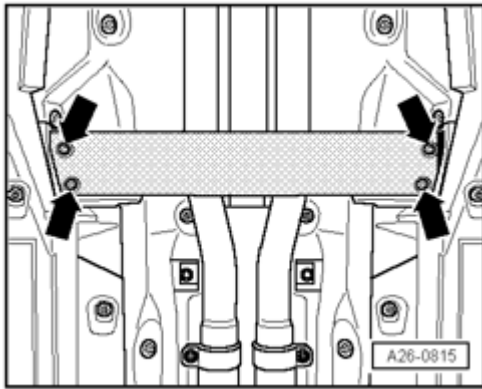


Fig. 536: Removing Front Transverse Beam
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove front transverse beam - **arrows** -.

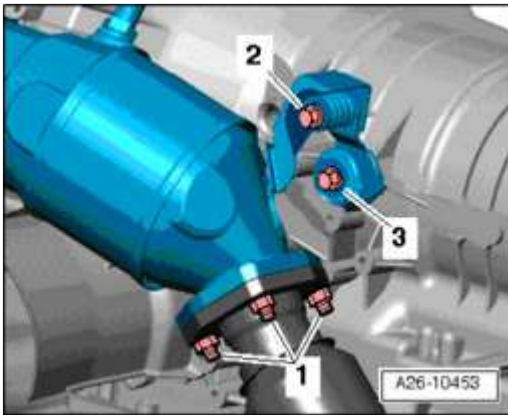


Fig. 537: Removing Left Front Muffler Nuts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove left front muffler nuts - **1** -.

NOTE:

- Ignore items - **2 and 3** -.

CAUTION: Risk of damaging decoupling elements in front muffler.

- Do not bend decoupling elements in front muffler more than 10°.

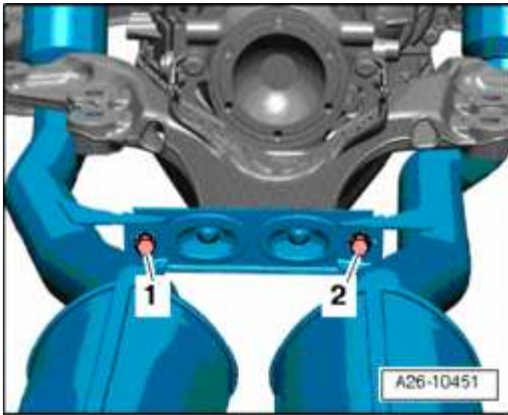


Fig. 538: Removing Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - 1 -.

NOTE:

- Ignore - 2 -.

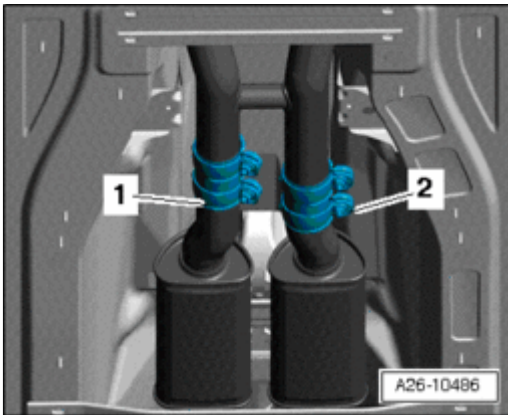


Fig. 539: Loosening Left/Right Clamping Sleeve

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen left clamping sleeve - 1 - and slide it back.
- Remove left front muffler.

NOTE:

- Ignore - 2 -.

Installing

- Tightening torque --> **Muffler, assembly overview.**

Installation is in reverse order of removal, note the following:

NOTE:

- **Replace seals and self-locking nuts.**

- Align exhaust system free of tension --> **Exhaust system, installing free of tension.**
- Install front cross member --> **40 - FRONT SUSPENSION** .

Right front muffler, removing and installing

Removing

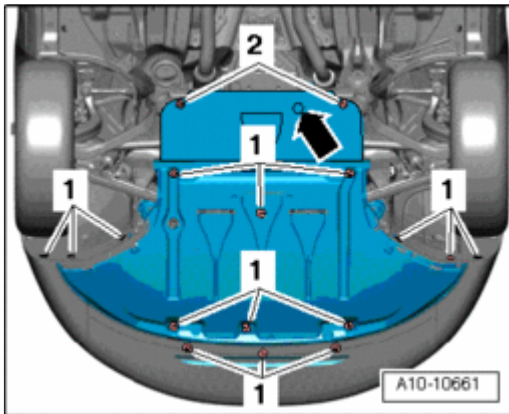


Fig. 540: Identifying Noise Insulation And Mountings
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove rear sound insulation by loosening securing pieces - **2 and arrow** - .

NOTE:

- **Ignore - 1 - .**

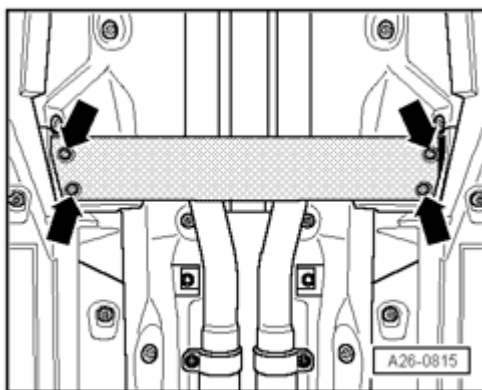


Fig. 541: Removing Front Transverse Beam
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unbolt front transverse beam - **arrows** - .

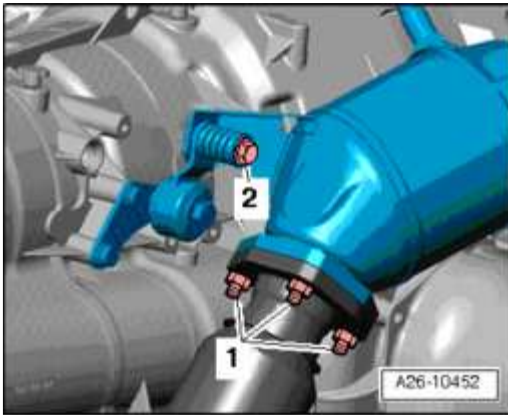


Fig. 542: Removing Right Front Muffler Nuts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove right front muffler nuts - 1 -.

NOTE:

- Ignore - 2 -.

CAUTION: Risk of damaging decoupling elements in front muffler.

- Do not bend decoupling elements in front muffler more than 10°.

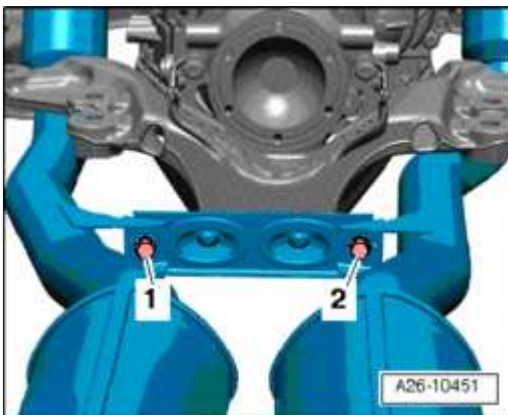


Fig. 543: Removing Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - 2 -.

NOTE:

- Ignore - 1 -.

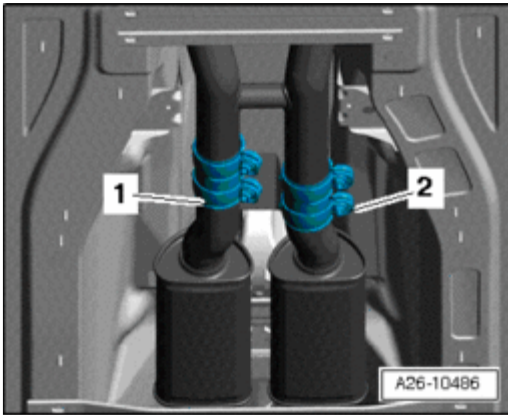


Fig. 544: Loosening Left/Right Clamping Sleeve
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen right clamping sleeve - 2 - and slide it back.
- Remove right front muffler.

NOTE: ● Ignore - 1 -.

Installing

- Tightening torque --> Muffler, assembly overview.

Installation is in reverse order of removal, note the following:

NOTE: ● **Replace seals and self-locking nuts.**

- Align exhaust system free of tension --> Exhaust system, installing free of tension.
- Install front cross member --> 40 - FRONT SUSPENSION .

Center muffler and rear muffler, separating

- A separating point has been provided in the connecting pipe for individual replacement of the center or rear muffler
- The separating point is marked by a depression around circumference of the exhaust pipe.

Special tools, testers and auxiliary items required

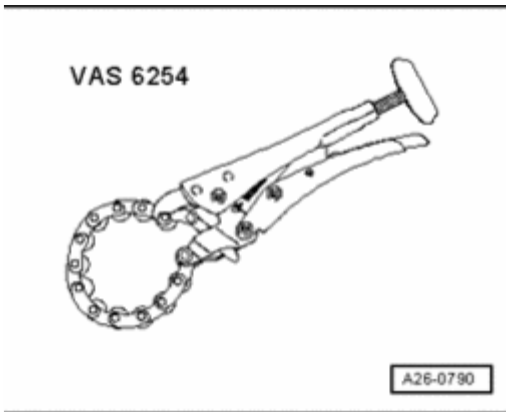


Fig. 545: Chain Pipe Cutter VAS 6254
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Chain pipe cutter VAS 6254

Work procedure

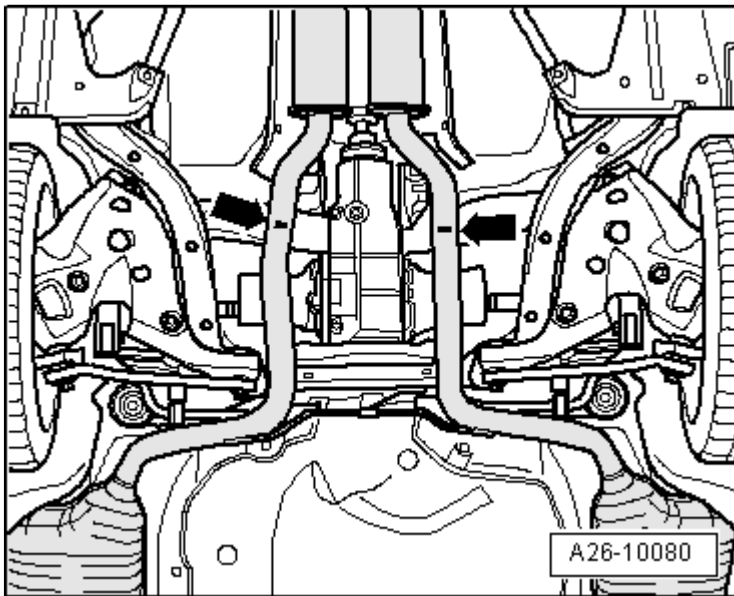


Fig. 546: Separating Exhaust Pipes At Separating Point Using Chain Pipe Cutter VAS 6254 At Right Angle

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separate exhaust pipes at separating point - **arrows** - using chain pipe cutter VAS 6254 at a right angle.

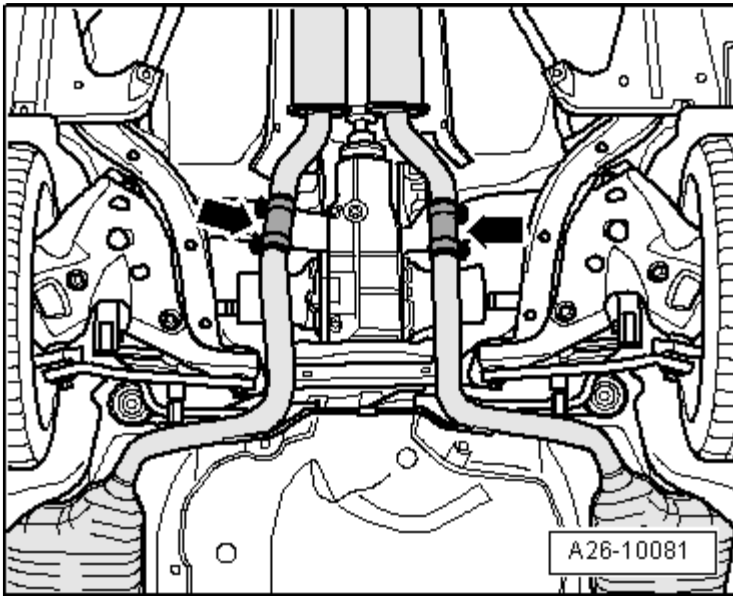


Fig. 547: Positioning Clamping Sleeves At Center Of Separating Cut
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position clamping sleeves - **arrows** - at center of separating cut.

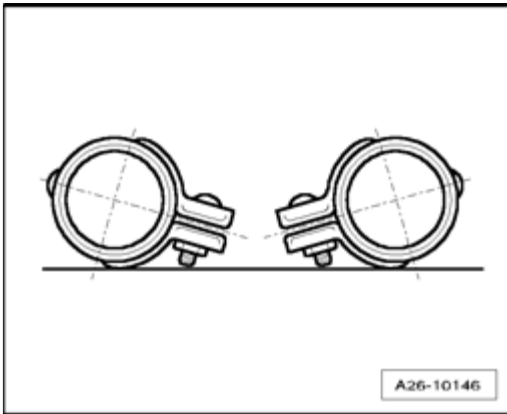


Fig. 548: Installed Position Of Front Double Clamps
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- When installing double clamps, ensure that the bolt ends do not project beyond lower edge of double clamp.
- The threaded connections face each other.
- Align exhaust system free of tension --> **Exhaust system, installing free of tension.**

End pipe, replacing

Special tools, testers and auxiliary items required

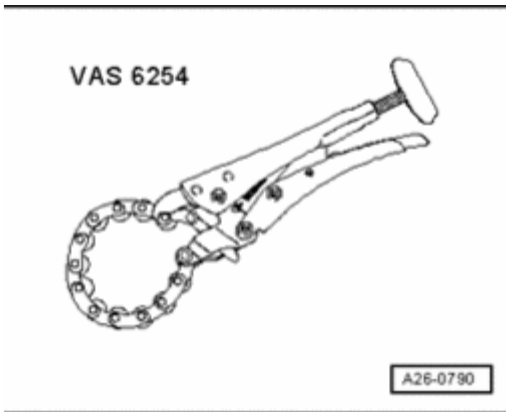


Fig. 549: Chain Pipe Cutter VAS 6254

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Chain pipe cutter VAS 6254

Work procedure

- Tightening torque --> Muffler, assembly overview.

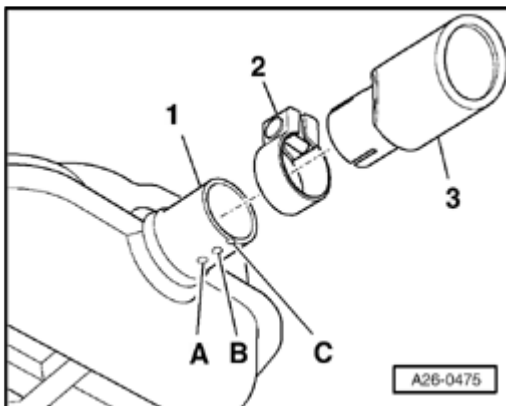


Fig. 550: Identifying End Pipes, Separating Point, Markings & Clamps

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separate end pipe - **1** - at separating point - **C** - using Chain Pipe Cutter VAS 6254.
- Connect end pipe - **3** - up to marking - **A** - so that slot on end pipe lines up with marking - **B** -.
- Tighten clamping sleeve nut - **2** -.

Exhaust system, installing free of tension

- Align exhaust system when cold.
- Tightening torques --> Muffler, assembly overview.

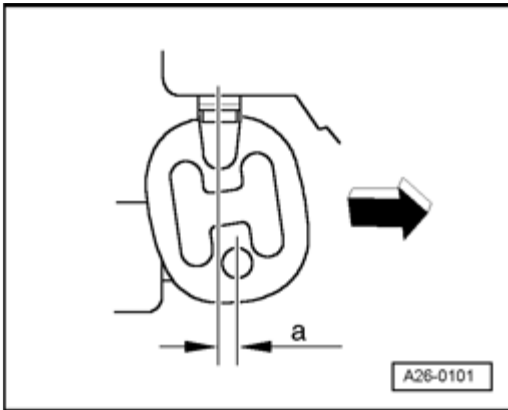


Fig. 551: Pushing Exhaust System Toward Front Of Vehicle
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Vehicles without double clamps between center and rear muffler

- Loosen clamping sleeves bolts.
- Press exhaust system forward - **arrow** - far enough until pretension on retaining loops at rear mufflers - **a** - = 13 to 17 mm.
- Tighten clamping sleeve threaded connections evenly.
- Align end pipes --> **Tail pipes, aligning.**

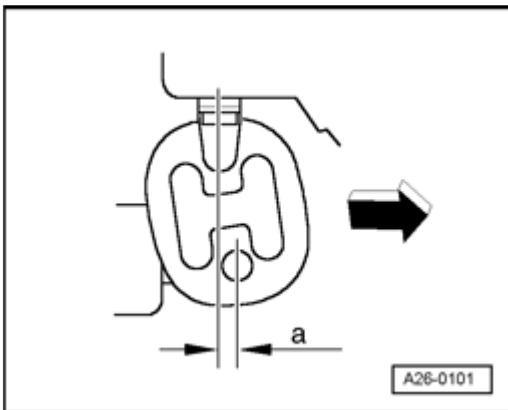


Fig. 552: Pushing Exhaust System Toward Front Of Vehicle
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Vehicles with double clamps between center and rear muffler

NOTE:

- **Only for vehicles with double clamps between center and rear mufflers, the center muffler must also be aligned.**

- Loosen bolts of double clamps and.
- Push forward part of exhaust system far enough forward - **arrow** - until pre-load on retaining loops on center muffler - **a** - = 9 to 13 mm.

- Tighten front clamping sleeve threaded connections evenly.

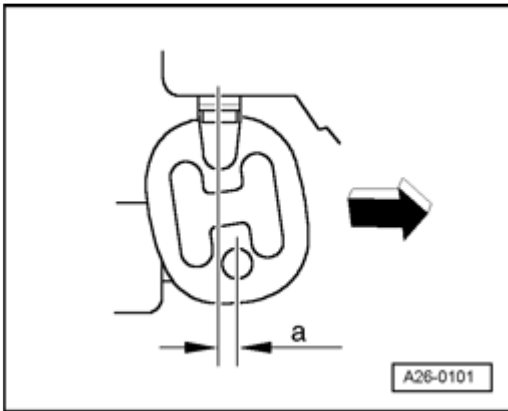


Fig. 553: Pushing Exhaust System Toward Front Of Vehicle
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Push rear part of exhaust system far enough forward - **arrow** - until pre-load on retaining loops at rear on rear muffler - **a** - = 13 to 17 mm.
- Align rear muffler horizontally.
- Tighten rear clamping sleeve threaded connections evenly.
- Align end pipes --> **Tail pipes, aligning.**

Tail pipes, aligning

Work procedure

- Tightening torque --> **Muffler, assembly overview.**

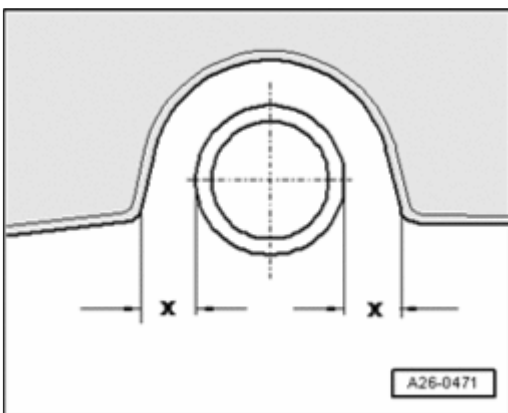


Fig. 554: Checking Distance Of End Pipes At Left/Right To Bumper
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check distance of end pipes at left and right to bumper cover:
 - Dimension - **x** - left = dimension - **x** - right.

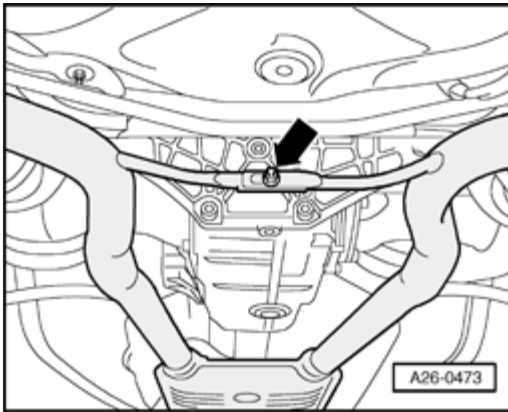


Fig. 555: Loosening Nut Of Brace Between Exhaust Pipes
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

If necessary, correct dimension "x" as follows:

- Loosen threaded connections - **arrow** - of brace between exhaust pipes.
- Adjust distance between rear mufflers.
- Tighten bolts.

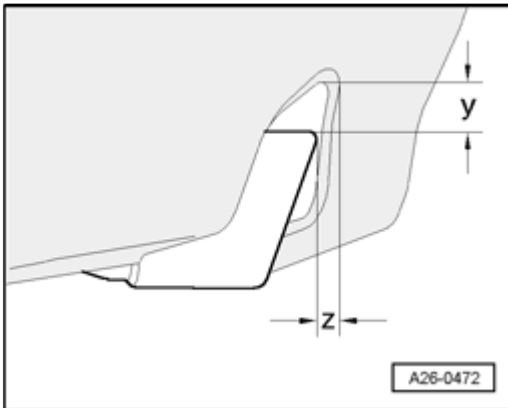


Fig. 556: Checking Distances Of End Pipes To Bumper
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check distances - **y** - and - **z** - of end pipes to bumper cover:
 - Dimension - **y** - Sedan and Avant = 16.0 to 21.0 mm.
 - Dimension - **y** - Allroad = 17.5 to 22.0 mm.
 - Dimension - **z** - Sedan and Avant = 8.5 to 13.5 mm.
 - Dimension - **z** - Avant S-line = 13.5 to 18.5 mm.
 - Dimension - **z** - Allroad = -1.5 to 6.5 mm (end pipe is over).
- If end pipes cannot be aligned, check whether exhaust system is aligned tension-free --> **Exhaust system**,

installing free of tension.

EXHAUST MANIFOLD

Exhaust manifold, assembly overview

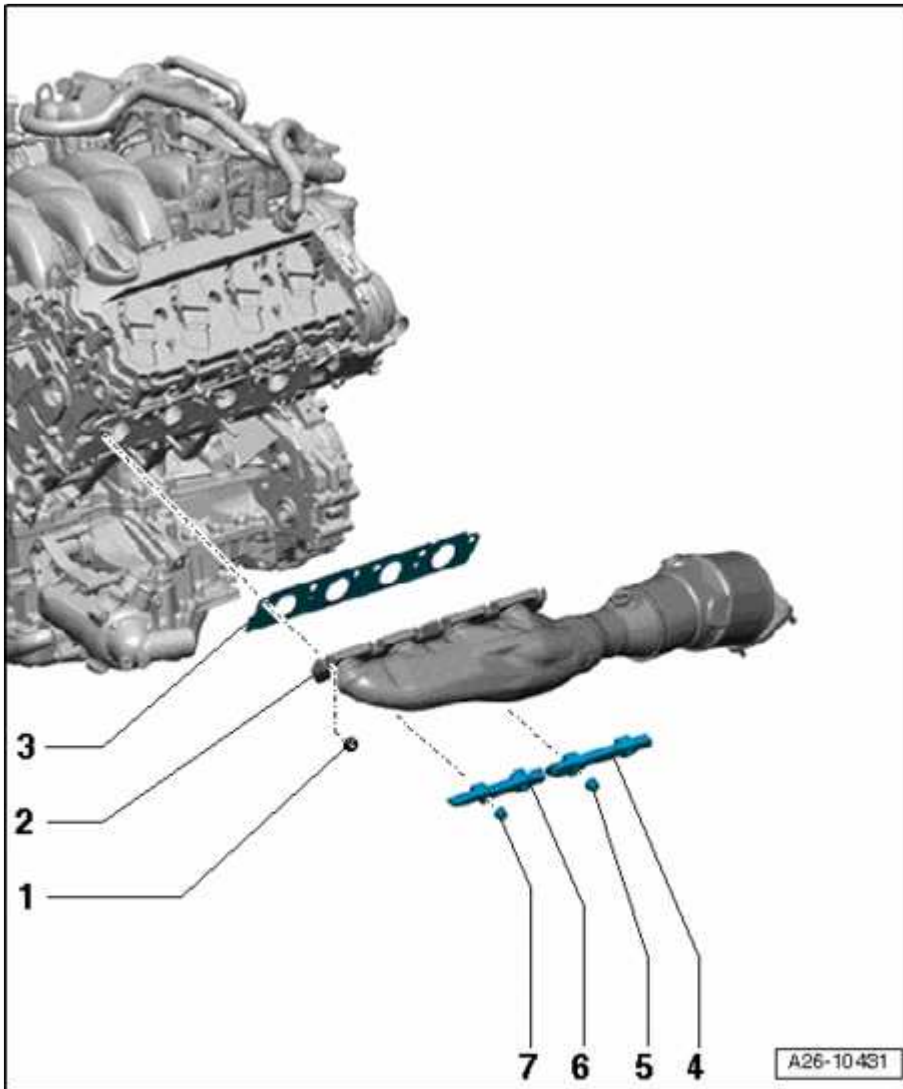


Fig. 557: Identifying Special Tools - Exhaust Manifold, Assembly Overview
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Nut

- Replace
- Lubricate with hot bolt paste; Hot bolt paste
- Tightening sequence: Left exhaust manifold **Left exhaust manifold tightening sequence** , right exhaust manifold **Right exhaust manifold tightening sequence**

2 - Exhaust manifold with catalytic converter

- Individual components of mounting: Left **Individual suspension components, left side** , right **Individual components of suspension, right side**
- Removing and installing: Left --> **Left exhaust manifold with catalytic converter, removing and installing** , right --> **Right exhaust manifold with catalytic converter, removing and installing**

3 - Gasket

- Replace

4 - Securing strip

- Remains installed when removing exhaust manifold

5 - Nut

- Replace
- Lubricate with hot bolt paste; Hot bolt paste
- 25 Nm

6 - Securing strip

- Remains installed when removing exhaust manifold

7 - Nut

- Replace
- Lubricate with hot bolt paste; Hot bolt paste
- 25 Nm

Left exhaust manifold tightening sequence

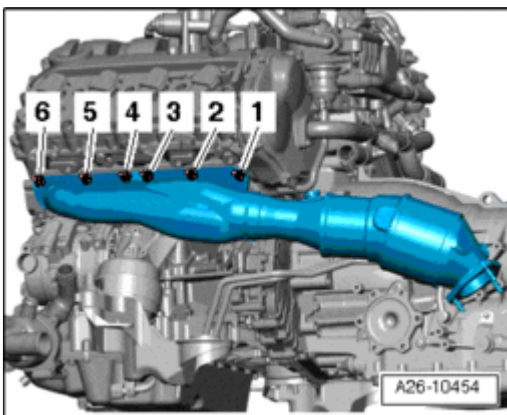


Fig. 558: Removing Nuts And Left Exhaust Manifold With Catalytic Converter

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten nuts in 3 stages in - **1 to 6** - sequence as follows:

- Tighten nuts by hand.
- Pre-tighten nuts to 20 Nm.
- Tighten nuts to 30 Nm.

Right exhaust manifold tightening sequence

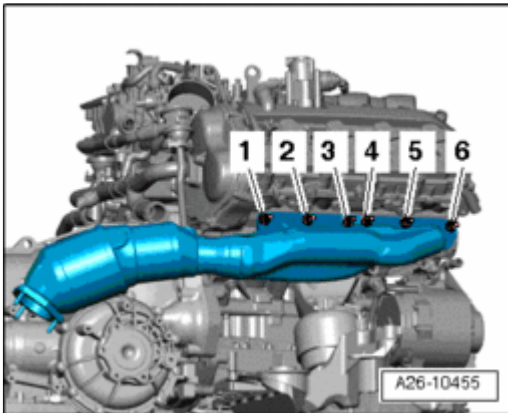


Fig. 559: Removing Nuts And Right Exhaust Manifold With Catalytic Converter
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten nuts in 3 stages in - **1 to 6** - sequence as follows:

- Tighten nuts by hand.
- Pre-tighten nuts to 20 Nm.
- Tighten nuts to 30 Nm.

Individual suspension components, left side

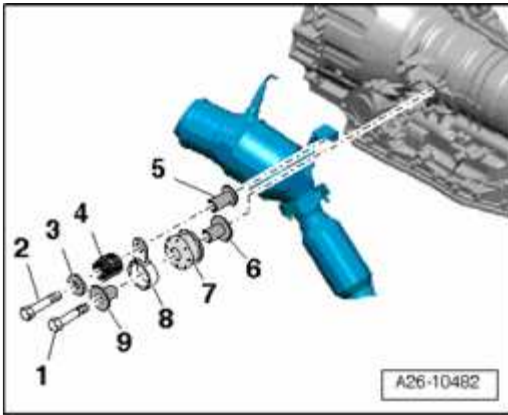


Fig. 560: Individual Suspension Components, Left Side
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1. Bolt, 23 Nm
2. Bolt, 23 Nm
3. Washer
4. Spring
5. Spacing sleeve
6. Spacing sleeve
7. Buffer
8. Tab
9. Spacing sleeve

Individual components of suspension, right side

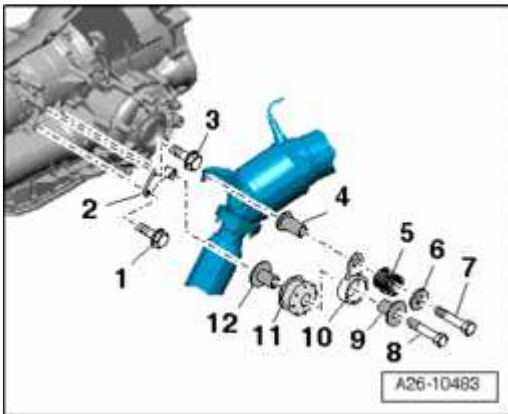


Fig. 561: Individual Components Of Suspension, Right Side
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1. Bolt, 23 Nm
2. Bracket
3. Bolt, 23 Nm

4. Spacing sleeve
5. Spring
6. Washer
7. Bolt, 23 Nm
8. Bolt, 23 Nm
9. Spacing sleeve
10. Tab
11. Buffer
12. Spacing sleeve

Left exhaust manifold with catalytic converter, removing and installing

Removing

NOTE:

- During installation, all cable ties must be re-installed at the same location.



Fig. 562: Removing Rear Engine Cover

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull rear engine cover - **arrows** - off.
- Drain coolant --> **Cooling system, draining and filling.**
- Remove left coolant pipe --> **Left coolant pipe, removing and installing.**
- Remove left front muffler --> **Left front muffler, removing and installing.**

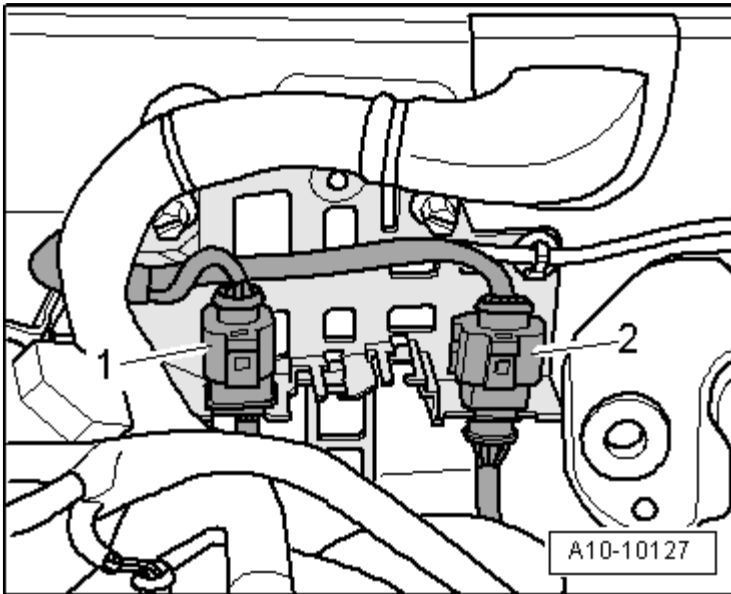


Fig. 563: Disconnecting Electrical Harness Connector For Oxygen Sensor (O2S) 2 Behind Three Way Catalytic Converter (TWC) G131
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove electrical harness connectors from bracket and disconnect it:
 1. For Heated Oxygen Sensor (HO2S) 2 G108
 2. For Oxygen Sensor (O2S) 2 Behind Three Way Catalytic Converter (TWC) G131
- Free up electrical wires to oxygen sensors.

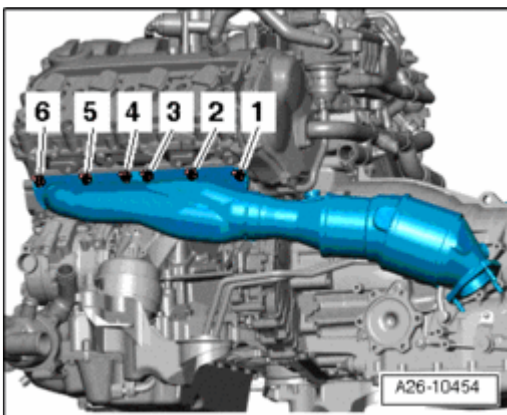


Fig. 564: Removing Nuts And Left Exhaust Manifold With Catalytic Converter
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove nuts - 6 to 1 -.

NOTE:

- To improve clarity, the removed engine is shown.

- Both lower securing strips remain installed.

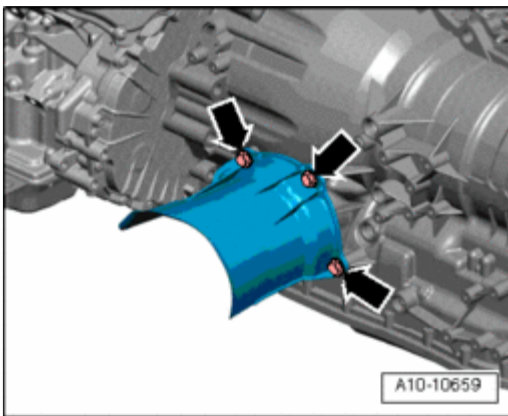


Fig. 565: Removing Left Drive Shaft Heat Shield From Transmission
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove left front wheel.
- Remove left drive shaft heat shield from transmission - **arrows** -.

NOTE: • To improve clarity, the removed engine is shown.

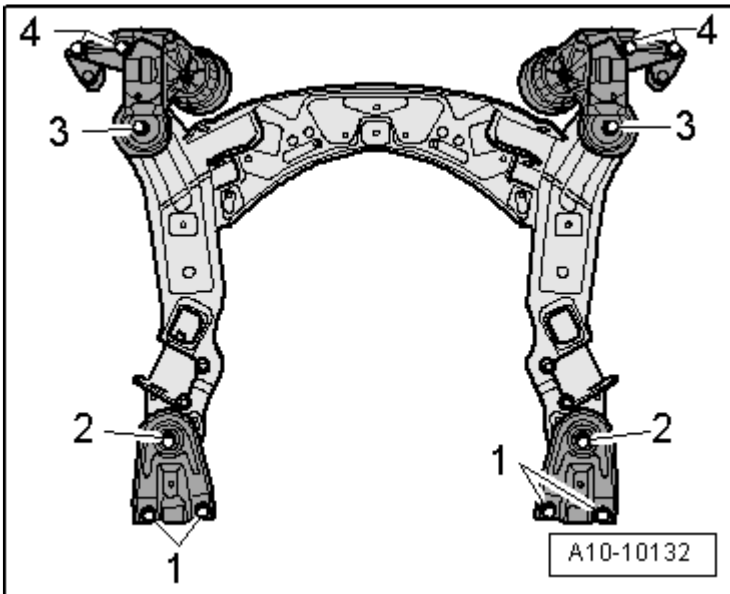


Fig. 566: Engine Mount Plate Bolts Removal/Installing Sequence
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **1 and 2** -.

NOTE: • Ignore items - **3 and 4** -.

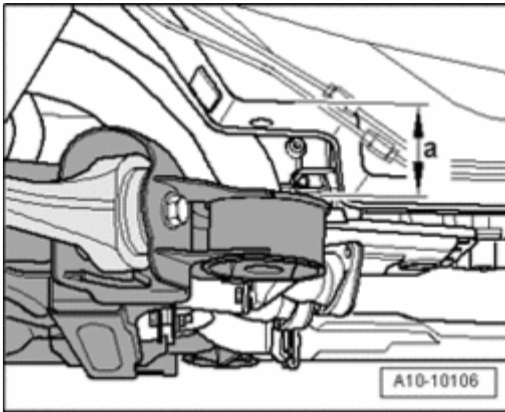


Fig. 567: Lowering Engine/Transmission Assembly Using Scissor Lift Platform VAS 6131 Only Approx. By Dimension

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lower rear of subframe by dimension - a -.
- Dimension - a - = 85 mm maximum.

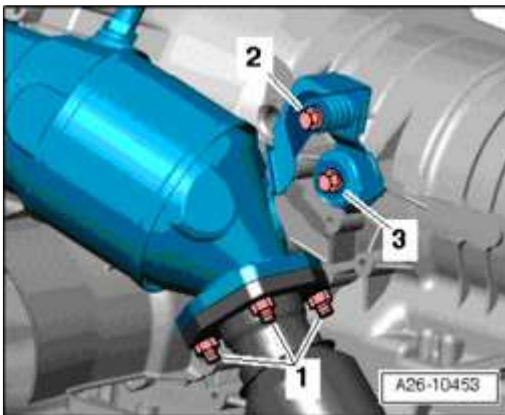


Fig. 568: Removing Left Front Muffler Nuts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - 2 and 3 - and remove tab.

NOTE:

- Ignore - 1 -.

CAUTION: Risk of damaging drive shaft boots.

- Carefully guide left exhaust manifold with catalytic converter when removing.

- Remove left exhaust manifold with catalytic converter toward rear.

Installing

- Tightening torques --> **Engine, installing , Left exhaust manifold tightening sequence**

Installation is in reverse order of removal, note the following:

NOTE:

- Replace seal, self-locking nuts and oil dipstick guide tube O-ring.

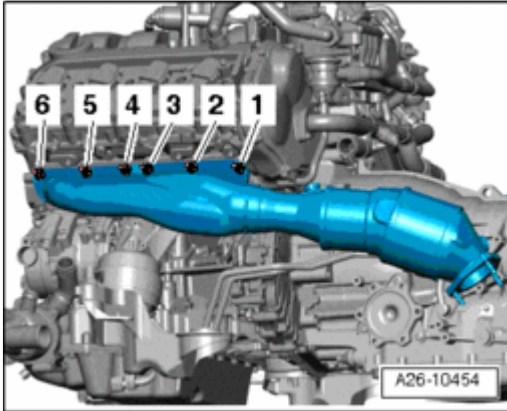


Fig. 569: Removing Nuts And Left Exhaust Manifold With Catalytic Converter
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place gasket onto stud bolts.
- Insert exhaust manifold in securing strips and tighten **Left exhaust manifold tightening sequence**.
- Install left coolant pipe --> **Left coolant pipe, removing and installing**.
- Place oil dipstick guide tube in hole on upper part of oil pan.
- Install subframe --> **40 - FRONT SUSPENSION** .
- Install left front muffler --> **Left front muffler, removing and installing**.
- Align exhaust system free of tension --> **Exhaust system, installing free of tension**.
- Fill with coolant **Filling**.

Right exhaust manifold with catalytic converter, removing and installing

Special tools, testers and auxiliary items required

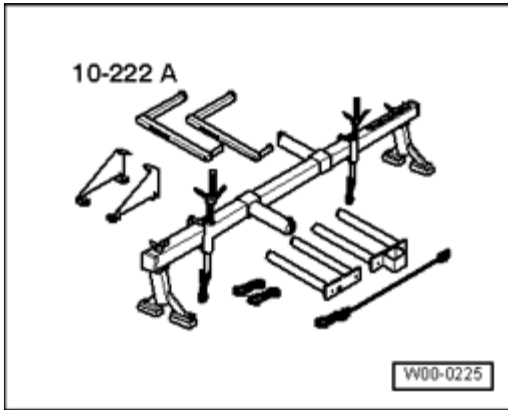


Fig. 570: Identifying Engine Support Bridge 10 - 222 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Engine support bridge 10 - 222 A

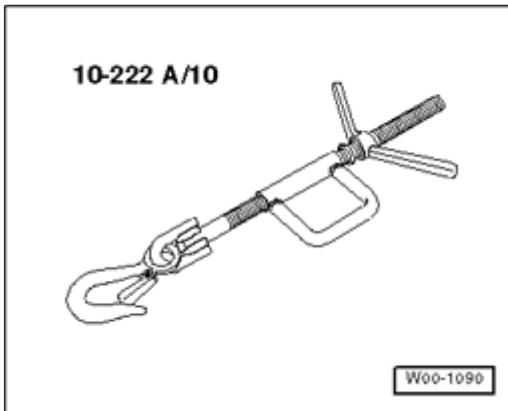


Fig. 571: Hook 10 - 222 A/10
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Hook 10 - 222 A/10

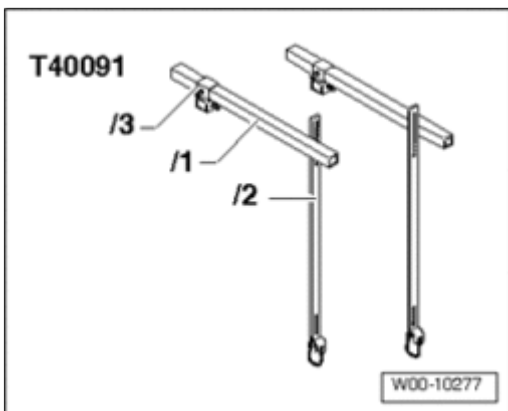


Fig. 572: Engine Support Basic Set T40091
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Engine Support Basic Set T40091

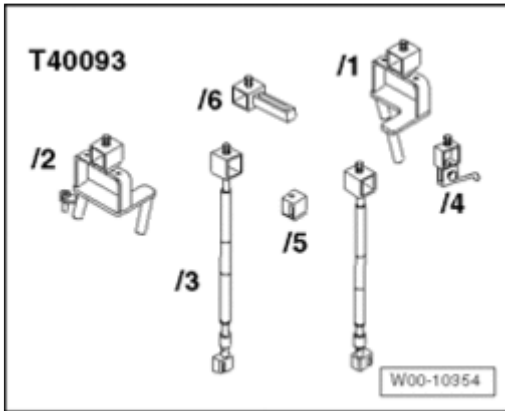


Fig. 573: Engine Support Supplement Set T40093
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Engine Support Supplement Set T40093

Removing

NOTE: • During installation, all cable ties must be re-installed at the same location.

CAUTION: Risk of destroying electrical components when battery is disconnected.

- Observe measures when disconnecting battery.

- With ignition switched off, disconnect Battery Ground (GND) wire --> **27 - STARTER, GENERATOR, CRUISE CONTROL** .



Fig. 574: Removing Rear Engine Cover
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull rear engine cover - **arrows** - off.

- Drain coolant --> **Cooling system, draining and filling.**
- Remove right coolant pipe --> **Right coolant pipe, removing and installing.**
- Remove ribbed belt --> **Ribbed belt, removing and installing**

- Remove generator --> **27 - STARTER, GENERATOR, CRUISE CONTROL .**
- Remove right front muffler --> **Right front muffler, removing and installing.**

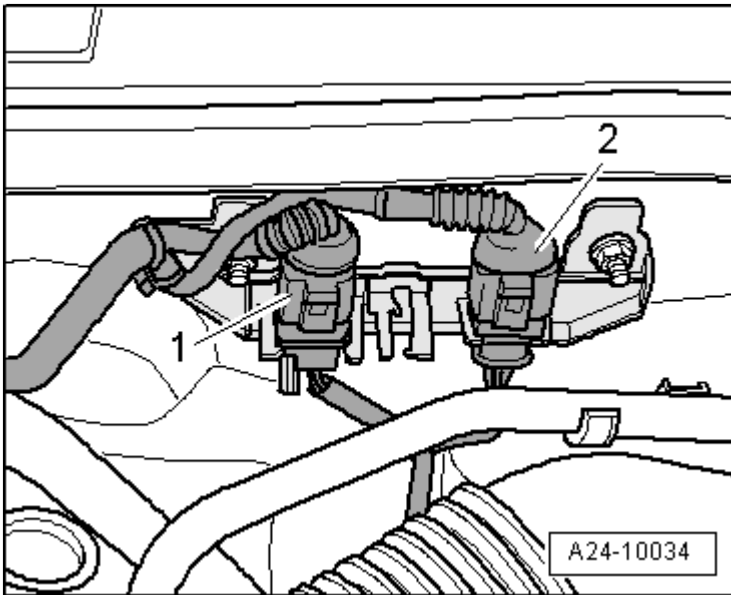


Fig. 575: Disconnecting Electrical Harness Connector For Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) G130

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove electrical harness connectors from bracket and disconnect it:
 1. For Heated Oxygen Sensor (HO2S) G39
 2. For Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) G130

- Free up electrical wires to oxygen sensors.

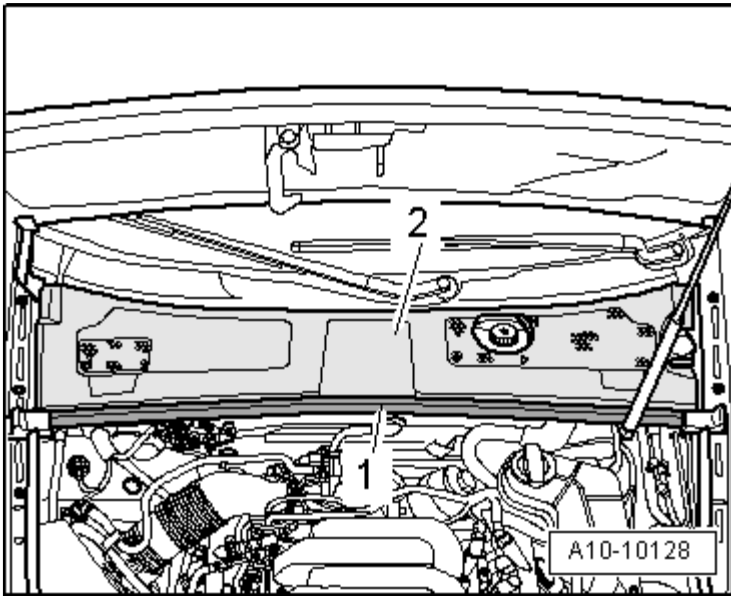


Fig. 576: Removing Rubber Seal And Plenum Chamber Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove rubber seal - 1 - and remove plenum chamber cover - 2 -.

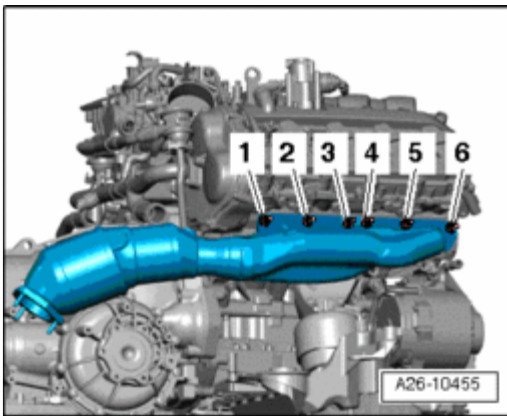


Fig. 577: Removing Nuts And Right Exhaust Manifold With Catalytic Converter
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove nuts - 6 to 1 -.

NOTE:

- To improve clarity, the removed engine is shown.
- Both lower securing strips remain installed.

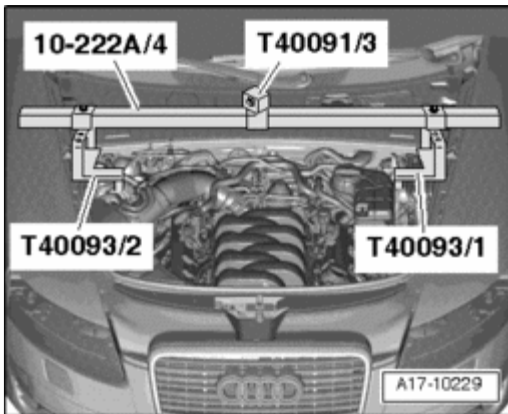


Fig. 578: Securing Adapter 10 - 222 A/4 Using Binder T40091/3 As Well As Supports T40093/1 And T40093/2 At Suspension Strut Domes
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure Adapter 10 - 222 A/4 with connector T40091/3 and supports T40093/1 and T40093/2 to suspension strut towers.
- Support for left and right side of vehicle is marked.

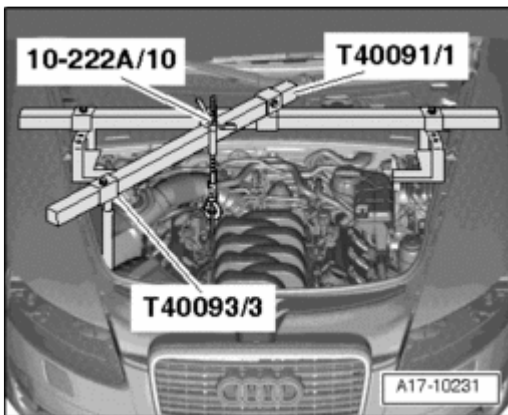


Fig. 579: Assembling Other Components Of Engine Support Bridge 10 - 222 A
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install additional Engine Support Bridge parts as shown in illustration. Position supports T40093/3 on long member notches.
- Engage Hook 10 - 222 A/10 in left engine lifting eye.
- Tension engine with spindle.

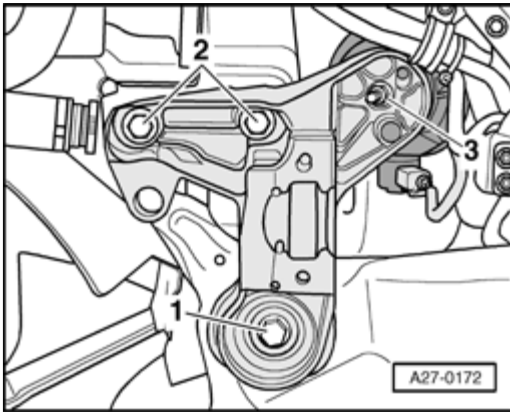


Fig. 580: Identifying Nuts, Bolts, And Right Side Engine Mount Carrier
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove nut - **3** -.
- Remove bolts - **1 and 2** - and remove right engine mount plate.

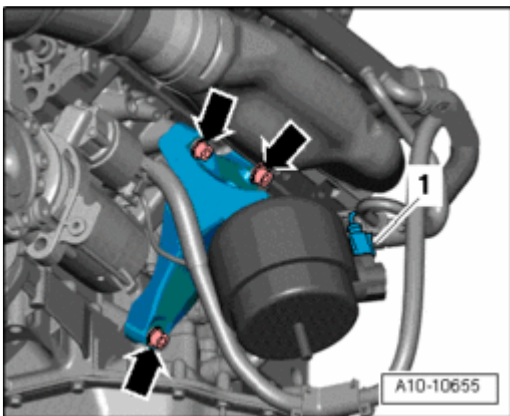


Fig. 581: Identifying Electrical Harness Connector And Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect electrical connector at engine mount - **1** -.
- Remove bolts - **arrows** - and remove engine support with engine mount.

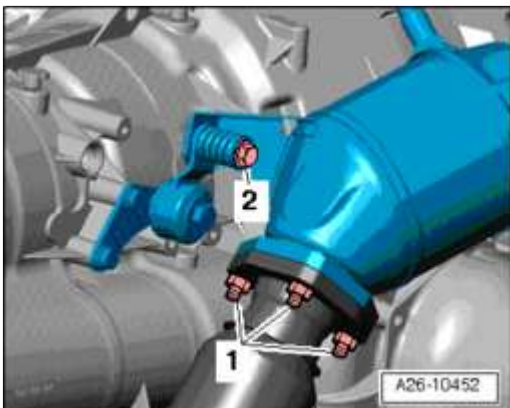


Fig. 582: Removing Right Front Muffler Nuts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - 2 - and remove left exhaust manifold with catalytic converter toward front.

NOTE:

- Ignore - 1 -.

Installing

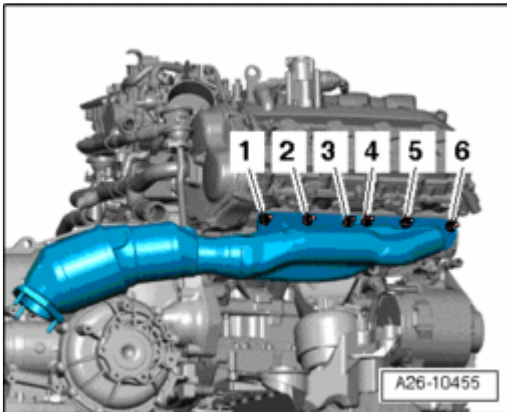
- Tightening torques Left exhaust manifold tightening sequence , --> Secondary air injection (AIR) system, assembly overview.

Installation is in reverse order of removal, note the following:

NOTE:

- Replace seal and self-locking nuts.

- Place gasket onto stud bolts.

**Fig. 583: Removing Nuts And Right Exhaust Manifold With Catalytic Converter**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert exhaust manifold in securing strips and tighten Left exhaust manifold tightening sequence
- Install right front muffler --> Right front muffler, removing and installing.
- Install generator --> 27 - STARTER, GENERATOR, CRUISE CONTROL .
- Install ribbed belt --> Ribbed belt, removing and installing.
- Install engine support and right engine mount plate --> Right engine mount, removing and installing.
- Install right coolant pipe --> Right coolant pipe, removing and installing.
- Install stabilizer bar --> 40 - FRONT SUSPENSION .
- Align exhaust system free of tension --> Exhaust system, installing free of tension.
- Observe safety precautions after connecting battery --> 27 - STARTER, GENERATOR, CRUISE

CONTROL .

- Fill with coolant **Filling**.

SECONDARY AIR INJECTION (AIR) SYSTEM**Principle and function****Principle**

Due to the rich mixture during the cold start phase, the exhaust emissions contain an increased level of unburned hydrocarbons. The Secondary Air Injection (AIR) system improves the secondary oxidation within the catalytic converter, thereby reducing harmful emissions. The heat released by secondary oxidation shortens the start-up time of the catalytic converter considerably, as well as significantly improves emissions quality during the cold-running phase.

Function

In the cold start phase, the engine control module controls the Secondary Air Injection (AIR) pump via the pump relay. The stream of air from the Secondary Air Injection (AIR) pump opens the combination valves and allows air to flow into the exhaust system before the catalytic converter.

Secondary air injection (AIR) system, assembly overview

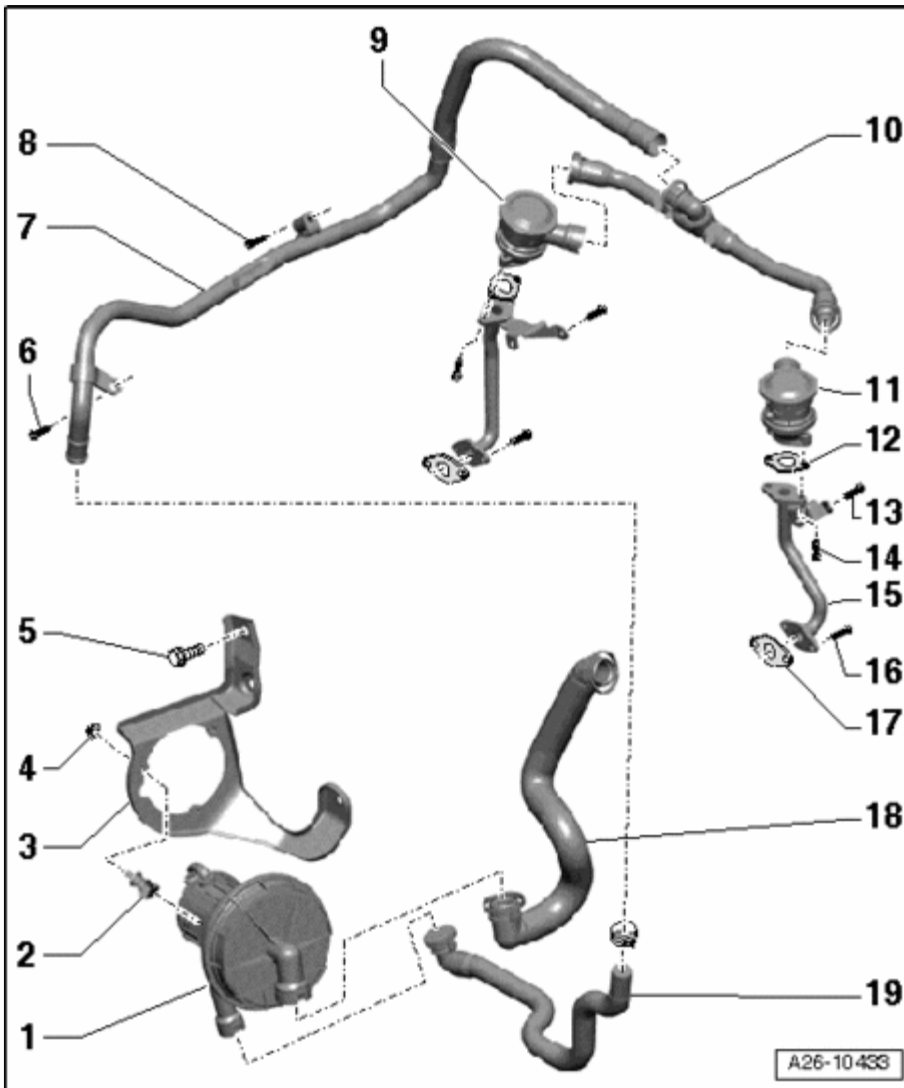


Fig. 584: Secondary Air Injection (AIR) System, Assembly Overview
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Secondary Air Injection (AIR) Pump Motor V101

- Component location: At front right in engine compartment below the longmember
- Removing and installing --> **Secondary Air Injection (AIR) pump, removing and installing**
- Check in "Guided Fault-Finding" operating mode

2 - Bonded rubber bushing

3 - Bracket

- For Secondary Air Injection (AIR) pump motor V101

4 - Nut

- 9 Nm

5 - Bolt

- 9 Nm

6 - Bolt

- 9 Nm

7 - Air guide pipe

- To Secondary Air Injection (AIR) combi-valves

8 - Bolt

- 22 Nm

9 - Right secondary air injection (AIR) combi-valve

- Component location: Back of right cylinder head
- Checking --> **Combination valve for secondary air injection (AIR), checking function and for leaks**
- Removing and installing --> **Right combination valve for Secondary Air Injection, removing and installing**

10 - Air guide hose

- To Secondary Air Injection (AIR) combi-valves

11 - Left secondary air injection (AIR) combi-valve

- Component location: back of left cylinder head
- Checking --> **Combination valve for secondary air injection (AIR), checking function and for leaks**
- Removing and installing --> **Left combination valve for Secondary Air Injection, removing and installing**

12 - Gasket

- Replace

13 - Bolt

- 9 Nm

14 - Bolt

- 9 Nm

15 - Connecting pipe

- To cylinder head

16 - Bolt

- 9 Nm

17 - Gasket

- Replace

18 - Air guide hose

- From air filter housing

19 - Air guide hose

- From Secondary Air Injection (AIR) Pump Motor V101 to secondary air injection combi-valves

Secondary Air Injection (AIR) pump, removing and installing

Removing

NOTE: • **During installation, all cable ties must be re-installed at the same location.**

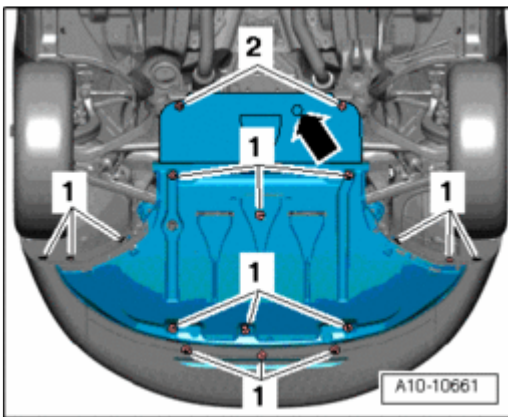


Fig. 585: Identifying Noise Insulation And Mountings
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove sound insulation by loosening securing pieces - **1, 2 and arrow** -.

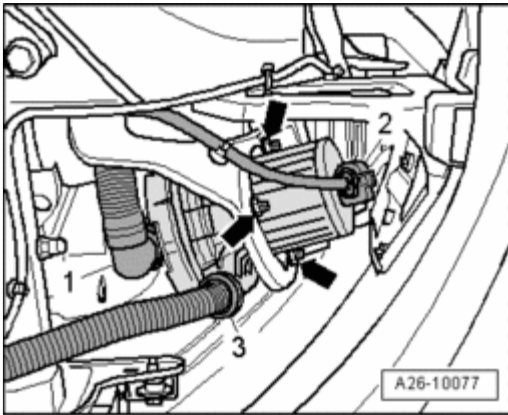


Fig. 586: Identifying Air Guide Hoses, Electrical Connector, Nuts & Secondary Air Injection (AIR) Pump

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove air guide hoses - **1 and 3** - from secondary air injection pump by pressing release buttons.
- Disconnect electrical connector - **2** -.
- Remove nuts - **arrows** - and remove secondary air injection (AIR) pump from bracket.

Installing

- Tightening torques --> **Secondary air injection (AIR) system, assembly overview.**

Installation is in reverse order of removal, note the following:

- NOTE:**
- **During installation, all cable ties must be re-installed at the same location.**

Combination valve for secondary air injection (AIR), checking function and for leaks

Work procedure

- Hose connections properly sealed.

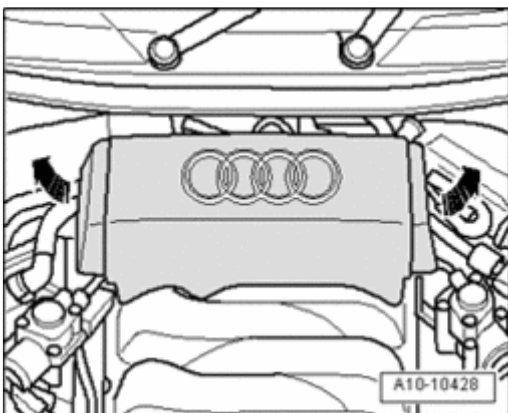
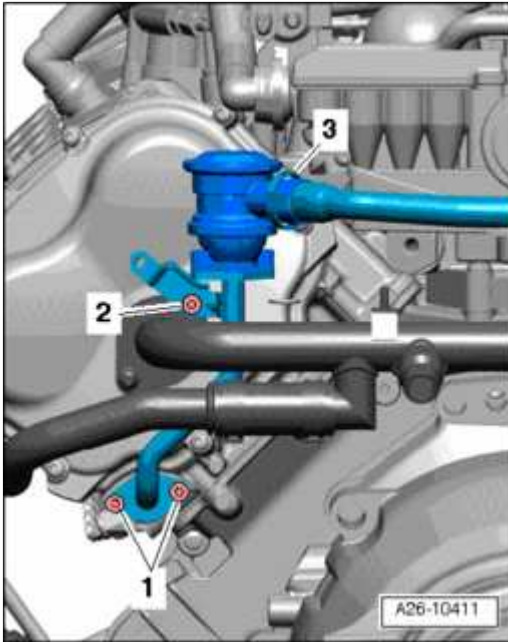


Fig. 587: Removing Rear Engine Cover

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull rear engine cover - **arrows** - off.

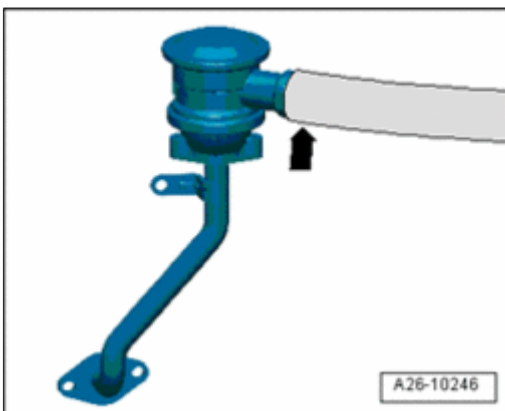
**Fig. 588: Disconnecting Air Guide Hose From Secondary Air Injection (AIR) Combi-Valve**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect air guide hose - **3** - from Secondary Air Injection (AIR) combi-valve.

NOTE:

- The left combination valve for Secondary Air Injection (AIR) is depicted in the illustration.
- Ignore items - 1 and 2 -.

**Fig. 589: Connecting An Assisting Hose To Secondary Air Injection (AIR) Combi-Valve**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect an assisting hose - **arrow** - to Secondary Air Injection (AIR) combi-valve.
- Blow into assisting hose using light pressure (do not use pressurized air).
- Secondary Air Injection (AIR) combi-valve must be closed, it must not be possible to blow through.
- Blow into assisting hose using higher pressure (do not use pressurized air).
- The Secondary Air Injection (AIR) combi-valve must open, it must be possible to blow through.

If switching point is not recognized:

- Replace Secondary Air Injection (AIR) combi-valve: Left --> **Left combination valve for Secondary Air Injection, removing and installing** , right --> **Right combination valve for Secondary Air Injection, removing and installing**.

Left combination valve for Secondary Air Injection, removing and installing

Removing

- NOTE:**
- During installation, all cable ties must be re-installed at the same location.



Fig. 590: Removing Rear Engine Cover

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull rear engine cover - **arrows** - off.
- Drain coolant --> **Cooling system, draining and filling**.
- Remove left coolant pipe --> **Left coolant pipe, removing and installing**.
- Remove Heated Oxygen Sensor (HO2S) 2 G108 (in front of catalytic converter) --> **24 - MULTIPORT FUEL INJECTION (MFI)** .

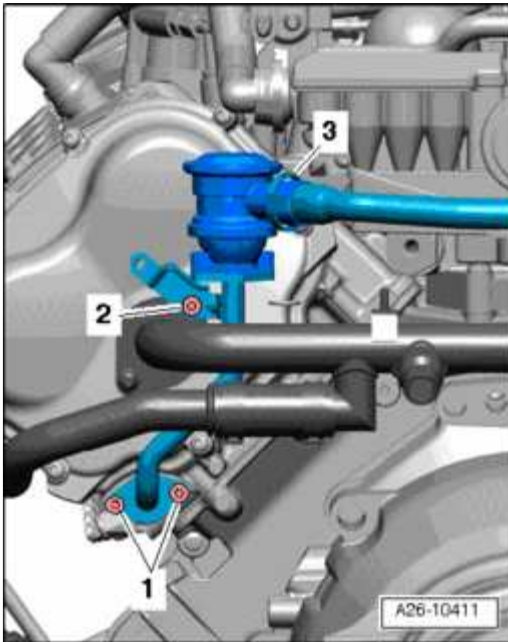


Fig. 591: Disconnecting Air Guide Hose From Secondary Air Injection (AIR) Combi-Valve
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect air guide hose - **3** - from Secondary Air Injection (AIR) combi-valve.
- Remove bolts - **1 and 2** -.
- Free up electrical wiring and remove secondary air injection (AIR) combi-valve.

NOTE: ● **The engine is shown from behind to provide a better illustration.**

Installing

- Tightening torque --> **Secondary air injection (AIR) system, assembly overview.**

Installation is in reverse order of removal, note the following:

NOTE:

- **Replace seals and O-rings.**
- **Secure all hose connections using hose clamps appropriate for the model type .**
- **During installation, all cable ties must be re-installed at the same location.**

- Install Heated Oxygen Sensor (HO2S) 2 G108 (in front of catalytic converter) --> **24 - MULTIPORT FUEL INJECTION (MFI)** .
- Install left coolant pipe --> **Left coolant pipe, removing and installing.**
- Place oil dipstick guide tube in hole on upper part of oil pan.
- Fill with coolant **Filling.**

Right combination valve for Secondary Air Injection, removing and installing

Removing

NOTE:

- During installation, all cable ties must be re-installed at the same location.



Fig. 592: Removing Rear Engine Cover

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull rear engine cover - **arrows** - off.

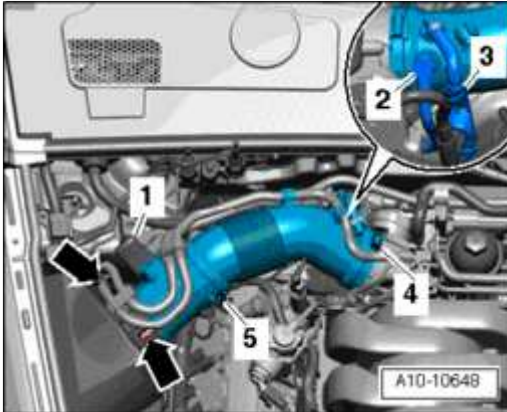


Fig. 593: Identifying Mass Air Flow (MAF) Sensor G70 Electrical Harness Connector, Vacuum Line, Hose Connection, Crankcase Ventilation Hose & Hose Clamps

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Free up fuel line and line to EVAP canister on air filter housing and air guide pipe.
- Remove vacuum line - **3** - to air guide hose.
- Remove air guide hose from air filter housing by loosening hose clamps - **4 and 5** -.
- Lay aside air guide hose with connected line - **2** -.

NOTE:

- Ignore - **1** - and - **arrows** -.

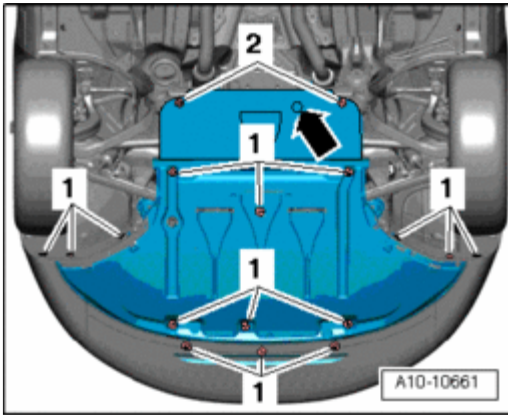


Fig. 594: Identifying Noise Insulation And Mountings
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove sound insulation by loosening securing pieces - **1, 2, arrow** -.

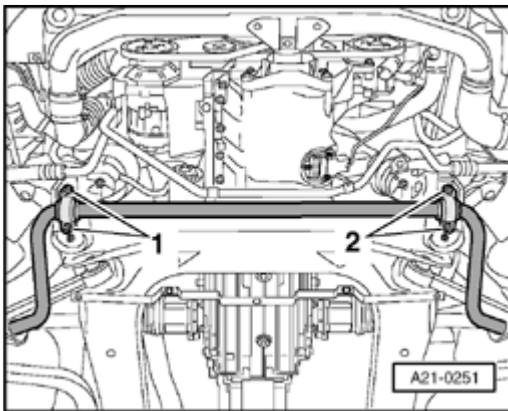


Fig. 595: Removing Bolts For Left And Right Stabilizer Bar Mount
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **1 and 2** - for left and right stabilizer bar mount.
- Slightly lower stabilizer bar.

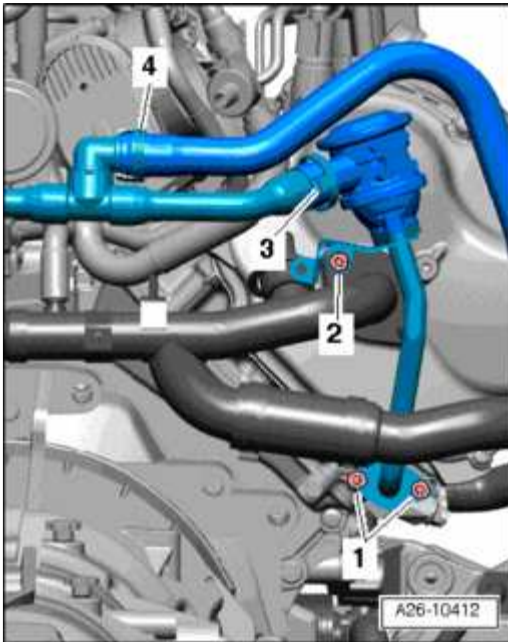


Fig. 596: Identifying Bolts, Air Guide Hoses & Secondary Air Injection (AIR) Combi-Valve
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **1** - from below.
- Remove air guide hoses - **3 and 4** - from above and lay them aside.
- Remove bolts - **2** -.
- Free up electrical wiring and remove secondary air injection (AIR) combi-valve.

NOTE: ● **The engine is shown from behind to provide a better illustration.**

Installing

- Tightening torque --> **Secondary air injection (AIR) system, assembly overview.**

Installation is in reverse order of removal, note the following:

- NOTE:**
- **Replace seals and O-rings.**
 - **Secure all hose connections using hose clamps appropriate for the model type .**
 - **During installation, all cable ties must be re-installed at the same location.**
- Install stabilizer bar --> **40 - FRONT SUSPENSION .**