

Fuel Charging and Controls - TDV6 3.0L Diesel -

Torque Specification

- NOTE: A = refer to procedure for the correct torque sequence.

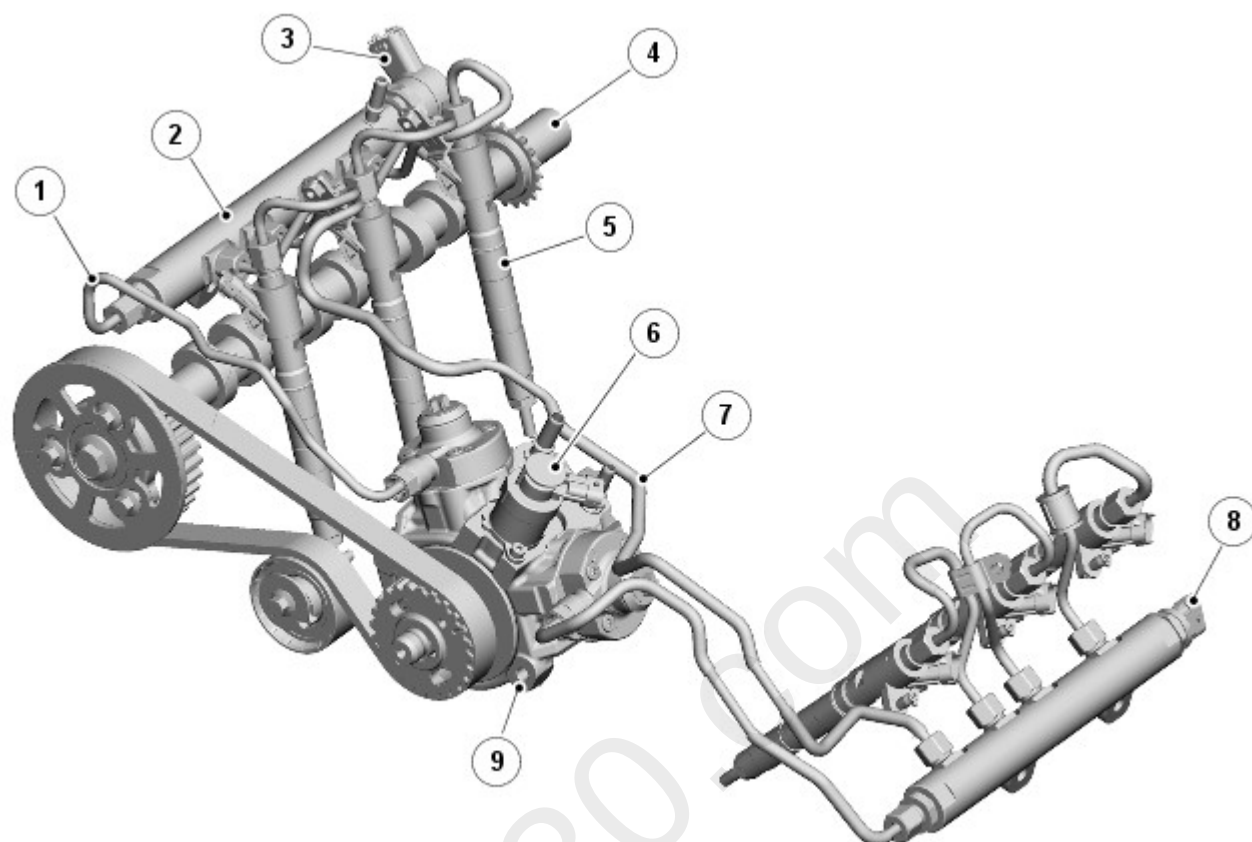
Description	Nm	lb-ft	lb-in
Fuel injection pump cradle bolts	23	16	-
Fuel injection pump retaining bolts	23	16	-
Fuel injection pump bracket	9	-	80
Fuel injection pump sprocket bolt	50	37	-
Inlet manifold retaining bolts	9	-	80
Fuel injection pump belt rear cover retaining bolts	9	-	80
Camshaft rear end accessory drive (READ) pulley hub retaining bolt	A	-	-
Fuel injection pump belt tensioner retaining bolt	23	16	-
Camshaft READ pulley retaining bolt	A	-	-
Fuel rail bracket retaining bolts	23	16	-
Fuel injector retaining bolts	10	-	-
Fuel rail retaining bolts	25	-	-
High-pressure fuel line bracket retaining bolts	9	-	80
High-pressure fuel line union nuts	A	-	-
Fuel rail supply tube union nuts	A	-	-
Fuel crossover line union nuts	A	-	-
Exhaust gas recirculation (EGR) valve retaining bolts	9	-	80

Fuel Charging and Controls - TDV6 3.0L Diesel - Fuel Charging and Controls

- Component Location

Description and Operation

Component Location



E107576

ItemDescription

1	High pressure fuel supply
2	Common fuel rail
3	Fuel pressure control valve
4	Exhaust camshaft
5	Injectors
6	Volume control valve
7	Fuel rail balance pipe
8	Fuel pressure sensor
9	High pressure fuel pump

Fuel Charging and Controls - TDV6 3.0L Diesel - Fuel Charging and Controls

- Overview

Description and Operation

OVERVIEW

The 3.0L V6 diesel engine is equipped with a HP (high pressure) common rail fuel injection system. With this fuel injection process, a HP pump delivers a uniform level of pressure to the shared fuel lines (the common rails), which serve all 6 fuel injectors. Pressure is controlled to the optimum level for smooth operation.

The common rail system supports a pre and pilot injection depending on engine operating conditions, which reduces combustion noise levels, more commonly referred to as 'diesel knock'.

Fuel injection pressure is generated independently of engine speed and fuel injection events.

The fuel injection timing and volume are calculated by the [ECM \(engine control module\)](#), which then energizes the appropriate piezo actuated injector. The common rail fuel injection system has the following features:

- High fuel injection pressures of up to 2000 bar (29007 lbf/in²) for greater atomization of fuel (increasing performance and lowering emissions).
- Variable injection to optimize combustion in all engine operating conditions
- Low tolerances and high precision throughout the life of the system.

The fuel system is divided into two sub systems:

- LP (low pressure) system
- HP system.

The LP system features the following components:

- In-tank fuel pump
- Fuel pressure regulator (integral to the fuel delivery module)
- Fuel filter
- Return pipes
- Injector return pipes
- Fuel coolers (engine and vehicle).

The LP system is regulated to 0.5 bar (7.25 lbf/in²).

The HP system features the following components:

- HP pump
- Fuel rails and diverter rail
- HP fuel pipes
- Injectors.

Fuel Charging and Controls - TDV6 3.0L Diesel - Fuel Charging and Controls - System Operation and Component Description

Description and Operation

System Operation

ENGINE STARTING

During starting, the fuel rail pressure must be at least 150 bar (2175 lbf/in²). Should the pressure be below this figure, the injectors will not operate, resulting in the vehicle not starting.

ENGINE STOPPING

To stop the engine the [ECM \(engine control module\)](#) stops energizing the actuators in the fuel injectors, therefore, no fuel is injected and the engine speed drops to zero.

Refer to: [Electronic Engine Controls](#) (303-14B Electronic Engine Controls - TDV6 3.0L Diesel, Description and Operation).

HP FUEL PUMP

When the HP fuel pump is rotated, pressure is created when the volume control valve is open and the pressure control valve is closed. Both valves are electronically controlled by the [ECM](#) to allow variable fuel delivery and pressure control. When the [ECM](#) actuates the piezo actuators, the fuel rail pressure drop is off-set by additional fuel being delivered to the fuel rails by the pressure control valve. The fuel pressure in the system is reduced within a few seconds after the engine has stopped as the pressure control valve no longer has the holding current it requires, and therefore opens. No residual pressure remains in the system and the fuel is returned to the LP fuel return line to the fuel filter through the open pressure control valve.

Component Description

LOW PRESSURE (LP) SYSTEM

LP Fuel Pump

The electric fuel pump is located inside the fuel tank. Fuel is pumped from the tank via the in-tank fuel pump, to the HP pump via the fuel filter.

Refer to: Fuel Tank and Lines (310-01 Fuel Tank and Lines - 3.0L Diesel, Description and Operation).

Fuel Filter

The fuel filter assembly is located in front of the fuel tank and is mounted on a bracket which is attached to the top face of the transfer box chassis cross member.

Fuel returning from the HP pump passes through the fuel cooler before returning to the filter to maintain the fuel at an optimum temperature. The returning fuel is re-circulated through the filter to help prevent waxing in cold operating conditions. Fuel pressure and fuel delivery is maintained by the in-tank pump and regulator via the tank fuel feed line.

The filter has an air bleed return to the fuel tank which returns excess air and fuel to the tank.

The filter element has a capacity of 200cm³ (12.2in³). The filtration element has the capacity to filter particulate matter larger than 5 microns.

The fuel filter is also fitted with a water sensor to detect when moisture which has collected in the filter has reached an unacceptable level.

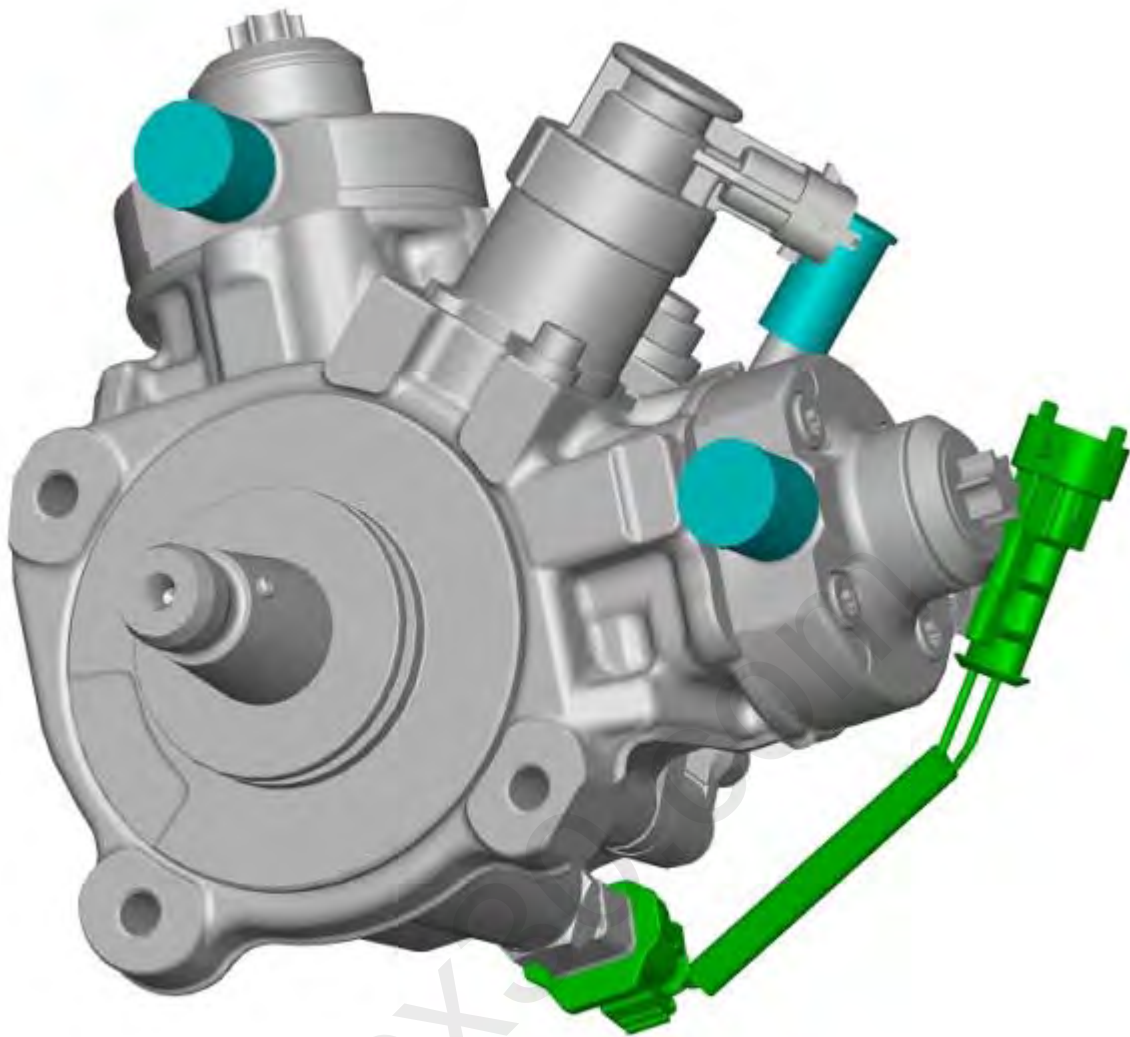
Refer to: Fuel Tank and Lines (310-01 Fuel Tank and Lines - 3.0L Diesel, Description and Operation).

Fuel Cooler

An air blast fuel cooler is located off the engine crossmember at the front of the engine oil pan. The fuel cooler has 2 connections; one is an inlet which allows heated fuel from the HP pump to be cooled, the second allows the cooled fuel to be fed from the cooler into the supply pipe from the LP fuel pump in the fuel tank, via a 'Y' connector back to the fuel filter.

HIGH PRESSURE (HP) SYSTEM

HP Fuel Pump



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The HP pump is a 2 piston radial plunger pump. The pump has the ability to produce a maximum pressure of 2000 bar (29007 lbf/in²). The housing is cast from iron, the flange is cast from aluminum.

The HP pump is driven from the [LH \(left-hand\)](#) cylinder bank exhaust camshaft via a toothed belt. The drive from the belt rotates a cam within the pump which operates a plunger within each pumping element. A procedure and special tools are required for pump or belt replacement to time the pump.

The high-pressure pump comprises 2 high pressure pumping elements, a volume control valve, an internal transfer pump and a fuel temperature sensor.

The fuel is delivered to the internal transfer pump via the external fuel filter and an electric fuel pump which is located in the fuel tank.

The volume control valve is mounted on the high-pressure pump, and located in the feed port between the high pressure pump elements and the internal transfer pump. The volume control valve is a variable position solenoid-operated valve that is controlled by the [ECM](#). The volume control valve determines the amount of fuel that is delivered from the internal transfer pump to the HP pumping elements. When there is no signal to the volume control valve, the valve is closed and there is no fuel delivery.

The fuel from the internal transfer pump is passed to the HP pumping elements at a constant pressure known as transfer pressure. The transfer pressure is controlled by an internal pressure relief valve. Once the fuel enters each of the HP pump elements the pressure rises rapidly, with each element providing a HP supply to one of the fuel rails. The high pressure is controlled by the high pressure regulator valve and the fuel rail pressure sensor.

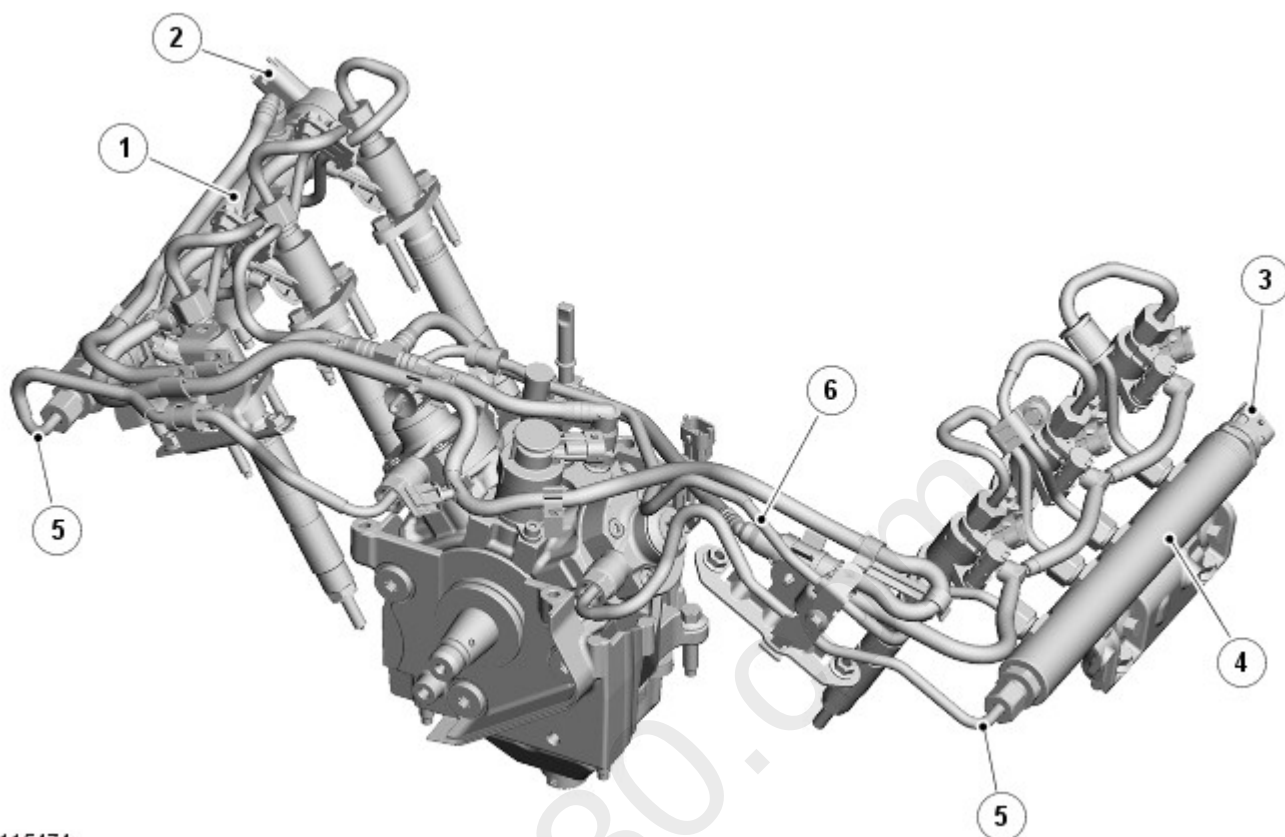
A controlled amount of fuel is allowed to leak-off from the internal transfer pump. This fuel is delivered to the pump internal components to provide cooling and lubrication and is passed back the fuel filter via the LP feed line.

The pressure control valve is located in one of the fuel rails. The fuel pressure is monitored by a pressure sensor located in the other fuel rail. The [ECM](#) controls the pressure control valve using the received signals from the pressure sensor.

Reducing the pressure in the fuel rails via the pressure control valve results in fuel returning from the fuel rails to the LP fuel return to the fuel filter.

The fuel temperature sensor is located on the rear of the HP pump. It measures the fuel temperature in the low-pressure side of the HP pump. The [ECM](#) continually monitors this signal to determine the fuel temperature to prevent overheating of the fuel system. The [ECM](#) will also make fine adjustments to fuel injection quantity to adjust for fuel temperature.

Fuel Rails



E115474

Item	Description
1	LH fuel rail
2	Fuel pressure control valve
3	Fuel pressure sensor
4	RH (right-hand) fuel rail
5	HP fuel connection from HP pump
6	Fuel rail balance pipe

Item	Description
1	LH fuel rail
2	Fuel pressure control valve
3	Fuel pressure sensor
4	RH (right-hand) fuel rail
5	HP fuel connection from HP pump
6	Fuel rail balance pipe

The fuel rails are steel fabrications and are similar in their construction. Two fuel rails are used with each rail supplying high pressure fuel to 3 fuel injectors.

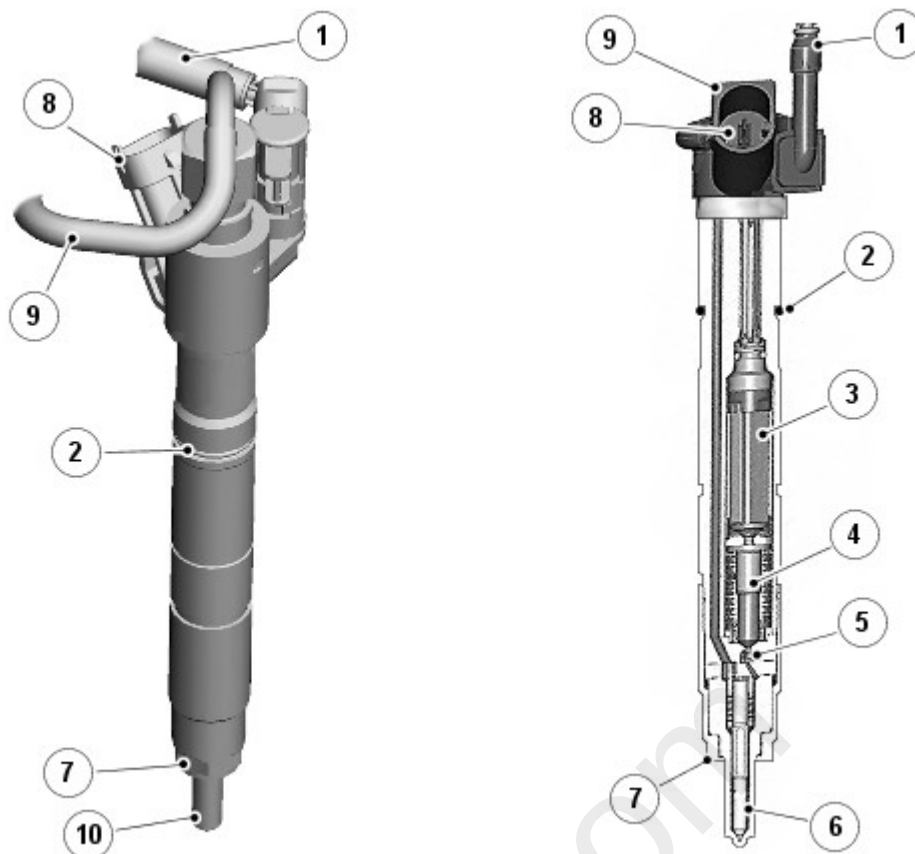
Each rail has 5 threaded connections which provide for the attachment of the high pressure fuel supply from the HP pump, the balance pipe and connections for the 3 injectors supplied with fuel from that rail.

The fuel pressure in the rails is detected by a fuel pressure sensor which is located in the end of the [RH](#) rail. The [LH](#) rail houses a pressure control valve. The [ECM](#) controls the pressure control valve using signals from the pressure sensor.

The fuel rail pressure sensor is a piezo-resistive type sensor containing an actuating diaphragm. Deflection of the diaphragm provides a proportional signal (output) voltage to the [ECM](#), dependant on the fuel pressure within the fuel rail.

Both rails are connected together with a balance pipe which ensures the pressure in both rails is equal, even though each rail is supplied from a different pumping element in the HP pump.

Fuel Injectors



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ItemDescription

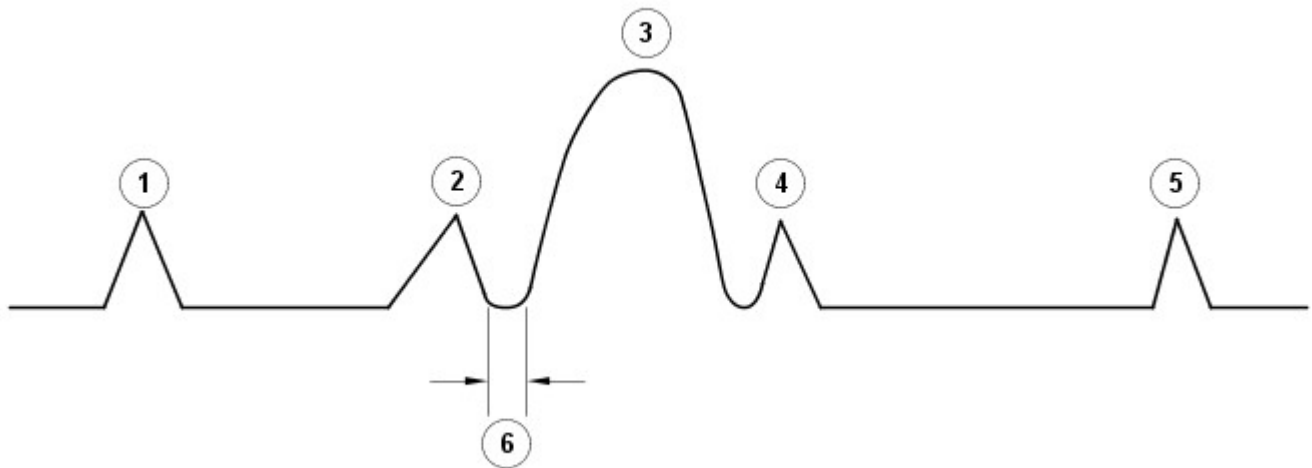
1	Fuel return
2	O-ring seal
3	Piezo stack actuator
4	Hydraulic coupler
5	Control valve
6	Nozzle body
7	Copper sealing washer
8	Electrical connector
9	High pressure feed
10	Nozzle

Six fuel injectors are used in the fuel system. A piezo actuator in each injector is electronically controlled by the [ECM](#) to operate the injector in response to engine speed and load conditions.

Each injector has an electrical connector which connects the injector to the engine harness. A fuel connection on the top of the injector provides for the high pressure fuel inlet from the HP pump. A second fuel connection allows fuel leakage within the injector to return to the HP pump.

Each injector is located in a machined hole in the cylinder head and is sealed in the cylinder head with a copper sealing washer and an O-ring seal. The injector is retained in the cylinder head with a clamp plate and 2 bolts. If an injector is removed or replaced, a new copper sealing washer and a clamp plate must be used when refitting the injector.

The injector can operate up to 5 times during one combustion cycle depending on engine speed and load. The injection sequence can occur as follows:



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- Pilot injection - occurs before the main injection and improves fuel and air mixing
- Pre-injection - shortens the main injection's ignition delay and therefore reduces the generation of nitrous oxides
- Main injection - delivers the required engine torque
- After injection - occurs after the Main injection and assists the re-burn of any remaining particulate matter
- Post injection - helps manage the temperature of the exhaust gas for more effective exhaust-gas after-treatment
- Injection delay 0.4 ms.

Each injector is calibrated to the [ECM](#) and applicable the cylinder to which it is fitted. Therefore, if an injector is removed it must be refitted to the cylinder from which it was removed. If a new injector is fitted, a calibration routine using Land Rover approved diagnostic equipment must be performed to calibrate the injector unique code to the [ECM](#).

The operating voltage of the injector is between 110 and 163 volts depending on engine speed and load and care must be taken when working in the vicinity of the injectors. The voltage increases linearly from 200 to 2000 bar.

Each injector has an electrical resistance value of between 150 - 250 kOhms.



CAUTION: Each injector operation is controlled by a charge and discharge cycle allowing energy to dissipate in, and recover from the injector. Never disconnect the wiring connection when the engine is running. The injector can remain open thus causing engine damage.

Fuel Charging and Controls - TDV6 3.0L Diesel - Fuel Charging and Controls

Diagnosis and Testing

Principles of Operation

For a detailed description of the fuel charging and controls system and operation, refer to the relevant Description and Operation section of the workshop manual.

REFER to: [Fuel Charging and Controls](#) (303-04C Fuel Charging and Controls - TDV6 3.0L Diesel, Description and Operation).

Inspection and Verification



WARNING: Make sure that all suitable safety precautions are observed when carrying out any work on the fuel system. Failure to observe this warning may result in personal injury.

• CAUTIONS:



Make sure that absolute cleanliness is observed when working with these components. Always install blanking plugs to any open orifices or lines. Failure to follow this instruction may result in damage to the vehicle.



Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle.

• NOTE: Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. 1. Verify the customer concern.
2. 2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

Mechanical	Electrical
● Low/Contaminated fuel ● Fuel supply/return line(s) ● Fuel tank and filler pipe ● Fuel leak(s) ● Fuel filler cap ● Fuel filter ● Push connect fittings ● Fuel rail ● Fuel pump ● Exhaust Gas Recirculation (EGR) system	● Fuses ● Glow plug indicator ● Inertia fuel shutoff switch ● Fuel pump module ● Sensor(s) ● Powertrain Control Module (PCM) ● Fuel volume control valve ● Fuel pressure control valve ● Fuel Rail Pressure (FRP) sensor ● Fuel temperature sensor ● Fuel injector(s) ● Exhaust Gas Recirculation (EGR) system

3. 3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. 4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

Symptom Chart

Symptom	Possible Causes	Action
Engine cranks, but does not start	● Inertia fuel shutoff switch ● Low/Contaminated fuel ● Air leakage ● Low-pressure fuel system fault ● Fuel pump module (lift pump) fault ● Blocked fuel filter ● Fuel volume regulator blocked/contaminated ● Fuel pressure control valve blocked/contaminated ● Fuel pump fault ● Crankshaft position (CKP) sensor	Check that the inertia switch has not tripped. Check the fuel level and condition. Draw off approximately 1 ltr (2.11 pints) of fuel and allow to stand for 1 minute. Check to make sure there is no separation of the fuel indicating water or other liquid in the fuel. Check the intake air system for leaks. Check the lift pump operation, check the low-pressure fuel system for leaks/damage. Check the fuel filter, check for DTCs indicating a fuel volume or pressure control valve fault. Check the fuel pump. Check the CKP sensor circuits. Refer to the electrical guides.
Difficult to start	● Glow plug system fault (very cold conditions) ● Low/Contaminated fuel ● Air leakage ● Fuel pump module (lift pump) fault	Check the glow plug circuits. Refer to the electrical guides. Check the fuel level/condition. Draw off approximately 1 ltr (2.11 pints) of fuel and allow to stand for 1 minute. Check to make sure there is no separation of the fuel indicating water or other liquid in the fuel. Check the intake air system for leaks. Check the lift pump operation, check the low-pressure fuel system for leaks/damage. Check the fuel filter, check for DTCs indicating a

Symptom	Possible Causes	Action
	● Low-pressure fuel system fault ● Blocked fuel filter ● Fuel volume control valve blocked/contaminated ● Fuel pressure control valve blocked/contaminated ● Exhaust gas recirculation (EGR) valve(s) fault	fuel volume or pressure control valve fault. Check the EGR system.
Rough idle	● Intake air system fault ● Low/Contaminated fuel ● Low-pressure fuel system fault ● Blocked fuel filter ● Fuel volume control valve blocked/contaminated ● Fuel pressure control valve blocked/contaminated ● Exhaust gas recirculation (EGR) valve(s) fault	Check the intake air system for leaks. Check the fuel level/condition. Draw off approximately 1 ltr (2.11 pints) of fuel and allow to stand for 1 minute. Check to make sure there is no separation of the fuel indicating water or other liquid in the fuel. Check the low-pressure fuel system for leaks/damage. Check the fuel filter, check for DTCs indicating a fuel volume or pressure control valve fault. Check the EGR system.
Lack of power when accelerating	● Intake air system fault ● Restricted exhaust system ● Low fuel pressure ● Exhaust gas recirculation (EGR) valve(s) fault ● Turbocharger actuator fault	Check the intake air system for leakage or restriction. Check for a blockage/restriction in the exhaust system, install new components as necessary. Check for DTCs indicating a fuel pressure fault. Check the EGR system. Check turbocharger actuator.
Engine stops/stalls	● Air leakage ● Low/Contaminated fuel ● Low-pressure fuel system fault ● High pressure fuel leak ● Fuel volume control valve blocked/contaminated ● Fuel pressure control valve blocked/contaminated ● Exhaust gas recirculation (EGR) valve fault	Check the intake air system for leaks. Check the fuel level/condition. Draw off approximately 1 ltr (2.11 pints) of fuel and allow to stand for 1 minute. Check to make sure there is no separation of the fuel indicating water or other liquid in the fuel. Check the fuel system for leaks/damage: Check for DTCs indicating a fuel volume or pressure control valve fault. Check the EGR system.
Engine judders	● Low/Contaminated fuel ● Air ingress ● Low-pressure fuel system fault ● Fuel metering valve blocked/contaminated ● Fuel volume control valve blocked/contaminated ● Fuel pressure control valve blocked/contaminated ● High pressure fuel leak ● Fuel pump fault	Check the fuel level/condition. Draw off approximately 1 ltr (2.11 pints) of fuel and allow to stand for 1 minute. Check to make sure there is no separation of the fuel indicating water or other liquid in the fuel. Check the intake air system for leaks. Check the low-pressure fuel system for leaks/damage. Check the high pressure fuel system for leaks, check for DTCs indicating a fuel volume or pressure control valve fault. Check the fuel pump.
Excessive fuel consumption	● Low-pressure fuel system fault ● Fuel volume control valve blocked/contaminated ● Fuel pressure control valve blocked/contaminated ● Fuel temperature sensor leak ● High pressure fuel leak ● Injector(s) fault ● Exhaust gas recirculation (EGR) valve(s) fault	Check the low-pressure fuel system for leaks/damage. Check for DTCs indicating a fuel volume or pressure control valve fault. Check the fuel temperature sensor, fuel pump, etc for leaks. Check for injector DTCs. Check the EGR system.

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00.
REFER to: Diagnostic Trouble Code (DTC) Index - DTC: Engine Control Module (PCM) 3.0L TdV6 (100-00, Description and Operation).

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Fuel Charging and Controls - TDV6 3.0L Diesel - Fuel Injection Component Cleaning

General Procedures

• WARNINGS:



Do not carry out any repairs to the fuel system with the engine running. The fuel pressure within the system can be as high as 1700 bar (24,656 lb-sq-in). Failure to follow this instruction may result in personal injury.



Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek immediate medical attention.



Place the vehicle in a well ventilated, quarantined area and arrange 'No Smoking/Petrol Fumes' signs about the vehicle.



Wait at least 30 seconds after the engine stops before commencing any repair to the high-pressure fuel injection system. Failure to follow this instruction may result in personal injury.



Wash hands thoroughly after fuel handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.



Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

• CAUTIONS:



Before using the cleaning fluid, protect all electrical components and connectors with lint-free non-flocking material.



Make sure that all parts removed from the vehicle are placed on the lint-free non-flocking material.



Make sure that any protective clothing worn is clean and made from lint-free non-flocking material.



Make sure that clean non-plated tools are used. Clean tools using a new brush that will not lose its bristles and fresh cleaning fluid, prior to starting work on the vehicle.



Use a steel topped workbench and cover it with clean, lint-free non-flocking material.



Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction.

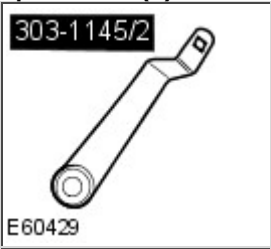
• NOTE: Pneumatic vacuum gun

1. Using a new brush that will not lose its bristles, brush cleaning fluid onto the components being removed and onto the surrounding area.
2. Using a pneumatic vacuum gun, remove all traces of cleaning fluid and foreign material.
3. Dispose of any used cleaning fluid and the brush after completing the repair.

Fuel Charging and Controls - TDV6 3.0L Diesel - Fuel Injection Pump

Removal and Installation

Special Tool(s)

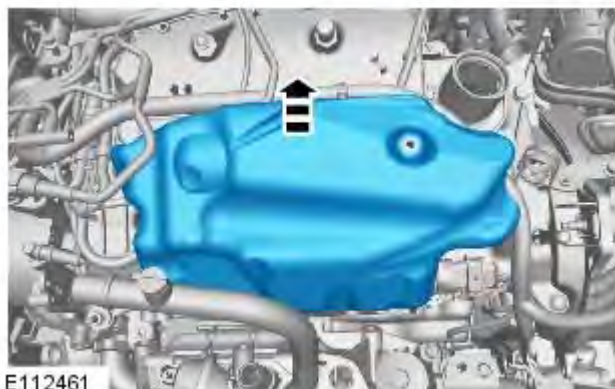
 303-1145/2 Remover, Camshaft Rear Pulley Bolt E60429	
 310-138A Holding Tool, Fuel Pump Pulley E117205	
 310-139A Holding Tool, Fuel Pump Pulley E117206	
 JLR-303-1523 Remover/Installer, Camshaft Rear Pulley E123916	

Removal

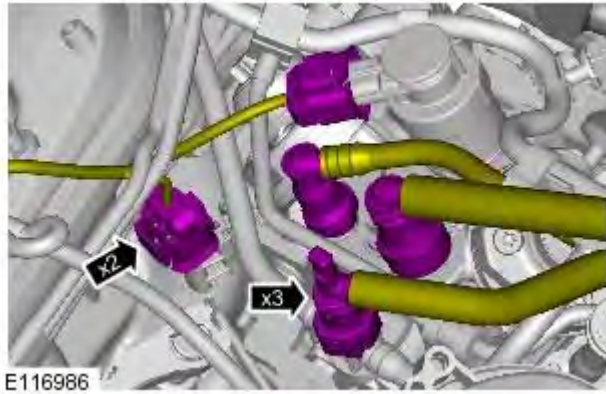
- NOTE: Removal steps in this procedure may contain installation details.
- NOTE: **Some variation in the illustrations may occur, but the essential information is always correct.**

1. Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).
2. Refer to: [Engine Cover - TDV6 3.0L Diesel](#) (501-05 Interior Trim and Ornammentation, Removal and Installation).

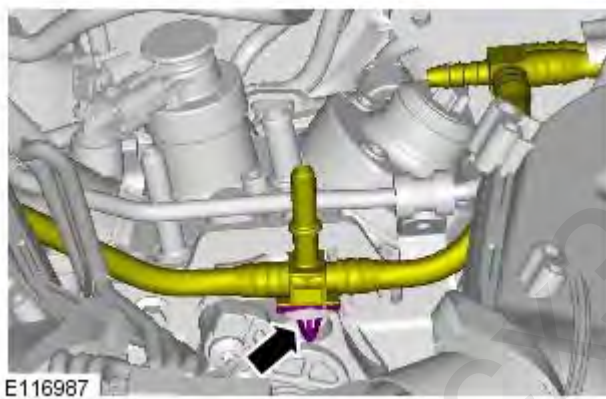
3. **3.** NOTE: Left-hand shown, right-hand similar.



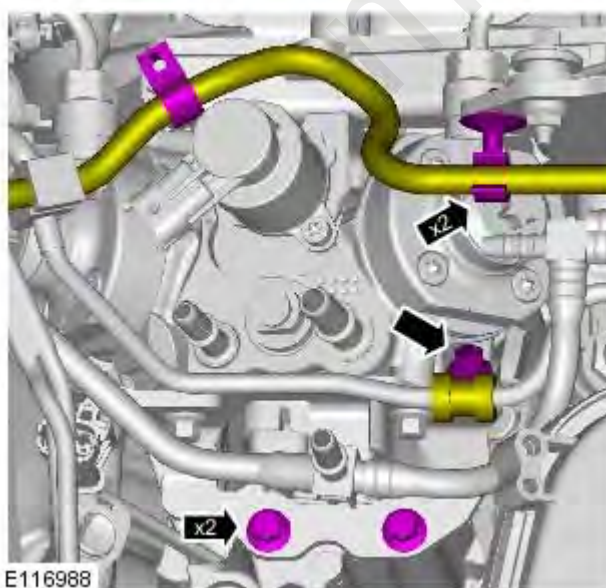
4. Refer to: [Fuel Injection Component Cleaning](#) (303-04A Fuel Charging and Controls - TDV6 2.7L Diesel, General Procedures).
5. Refer to: [Rear End Accessory Drive \(READ\)](#) (303-05B Accessory Drive - TDV6 3.0L Diesel, Removal and Installation).
6. Refer to: [Crankcase Vent Oil Separator](#) (303-08B Engine Emission Control - TDV6 3.0L Diesel, Removal and Installation).



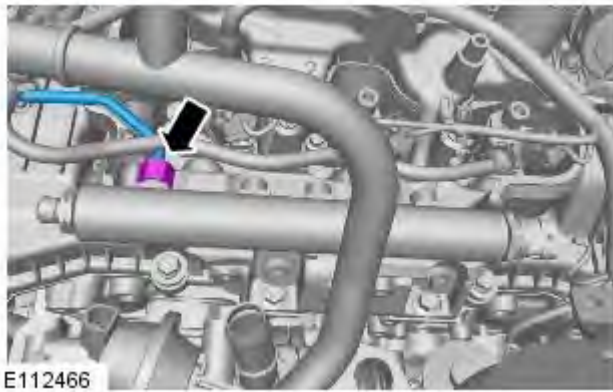
7. **7.**  **CAUTION:** Be prepared to collect escaping fuel.



8. **8.**  **CAUTION:** Be prepared to collect escaping fuel.



- 9.



10. **10. CAUTIONS:**



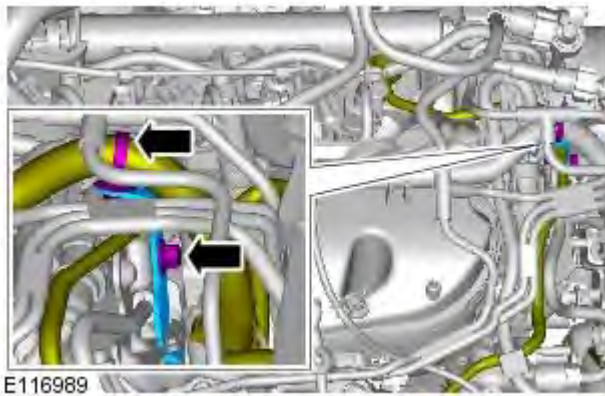
Be prepared to collect escaping fuel.



Discard the component.

• NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

11.



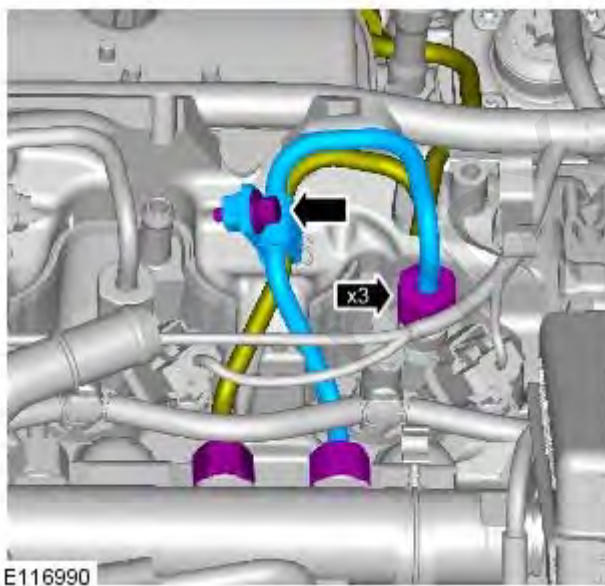
12. **12. CAUTIONS:**

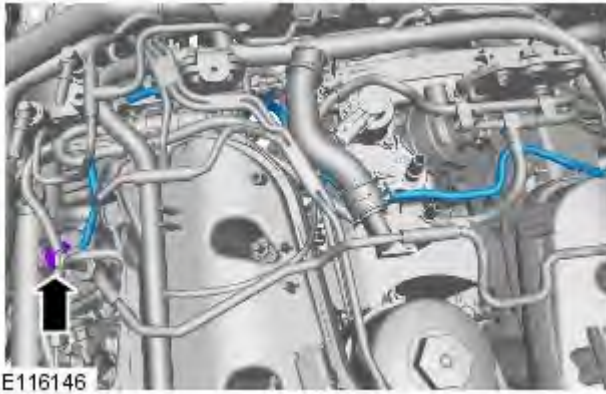


Be prepared to collect escaping fuel.



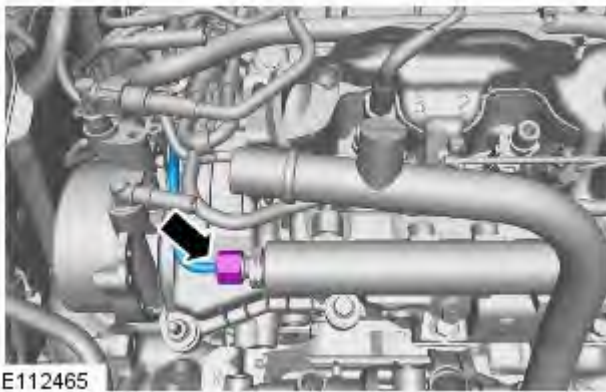
Discard the component.





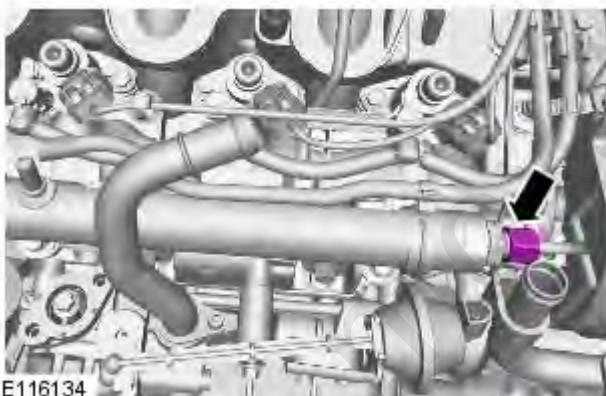
13. **13. CAUTIONS:**

-  Be prepared to collect escaping fuel.
-  Discard the component.



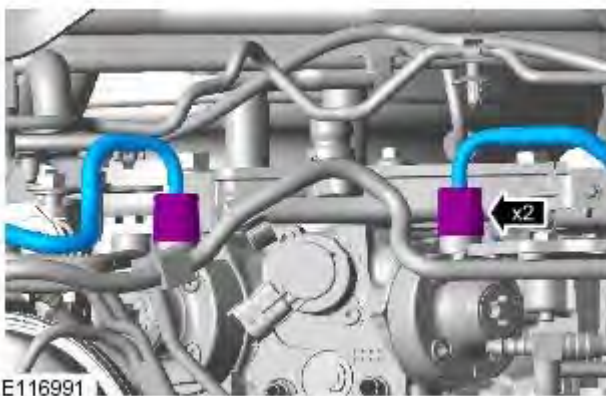
14. **14. CAUTION:** Be prepared to collect escaping fuel.

- NOTE: Some variation in the illustrations may occur, but the essential information is always correct.



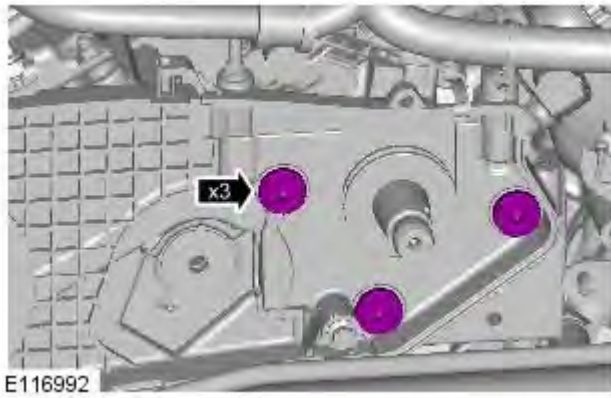
15. **15. CAUTION:** Be prepared to collect escaping fuel.

- NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

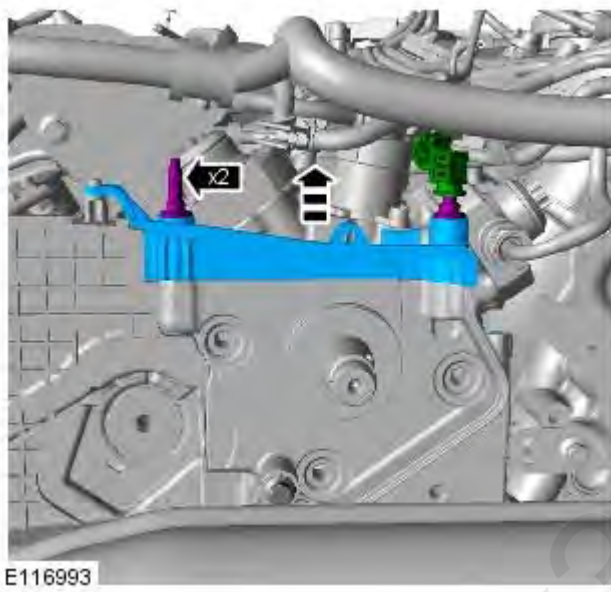


16. **16. CAUTIONS:**

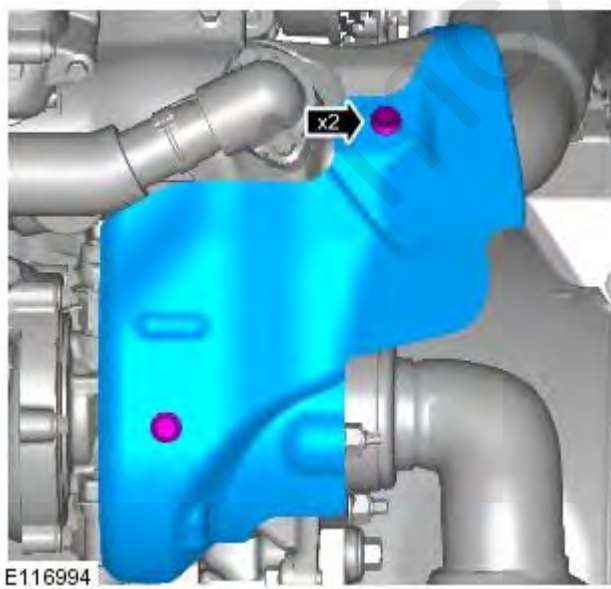
-  Be prepared to collect escaping fuel.
-  Discard the components.



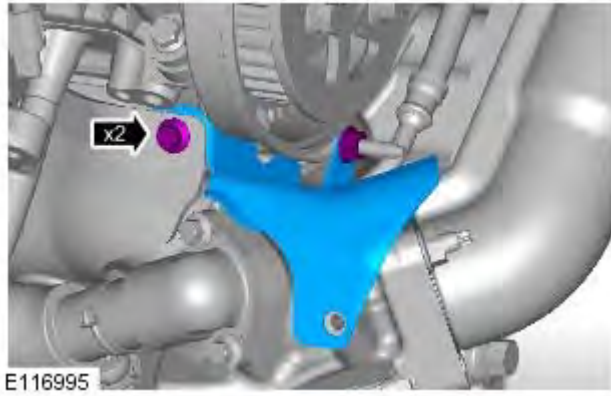
17. **17.** NOTE: Fuel injection pump pulley shown removed for clarity.



18. **18.** NOTE: Fuel injection pump pulley shown removed for clarity.



- 19.



20.



21. *Special Tool(s):* [JLR-303-1523](#)
Torque: 10 Nm



22. *Special Tool(s):* [JLR-303-1523](#)



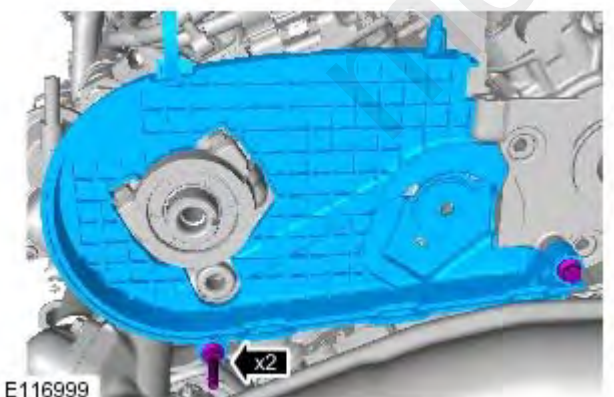
23. Remove the rear camshaft pulley retaining bolt.

Special Tool(s): [303-1145/2](#)

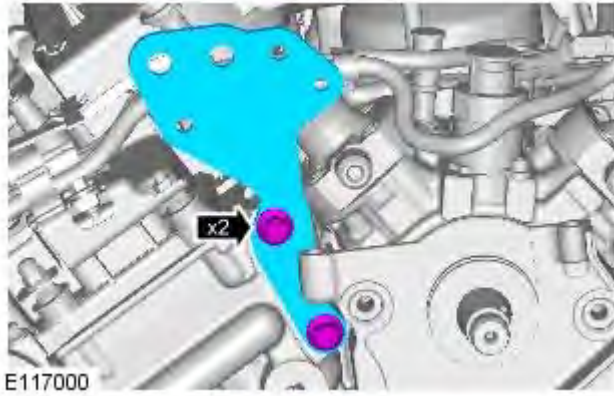
24. Remove the special tools.



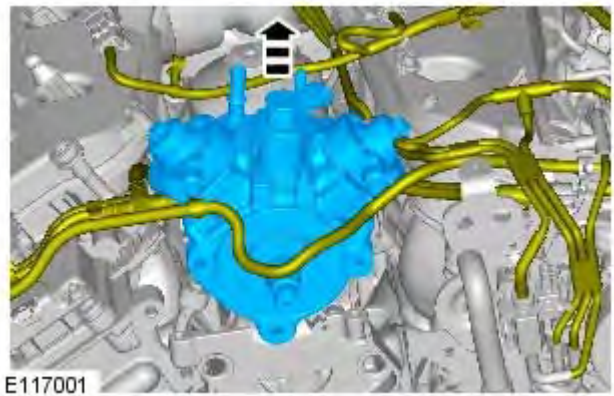
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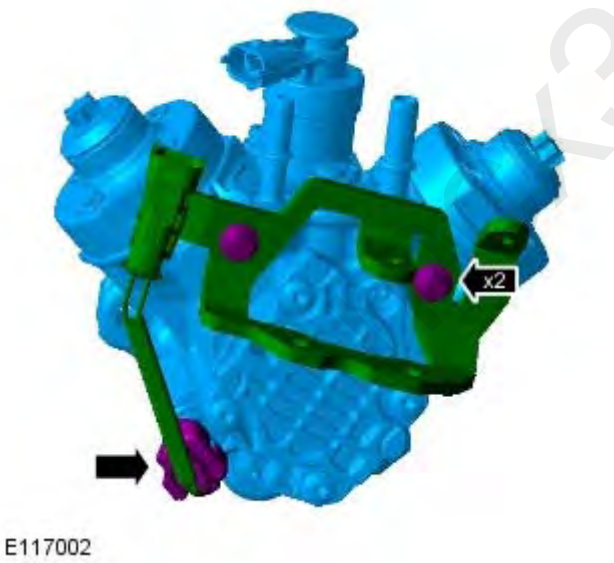
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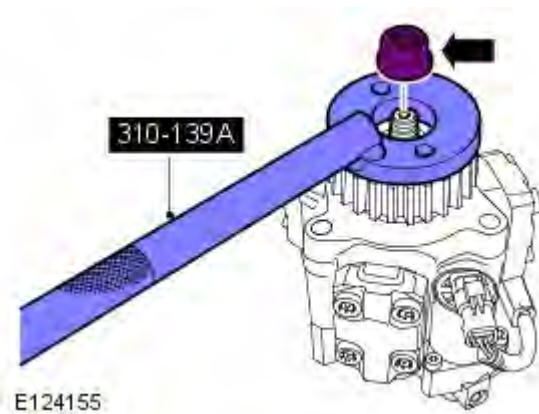
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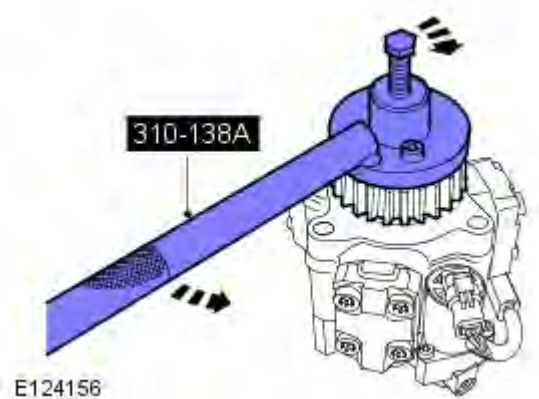
28.



29. **29.** NOTE: Do not disassemble further if the component is removed for access only.

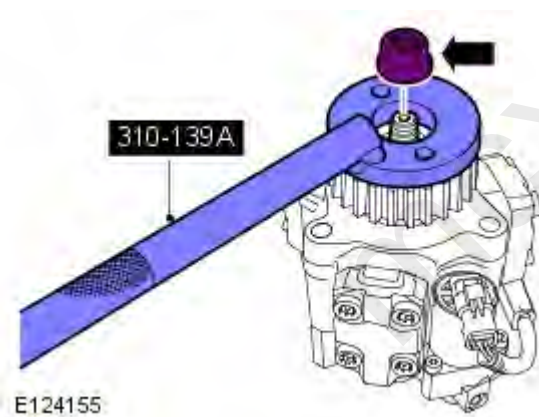


30. *Special Tool(s):* [310-139A](#)



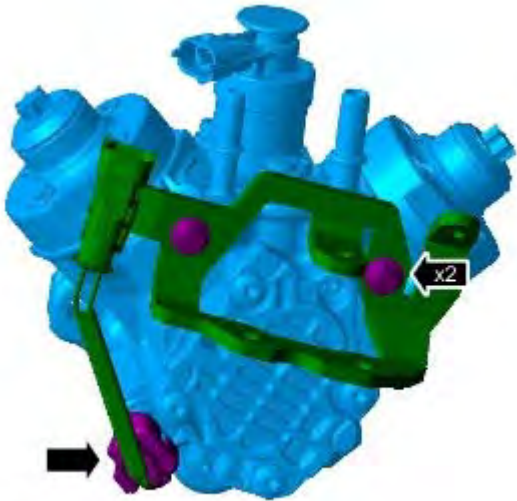
31. *Special Tool(s):* [310-138A](#)

Installation



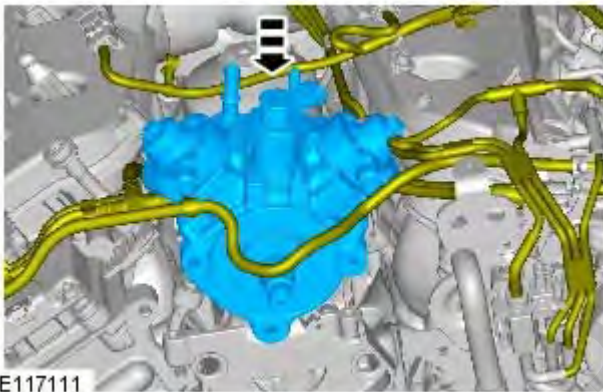
1. *Special Tool(s):* [310-139A](#)
Torque: 50 Nm

2. Torque: 3 Nm



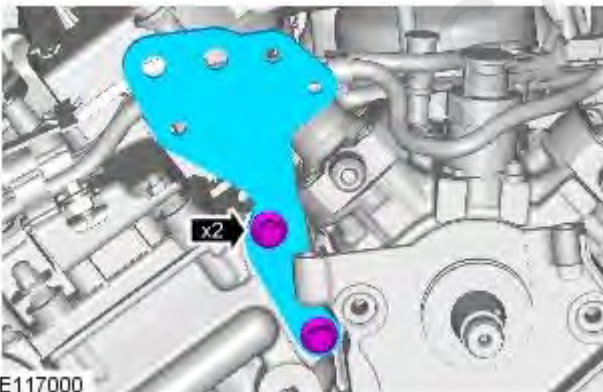
E117002

3.

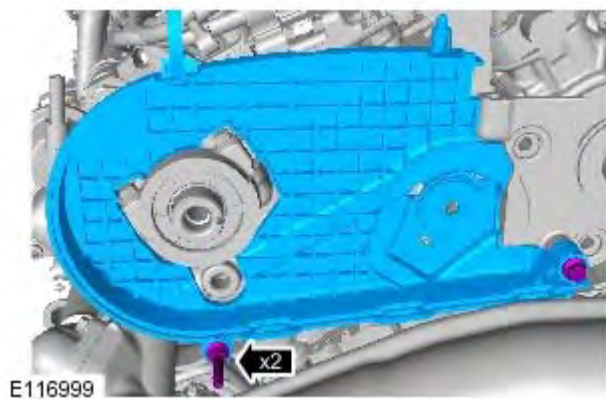


E117111

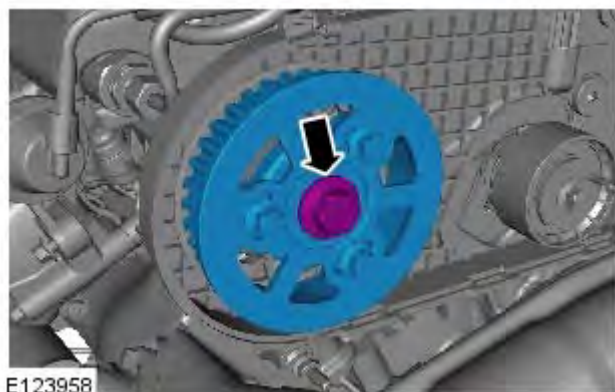
4. Torque: 23 Nm



E117000



5. Torque: 10 Nm



6. **CAUTIONS:**

 Apply loctite 242 (ESK-M4G247-A1) to the new camshaft pulley bolt.

 Install the bolt finger tight.

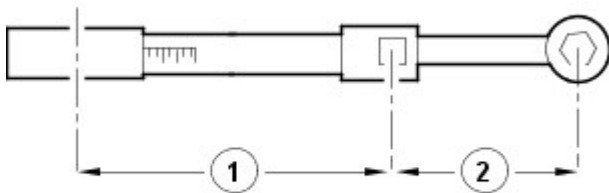


7. Torque: 10 Nm



E123894

8.



E37107

9. **CAUTION:** Make sure the torque wrench setting procedure is followed correctly. Failure to follow this instruction may result in damage to the vehicle.

- Calculate the setting for the torque wrench:
- **Stage 1:** Multiply the required torque by the effective length of the torque wrench (1).
- **Stage 2:** Add the effective length of the special tool (2) to the effective length of the torque wrench.
- **Stage 3:** Divide the total of stage 1 by the total of stage 2.
- **Stage 4:** Set the torque wrench to the figure arrived at in stage 3.



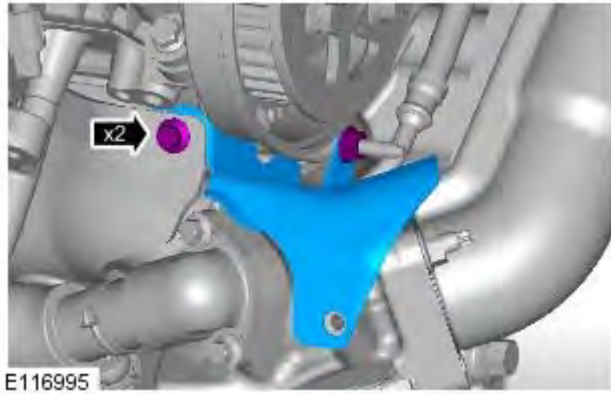
E123895

10. **CAUTION:** Make sure the torque wrench setting procedure is followed correctly. Failure to follow this instruction may result in damage to the vehicle.

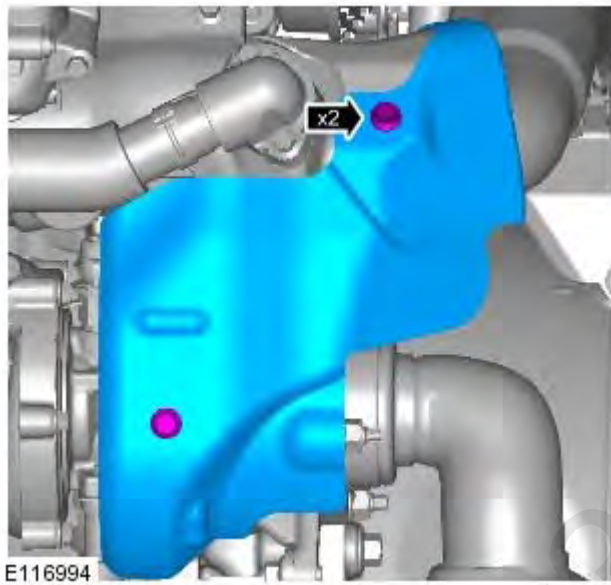
Torque:

Stage 1: 80 Nm
Stage 2: 80°

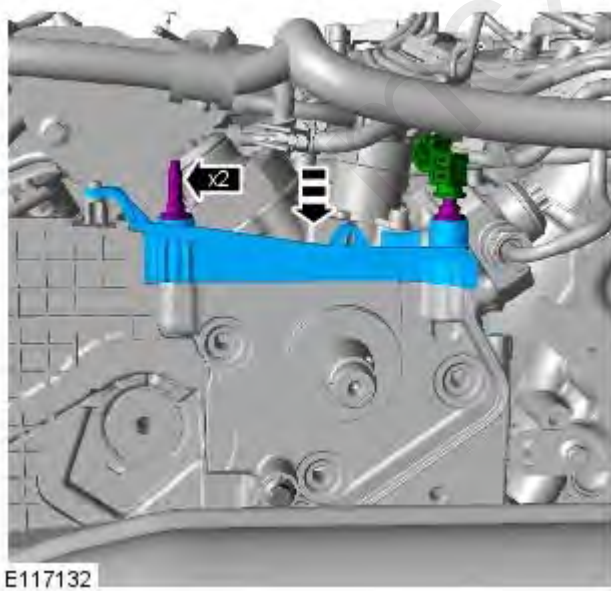
11. Remove the special tools.



12. Torque: 10 Nm

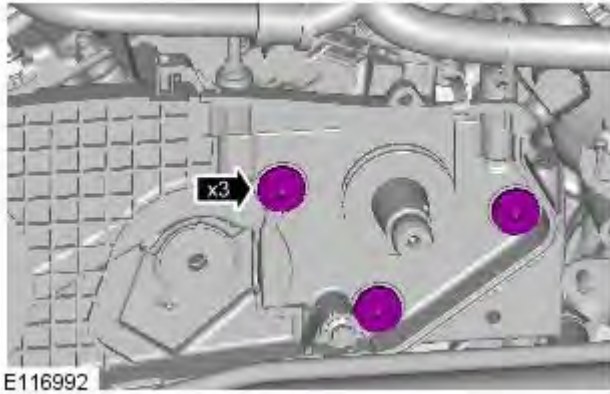


13. Torque: 10 Nm



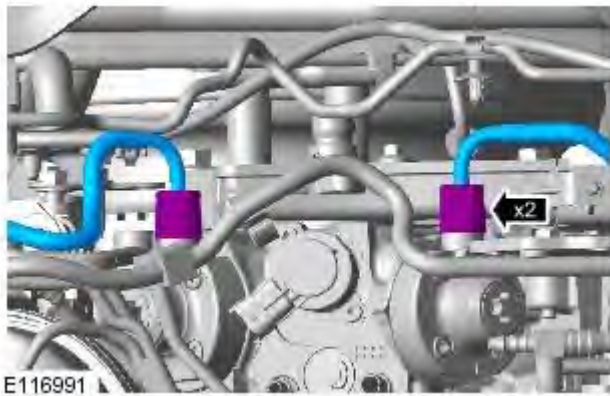
14. **14.** NOTE: Fuel injection pump pulley shown removed for clarity.

Torque: 10 Nm



15. **15.** NOTE: Fuel injection pump pulley shown removed for clarity.

Torque: 23 Nm



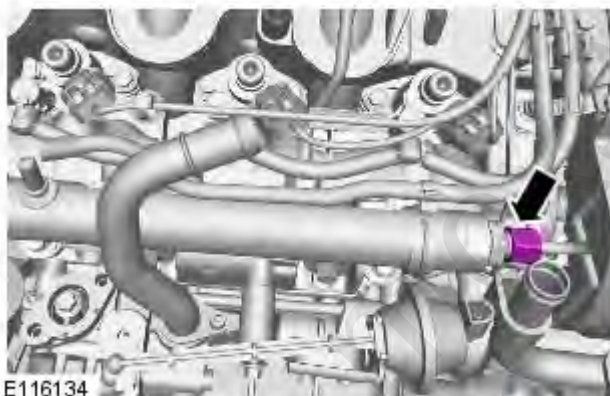
16. **16.** CAUTIONS:



Tighten the fuel supply line unions finger tight.



Make sure that a new component is installed.



17. **17.** CAUTIONS:

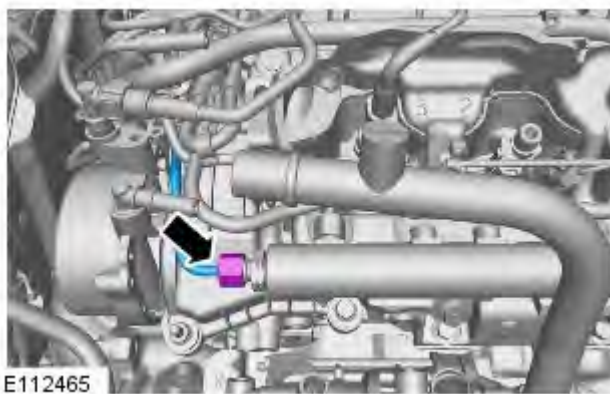


Make sure that a new component is installed.



Tighten the fuel supply line unions finger tight.

• NOTE: Some variation in the illustrations may occur, but the essential information is always correct.



18. **18.** CAUTIONS:

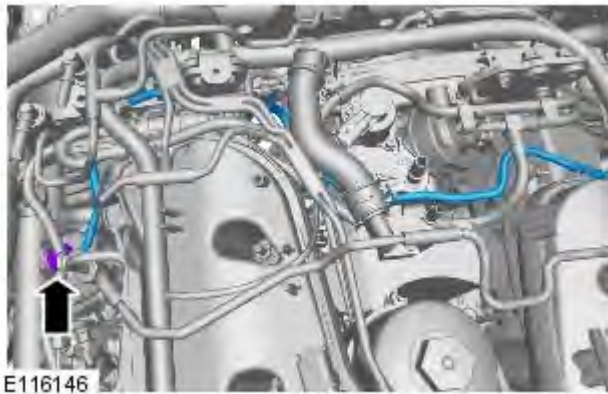


Make sure that a new component is installed.



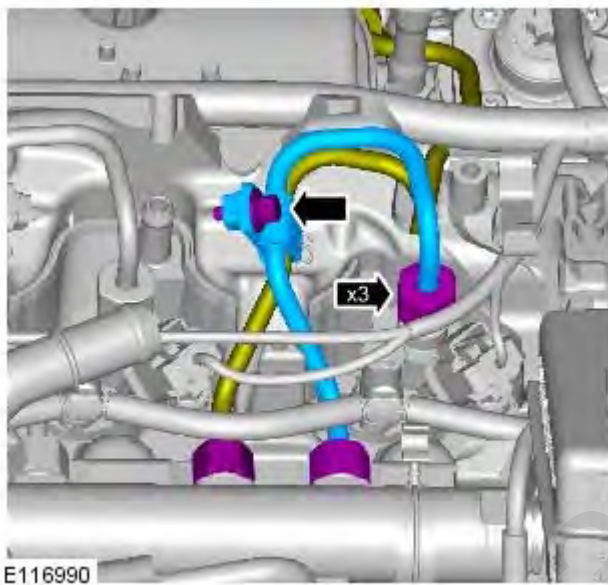
Tighten the fuel supply line unions finger tight.

• NOTE: Some variation in the illustrations may occur, but the essential information is always correct.



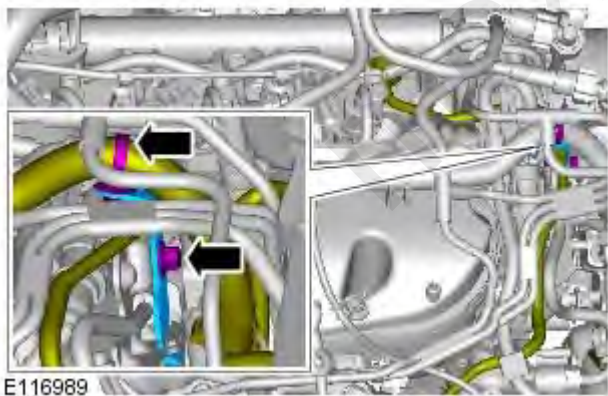
19. **19. CAUTIONS:**

-  Make sure that a new component is installed.
-  Tighten the fuel supply line unions finger tight.

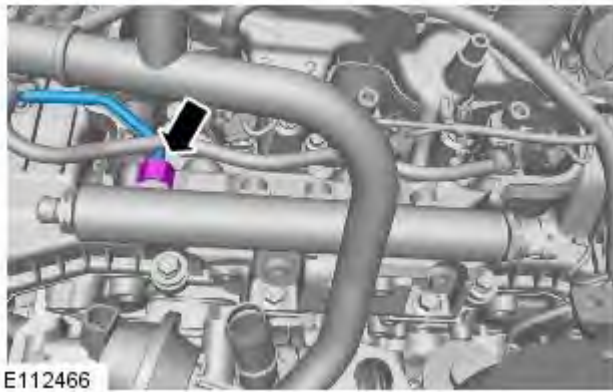


20. **20. CAUTIONS:**

-  Tighten the fuel supply line unions finger tight.
-  Make sure that new components are installed.



21. **Torque: 10 Nm**



22. **22. CAUTIONS:**

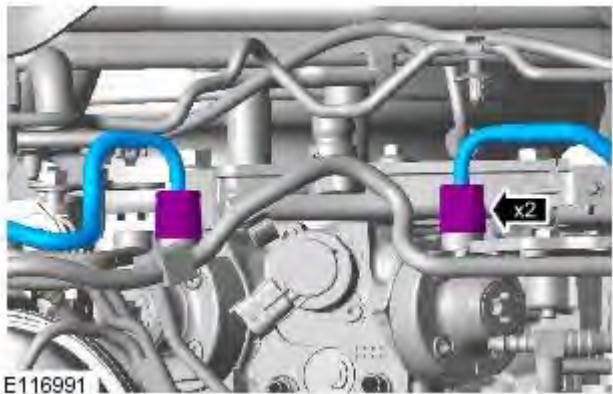


Make sure that a new component is installed.

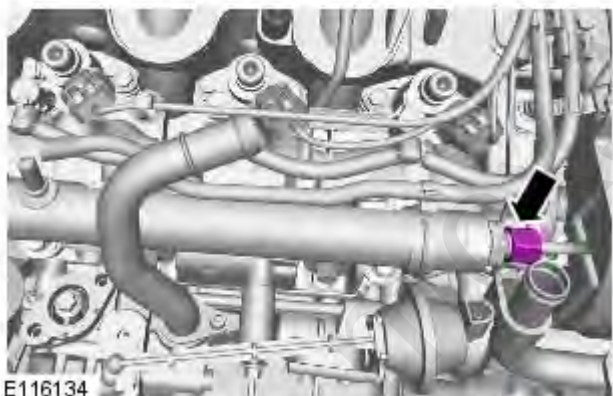


Tighten the fuel supply line unions finger tight.

• **NOTE:** Some variation in the illustrations may occur, but the essential information is always correct.

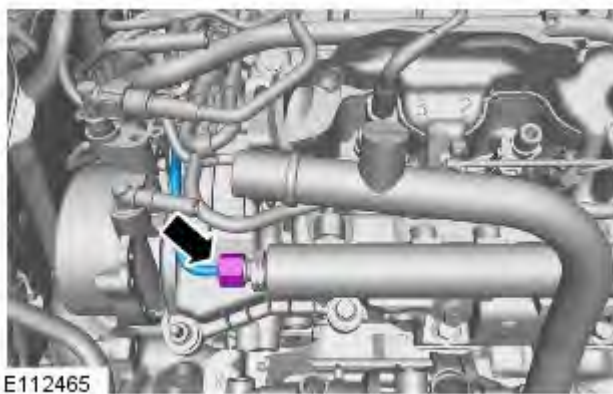


23. Tighten the high-pressure fuel lines union to 15Nm.



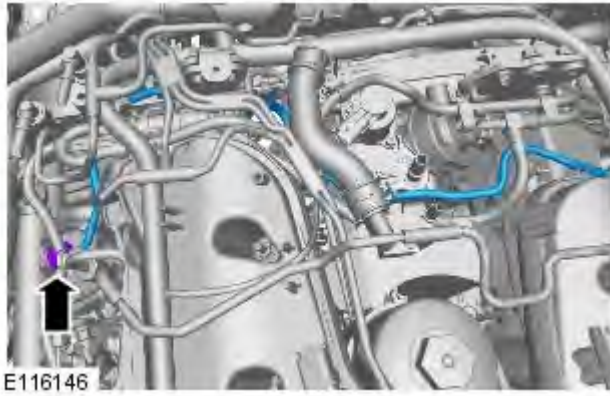
24. **24. NOTE:** Some variation in the illustrations may occur, but the essential information is always correct.

Tighten the high-pressure fuel lines union to 15Nm.

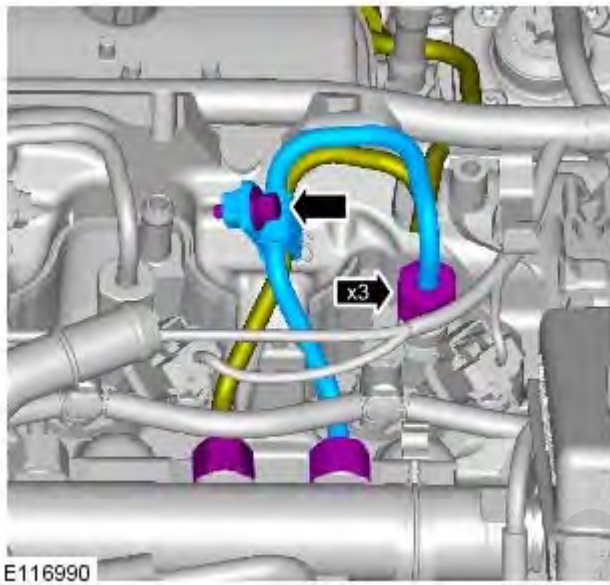


25. **25. NOTE:** Some variation in the illustrations may occur, but the essential information is always correct.

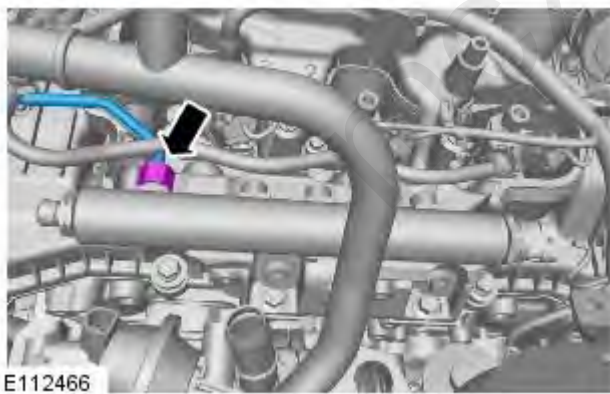
Tighten the high-pressure fuel lines union to 15Nm.



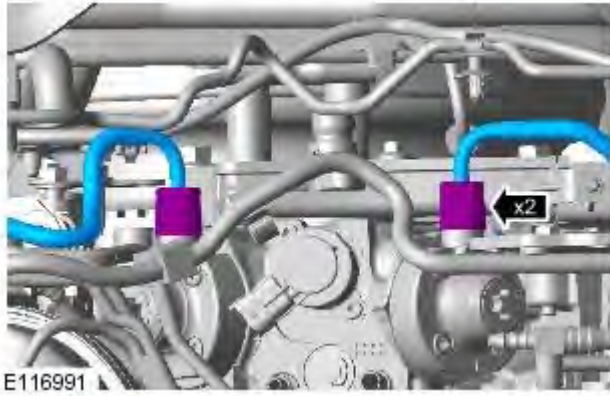
26. Tighten the high-pressure fuel lines union to 15Nm.



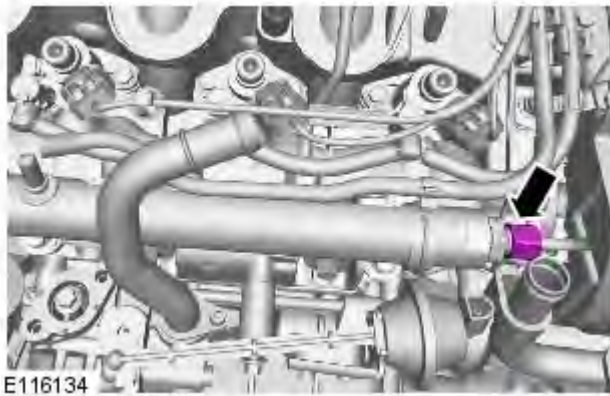
27. Tighten the high-pressure fuel lines union to 15Nm.



28. **28.** NOTE: Some variation in the illustrations may occur, but the essential information is always correct.
Tighten the high-pressure fuel lines union to 15Nm.

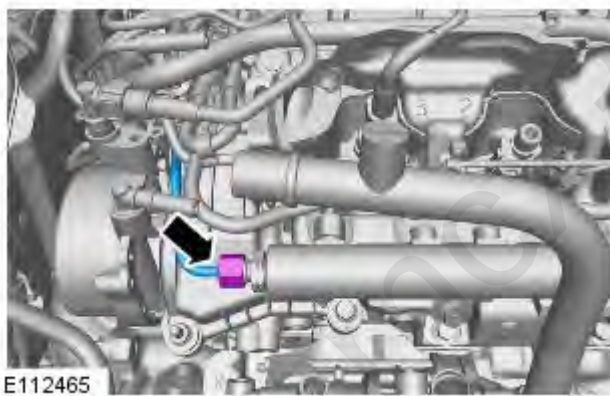


29. Tighten the high-pressure fuel line union to 35Nm.



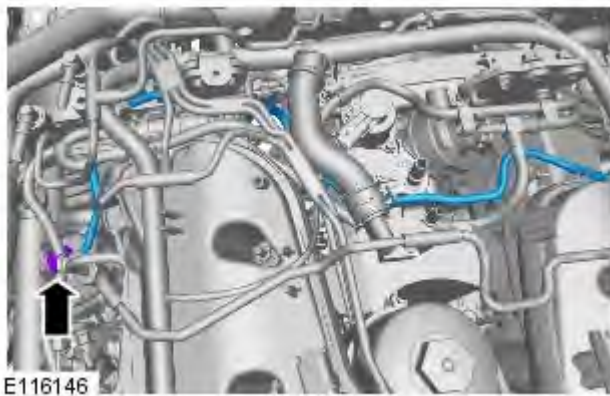
30. **30.** NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

Tighten the high-pressure fuel line union to 35Nm.

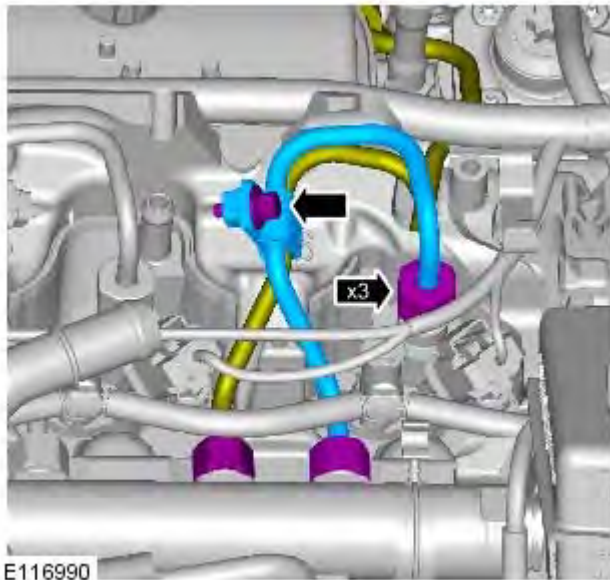


31. **31.** NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

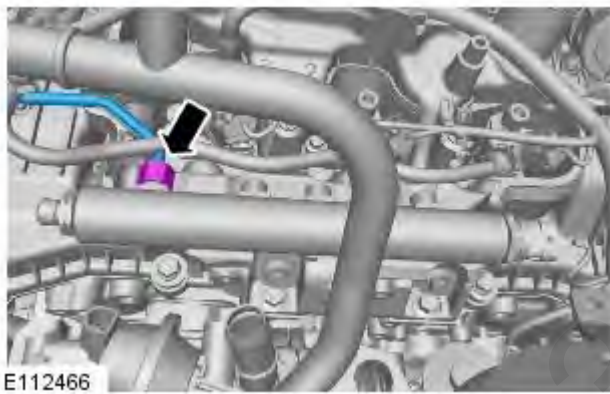
Tighten the high-pressure fuel line union to 35Nm.



32. Tighten the high-pressure fuel line union to 35Nm.

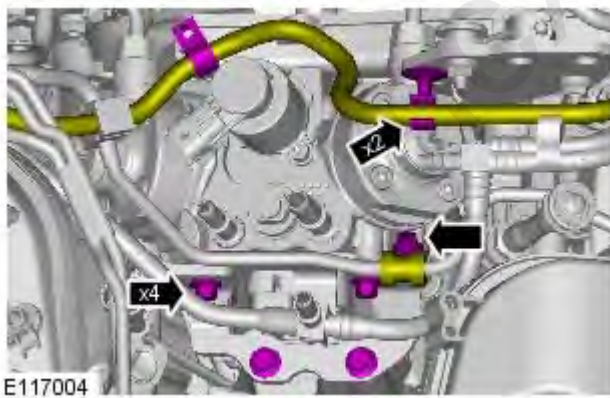


33. Tighten the high-pressure fuel line union to 35Nm.

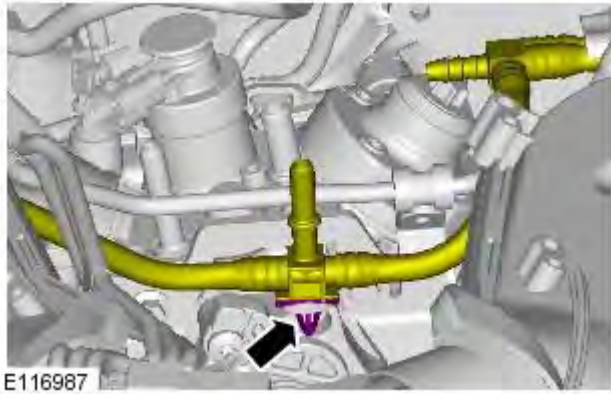


34. **34.** NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

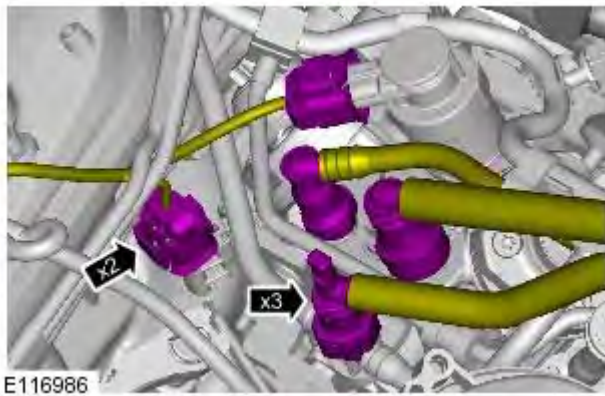
Tighten the high-pressure fuel line union to 35Nm.



35. Torque: 10 Nm



36.



37.

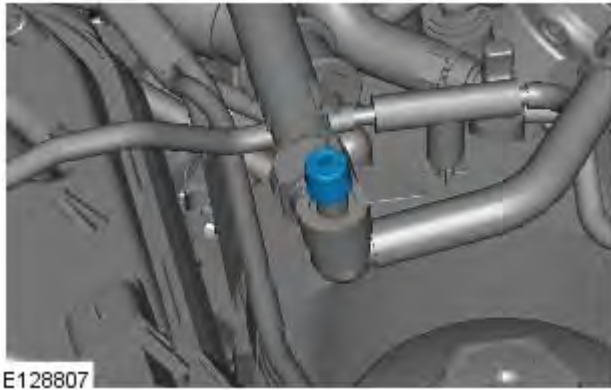
38. Refer to: [Crankcase Vent Oil Separator](#) (303-08B Engine Emission Control - TDV6 3.0L Diesel, Removal and Installation).

39. Refer to: [Rear End Accessory Drive \(READ\)](#) (303-05B Accessory Drive - TDV6 3.0L Diesel, Removal and Installation).

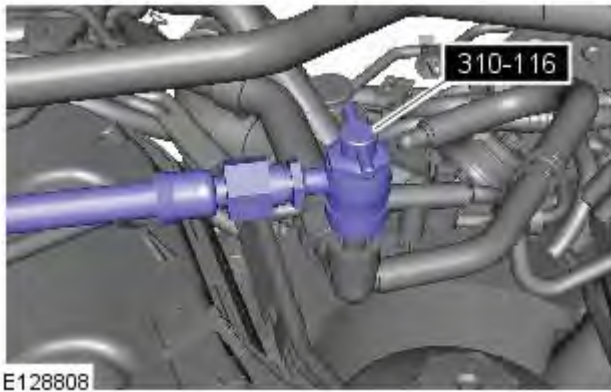
40. **40.** NOTE: Left-hand shown, right-hand similar.



41. Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).



42.



43. **43.** NOTE: The gauge component of the special tool must be removed before installing to the schröder valve.

- NOTE: Using a suitable container, place the end of the special tool into it to collect any fluid.

Install the pipe from special tool 310-116 to the schröder valve.

44.

1. NOTE: A minimum of 12 litres of fuel in the fuel tank is required for the following Steps.

Make sure the fuel tank has a sufficient amount of fuel to carry out the following Steps.

2. NOTE: Do not start the vehicle.

2. NOTE: Allow 15 seconds between **each** ignition cycle (between each ignition **ON** and ignition **OFF**) to allow the fuel tank pump to pump fuel to the fuel injection pump correctly.

Turn the ignition on and off four times.

3. Crank the engine until it starts.
4. Remove the special tool and suitable container.
5. Install the schröder valve cap.
6. Refer to: [Engine Cover - TDV6 3.0L Diesel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).
7. Road test the vehicle for at least 10 miles (16 Km).
8. Check the diagnostic trouble codes (DTC)s using the approved diagnostic tool. Clear or repair as necessary.

Fuel Charging and Controls - TDV6 3.0L Diesel - Fuel Injectors LH

Removal and Installation

Special Tool(s)

 100-012 E54135	100-012 Slide Hammer
 E116924	310-213 Fuel Injector Removal Adaptor
 E124125	JLR-310-237 Remover, Fuel Injector

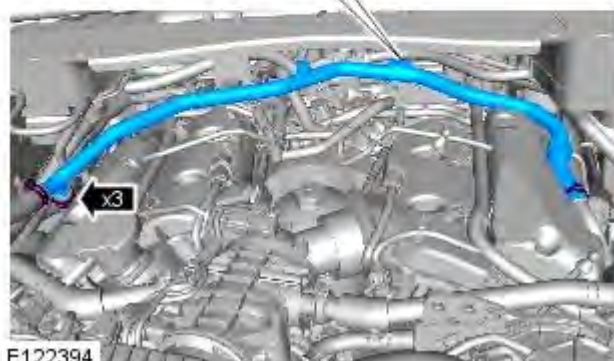
Removal



WARNING: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install new blanking plugs to any open orifices or lines. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

• NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: [Fuel Injection Component Cleaning](#) (303-04A Fuel Charging and Controls - TDV6 2.7L Diesel, General Procedures).
2. Disconnect the battery earth lead.
3. Refer to: Engine Cover - TDV6 3.0L Diesel (501-05, Removal and Installation).
4. Refer to: Cooling System Draining, Filling and Bleeding (303-03, General Procedures).



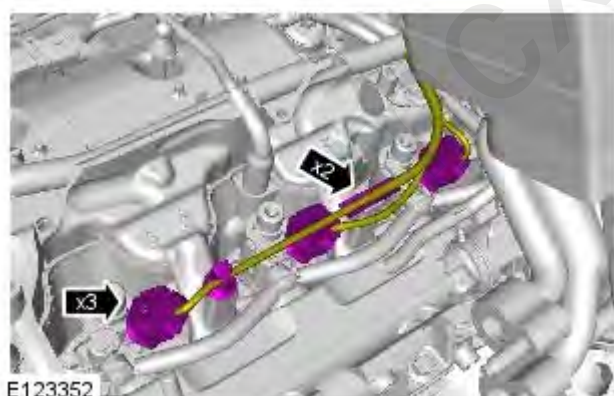
E122394

5.  **CAUTION:** Be prepared to collect escaping coolant.



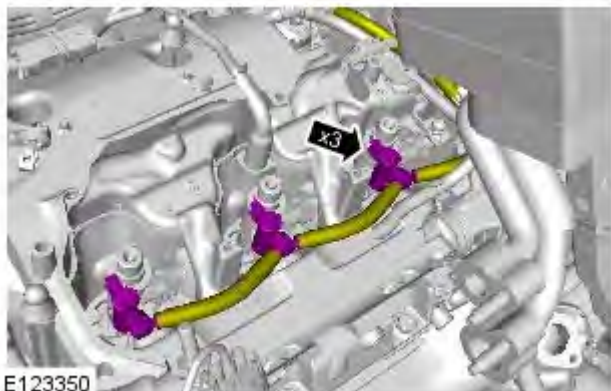
E116128

6.



E123352

7.



8. **8. CAUTIONS:**



Be prepared to collect escaping fuel.



Before disconnecting or removing components, ensure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

- NOTE: Make sure that the fuel injector return line has a maximum of 8 uses.

9.



10. **10. CAUTIONS:**



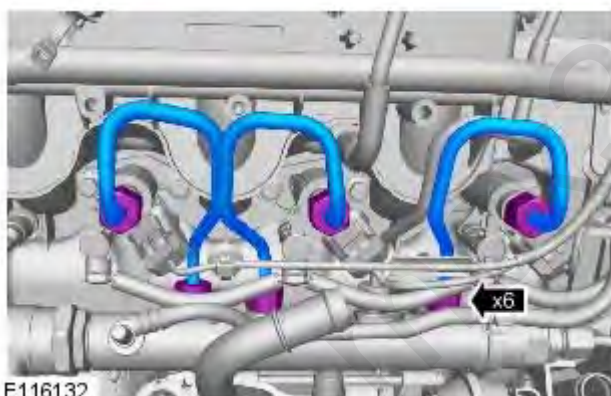
Be prepared to collect escaping fuel.



Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean.

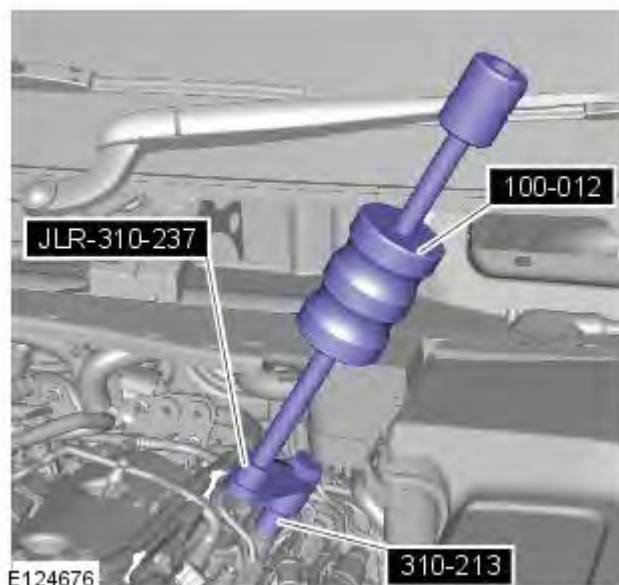


Remove and discard the high-pressure fuel supply lines.

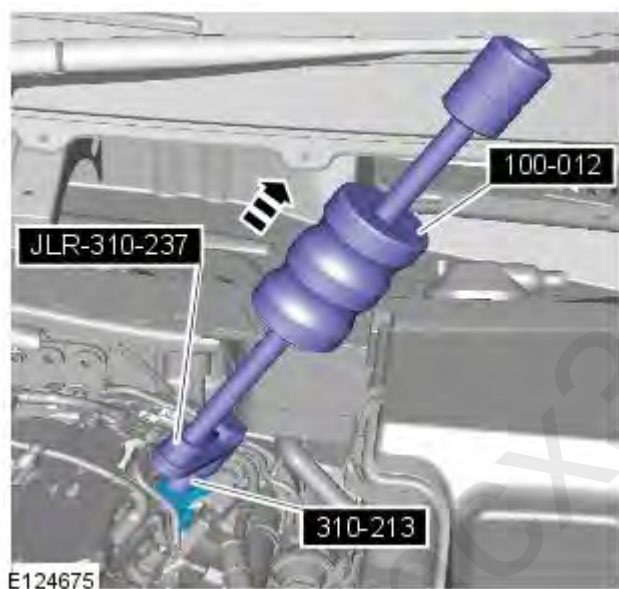


11.



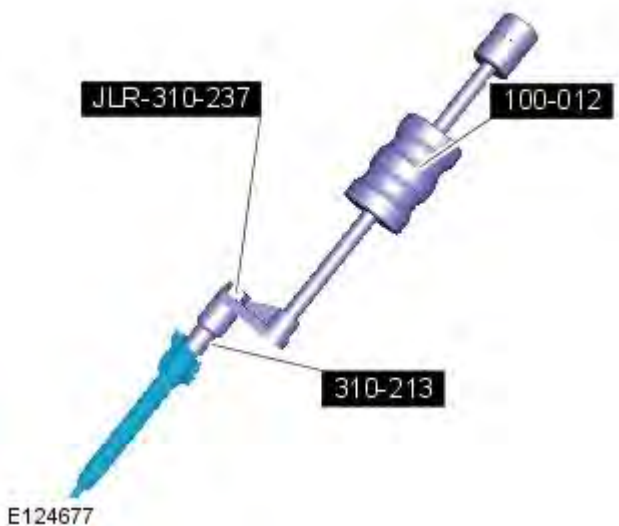


12. Install the special tool.

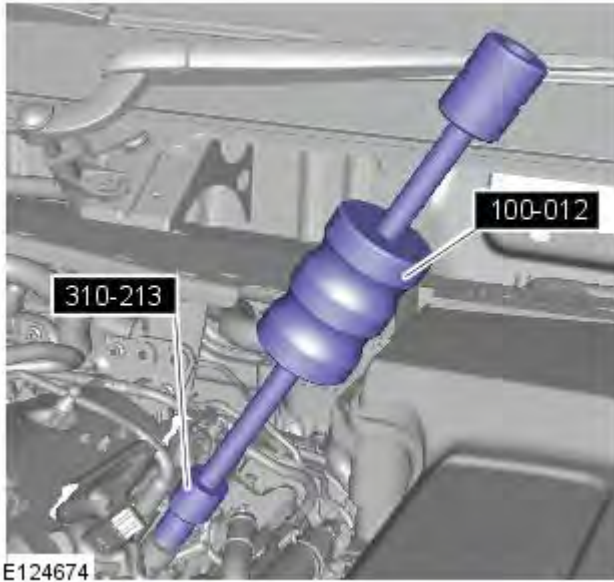


13.

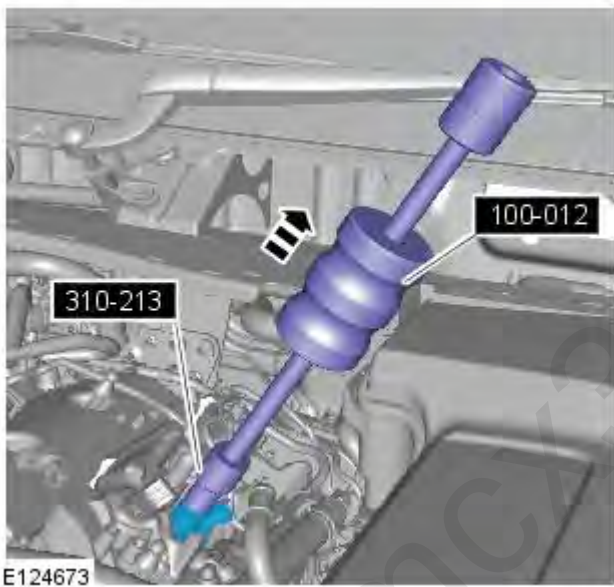
- Special Tool(s): [JLR-310-237](#)
- Special Tool(s): [310-213](#)
- Special Tool(s): [100-012](#)



14. Remove the special tool.

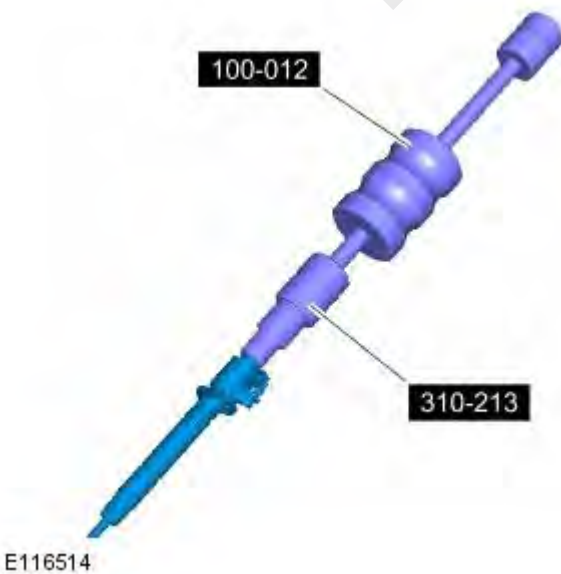


15. Install the special tool.



16.

- *Special Tool(s):* [310-213](#)
- *Special Tool(s):* [100-012](#)



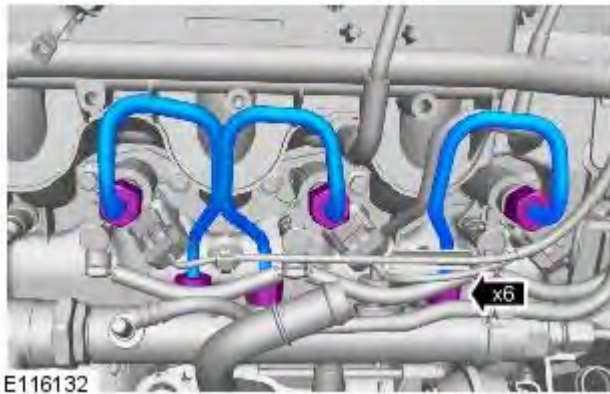
17. Remove the special tool.

Installation

18. Repeat the above procedure for the remaining injectors.



1. **1.**  **CAUTION:** Make sure that the area around the open fuel injector ports are clean and free of foreign material and lubricant prior to installing the fuel injector.



2. **2.** **CAUTIONS:**



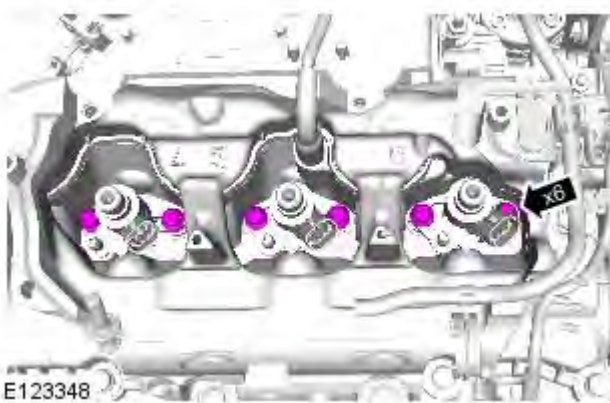
Make sure that a new component is installed.



Only tighten the unions finger-tight at this stage.

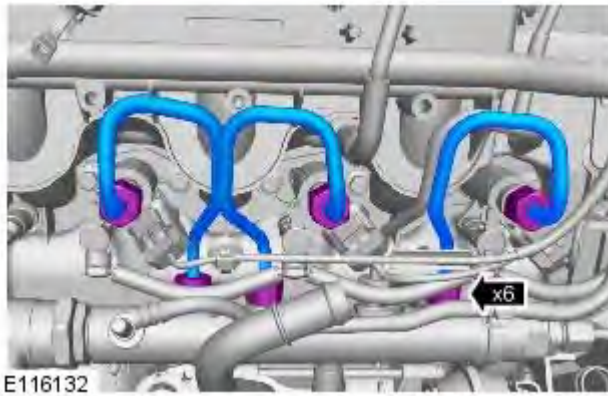


3. **Torque:** 10 Nm



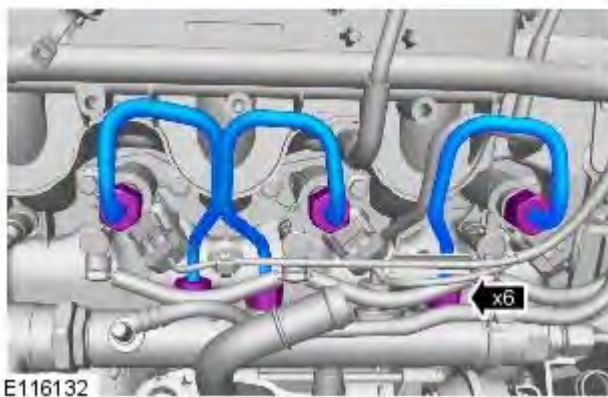
4. **4.** **NOTE:** Tighten the retaining bolts evenly and progressively.

Torque: 9 Nm



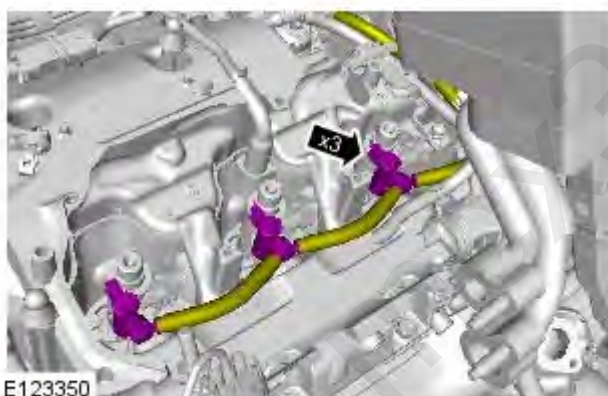
5.

- Stage 1: Tighten the high-pressure fuel supply line unions at the fuel rail to 15Nm.
- Stage 2: Tighten the high-pressure fuel supply line unions at the injector to 15Nm.

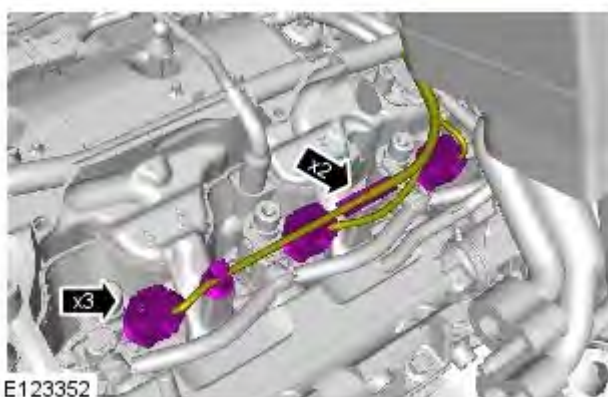


6.

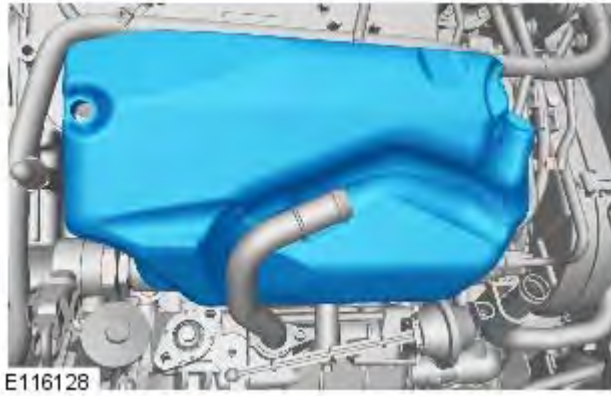
- Stage 1: Tighten the high-pressure fuel supply line unions at the fuel rail to 35Nm.
- Stage 2: Tighten the high-pressure fuel supply line unions at the injector to 35Nm.



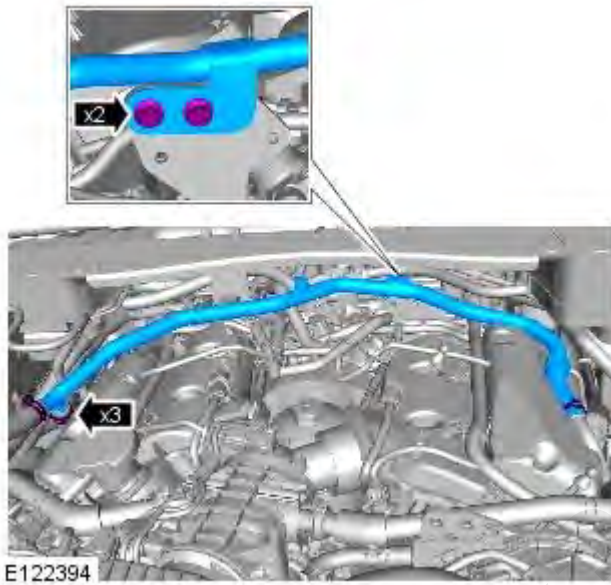
7. **NOTE:** Make sure that the fuel injector return line has a maximum of 8 uses.



8.



9.



10. Torque: 10 Nm

11. Refer to: Cooling System Draining, Filling and Bleeding (303-03, General Procedures).
12. Refer to: Engine Cover - TDV6 3.0L Diesel (501-05, Removal and Installation).
13. Connect the battery earth lead.
14. If a new unit is installed, configure using the approved diagnostic tool.

Fuel Charging and Controls - TDV6 3.0L Diesel - Fuel Injectors RH

Removal and Installation

Special Tool(s)

 100-012 E54135	100-012 Slide Hammer
 E116924	310-213 Fuel Injector Removal Adaptor
 E124125	JLR-310-237 Remover, Fuel Injector

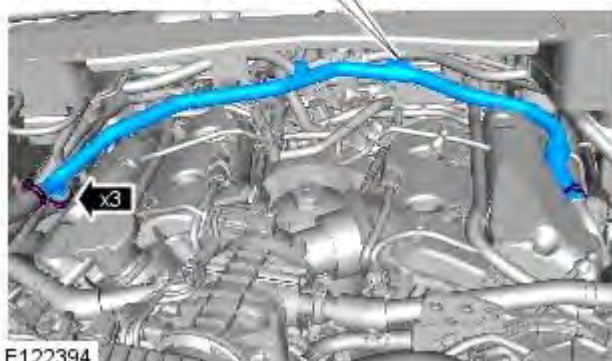
Removal



WARNING: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install new blanking plugs to any open orifices or lines. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

• NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: [Fuel Injection Component Cleaning](#) (303-04A Fuel Charging and Controls - TDV6 2.7L Diesel, General Procedures).
2. Disconnect the battery earth lead.
3. Refer to: [Engine Cover - V8 5.0L Petrol](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).
4. Refer to: Cooling System Draining, Filling and Bleeding (303-03, General Procedures).



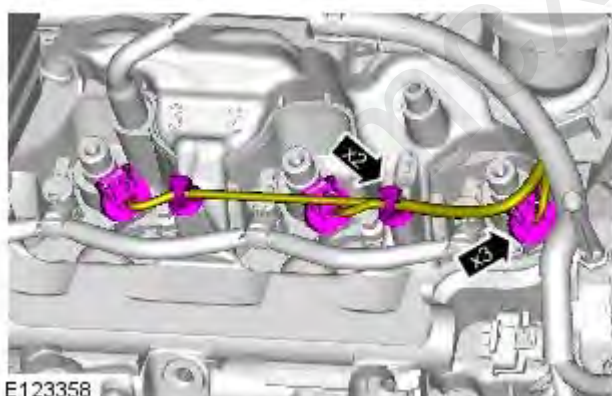
E122394

5.  **CAUTION:** Be prepared to collect escaping coolant.



E121965

6.



E123358

7.



8. **8. CAUTIONS:**



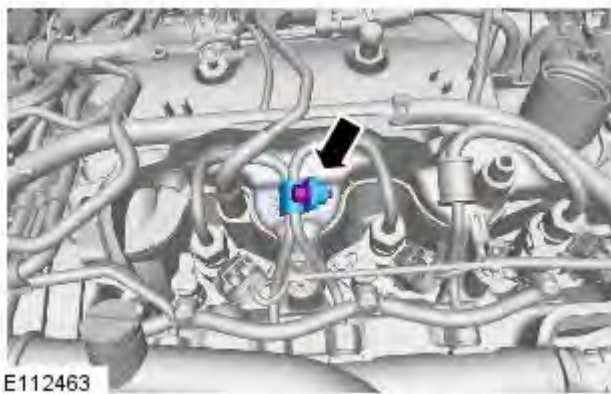
Be prepared to collect escaping fuel.



Before disconnecting or removing components, ensure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

- NOTE: Make sure that the fuel injector return line has a maximum of 8 uses.

9.



10. **10. CAUTIONS:**



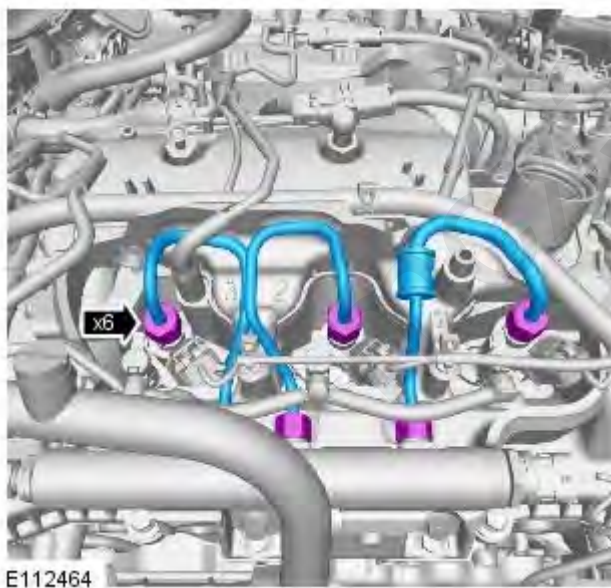
Be prepared to collect escaping fuel.

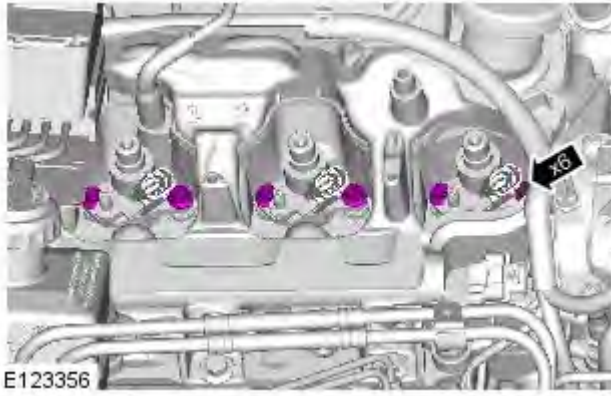


Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean.

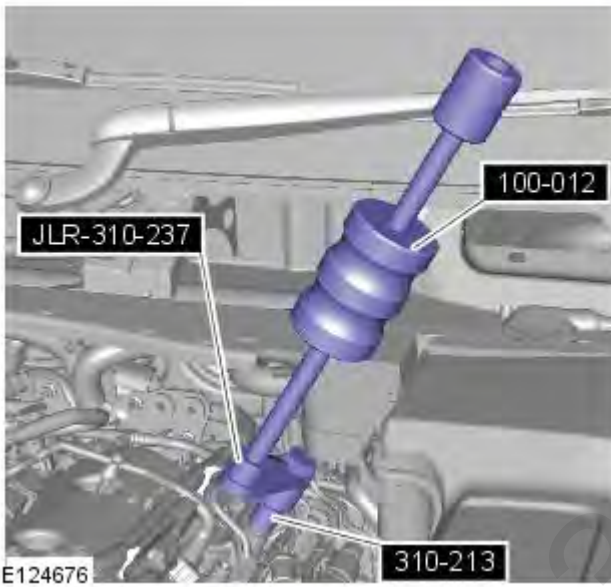


Remove and discard the high-pressure fuel supply lines.

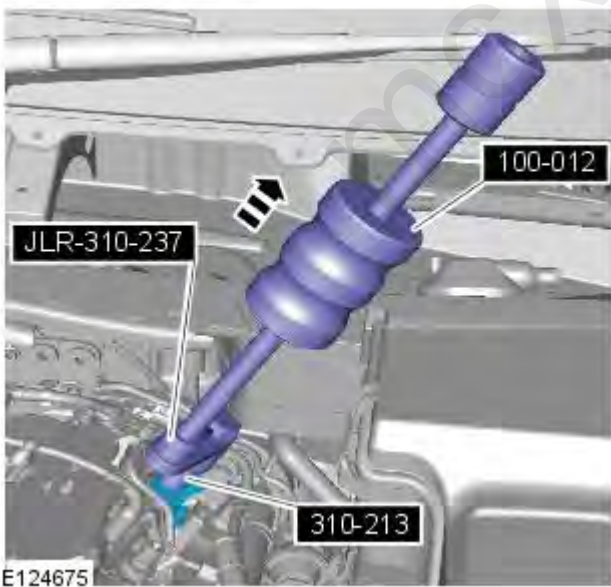




11.

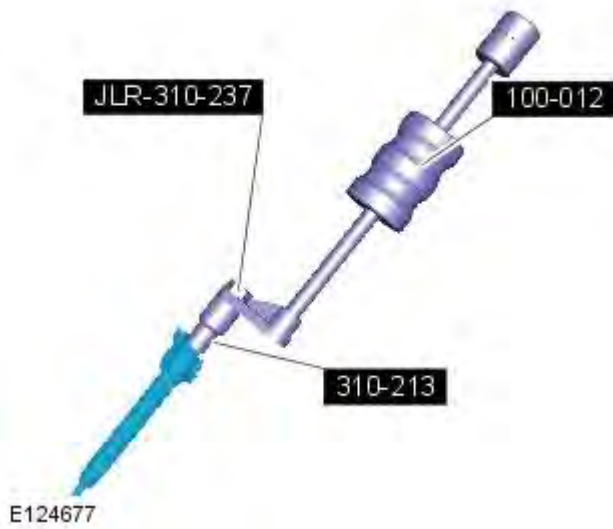


12. **12.**  **CAUTION:** LH illustration shown, RH is similar.
Install the special tool.

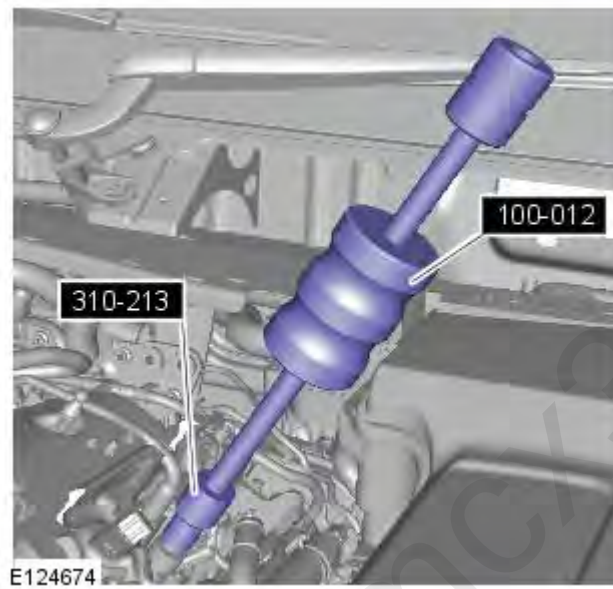


13. **13.**  **CAUTION:** LH illustration shown, RH is similar.
- Special Tool(s): [100-012](#)
 - Special Tool(s): [JLR-310-237](#)
 - Special Tool(s): [310-213](#)

14. Remove the special tool.

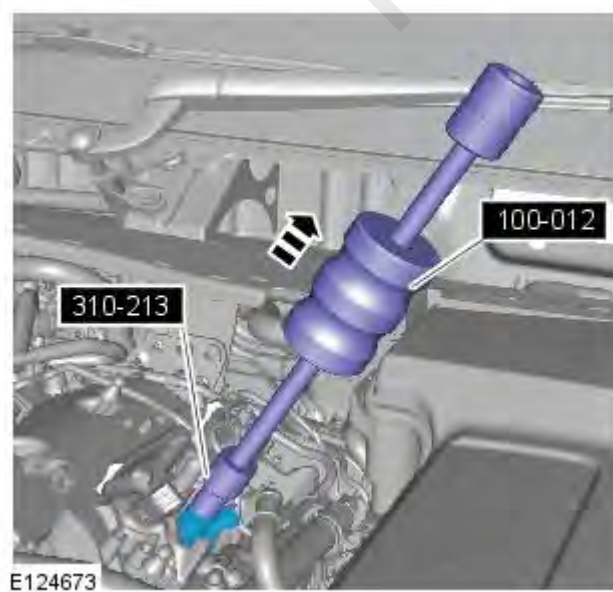


15. **15.**  CAUTION: LH illustration shown, RH is similar.
Install the special tool.

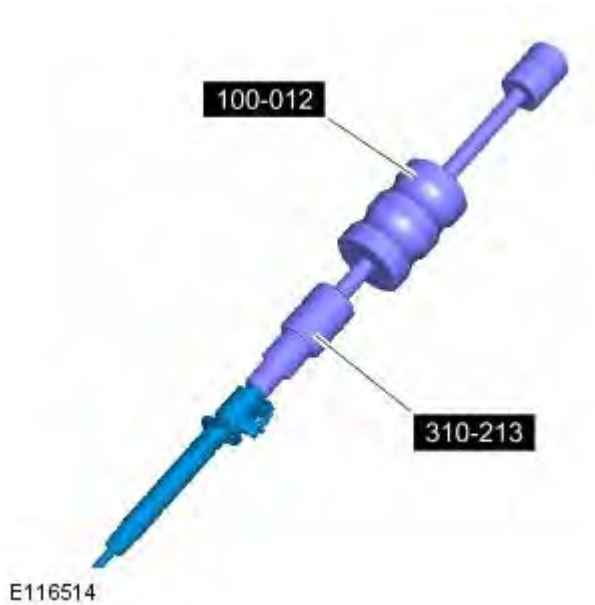


16. **16.**  CAUTION: LH illustration shown, RH is similar.

- Special Tool(s): [310-213](#)
- Special Tool(s): [100-012](#)



17. Remove the special tool.



18. Repeat the above procedure for the remaining injectors.

Installation



1. CAUTIONS:

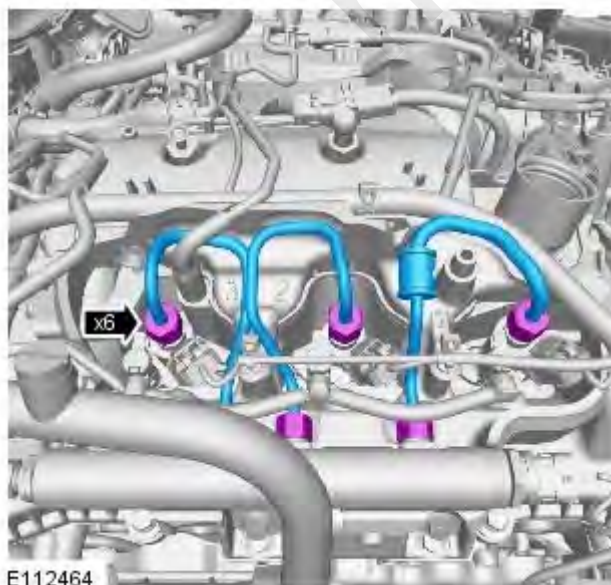
 Make sure that the area around the open fuel injector ports are clean and free of foreign material and lubricant prior to installing the fuel injector.

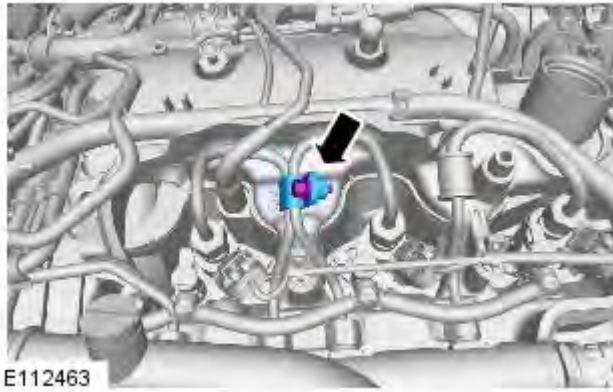
 LH illustration shown, RH is similar.

2. CAUTIONS:

 Make sure that a new component is installed.

 Only tighten the unions finger-tight at this stage.



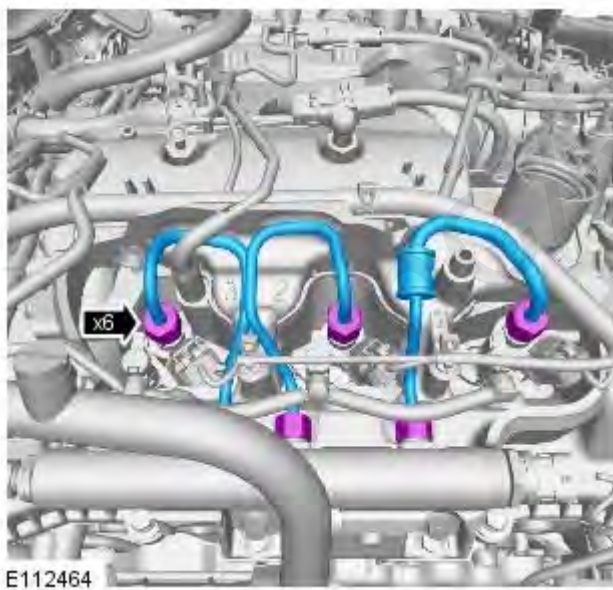


3. Torque: 10 Nm



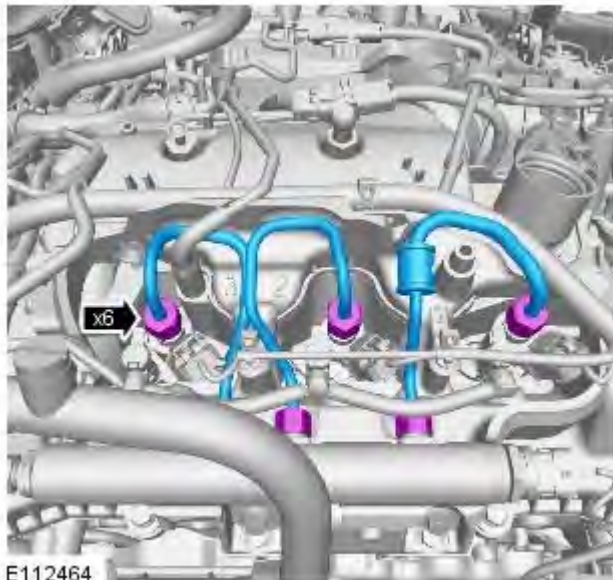
4. **4. NOTE:** Tighten the retaining bolts evenly and progressively.

Torque: 9 Nm



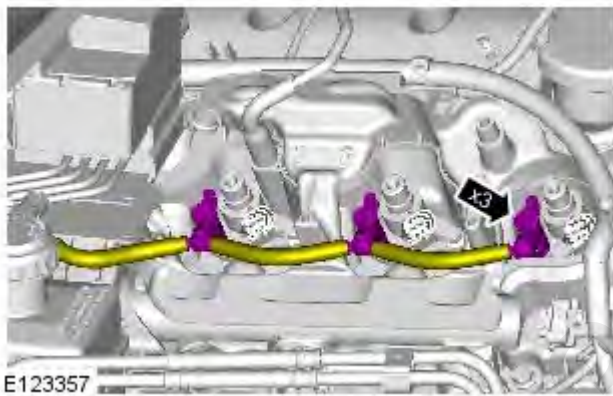
5.

- Stage 1: Tighten the high-pressure fuel supply line unions at the fuel rail to 15Nm.
- Stage 2: Tighten the high-pressure fuel supply line unions at the injector to 15Nm.

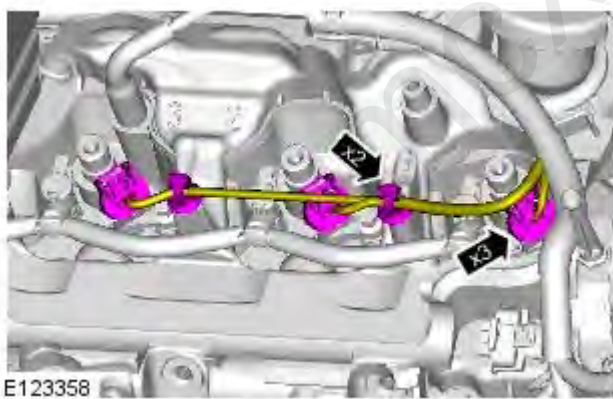


6.

- Stage 1: Tighten the high-pressure fuel supply line unions at the fuel rail to 35Nm.
- Stage 2: Tighten the high-pressure fuel supply line unions at the injector to 35Nm.



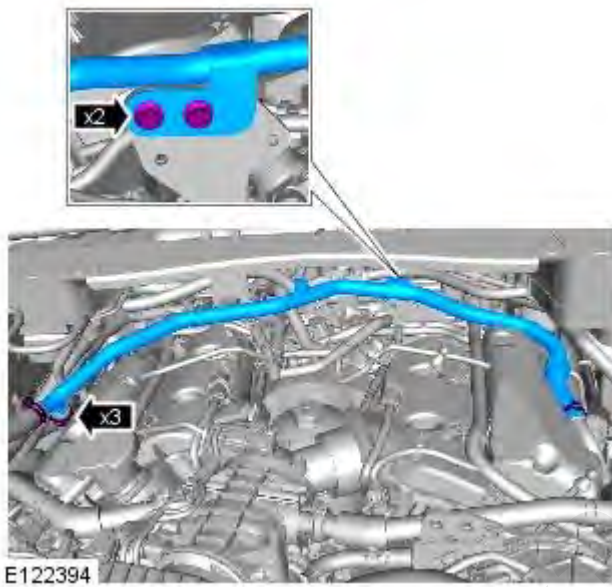
7. **7. NOTE:** Make sure that the fuel injector return line has a maximum of 8 uses.



8.



9.



10. Torque: 10 Nm

11. Refer to: Cooling System Draining, Filling and Bleeding (303-03, General Procedures).
12. Refer to: [Engine Cover - V8 5.0L Petrol](#) (501-05 Interior Trim and Oramentation, Removal and Installation).
13. Connect the battery earth lead.
14. If a new unit is installed, configure using the approved diagnostic tool.

Fuel Charging and Controls - TDV6 3.0L Diesel - Fuel Rail LH

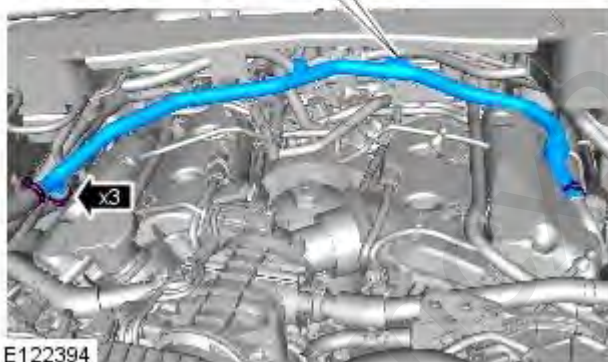
Removal and Installation

Removal

- NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

1.  **WARNING:** Make sure to support the vehicle with axle stands.
Raise and support the vehicle.
2. Disconnect the battery ground cable.
3. Refer to: Engine Cover - TDV6 3.0L Diesel (501-05, Removal and Installation).
4. Refer to: [Fuel Injection Component Cleaning](#) (303-04A Fuel Charging and Controls - TDV6 2.7L Diesel, General Procedures).

5.



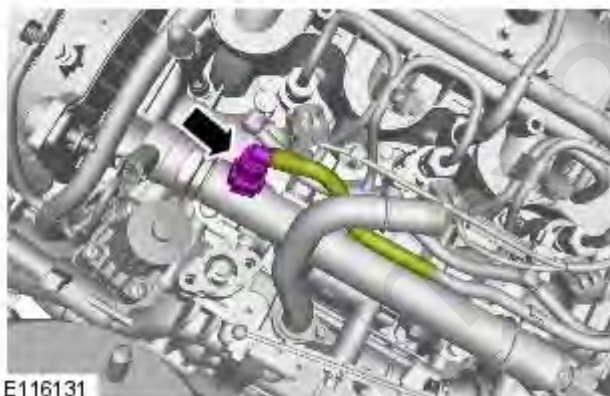
6. **6.** NOTE: Left-hand shown, right-hand similar.



7.



8.



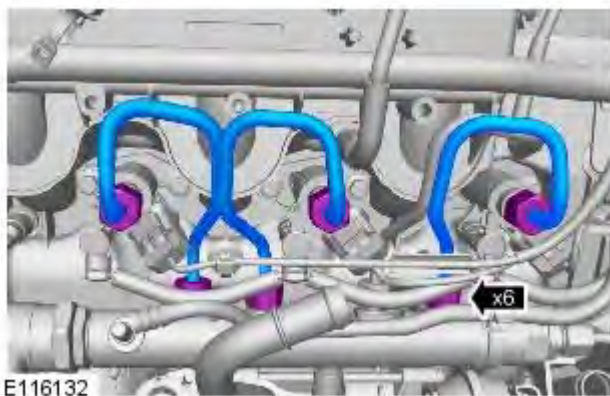
9. **9. CAUTIONS:**



Be prepared to collect escaping fuel.



Before disconnecting or removing components, ensure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.



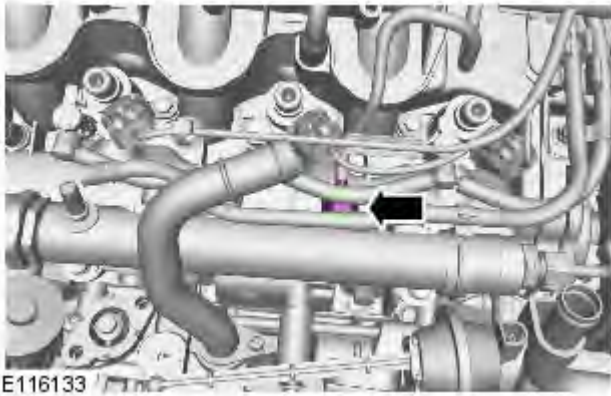
10. **10. CAUTIONS:**



Be prepared to collect escaping fuel.



Before disconnecting or removing components, ensure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.



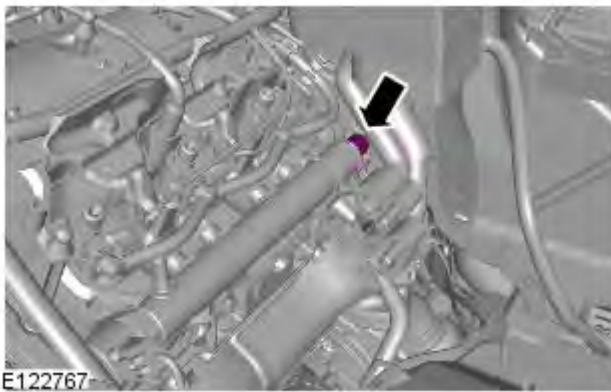
11. **11. CAUTIONS:**



Be prepared to collect escaping fuel.



Before disconnecting or removing components, ensure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.



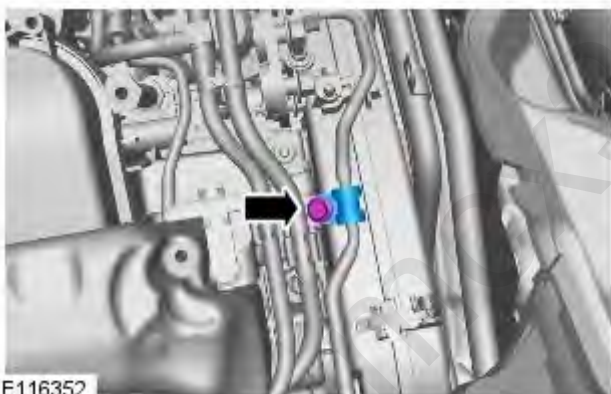
12. **12. CAUTIONS:**



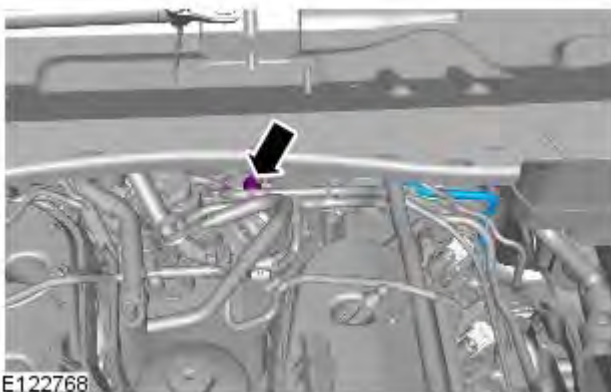
Be prepared to collect escaping fuel.



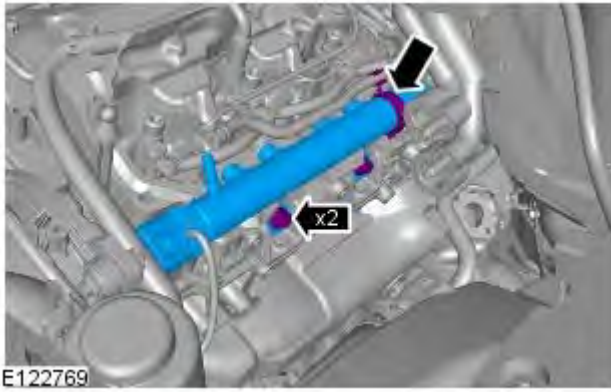
Before disconnecting or removing components, ensure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.



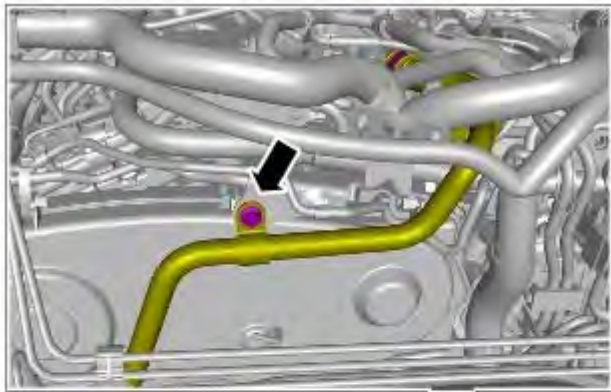
13.



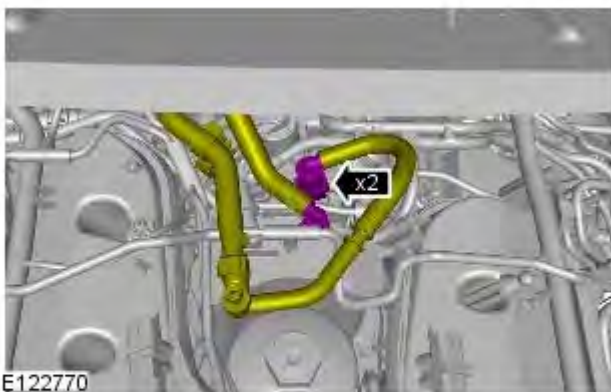
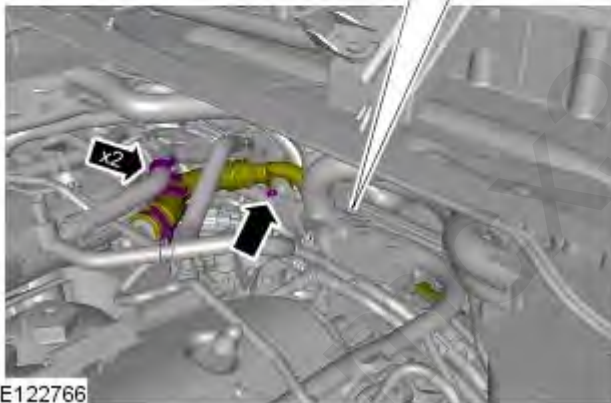
14. **14. CAUTION:** Be prepared to collect escaping fuel.



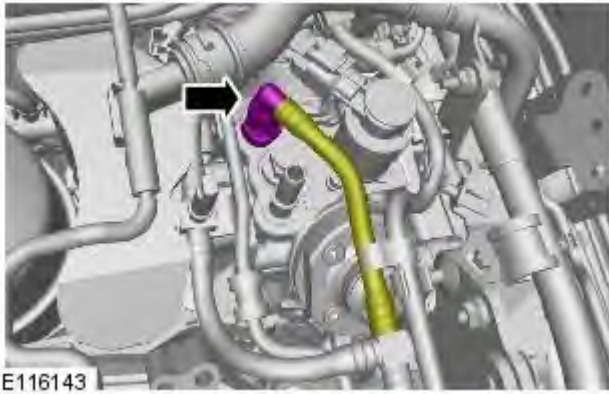
15. **15.**  CAUTION: Be prepared to collect escaping fuel.



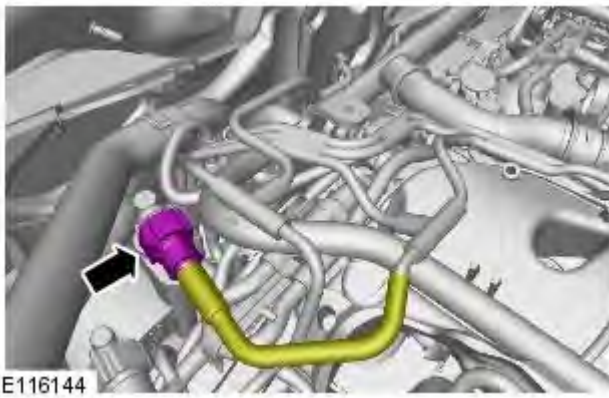
16.



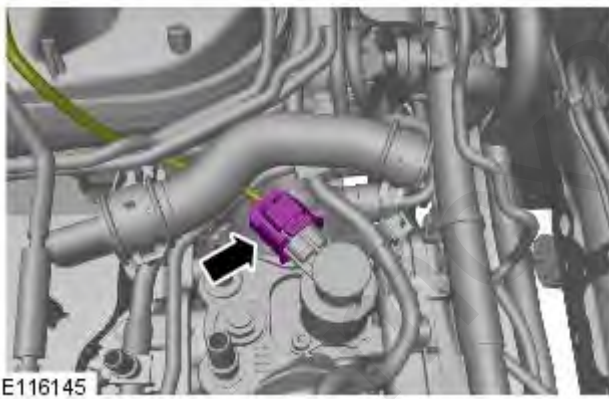
17. **17.**  CAUTION: Be prepared to collect escaping fuel.



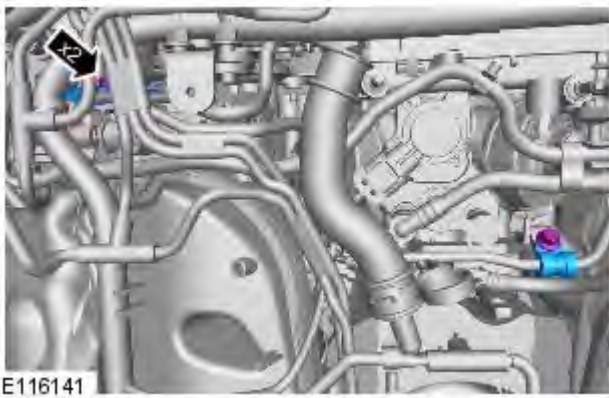
18. **18.**  CAUTION: Be prepared to collect escaping fuel.



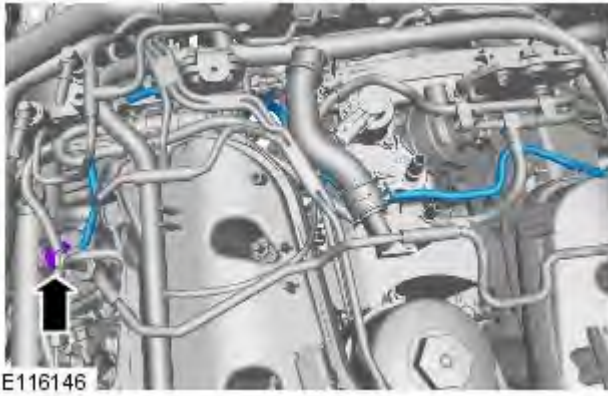
19.



20.

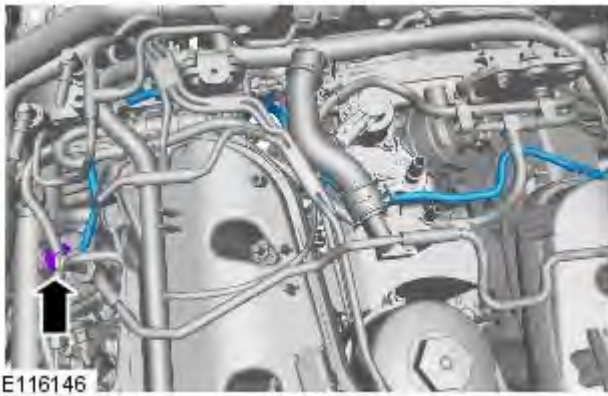


21.



22. **22.**  **CAUTION:** Be prepared to collect escaping fuel.

Installation



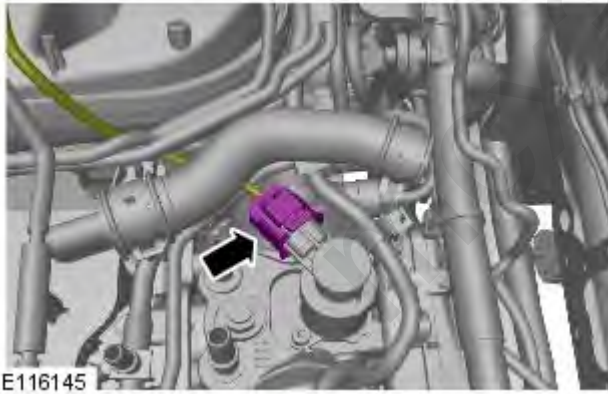
1. **1.** **CAUTIONS:**



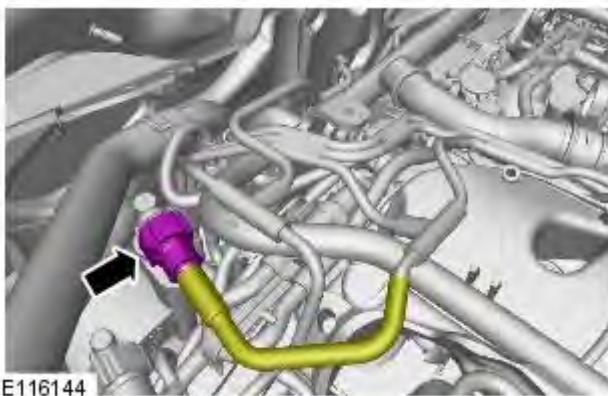
Make sure that a new component is installed.



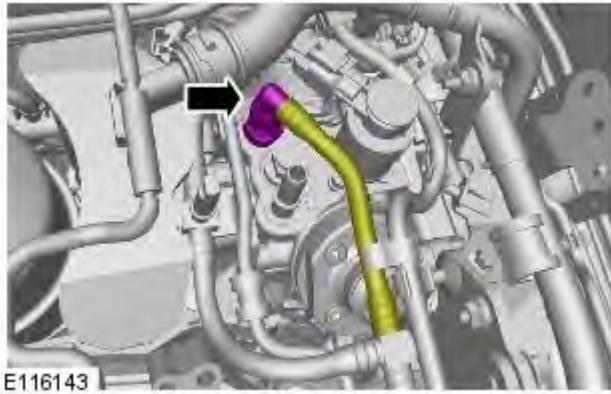
Tighten the fuel supply line unions finger tight.



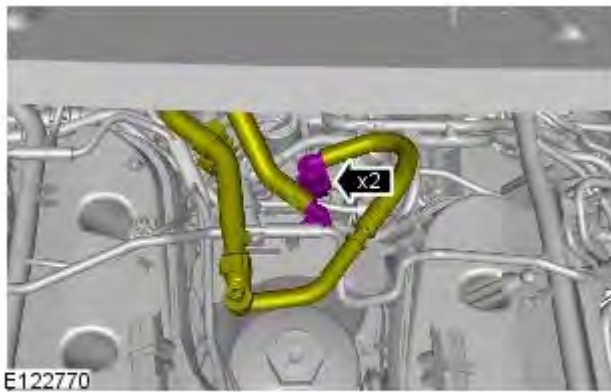
- 2.



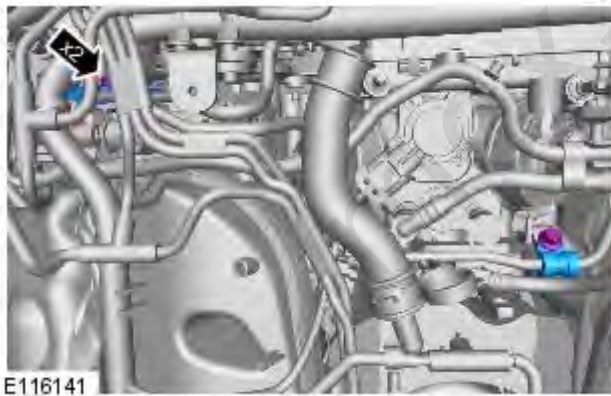
- 3.



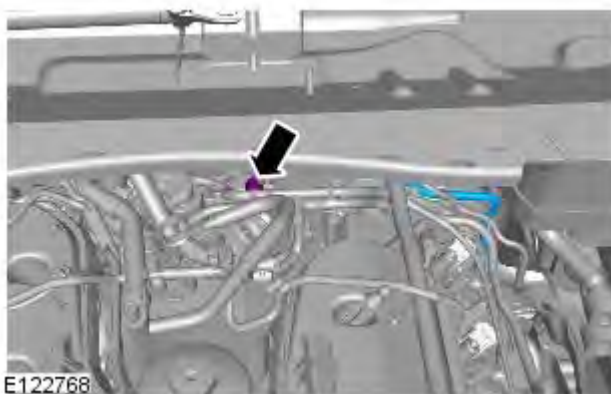
4.



5.



6.  **CAUTION:** Only tighten the bolts finger-tight at this stage.



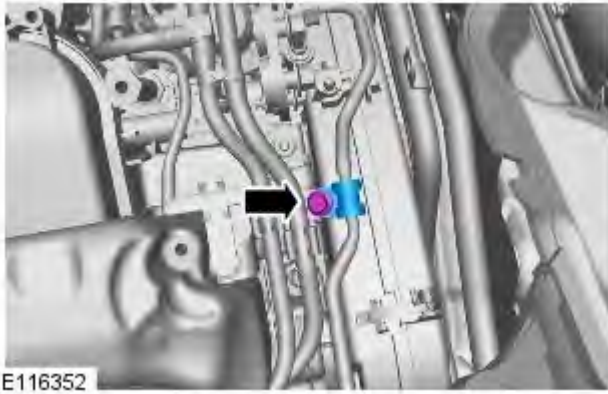
7. **7. CAUTIONS:**



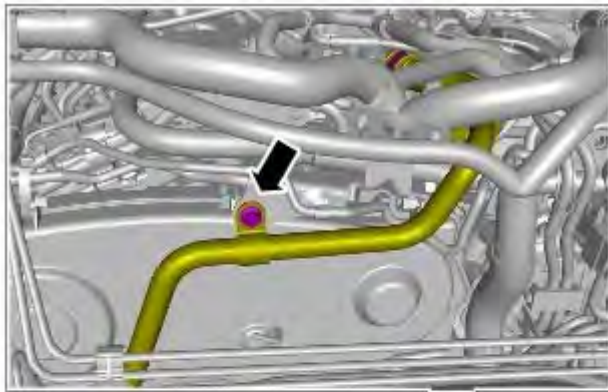
Make sure that a new component is installed.



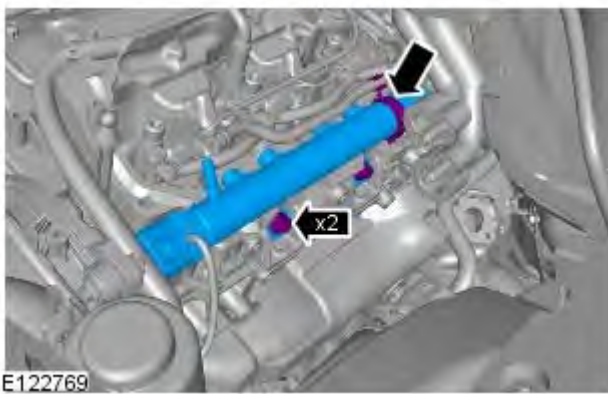
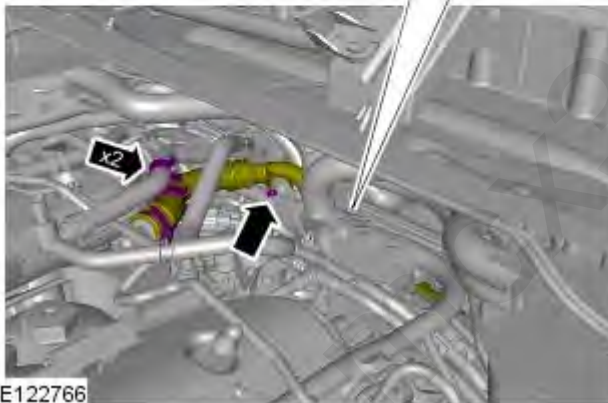
Tighten the fuel supply line unions finger tight.



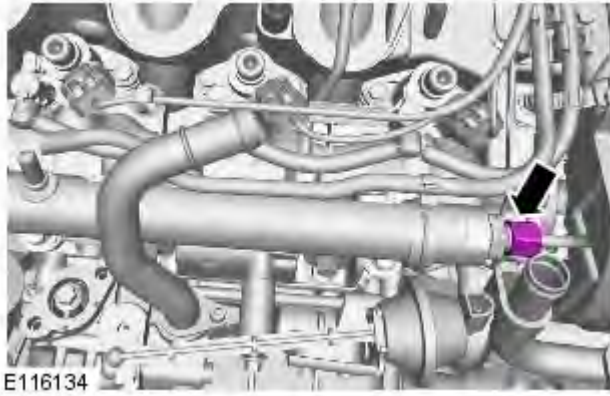
8.  **CAUTION:** Only tighten the bolts finger-tight at this stage.



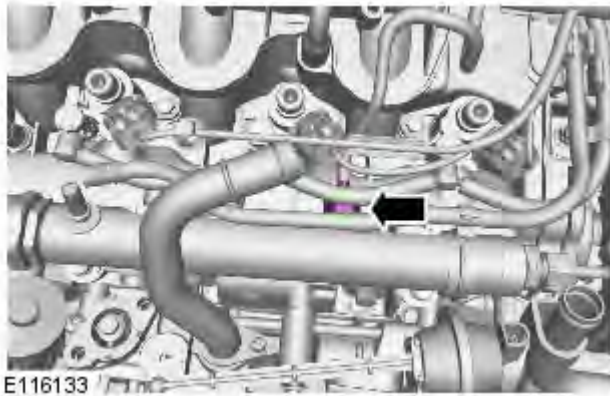
9. Torque: 10 Nm



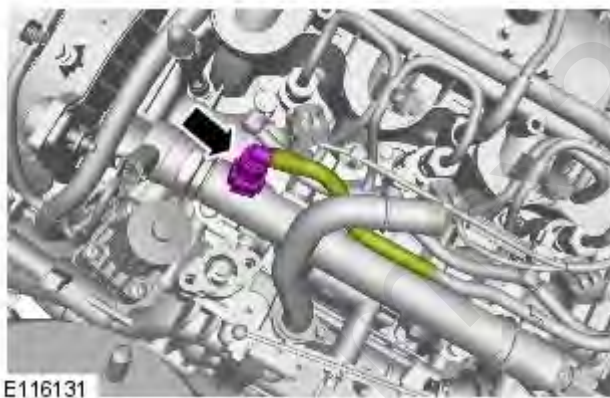
10. Torque: 24 Nm



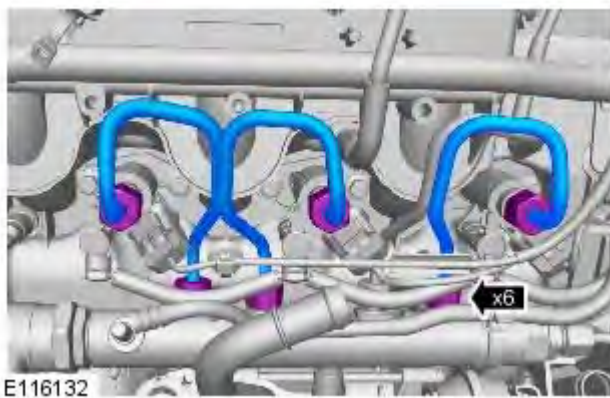
11. **11.**  **CAUTION:** Tighten the fuel supply line unions finger tight.



12. **12.**  **CAUTION:** Tighten the fuel supply line unions finger tight.



- 13.



14. **14.** **CAUTIONS:**



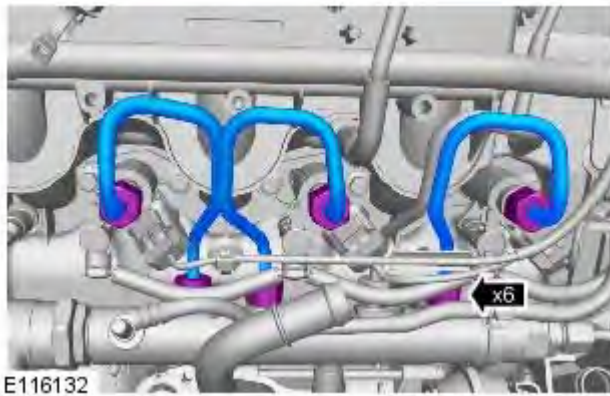
Make sure that a new component is installed.



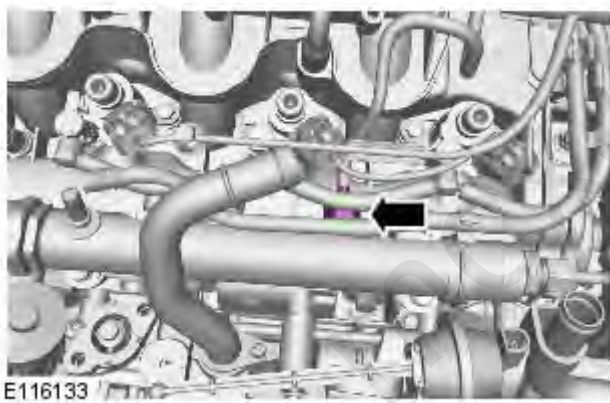
Tighten the fuel supply line unions finger tight.



15. **15.**  **CAUTION:** Only tighten the bolt finger-tight at this stage.



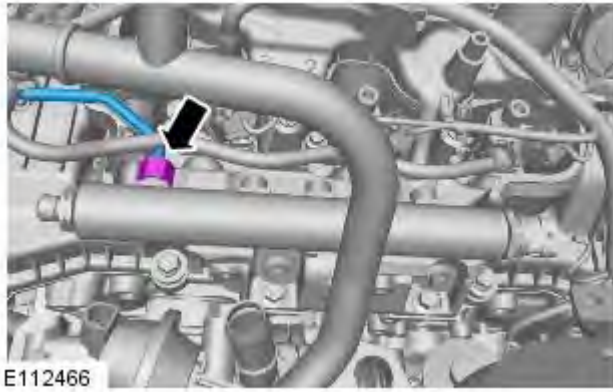
- 16.
- Stage 1: Tighten the high-pressure fuel supply line unions at the fuel rail to 15Nm.
 - Stage 2: Tighten the high-pressure fuel supply line unions at the injector to 15Nm.



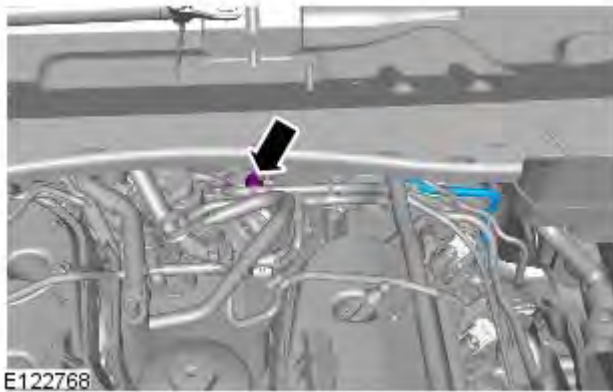
17. Tighten the high-pressure fuel lines union to 15Nm.



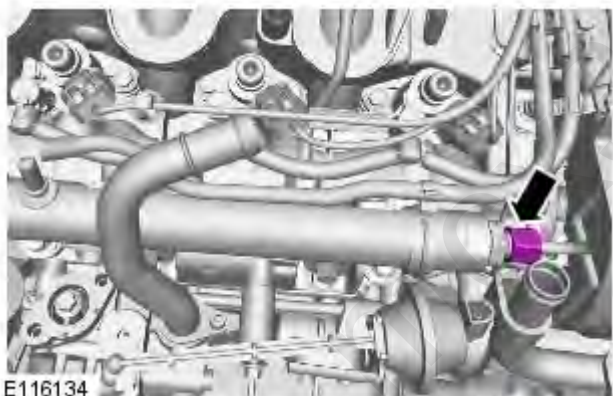
18. Tighten the high-pressure fuel lines union to 15Nm.



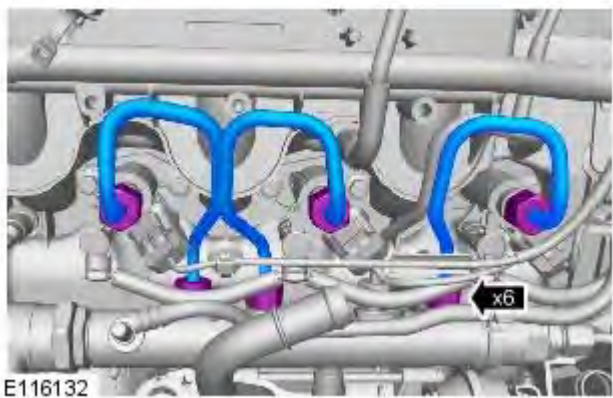
19. Tighten the high-pressure fuel lines union to 15Nm.



20. Tighten the high-pressure fuel lines union to 15Nm.

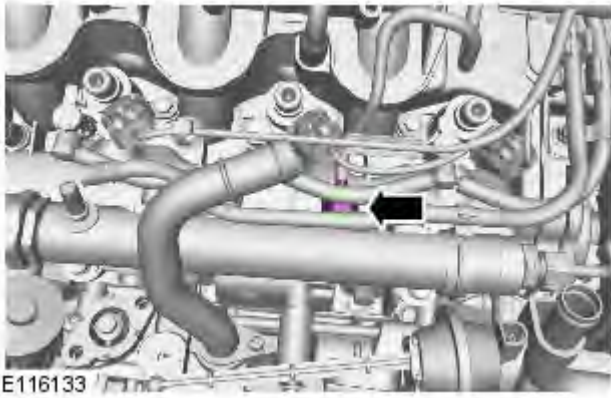


21. Tighten the high-pressure fuel lines union to 15Nm.

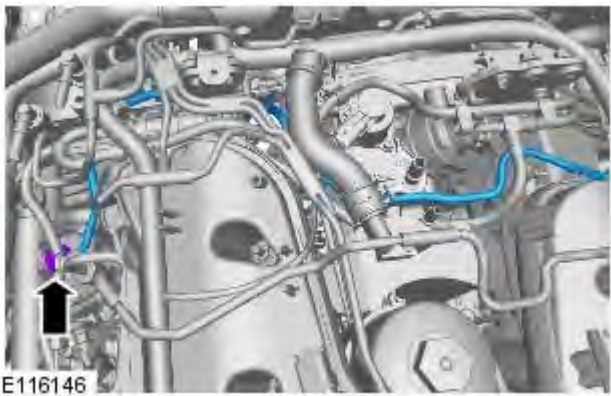


22.

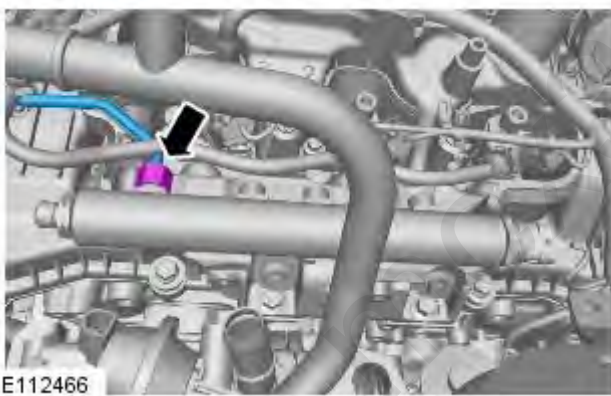
- Stage 1: Tighten the high-pressure fuel supply line unions at the fuel rail to 35Nm.
- Stage 2: Tighten the high-pressure fuel supply line unions at the injector to 35Nm.



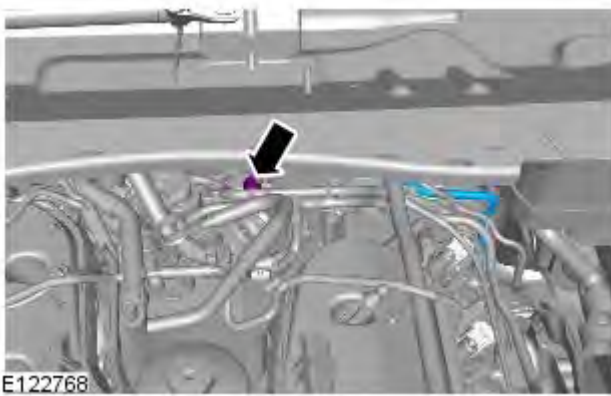
23. Tighten the high-pressure fuel line union to 30 Nm.



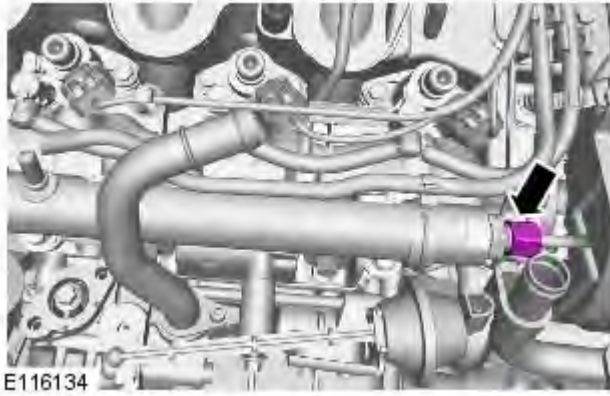
24. Tighten the high-pressure fuel line union to 30 Nm.



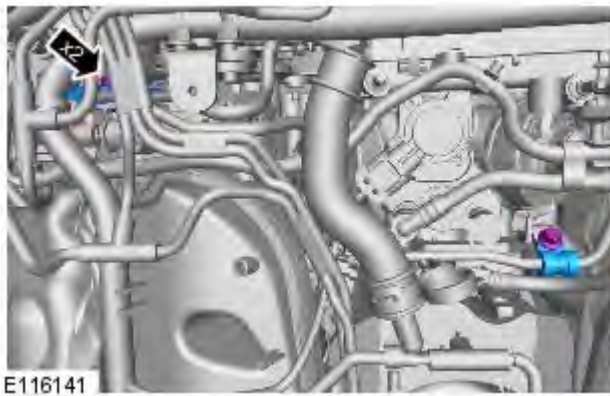
25. Tighten the high-pressure fuel line union to 30 Nm.



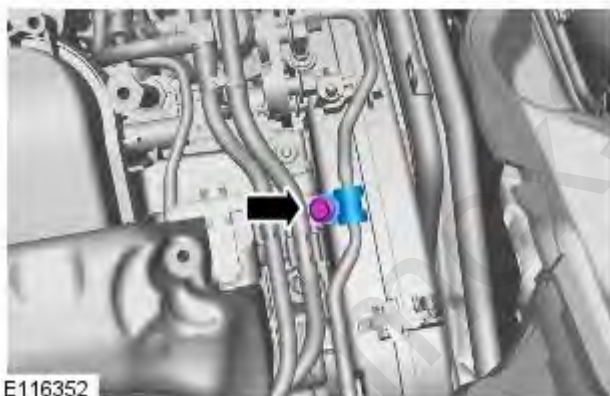
26. Tighten the high-pressure fuel line union to 30 Nm.



27. Tighten the high-pressure fuel line union to 30 Nm.



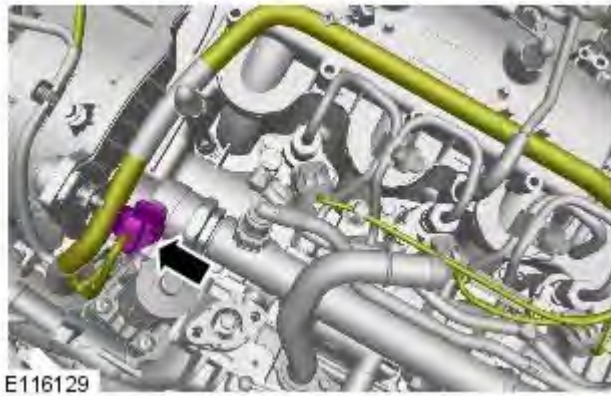
28. Torque: 10 Nm



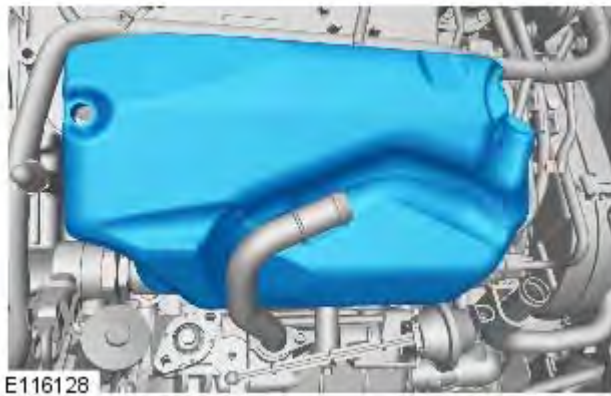
29. Torque: 10 Nm



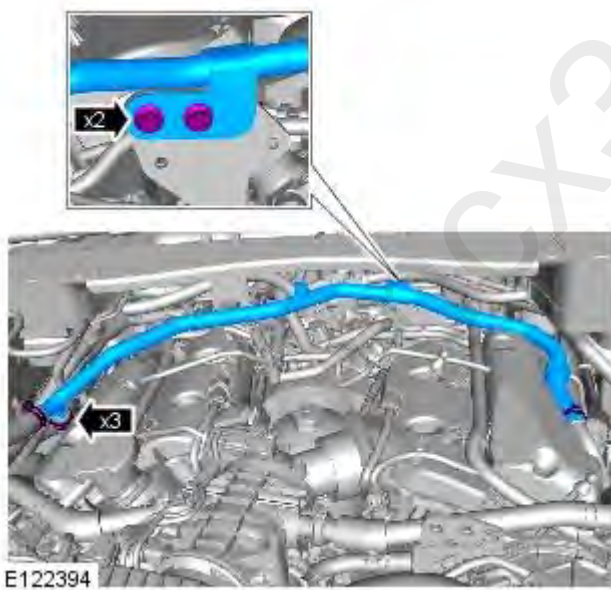
30. Torque: 10 Nm



31.



32. **32.** NOTE: Left-hand shown, right-hand similar.



33.

34. Refer to: Engine Cover - TDV6 3.0L Diesel (501-05, Removal and Installation).

35. Disconnect the battery ground cable.

Fuel Charging and Controls - TDV6 3.0L Diesel - Fuel Rail RH

Removal and Installation

Removal

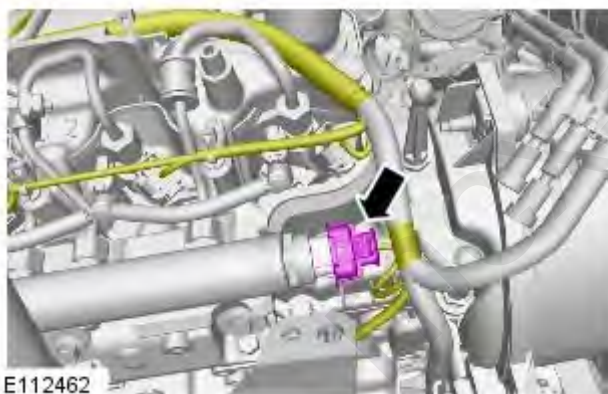
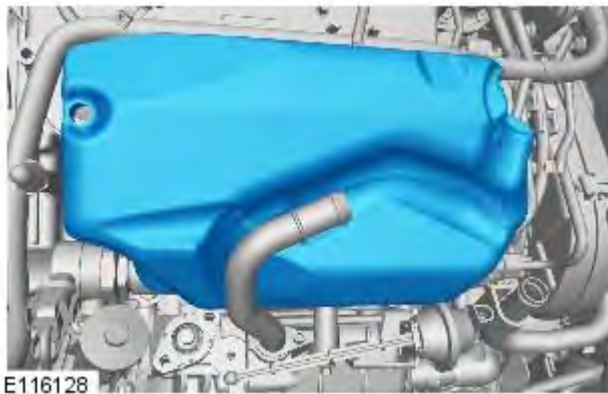
- NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

1. Disconnect the battery ground cable.

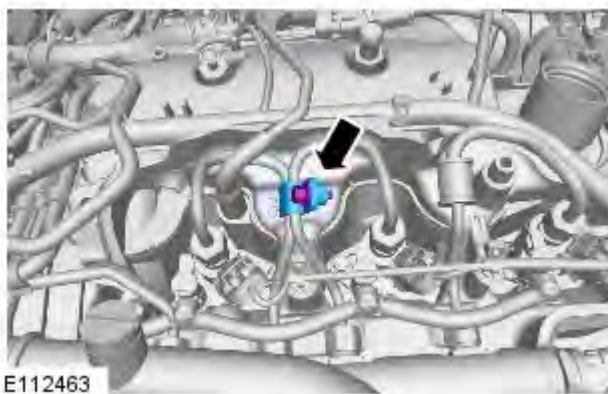
2.

3. Refer to: [Fuel Injection Component Cleaning](#) (303-04A Fuel Charging and Controls - TDV6 2.7L Diesel, General Procedures).

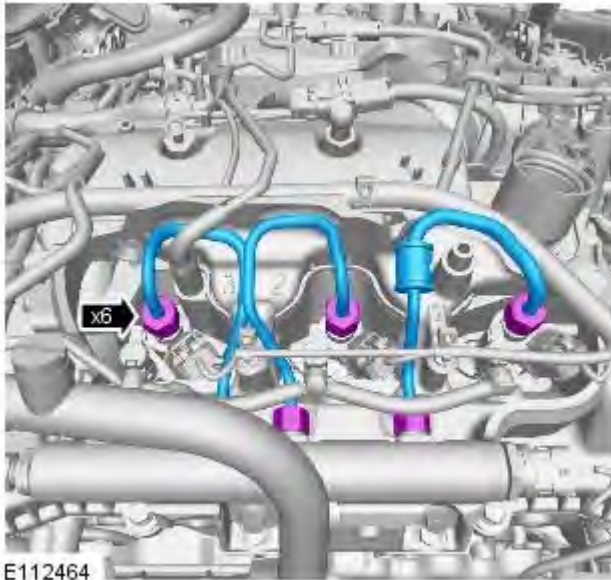
4. **4.** NOTE: Left-hand shown, right-hand similar.



5.

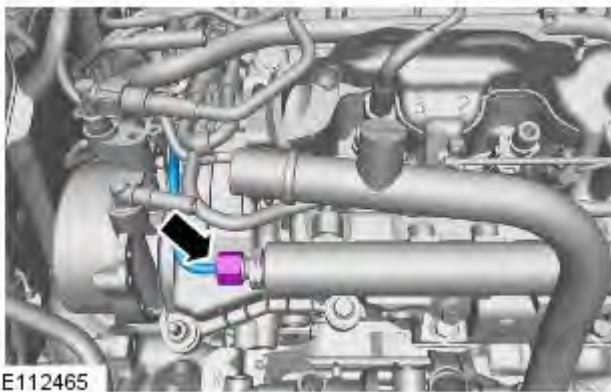


6.



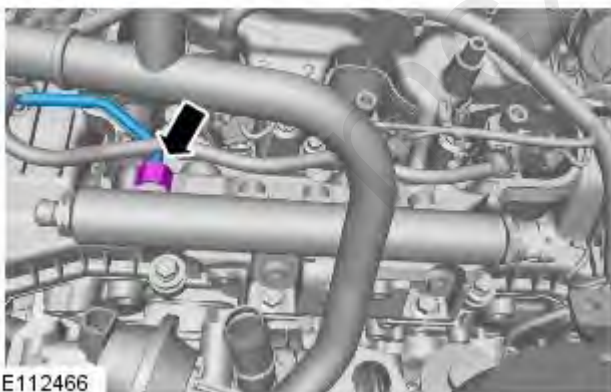
7. **7. CAUTIONS:**

-  Be prepared to collect escaping fuel.
-  Discard the component.
-  Before disconnecting or removing components, ensure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.



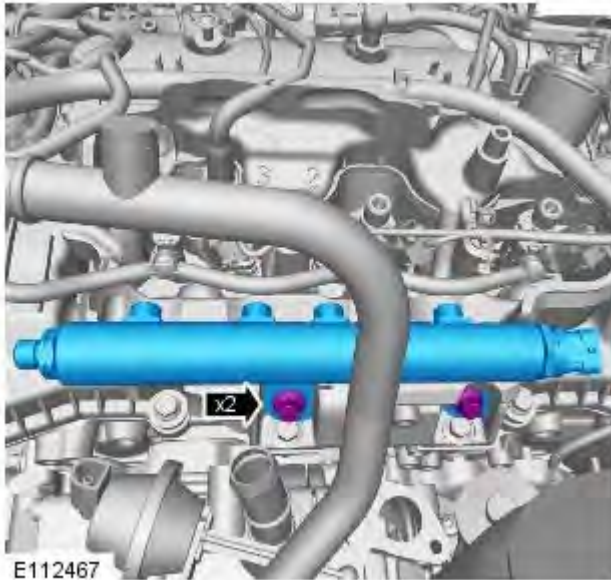
8. **8. CAUTIONS:**

-  Be prepared to collect escaping fuel.
-  Before disconnecting or removing components, ensure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

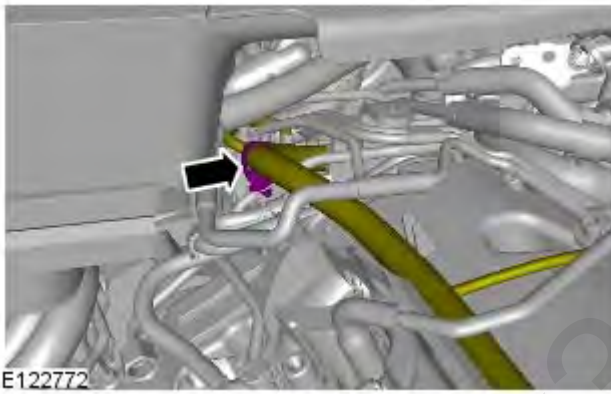


9. **9. CAUTIONS:**

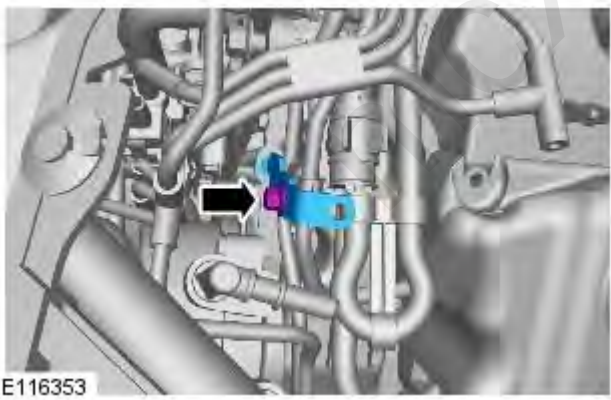
-  Be prepared to collect escaping fuel.
-  Before disconnecting or removing components, ensure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.



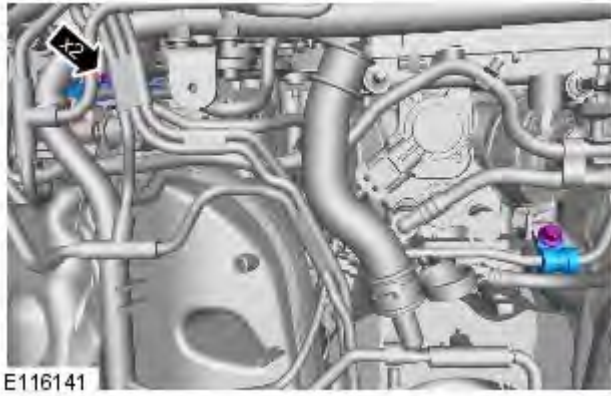
10. **10.**  CAUTION: Be prepared to collect escaping fuel.



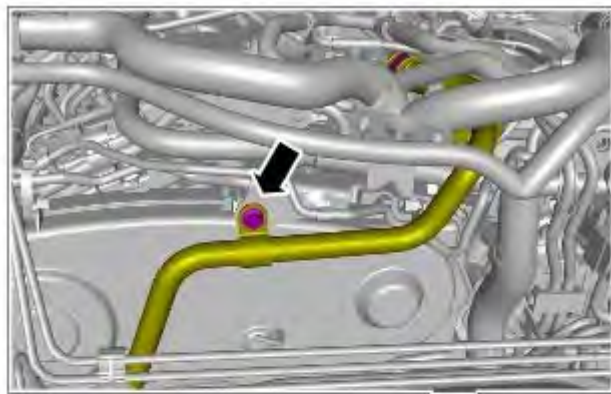
11.



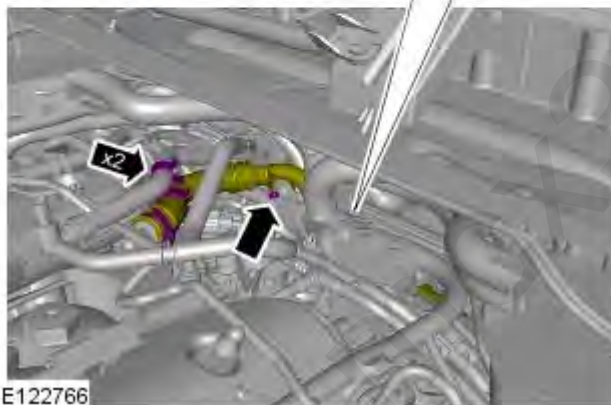
12.



13.



14.

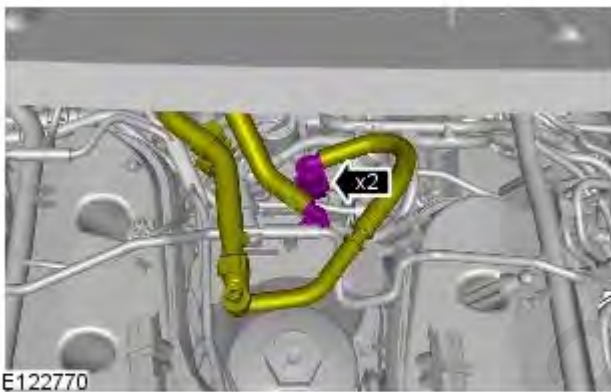




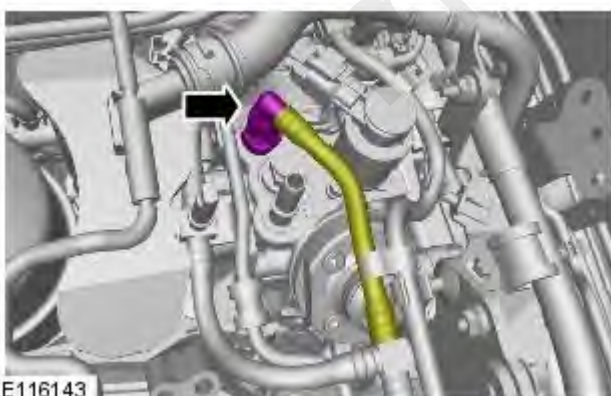
15. **15. CAUTIONS:**

 Be prepared to collect escaping fuel.

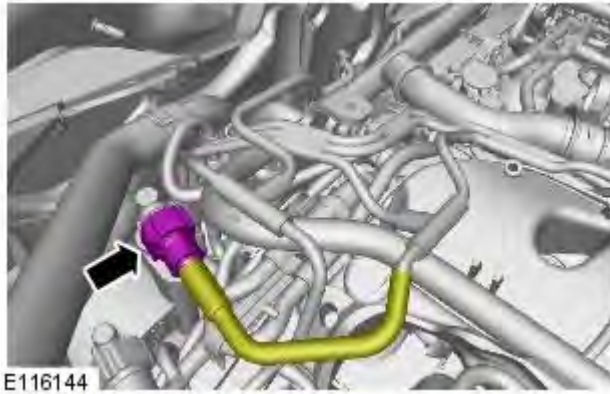
 Discard the component.



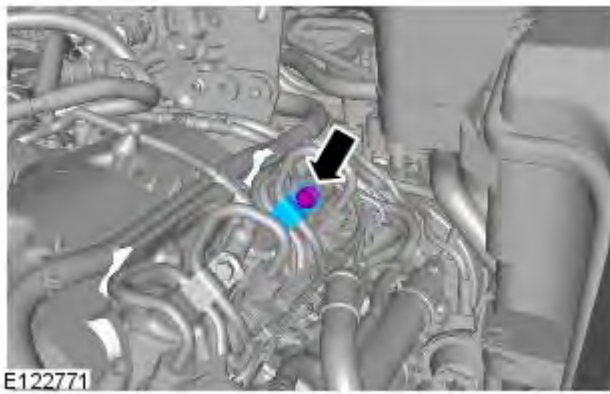
16. **16.** **CAUTION:** Be prepared to collect escaping fuel.



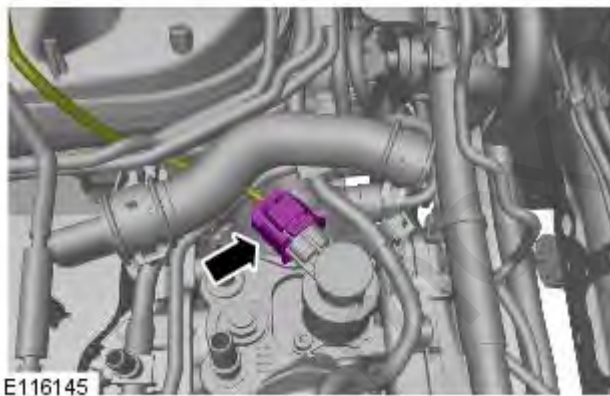
17. **17.** **CAUTION:** Be prepared to collect escaping fuel.



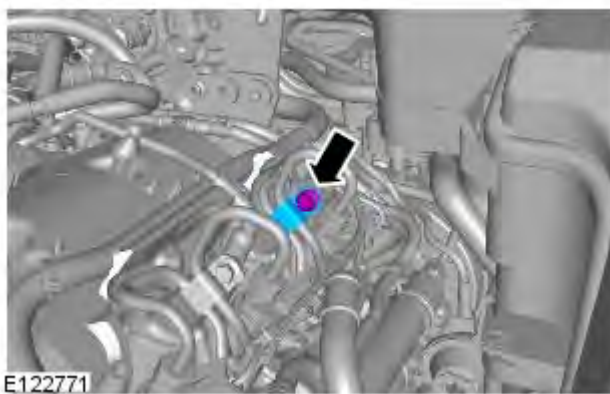
18.



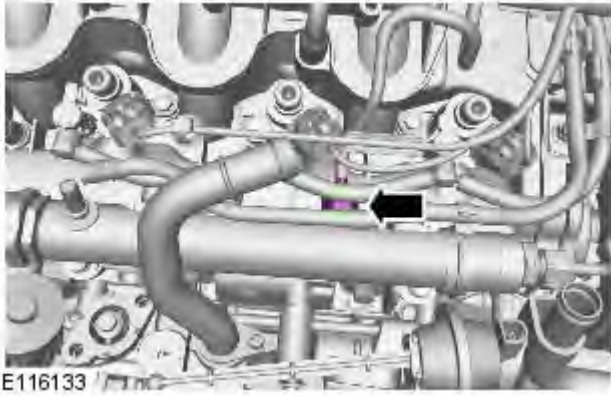
19.



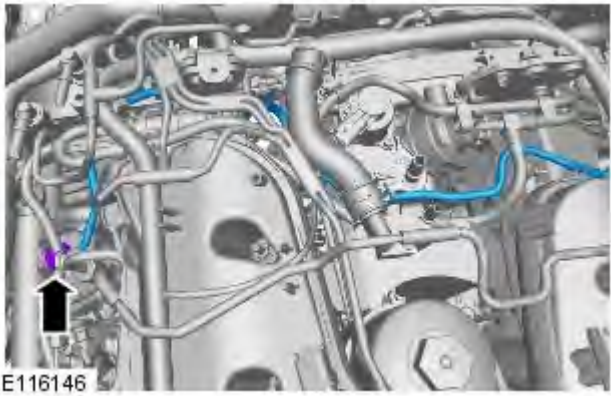
20.



21.



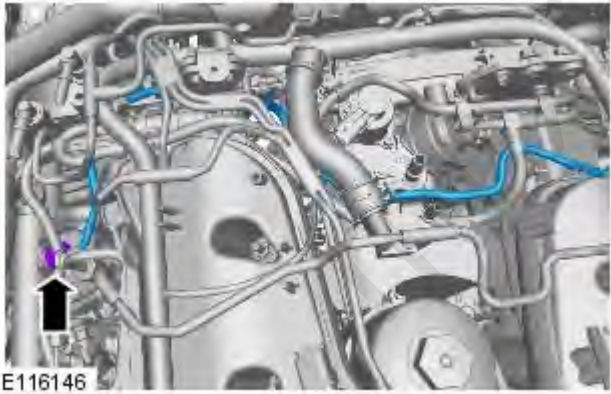
22.



23. **23. CAUTIONS:**

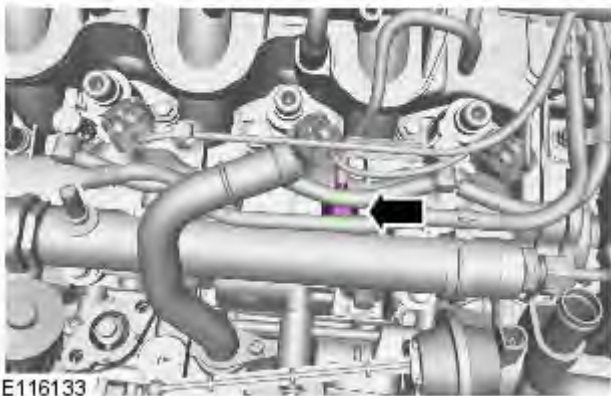
-  Be prepared to collect escaping fuel.
-  Discard the component.

Installation

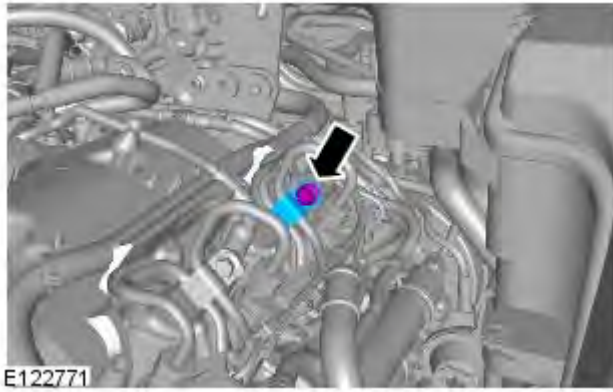


1. **1. CAUTIONS:**

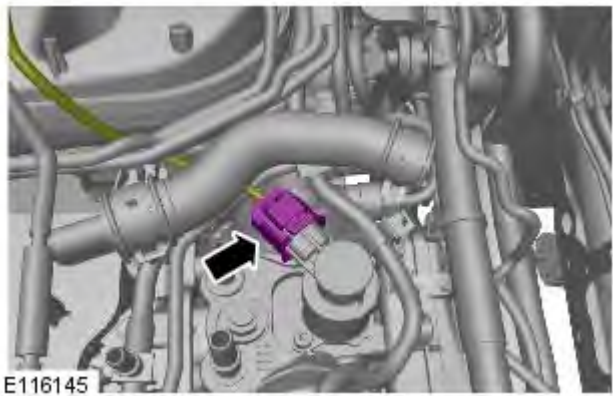
-  Make sure that a new component is installed.
-  Tighten the fuel supply line unions finger tight.



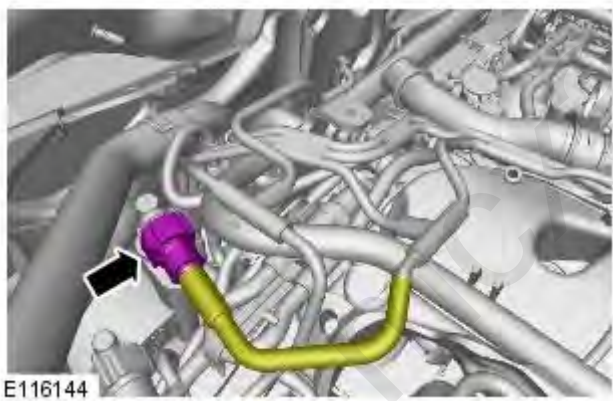
2. **2.  CAUTION:** Only tighten the unions finger-tight at this stage.



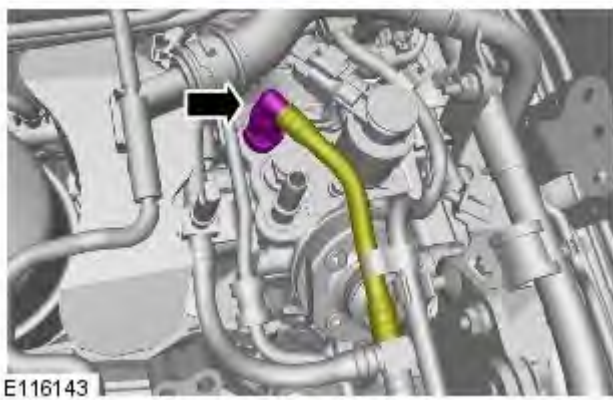
3. **3.**  **CAUTION:** Only tighten the bolt finger-tight at this stage.



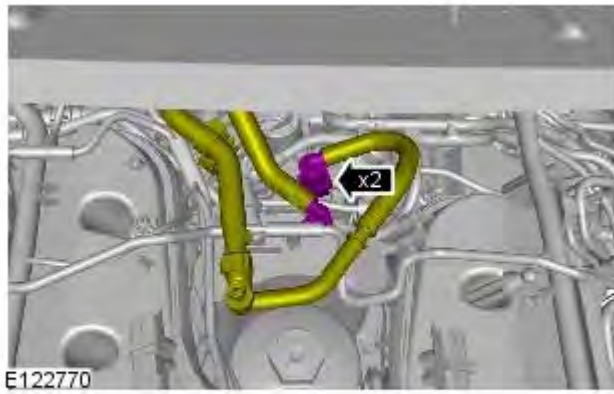
4.



5.



6.



7.



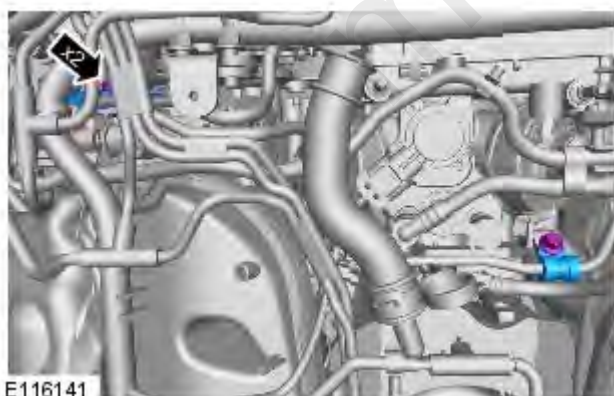
8. **8. CAUTIONS:**



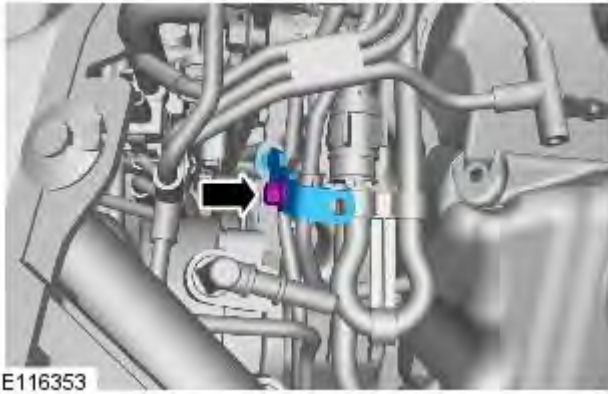
Make sure that a new component is installed.



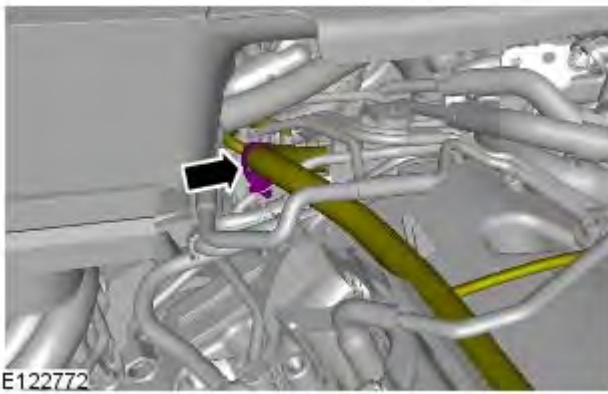
Tighten the fuel supply line unions finger tight.



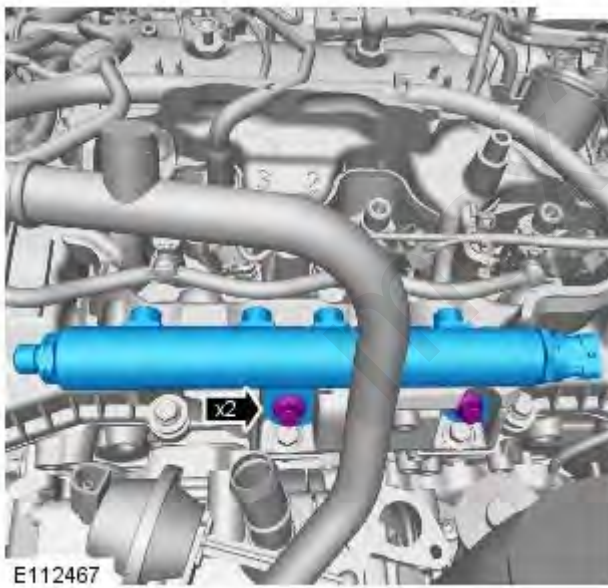
9. **9. CAUTION:** Only tighten the bolts finger-tight at this stage.



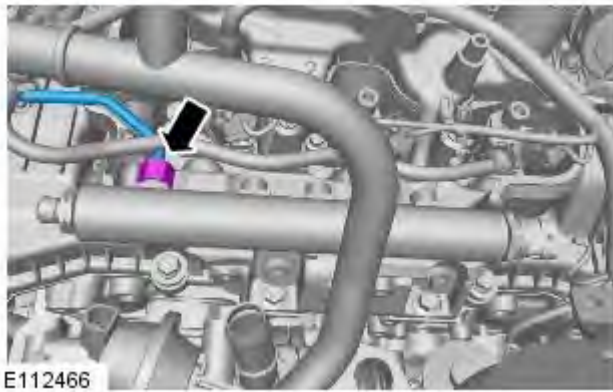
10. **10.**  **CAUTION:** Only tighten the bolts finger-tight at this stage.



11.

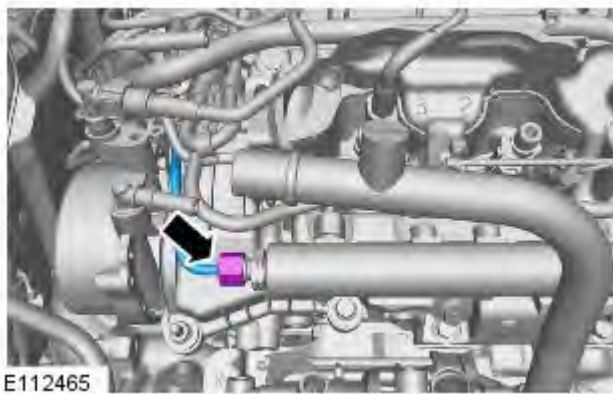


12. Torque: 24 Nm

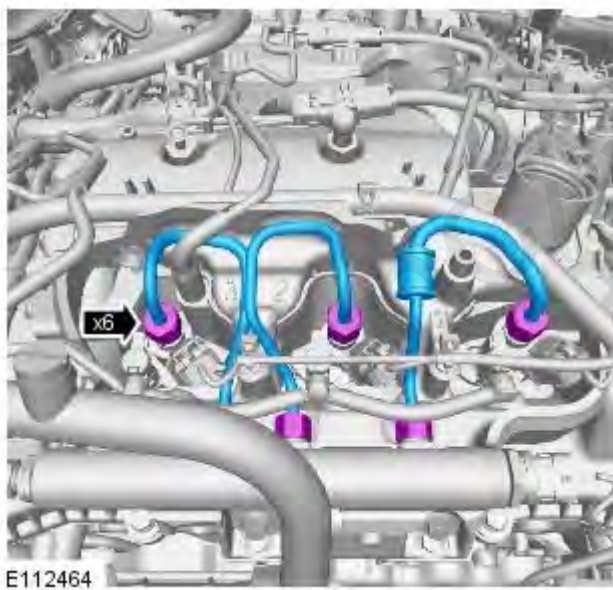


13. **13. CAUTIONS:**

-  Tighten the fuel supply line unions finger tight.
-  Make sure that a new component is installed.

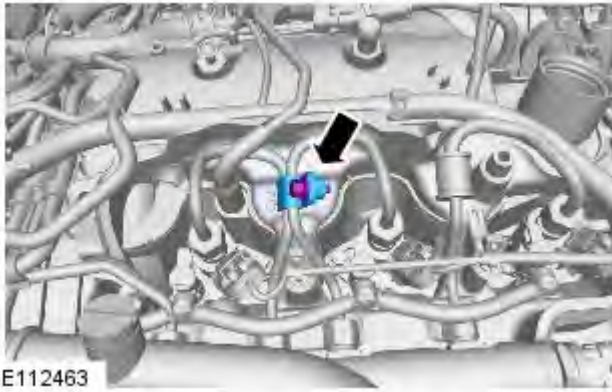


14. **14. CAUTION:** Tighten the fuel supply line unions finger tight.

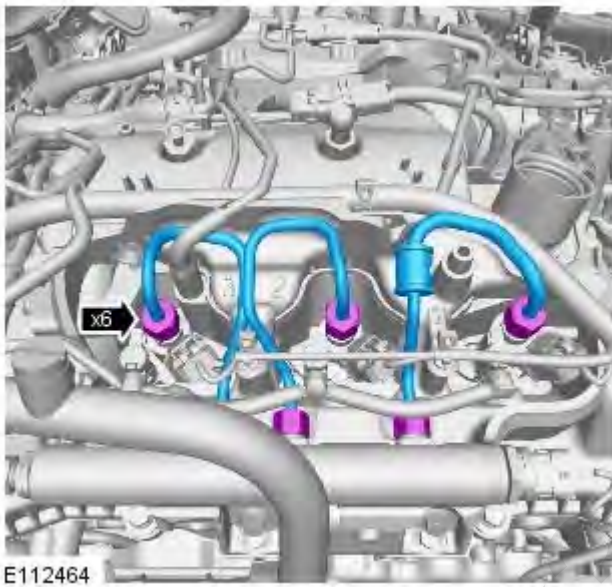


15. **15. CAUTIONS:**

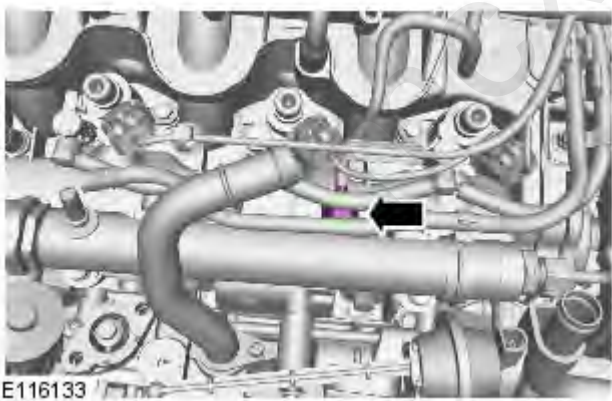
-  Make sure that a new component is installed.
-  Tighten the fuel supply line unions finger tight.



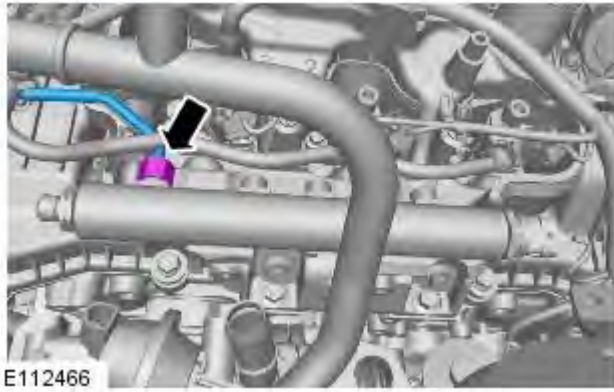
16. **16.**  **CAUTION:** Only tighten the bolt finger-tight at this stage.



- 17.
- Stage 1: Tighten the high-pressure fuel supply line unions at the fuel rail to 15Nm.
 - Stage 2: Tighten the high-pressure fuel supply line unions at the injector to 15Nm.



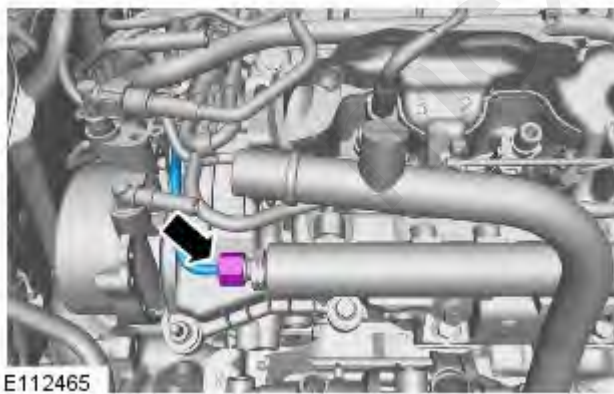
18. Tighten the high-pressure fuel lines union to 15Nm.



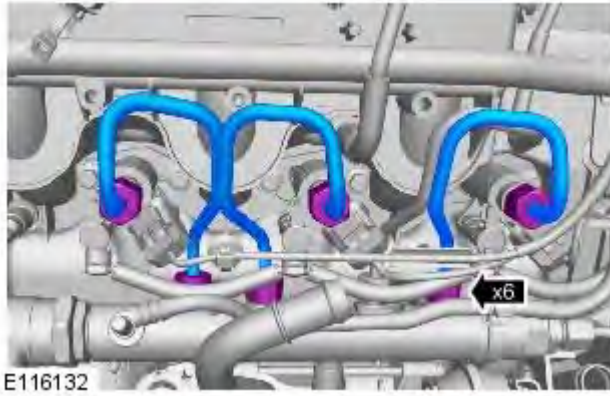
19. Tighten the high-pressure fuel lines union to 15Nm.



20. Tighten the high-pressure fuel lines union to 15Nm.

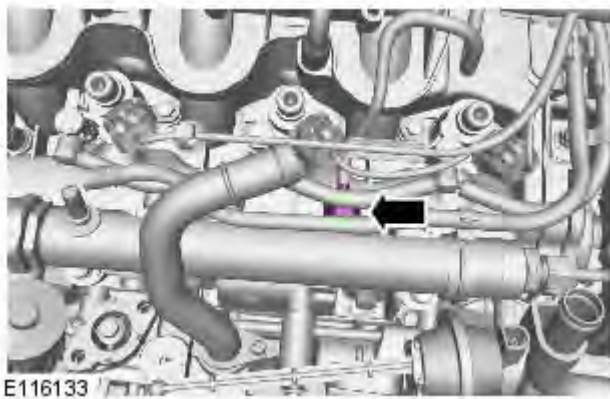


21. Tighten the high-pressure fuel lines union to 15Nm.

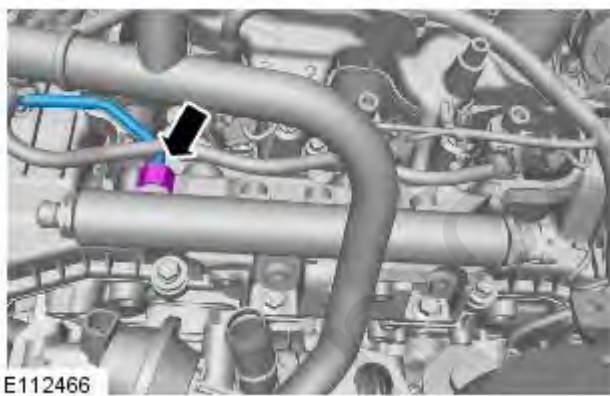


22.

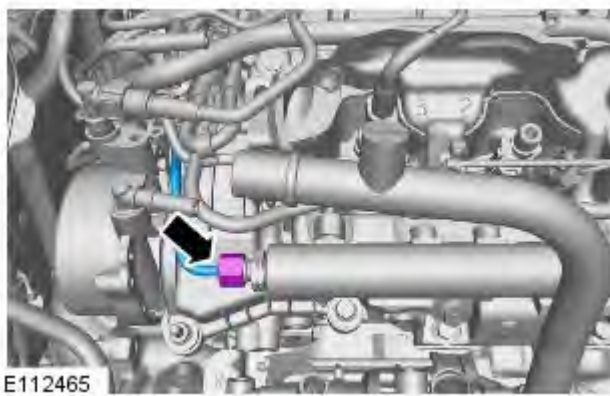
- Stage 1: Tighten the high-pressure fuel supply line unions at the fuel rail to 35Nm.
- Stage 2: Tighten the high-pressure fuel supply line unions at the injector to 35Nm.



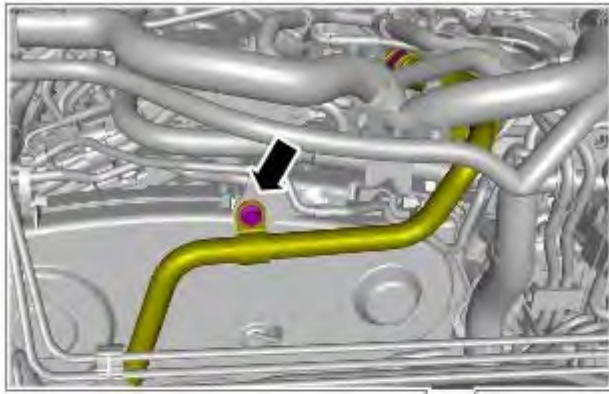
23. Tighten the high-pressure fuel line union to 30Nm.



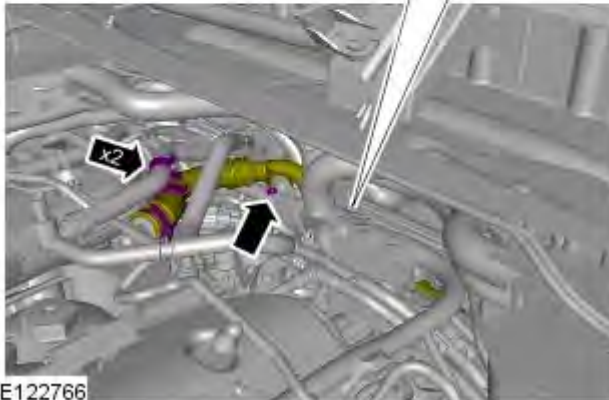
24. Tighten the high-pressure fuel line union to 30Nm.



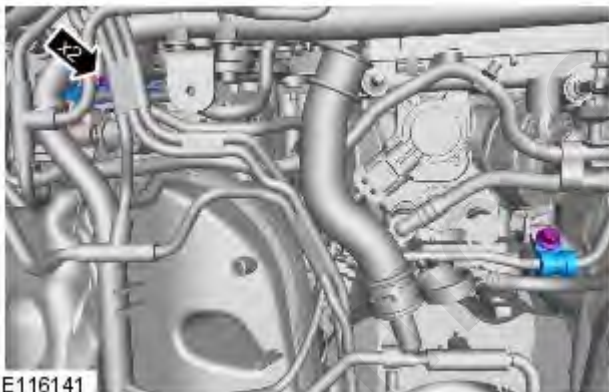
25. Tighten the high-pressure fuel line union to 30Nm.



26.

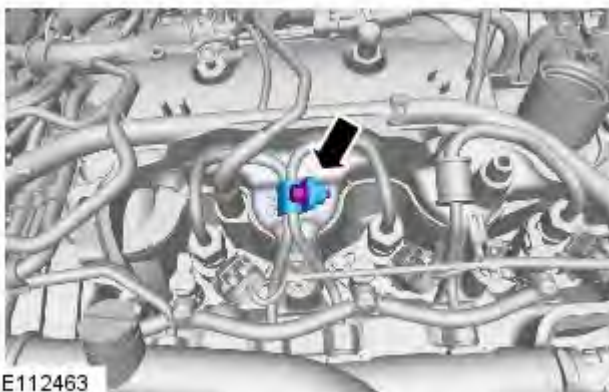


E122766



E116141

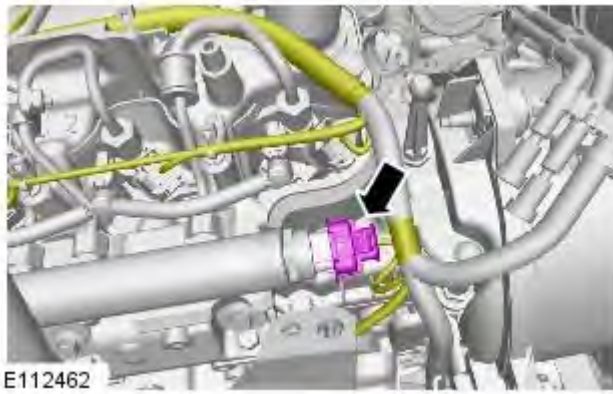
27. Torque: 10 Nm



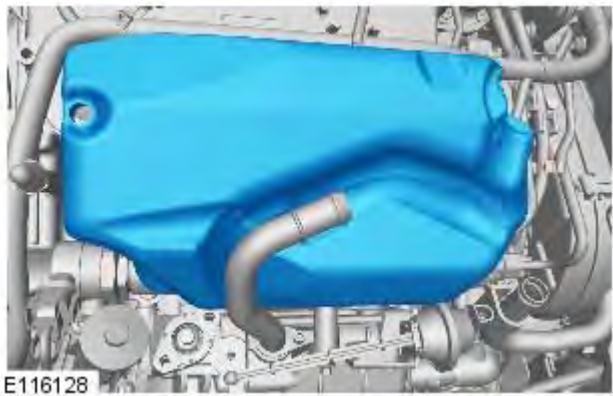
E112463

28. Torque: 10 Nm

29.



30. **30.** NOTE: Left-hand shown, right-hand similar.



31.

32. Connect the battery ground cable.

Fuel Charging and Controls - TDV6 3.0L Diesel - Intake Air Shutoff Throttle

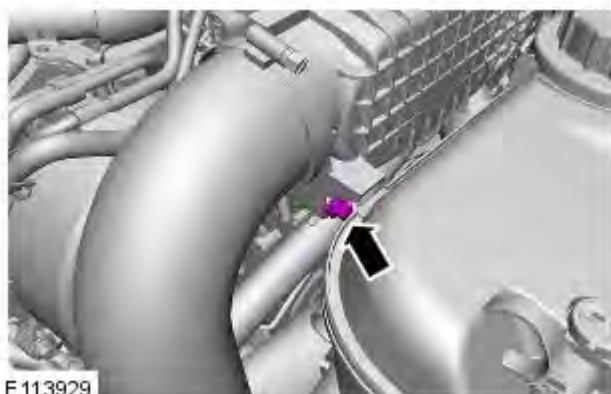
Removal and Installation

Removal

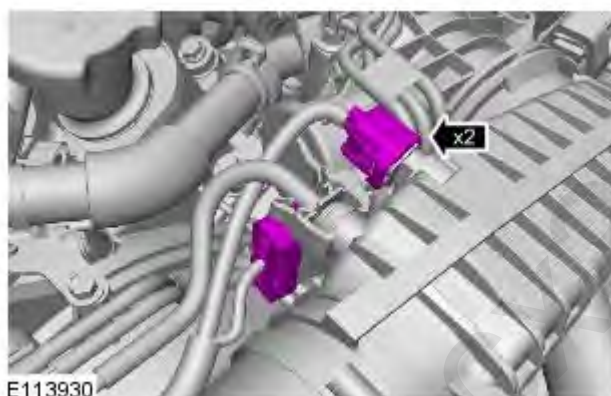
- NOTE: Removal steps in this procedure may contain installation details.

1. Refer to: [Engine Cover - TDV6 3.0L Diesel](#) (501-05 Interior Trim and Oramentation, Removal and Installation).

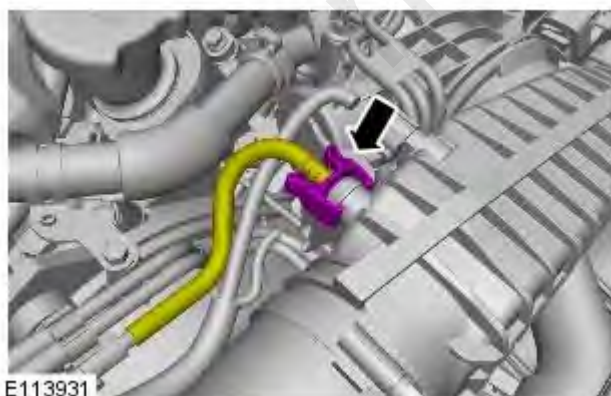
2. Torque: 10 Nm

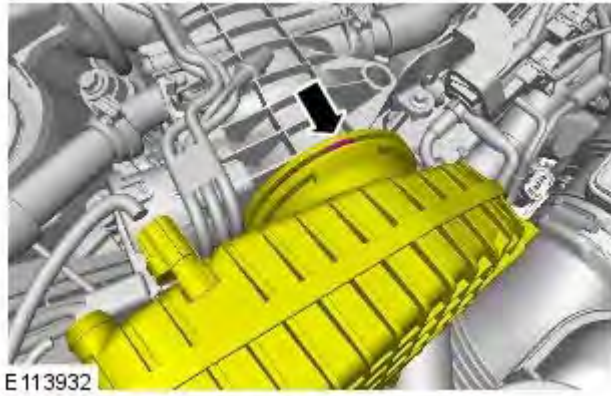


- 3.

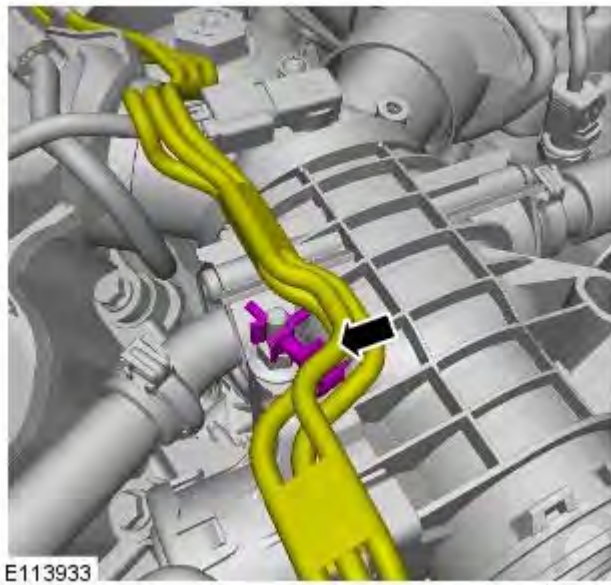


- 4.

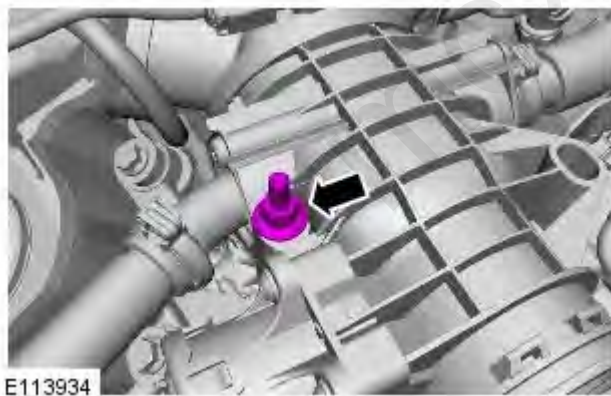




5.

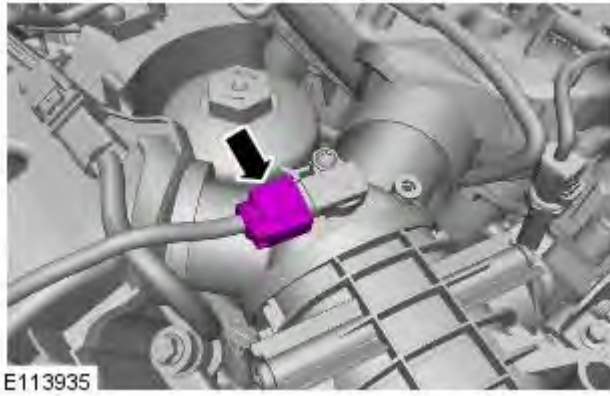


6.

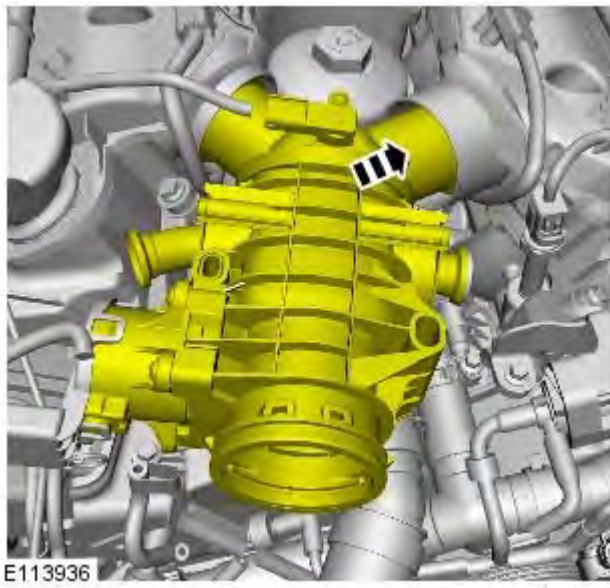


7. Torque: 10 Nm

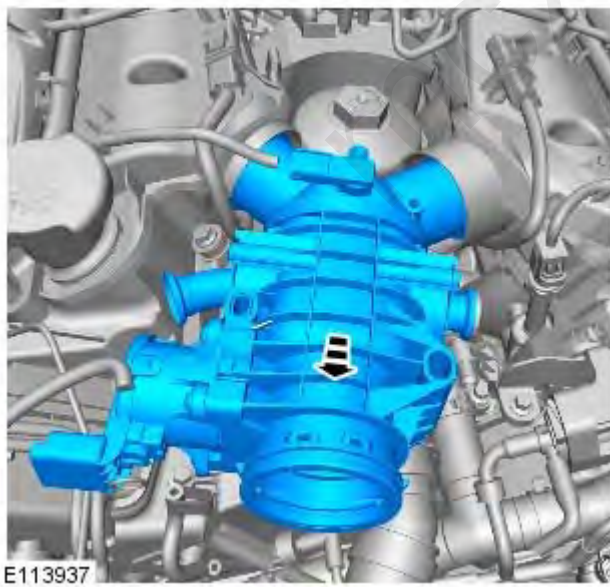
8. Refer to: [Exhaust Gas Recirculation \(EGR\) Valve Outlet Tube LH](#) (303-08B Engine Emission Control - TDV6 3.0L Diesel, Removal and Installation).
9. Refer to: [Exhaust Gas Recirculation \(EGR\) Valve Outlet Tube RH](#) (303-08B Engine Emission Control - TDV6 3.0L Diesel, Removal and Installation).



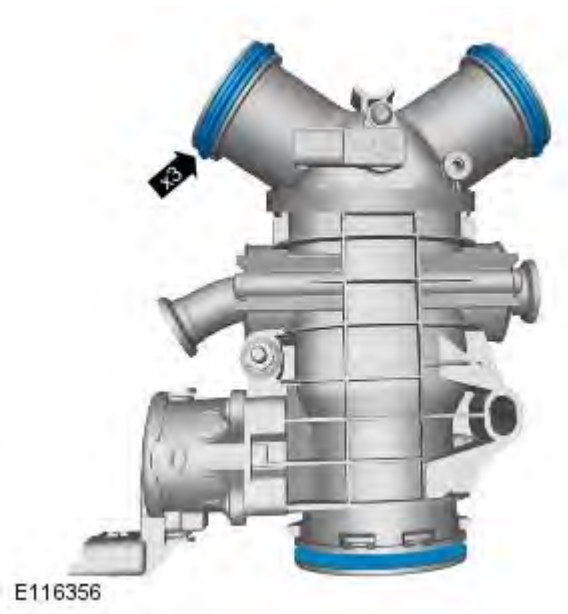
10.



11.



12.



13. **13.**  CAUTION: Install the new seals.

Installation

1. To install, reverse the removal procedure.
2. If a new unit is installed, configure using the approved diagnostic tool.