

Engine Cooling - TDV6 3.0L Diesel -

Description	Specification
Land Rover premium cooling system fluid	WSS M97B44-D
Land Rover premium cooling system flush	EGR-M14P7-A

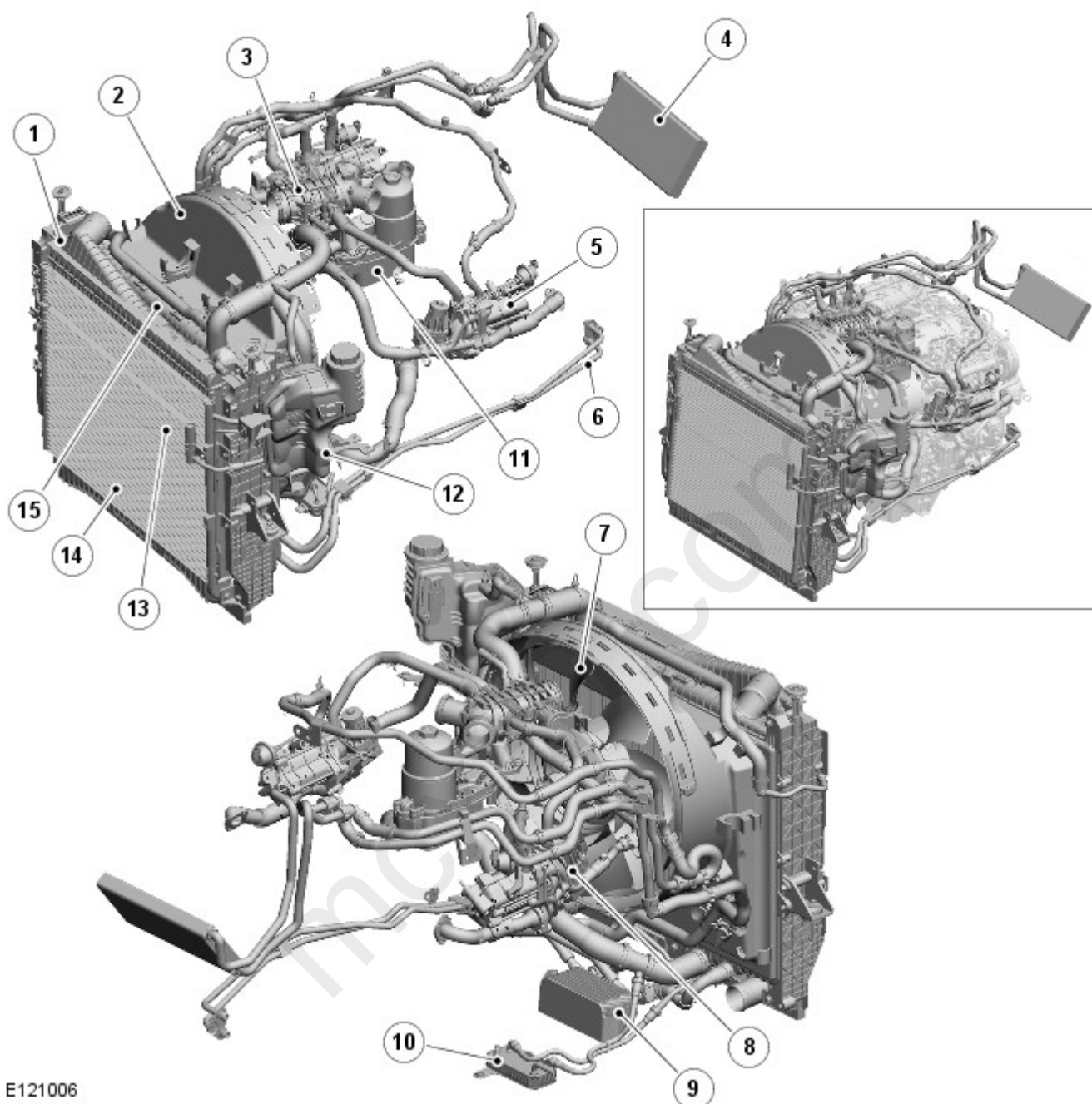
Capacities

Item	Specification		
Vehicles fitted with 4 zone air conditioning (A/C)	16.6L (dry capacity)		
Vehicles fitted with 2 zone A/C	15.9L (dry capacity)		
Description	Nm	lb-ft	lb-in
Coolant expansion tank bolt	10	7	-
Water outlet assembly bolts	10	7	-
Water inlet hose bolts	10	7	-
Coolant pump bolts	10	7	-
Cooling fan nut	65	48	-
Thermostat housing upper to lower bolts	4	-	35
Fuel cooler bolts	5	-	44
A/C radiator core bolts	5	-	44
Engine cooling module bolts	15	11	-
Cooling fan shroud M6 bolts	5	-	44
Cooling fan shroud M8 bolts	15	11	-
Charge air cooler bolts	15	11	-
Coolant bleed screw(s)	3	-	27

Engine Cooling - TDV6 3.0L Diesel - Engine Cooling - Component Location

Description and Operation

Component Location - without Fuel Fired Burning Heater



E121006

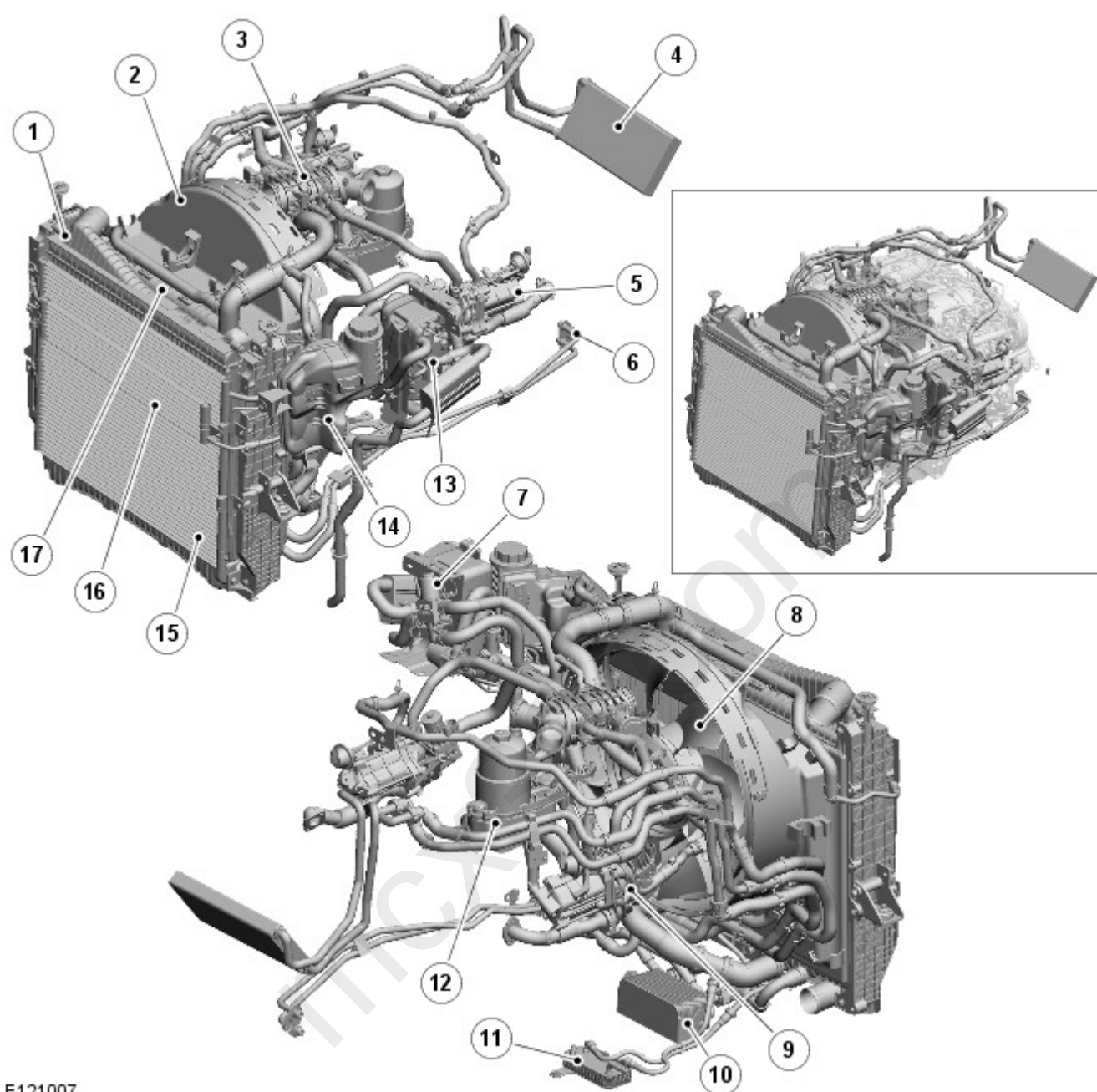
Item Description

1	Intercooler
2	Fan cowl
3	Throttle body
4	Heater core
5	LH (left-hand) EGR (exhaust gas recirculation) cooler
6	Transmission oil cooler pipes
7	Viscous fan
8	RH (right-hand) EGR cooler
9	Transmission oil cooler
10	Fuel sub-cooler
11	Engine oil cooler
12	Expansion tank
13	Fuel cooler
14	Fuel cooler
15	Fuel cooler

Condenser

15 Radiator

Component Location - with Fuel Fired Burning Heater and Park Heating



E121007

ItemDescription

1	Intercooler
2	Fan cowl
3	Throttle body
4	Heater core
5	LHEGR cooler
6	Transmission oil cooler pipes
7	Park heating valve assembly
8	Viscous fan
9	RHEGR cooler
10	Transmission oil cooler
11	Fuel sub-cooler
12	Engine oil cooler
13	FFBH (fuel fired burning heater)
14	Expansion tank
15	Condenser

Fuel cooler
17 Radiator

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Engine Cooling - TDV6 3.0L Diesel - Engine Cooling - Overview

Description and Operation

OVERVIEW

The engine cooling system maintains the engine within an optimum temperature range under changing ambient and engine operating conditions. It also provides:

- Heating for the passenger compartment.
Refer to: [Heating and Ventilation](#) (412-02A Heating and Ventilation, Description and Operation).
- Cooling for:
 - The engine oil
 - The fuel
 - The [EGR \(exhaust gas recirculation\)](#) systemRefer to: [Engine Emission Control](#) (303-08B Engine Emission Control - TDV6 3.0L Diesel, Description and Operation).
- The transmission fluid.

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Engine Cooling - TDV6 3.0L Diesel - Engine Cooling - System Operation and Component Description

Description and Operation

System Operation

COOLANT CIRCUIT FLOW

When the engine is running the coolant is circulated around the engine cooling system by the coolant pump. From the coolant pump, coolant flows through the cylinder block and the cylinder heads. Some of the coolant in the cylinder block is diverted through the engine oil cooler before returning to the 5-way connector via the water outlet.

From the 5-way connector, the majority of the coolant flows to the pressure relief thermostat, either directly or via the radiator, depending on the temperature of the coolant. From the outlet of the thermostat the coolant flows to the inlet of the coolant pump.

A separate hose from the radiator allows extra-cooled coolant from the radiator to flow through the transmission oil cooler. The coolant from the cooler is returned to the system via a branch in the bottom radiator hose.

Coolant from the water outlet also flows through the [EGR \(exhaust gas recirculation\)](#) coolers and then to the heater core. From the heater core outlet, the coolant flows to the outlet zone of the pressure relief thermostat.

The expansion tank allows expansion of coolant due to temperature increases to pass excess coolant back to the expansion tank. A small hose is connected from the water outlet to the expansion tank for this purpose. As the coolant cools, the coolant is allowed back into the system from the tank via a hose from the expansion tank into the radiator bottom hose.

PRESSURE RELIEF THERMOSTAT (PRT)

The thermostat is closed at temperatures below approximately 82°C (179°F). When the coolant temperature reaches approximately 82°C the thermostat starts to open and is fully open at approximately 96°C (204°F). In this condition the full flow of coolant is directed through the radiator. The thermostat is exposed to 90% hot coolant from the engine on one side and 10% cold coolant returning from the radiator bottom hose on the other side. Hot coolant from the engine passes from the by-pass pipe through four sensing holes in the flow valve into a tube surrounding 90% of the thermostat sensitive area. Cold coolant returning from the engine, cooled by the radiator, conducts through 10% of the sensitive area.

In cold ambient temperatures, the engine temperature is raised by approximately 10°C (50°F) to compensate for the heat loss of 10% exposure to the cold coolant returning from the bottom hose.

The by-pass flow valve is held closed by a light spring. It operates to further aid heater warm-up. When the main valve is closed and the engine speed is at idle, the coolant pump does not produce sufficient flow and pressure to open the valve. In this condition the valve prevents coolant circulating through the by-pass circuit and forces the coolant through the heater matrix only. This provides a higher flow of coolant through the heater matrix to improve passenger comfort in cold conditions. When the engine speed increases above idle, the coolant pump produces a greater flow and pressure than the heater circuit can take. The pressure acts on the by-pass flow valve and overcomes the valve spring pressure, opening the valve and limiting the pressure in the heater circuit. The valve modulates to provide maximum coolant flow through the heater core and yet allowing excess coolant to flow into the by-pass circuit to provide the engine's cooling needs at higher engine speeds.

COOLING FAN

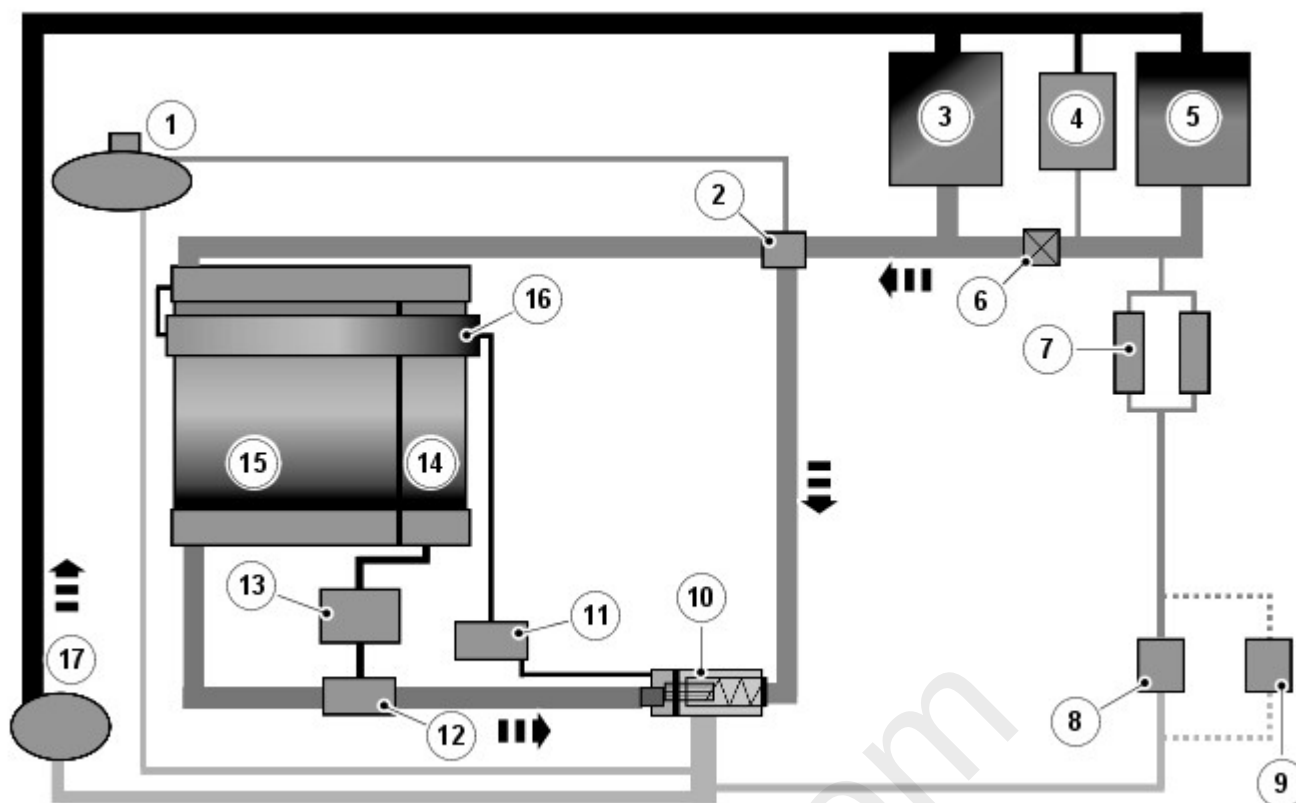
For additional airflow through the radiator matrix, particularly when the vehicle is stationary, there is an engine driven electro-viscous fan unit fitted to the rear of the radiator. The fan is used for engine cooling and for [A/C \(air conditioning\)](#) system cooling. This unit functions as a normal viscous fan, but with electronic control over the level engagement of the clutch. The [ECM \(engine control module\)](#), which determines the required fan speed, controls the level of clutch engagement. The [ECM](#) determines engagement based on the coolant, charge air, ambient and transmission oil temperatures and the [A/C](#) pressure. The fan is mounted using a left hand thread.

The viscous fan unit is electronically controlled by the [ECM](#) to optimize fan speed for all operating conditions.

• **NOTE:** If the electrical connections to the viscous fan are disconnected the fan will 'idle' and overheating may result. The ECM stores the appropriate fault codes in this case.

SCHEMATIC FLOW DIAGRAMS

ENGINE COOLING WITHOUT FUEL FIRED BURNING HEATER

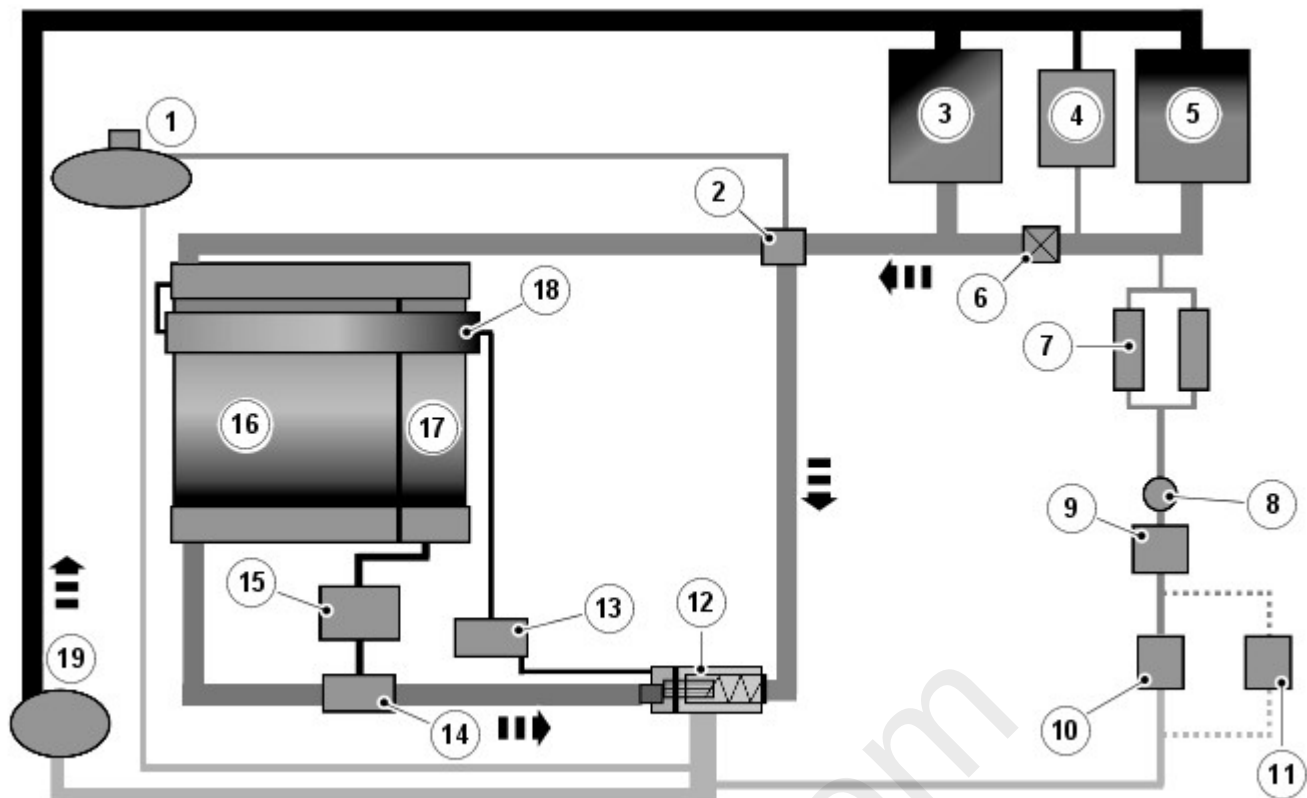


E107588

ItemDescription

1	Expansion tank
2	Degas connector
3	Cylinder head
4	Engine oil cooler
5	Cylinder head
6	Static bleed point
7	EGR coolers
8	Cabin heater
9	Rear heater
10	Pressure Relief Thermostat (PRT)
11	Fuel cooler
12	Venturi connector
13	Transmission oil cooler
14	Transmission oil sub-cooler
15	Radiator
16	Fuel sub-cooler
17	Water pump

ENGINE COOLING WITH FUEL FIRED BURNING HEATER - SCHEMATIC FLOW DIAGRAM

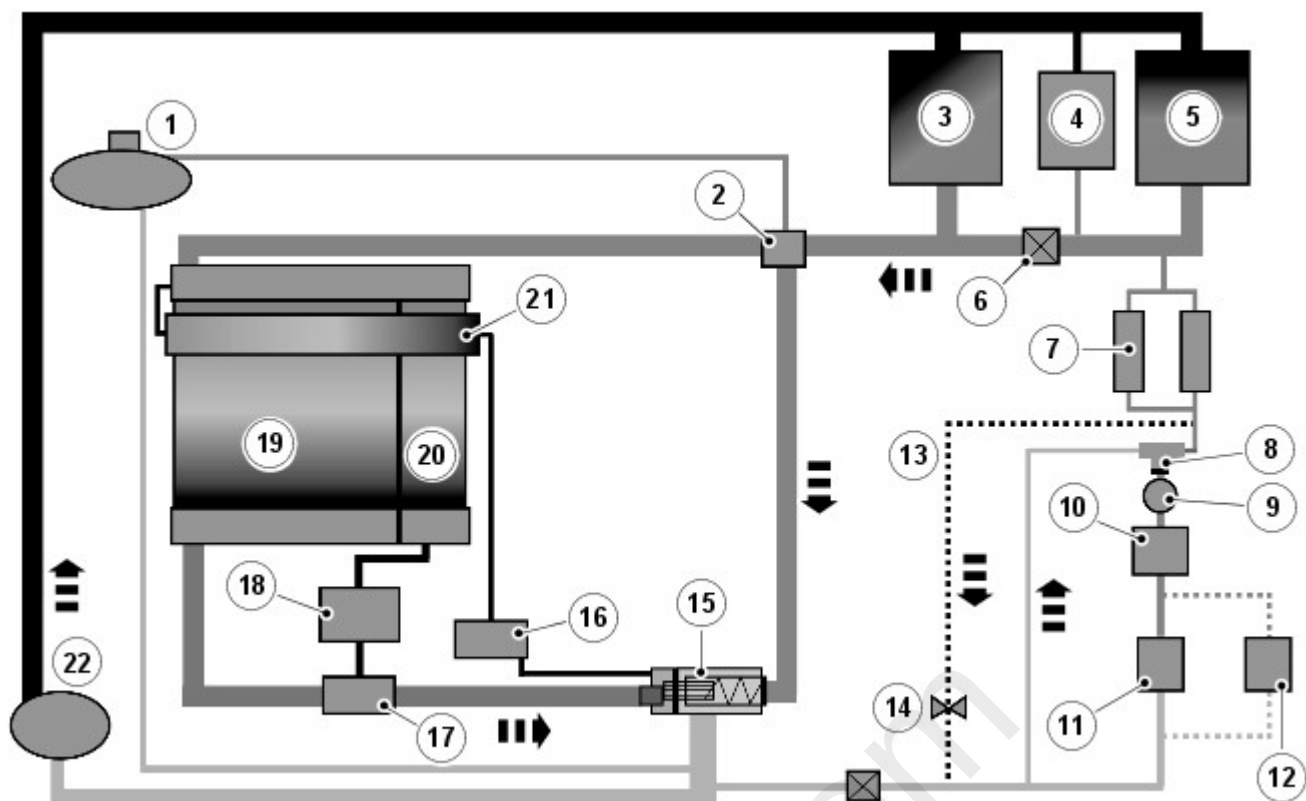


E107589

ItemDescription

1	Expansion tank
2	Degas connector
3	Cylinder head
4	Engine oil cooler
5	Cylinder head
6	Static bleed point
7	EGR coolers
8	Pump
9	FFBH (fuel fired burning heater)
10	Cabin heater
11	Rear heater
12	PRT
13	Fuel cooler
14	Venturi connector
15	Transmission oil cooler
16	Radiator
17	Transmission oil sub-cooler
18	Fuel sub-cooler
19	Water pump

ENGINE COOLING WITH FUEL FIRED BURNING HEATER AND PARK HEATING - SCHEMATIC FLOW DIAGRAM



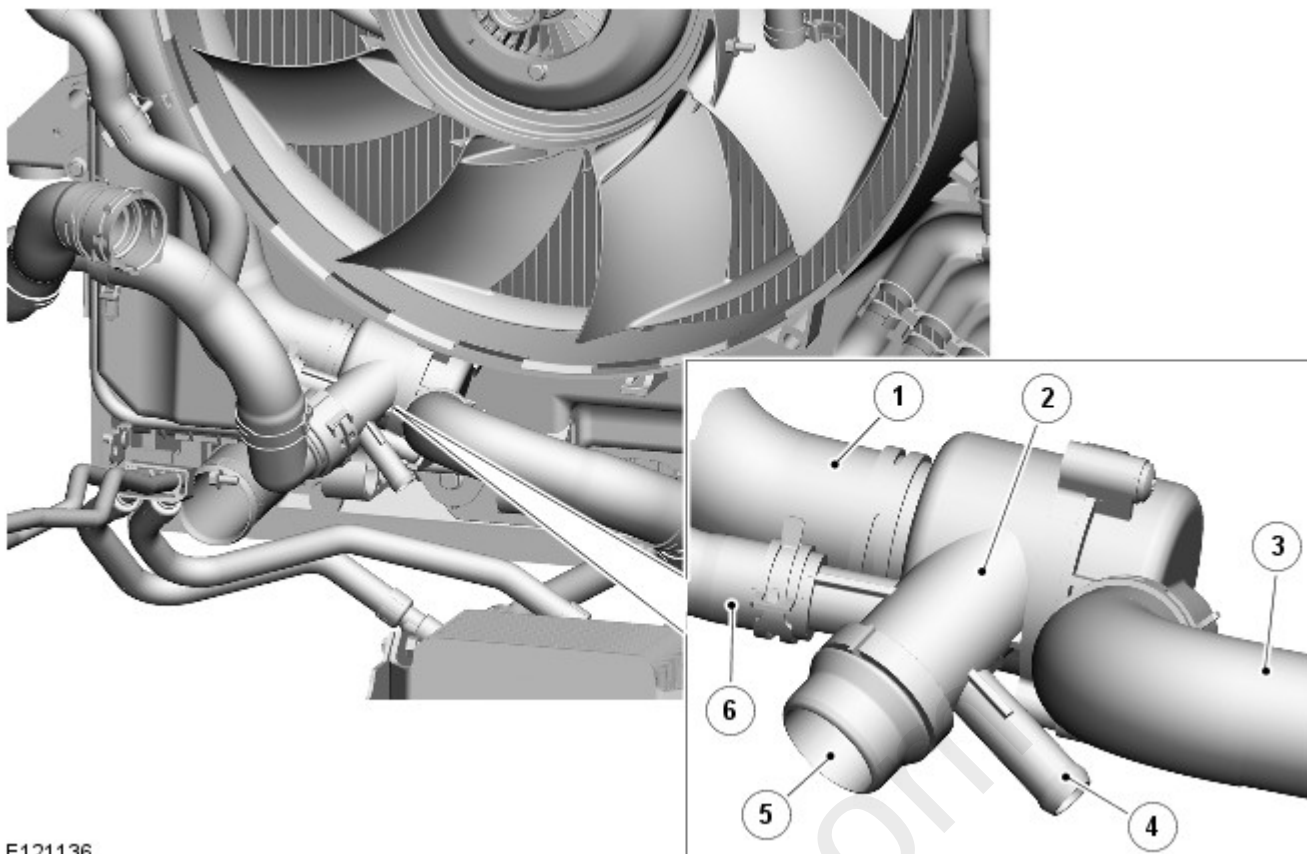
E107590

ItemDescription

1	Expansion tank
2	Degas connector
3	Cylinder head
4	Engine oil cooler
5	Cylinder head
6	Static bleed point
7	EGR coolers
8	3-way valve
9	Pump
10	FFBH (fuel fired burning heater)
11	Cabin heater
12	Rear heater
13	Heater by-pass
14	Restrictor
15	PRT
16	Fuel cooler
17	Venturi connector
18	Transmission oil cooler
19	Radiator
20	Transmission oil sub-cooler
21	Fuel sub-cooler
22	Water pump

Component Description

PRESSURE RELIEF THERMOSTAT (PRT)



E121136

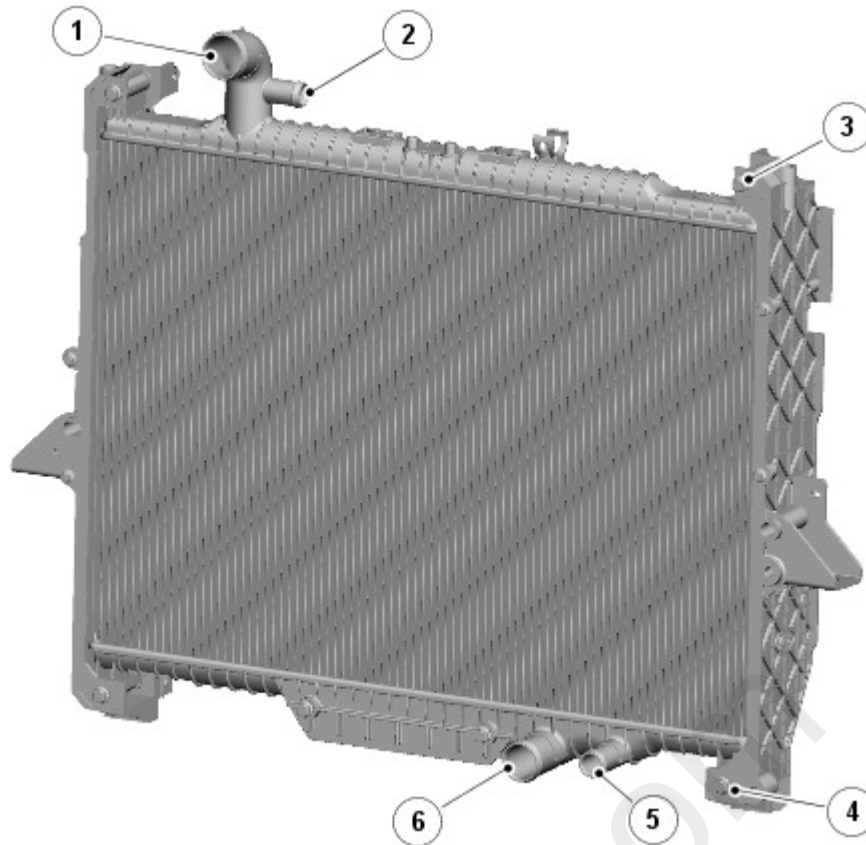
ItemDescription

1	Connection to radiator top hose
2	PRT body
3	Connection from radiator bottom hose
4	Heater core return connection
5	Connection to cylinder block water inlet
6	Connection to expansion tank

A plastic thermostat housing is located behind the radiator. The housing has 5 connections which locate the radiator bottom hose, top hose from the 5-way connector, coolant pump feed hose to the cylinder block and return feed from the heater core. The housing contains a wax element and a spring loaded by-pass flow valve.

The thermostat is used to maintain the coolant at the optimum temperature for efficient combustion and to aid engine warm-up.

RADIATOR



E121137

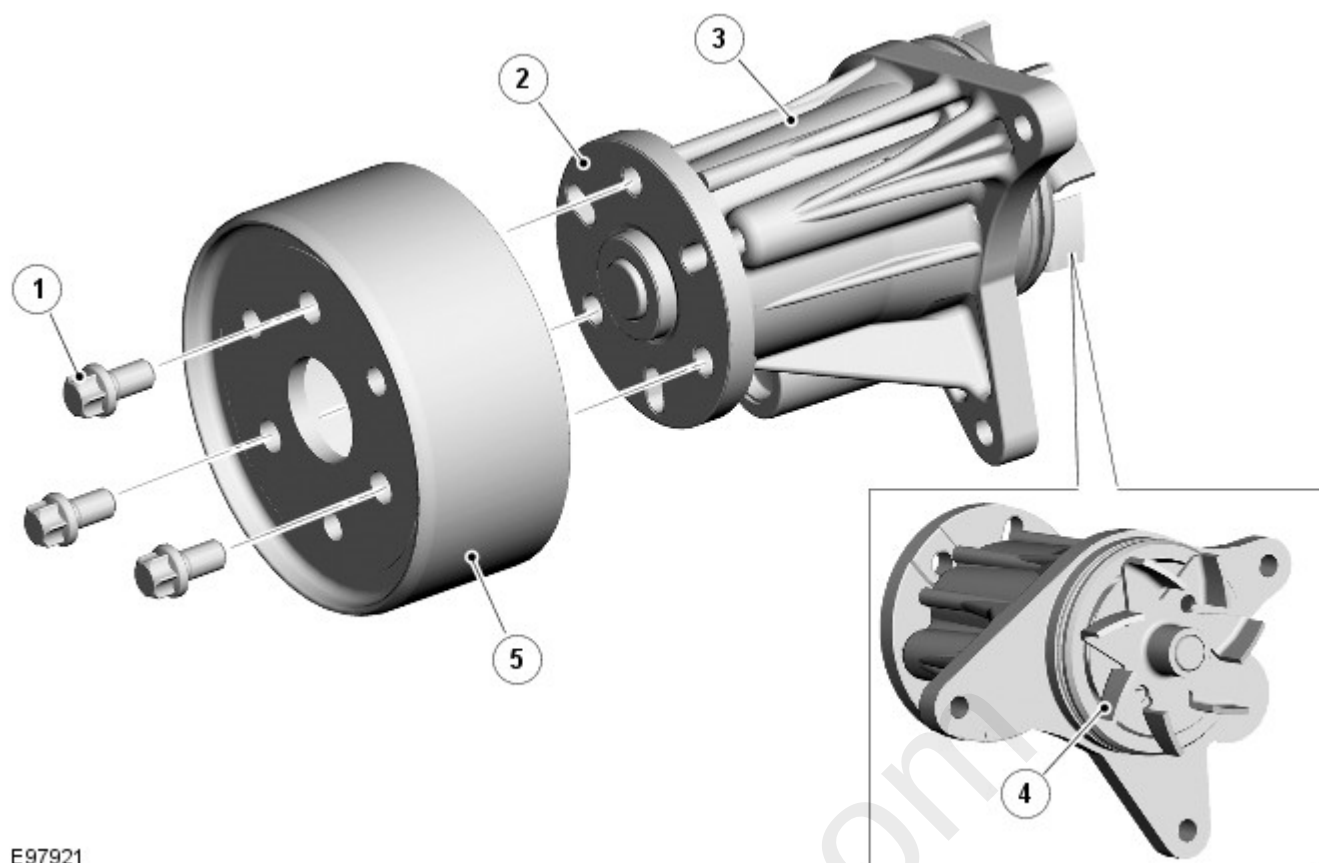
ItemDescription

1	Coolant inlet
2	Coolant outlet to fuel cooler
3	Support - upper (2 off)
4	Support - lower (2 off)
5	Coolant outlet to transmission oil cooler
6	Coolant outlet to pressure relief thermostat

The radiator is a vertical-flow type with an aluminum core and plastic end tanks. The radiator is located in the vehicle by locating spigots and supports integrated into the cooling pack end frames. The lower supports are installed in rubber bushes in the upper chassis rails. The upper locating spigots are installed in rubber bushes in the front end carrier. Coolant inlet and outlet connections are incorporated into the upper and lower end tanks respectively.

The lower end tank also has a connection for coolant outlet to the transmission fluid cooler.

COOLANT PUMP



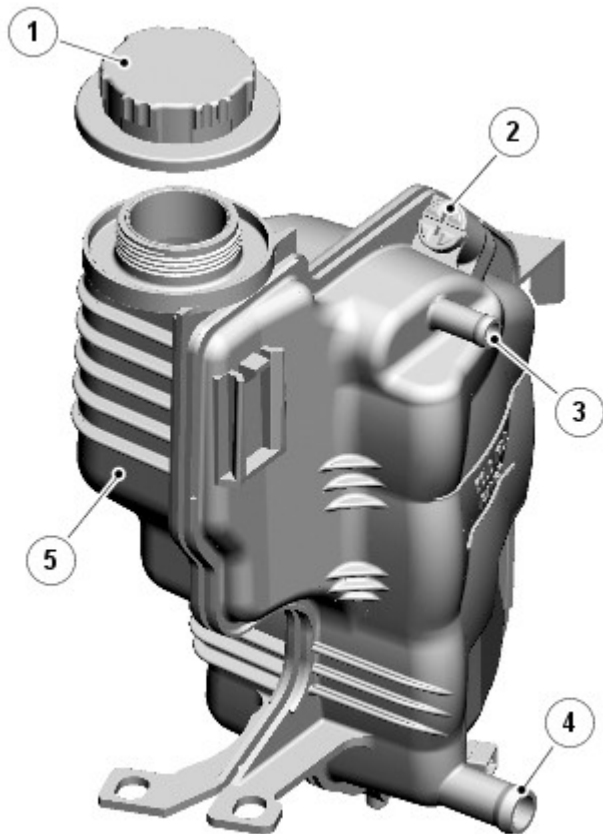
E97921

ItemDescription

1	Bolt (3 off)
2	Drive hub
3	Housing
4	Impeller
5	Pulley

The coolant pump has a housing that supports a shaft with an impeller attached to one end and a drive hub at the other. The housing is attached to the front of the cylinder block with the impeller located in a pumping chamber. The pump is driven by a pulley attached to the drive hub and driven by the accessory drive belt. For additional information refer to Accessory Drive 303-05B.

EXPANSION TANK



E121138

ItemDescription

1	Filler cap
2	Bleed screw
3	Vent hose connection
4	Expansion hose connection
5	Expansion tank

A pressurized expansion tank system is used which continuously separates the air from the cooling system and replenishes the system through a hose connected between the expansion tank and the heater return hose. A continuous vent into the expansion tank, through a hose connected to the engine's coolant outlet connector, prevents air locks from forming in the cooling system.

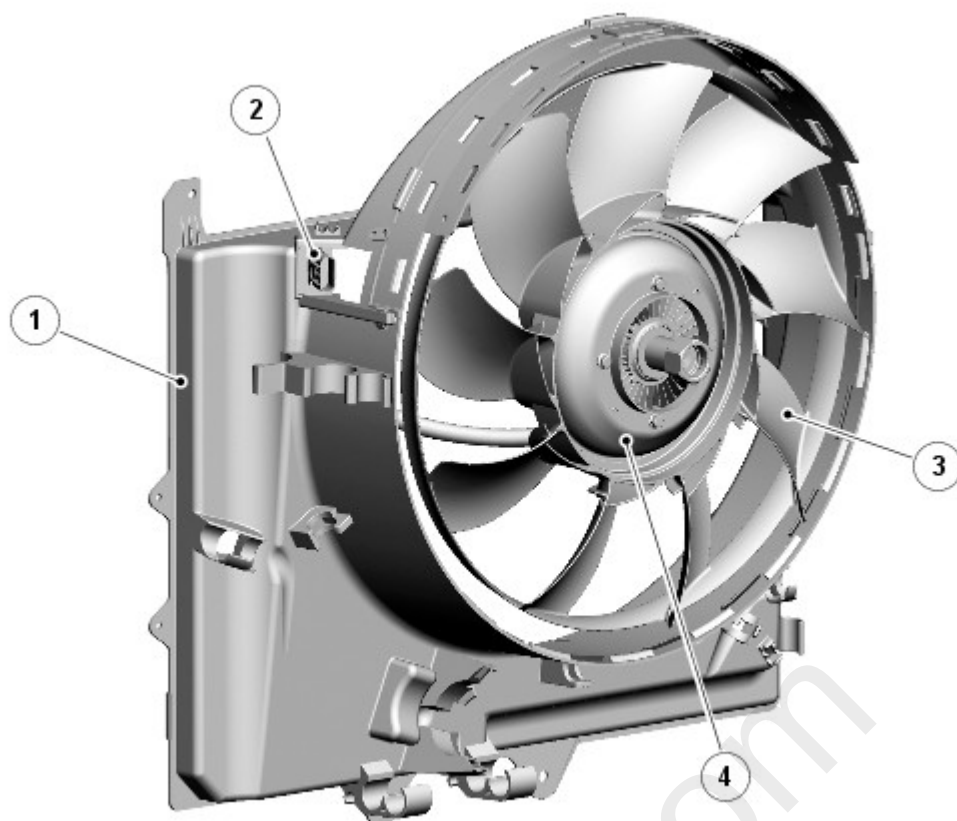
The expansion tank is installed behind the top right corner of the radiator. A filler cap, bleed screw and level sensor are incorporated into the expansion tank. MAX and MIN level markings are molded into the interior of the tank below the filler cap.

The expansion tank provides the following functions:

- Service fill
- Coolant expansion during warm-up
- Air separation during operation
- System pressurization by the filler cap

The expansion tank has an air space of approximately 0.5 to 1 liter (1.06 to 2,11 US pints), above the MAX level, to allow for coolant expansion.

COOLING FAN



E121139

ItemDescription

1	Shroud
2	Electrical connector
3	Fan
4	Viscous unit

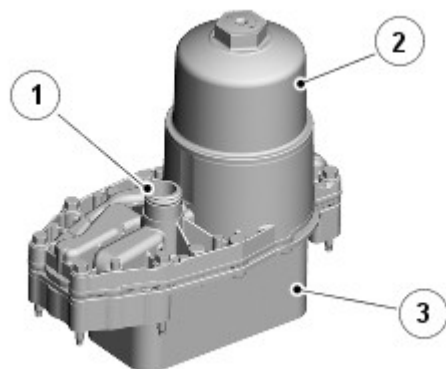
To control the cooling fan, the [ECM](#) sends a [PWM \(pulse width modulation\)](#) signal to the cooling fan module (integral to the [ECM](#)). The frequency of the [PWM](#) signal is used by the cooling fan module to determine the output voltage supplied to the fan motor.

The [ECM](#) varies the duty cycle of the [PWM](#) signal between 0 and 100% to vary the fan speed. If the [PWM](#) signal is outside the 0 to 100% range, the cooling fan module interprets the signal as an open or short circuit and runs the fans at maximum speed to ensure the engine and transmission do not overheat.

The [ECM](#) operates the fan in response to inputs from the [ECT \(engine coolant temperature\)](#) sensor, the transmission oil temperature sensor, the charge air temperature sensor, the [A/C](#) switch and the [A/C](#) pressure sensor.

The speed of the cooling fan is also influenced by vehicle road speed. The [ECM](#) adjusts the speed of the cooling fans, to compensate for the ram effect of vehicle speed, using the [CAN \(controller area network\)](#) road speed signal received from the [ABS \(anti-lock brake system\)](#) module.

ENGINE OIL COOLER



E115007

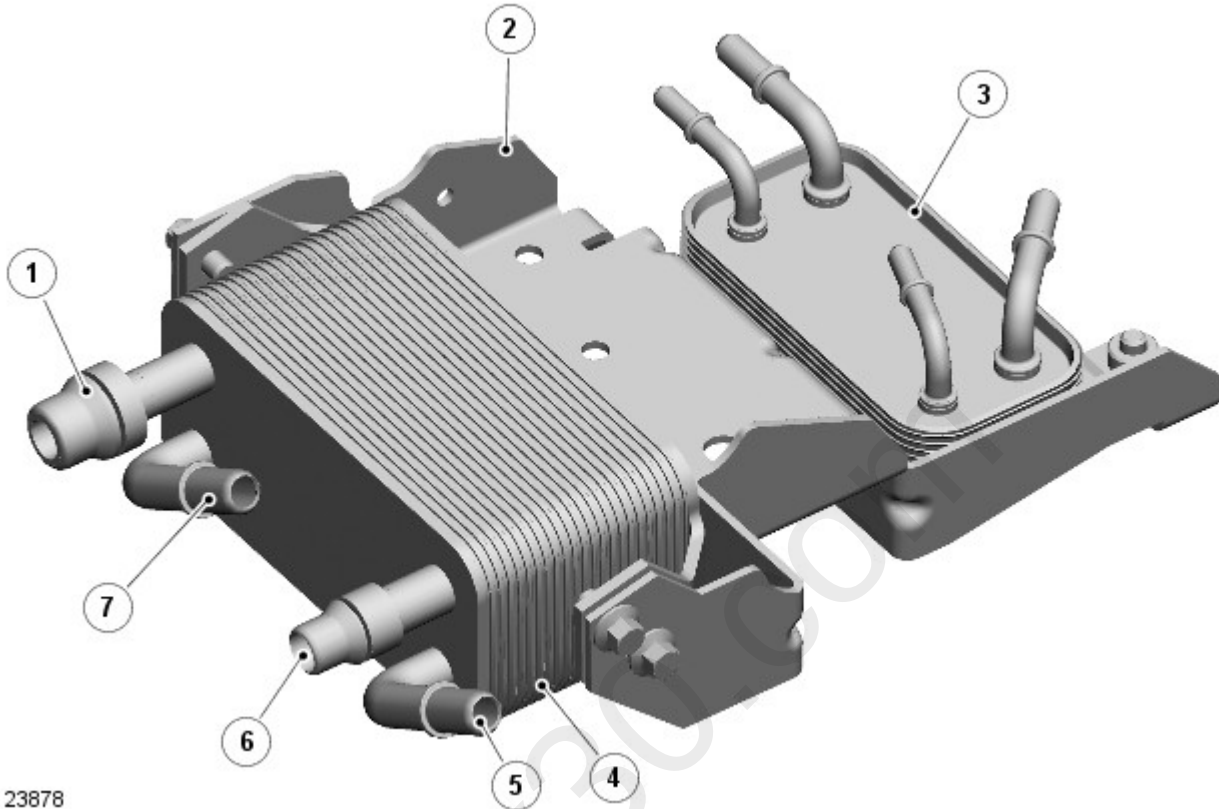
ItemDescription

1	Coolant outlet
2	Engine oil filter
3	

Engine oil cooler

The engine oil cooler is attached to a common adapter assembly located in the vee of the cylinder block. Inlet and outlet ports for engine oil, and an inlet port for coolant, are incorporated into the cylinder block mating face of the adapter assembly. A metal gasket seals the joint between the adapter assembly and the cylinder block. From the cylinder block, coolant flows through the adapter assembly and into the cooler. After passing through the cooler, the coolant then flows into the engine coolant water outlet.

TRANSMISSION FLUID COOLER



E123878

Item	Description
1	Coolant inlet from radiator
2	Mounting bracket
3	Fuel cooler
4	Transmission fluid cooler
5	Transmission fluid inlet
6	Coolant outlet to radiator bottom hose
7	Transmission fluid outlet

The transmission fluid cooler is located on chassis cross member behind the radiator, sharing a bracket with the fuel cooler. The cooler is connected to the cooling system with two hoses and receives cooled fluid from the lower section of the radiator, which flows through the cooler, reducing the temperature of the transmission fluid.

ENGINE COOLANT

The coolant is silicate free and must not be mixed with conventional engine coolant.

Engine Cooling - TDV6 3.0L Diesel - Engine Cooling

Diagnosis and Testing

Principle of Operation

For a detailed description of the engine cooling system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: (303-03B Engine Cooling - TDV6 3.0L Diesel)

[Engine Cooling](#) (Description and Operation),

[Engine Cooling](#) (Description and Operation),

[Engine Cooling](#) (Description and Operation).

Inspection and Verification



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

Visual Inspection

Mechanical	Electrical
• Coolant leaks • Coolant Hoses • Coolant expansion tank • Radiator • Heater core • Accessory drive belt • Viscous fan	• Fuses • Harnesses • Loose or corroded connector(s) • Engine Coolant Temperature (ECT) sensor

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. 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
Coolant loss	• Hoses • Hose connections • Radiator • Water pump • Heater core • Gaskets • Engine casting cracks • Engine block core plugs	Carry out a visual inspection. If there are no obvious leaks, carry out a cooling system pressure test. Rectify any leaks as necessary.
Overheating	• Low/Contaminated coolant • Thermostat • Viscous fan • ECT sensor • Restricted air flow over the radiator	Check the coolant level and condition. Carry out a cooling system pressure test. Rectify any leaks as necessary. Check the thermostat and rectify as necessary. Check the viscous fan operation, make sure the viscous fan rotates freely. Check for obstructions to the air flow over the radiator. Rectify as necessary.
Engine not reaching normal temperature	• Thermostat • Viscous fan • Thermostat • Electric fan • Fan speed module	Check the thermostat operation. Check the viscous fan operation, make sure the viscous fan is not seized. Rectify as necessary.

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).

Engine Cooling - TDV6 3.0L Diesel - Cooling System Draining, Filling and Bleeding

General Procedures

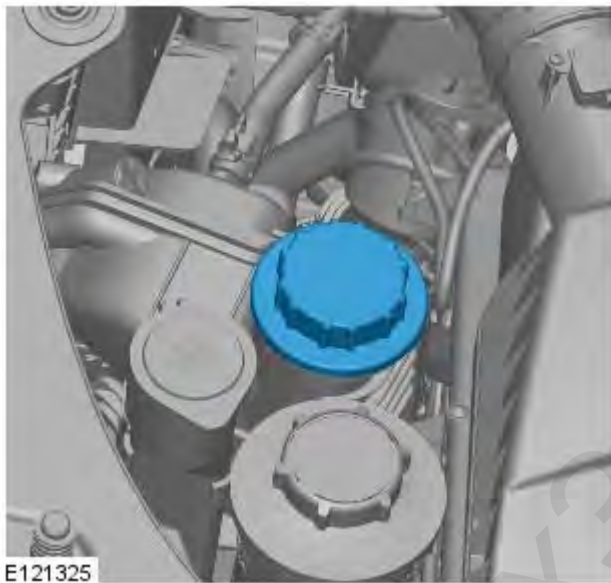
Draining

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

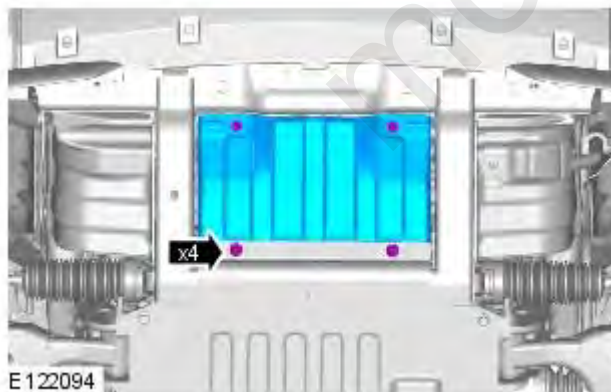
1. Refer to: [Engine Cover - TDV6 3.0L Diesel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

2.  **WARNING:** Make sure to support the vehicle with axle stands.

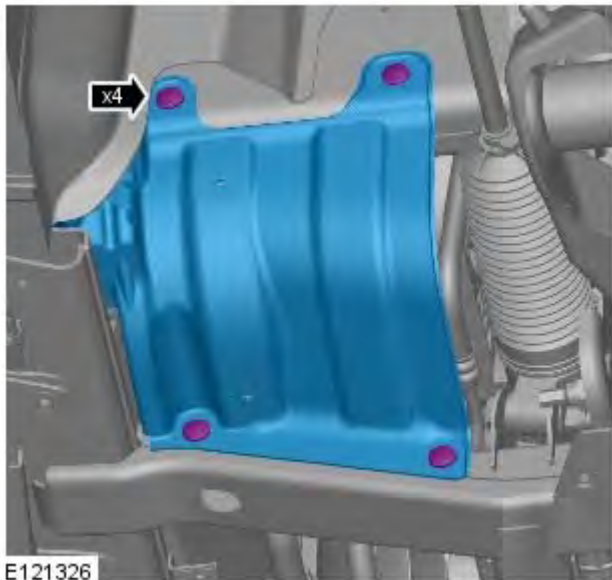
Raise and support the vehicle.



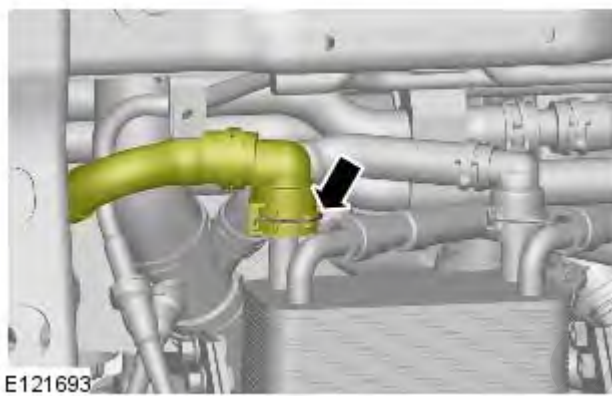
3.  **WARNING:** Since injury such as scalding could be caused by escaping steam or coolant, do not remove the filler cap from the coolant expansion tank while the system is hot.



4. Remove the 4 bolts.

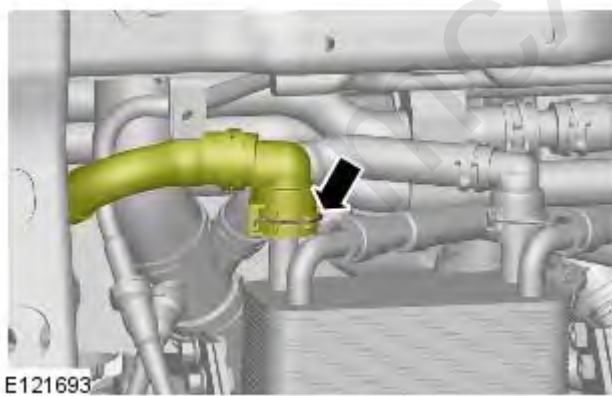


5.

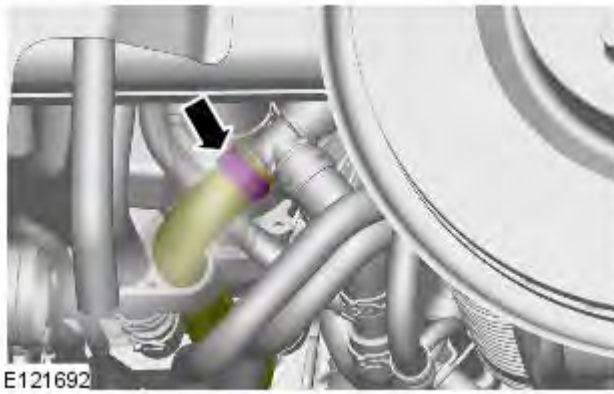


6.  **CAUTION:** Be prepared to collect escaping coolant.

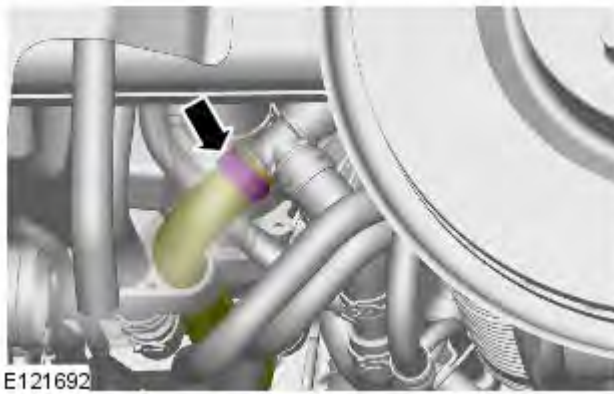
Position a container to collect the fluid.



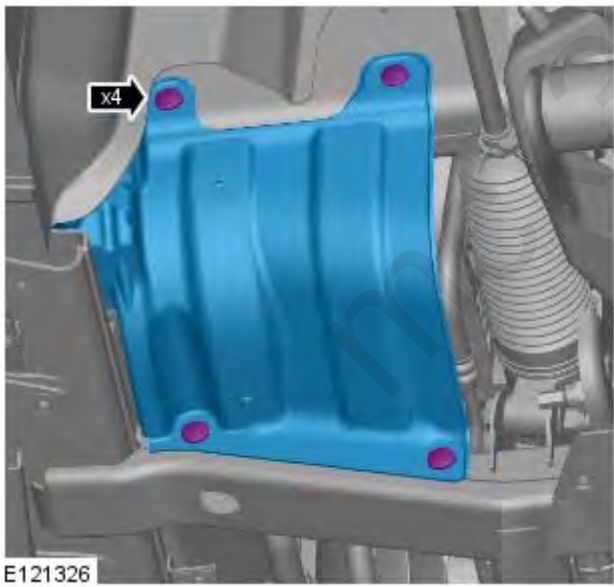
7. Connect the transmission fluid cooler coolant hose.



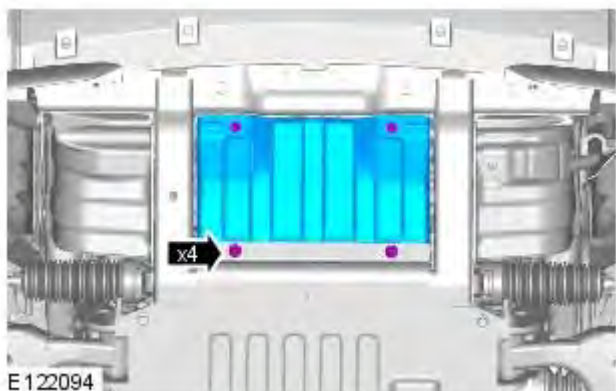
8.  CAUTION: Be prepared to collect escaping coolant.



9. Install the coolant hose.

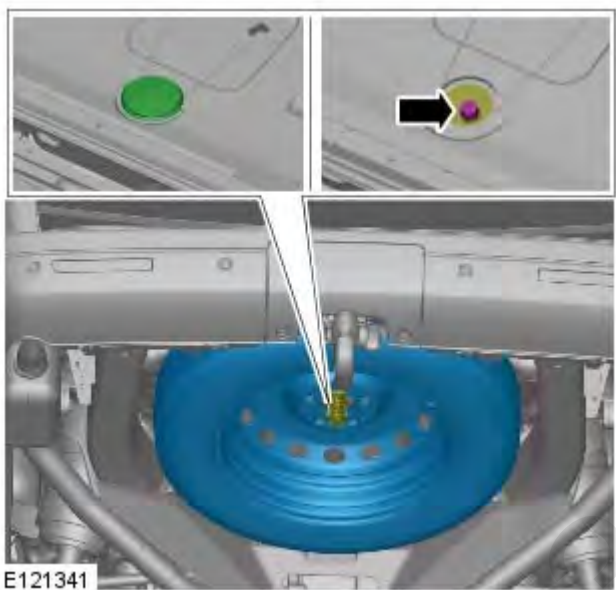


10. Install the LH splash shield.

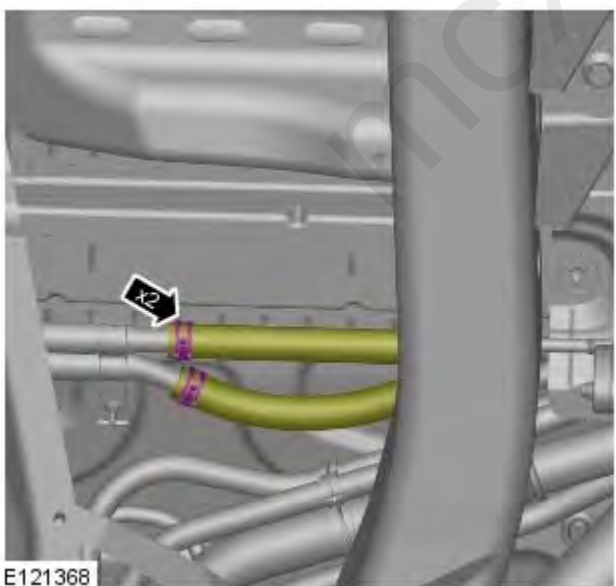


11.

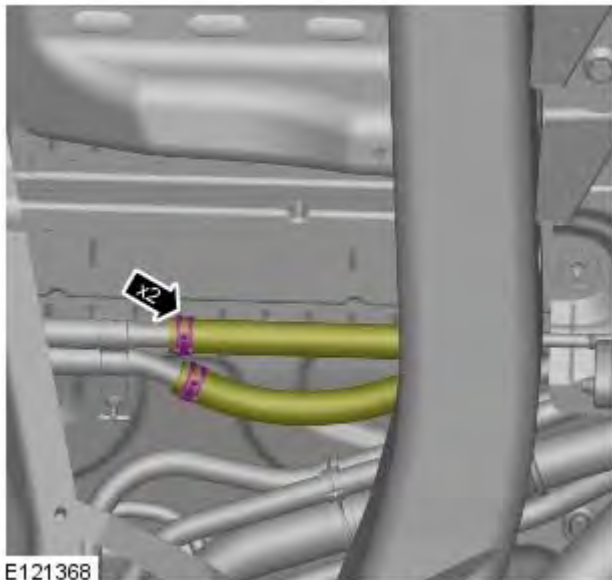
- Install the radiator access panel.
- *Torque:* 10 Nm



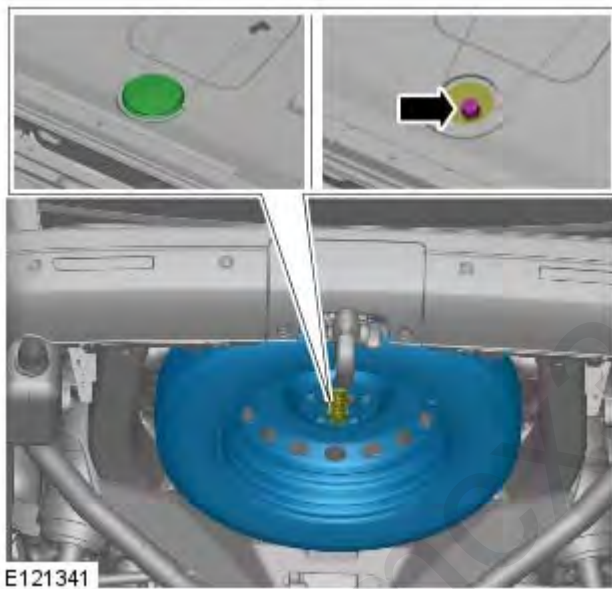
12. Remove the spare wheel and tire.



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



14. Install the coolant hoses.

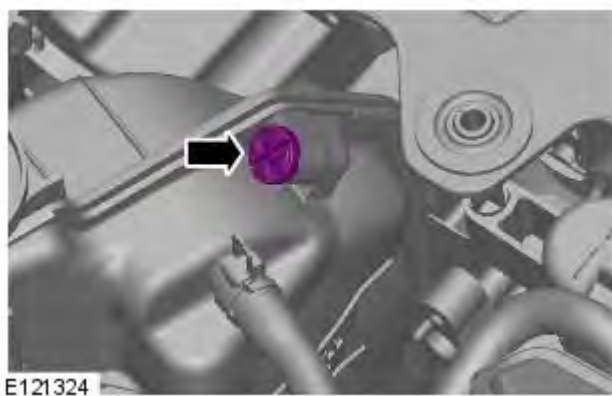


15. Install the spare wheel and tire.

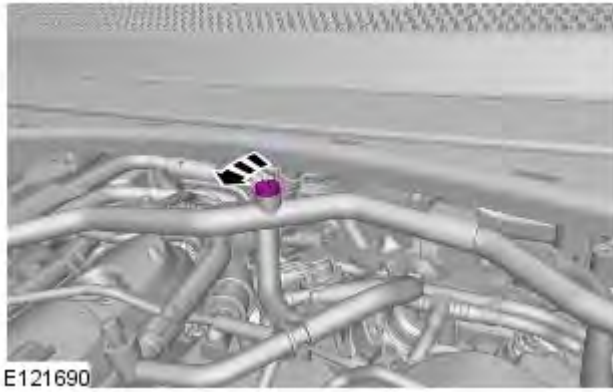
Filling

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

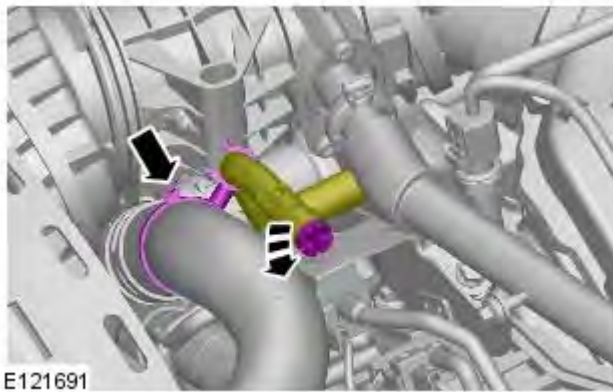
1. Lower the vehicle.



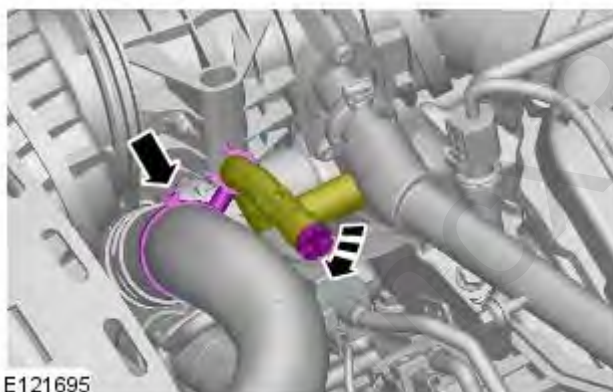
2.



3.



4.



5. **20. CAUTIONS:**

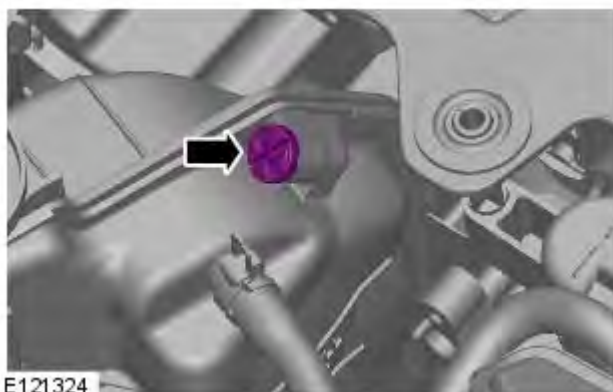


Anti-freeze concentration must be maintained at 50%.



Be prepared to collect escaping coolant.

Fill the coolant expansion tank until coolant appears through the bleed ports.



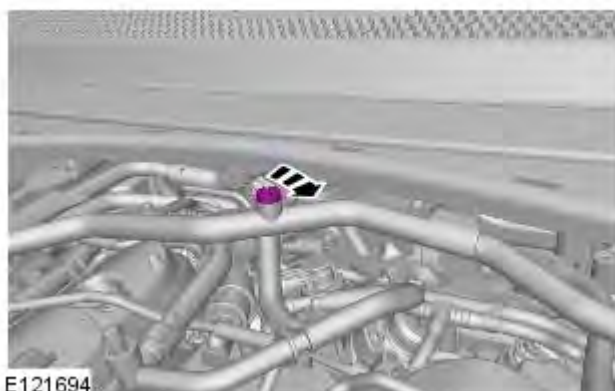
6. **21. CAUTION:** Be prepared to collect escaping coolant.

Fill the coolant expansion tank until coolant appears through the bleed ports.

7. Set the heater controls to maximum.

8. Start the engine and continue to fill the coolant until the maximum

level is reached.

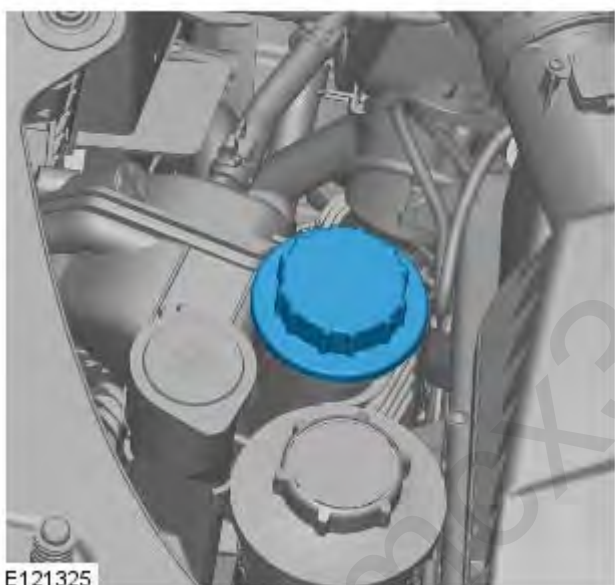


9. **24.**  **CAUTION:** Be prepared to collect escaping coolant.

Fill the coolant expansion tank until coolant appears through the bleed ports.

10. Increase engine speed to 2500rpm and cycle between this and idle.

11. Continue to top-up with coolant with the engine at idle.



12. **27.**  **CAUTION:** Correct installation of the Coolant expansion tank cap can be obtained by tightening the cap until an audible click is heard.

13. Allow the engine to idle, until hot air is emitted at the face registers.

14. Once the front heater is warm, check if the rear heater is warm (if equipped). If no heat is felt, increase the engine speed to 3000 rpm for 30 seconds and return to idle.

15. **30.**  **CAUTION:** Switch off the engine and allow the coolant temperature to go cold.

16. Visually check the engine and cooling system for signs of coolant leakage.

17. **32.**  **WARNING:** When releasing the cooling system pressure, cover the coolant expansion tank cap with a thick cloth.

• **CAUTIONS:**

 Since injury such as scalding could be caused by escaping

steam or coolant, make sure the vehicle cooling system is cool prior to carrying out this procedure



Make sure the coolant level remains above the "COLD FILL RANGE" lower level mark.

- NOTE: When the cooling system is warm, the coolant will be approximately 10mm above the upper level mark on the expansion tank with the cap removed.

Check and top-up the coolant if required.

18. Install the engine cover.

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

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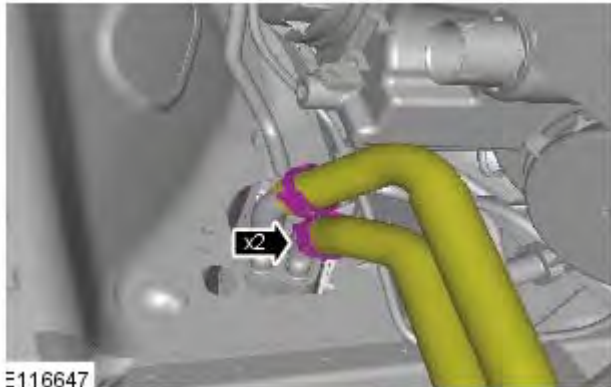
Engine Cooling - TDV6 3.0L Diesel - Auxiliary Radiator

Removal and Installation

Removal

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

1. Refer to: Battery Disconnect and Connect (414-01, General Procedures).
2. Refer to: [Cooling System Draining, Filling and Bleeding](#) (303-03B Engine Cooling - TDV6 3.0L Diesel, General Procedures).

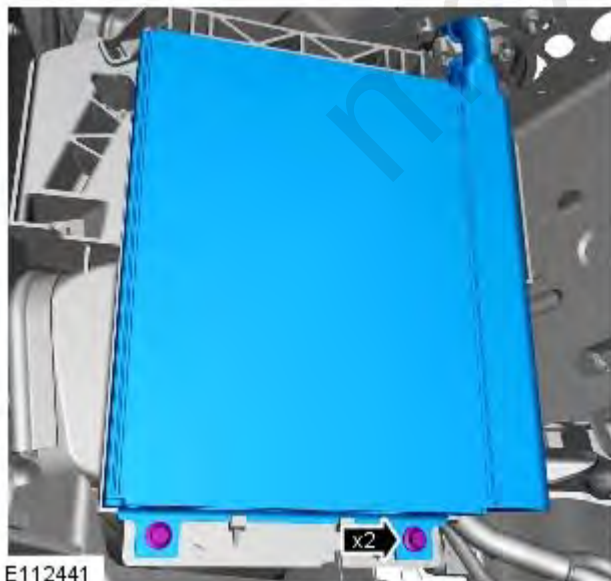


3.  CAUTION: Be prepared to collect escaping coolant.

4.  WARNING: Make sure to support the vehicle with axle stands.

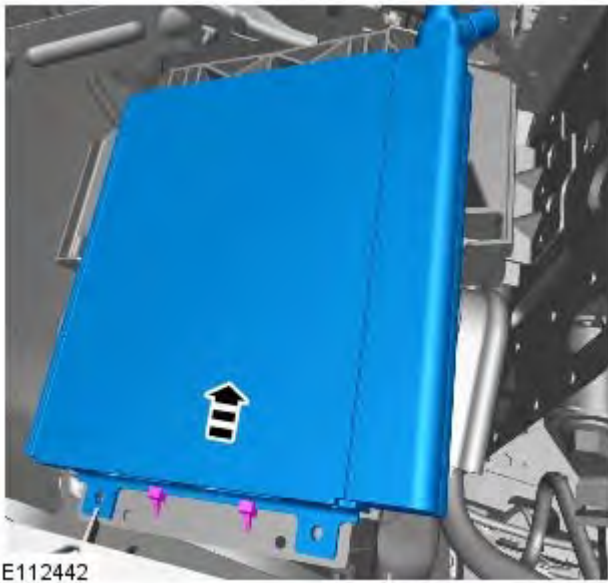
Raise and support the vehicle.

5. Refer to: Fender Splash Shield (501-02, Removal and Installation).



6. Torque: 7 Nm

7.



Installation

1. To install, reverse the removal procedure.

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Engine Cooling - TDV6 3.0L Diesel - Coolant Expansion Tank

Removal and Installation

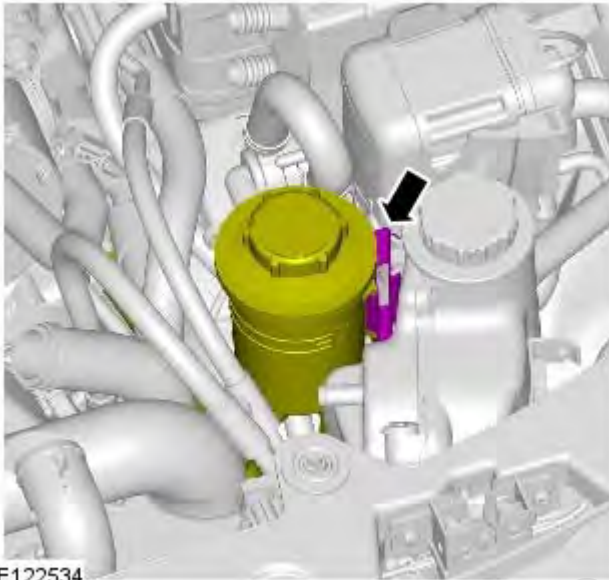
Removal

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

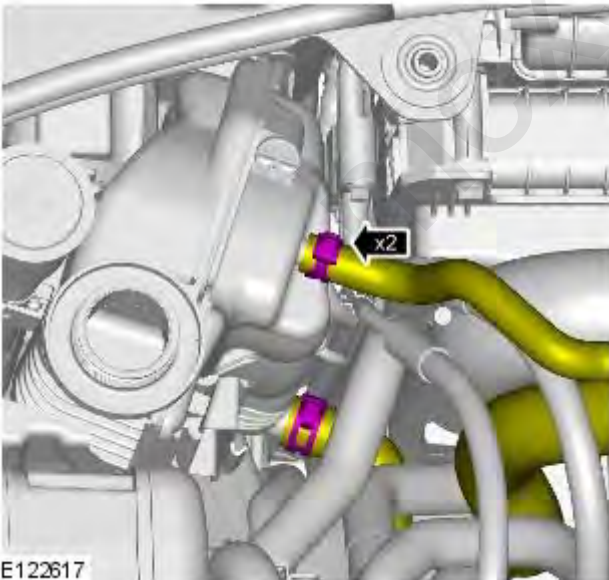
1.  **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

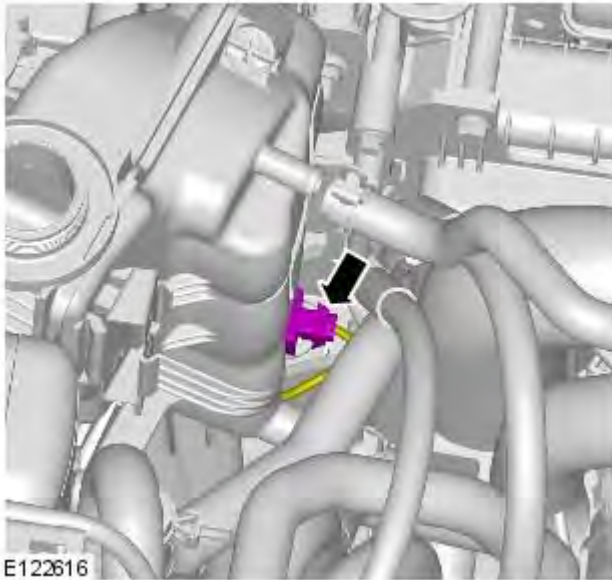
2.



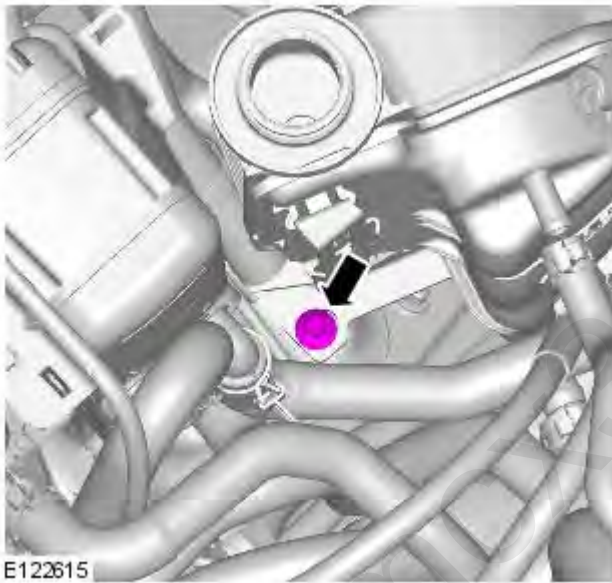
3.  **CAUTION:** Be prepared to collect escaping coolant.



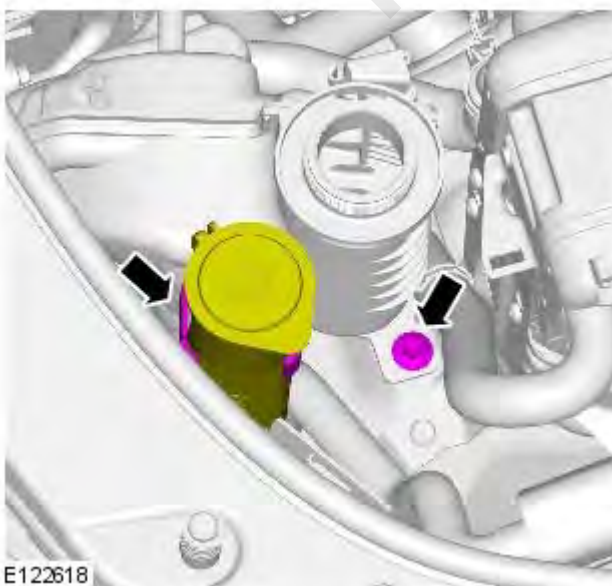
4.

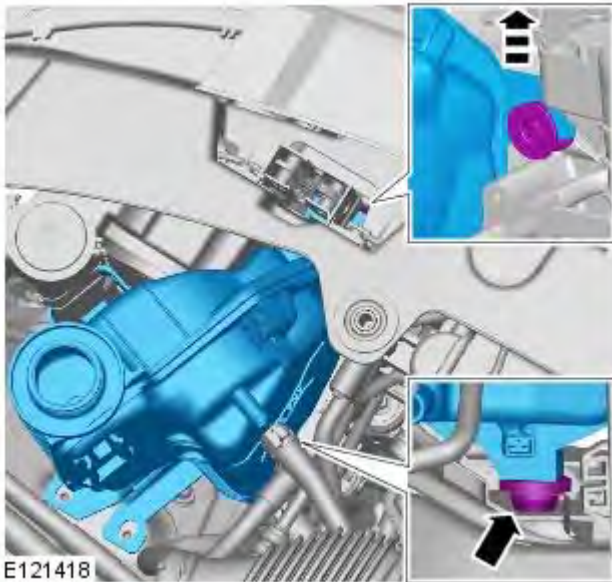


5. Torque: 10 Nm



6. Torque: 10 Nm





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



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



- 9.

Installation

1. To install, reverse the removal procedure.

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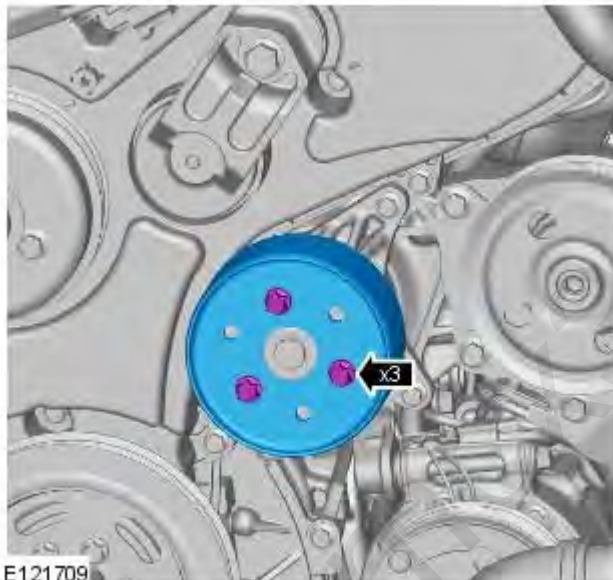
Engine Cooling - TDV6 3.0L Diesel - Coolant Pump

Removal and Installation

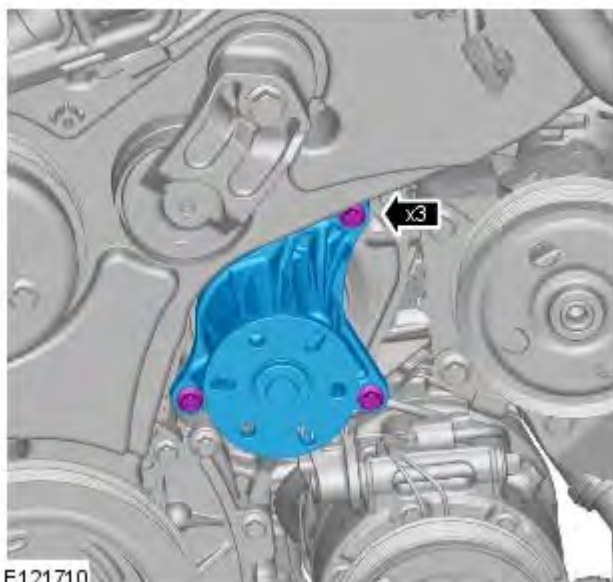
Removal

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

1. Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).
2.  **WARNING:** Make sure to support the vehicle with axle stands.
Raise and support the vehicle.
3. Refer to: [Cooling System Draining, Filling and Bleeding](#) (303-03B Engine Cooling - TDV6 3.0L Diesel, General Procedures).
4. Refer to: [Accessory Drive Belt](#) (303-05B Accessory Drive - TDV6 3.0L Diesel, Removal and Installation).



5.  **CAUTION:** Discard the bolts.
 - Using a suitable 6mm bar, retain the coolant pump pulley.
 - *Torque:* 25 Nm



6.  **CAUTION:** Discard the seal.
 - *Torque:* 10 Nm

Installation

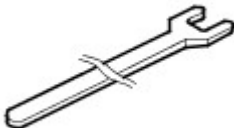
1. To install, reverse the removal procedure.

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Engine Cooling - TDV6 3.0L Diesel - Cooling Fan

Removal and Installation

Special Tool(s)

 E46076	303-1142 Viscous Coupling Wrench
 E55382	303-1143 Viscous Coupling Holding Tool

Removal

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

1. Disconnect the battery ground cable.

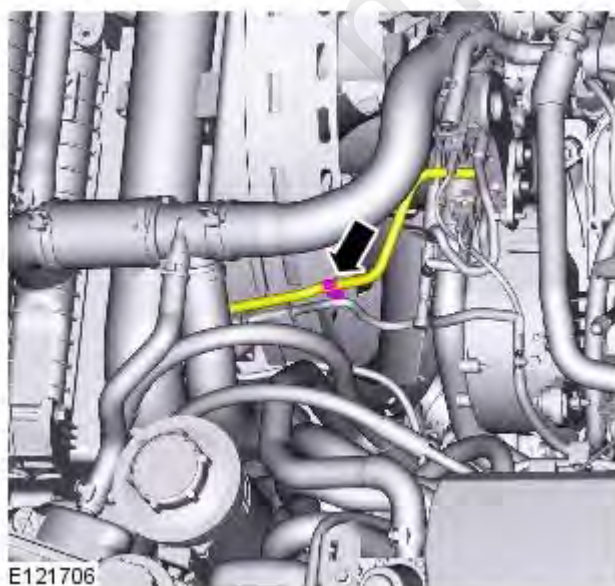
Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

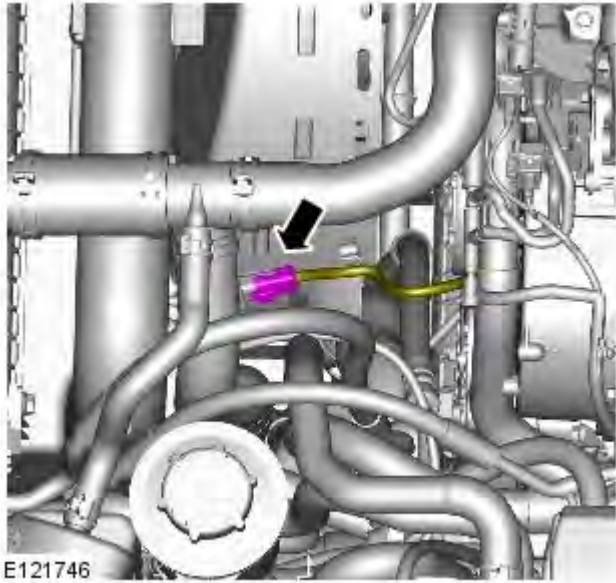
2.  **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

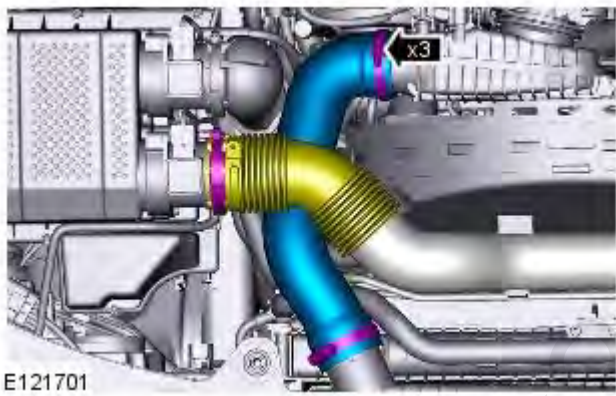
3. Refer to: [Cooling System Draining, Filling and Bleeding](#) (303-03B Engine Cooling - TDV6 3.0L Diesel, General Procedures).

- 4.

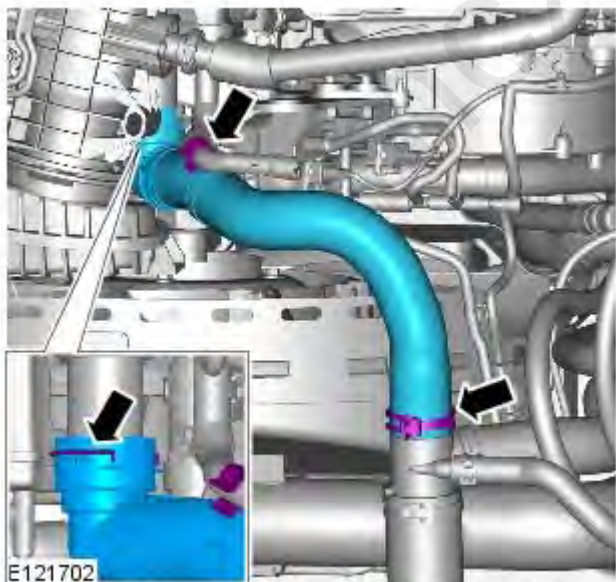




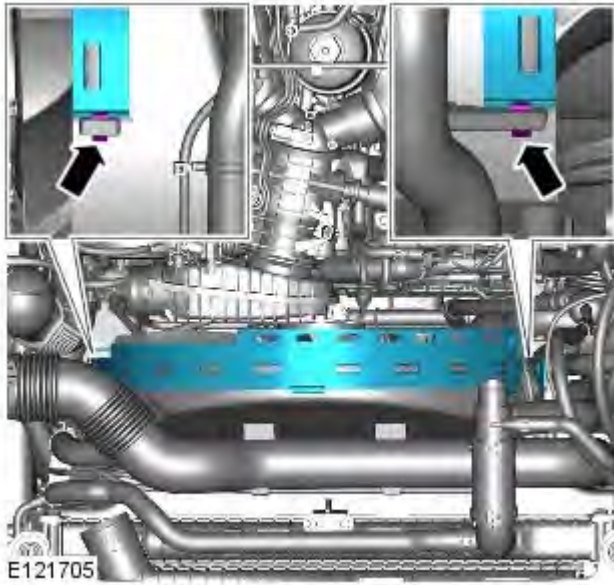
5.



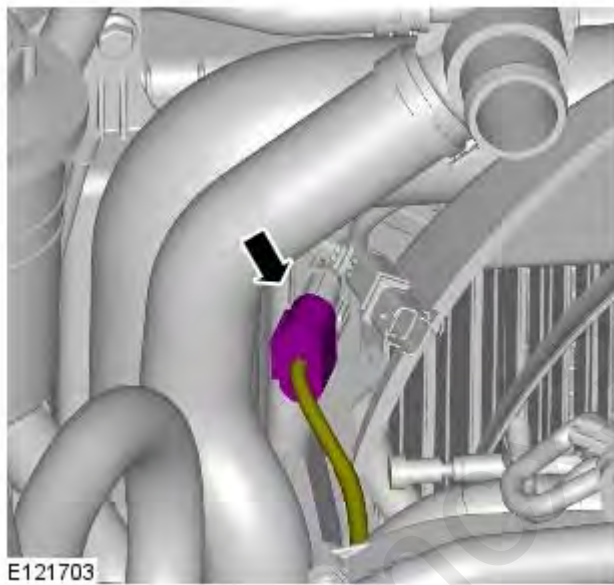
6. Torque: 3.5 Nm



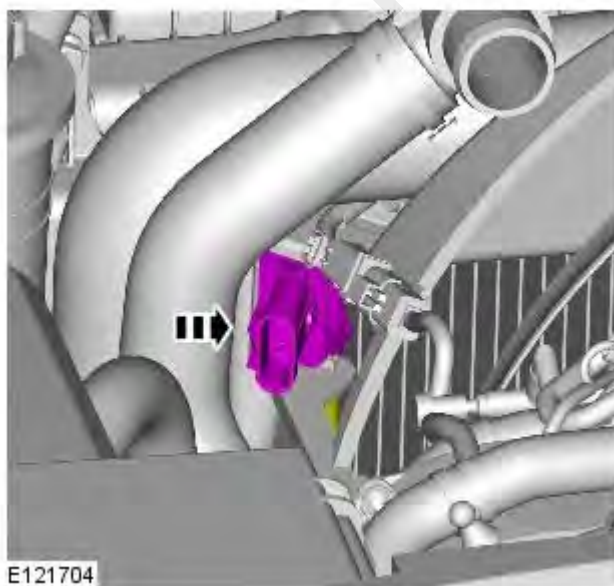
7.



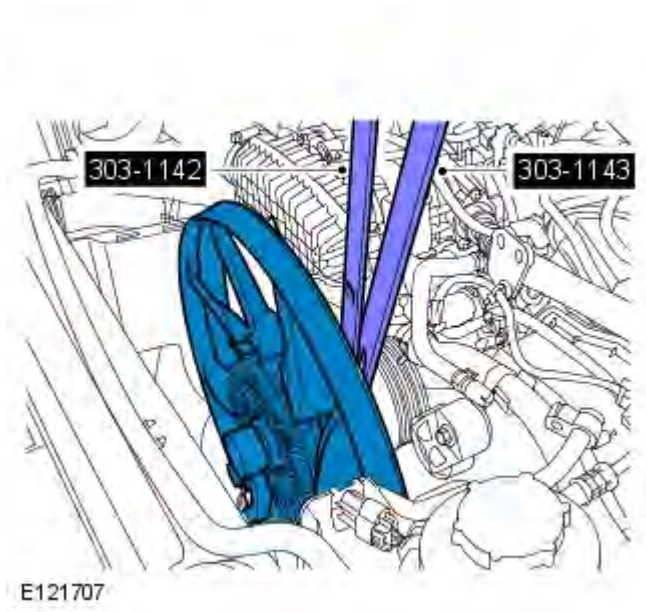
8.



9.



10.



11. **11.**  **CAUTION:** Always protect the cooling pack elements to prevent accidental damage.

- **NOTE:** The thread is left handed.

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

Special Tool(s): [303-1142](#), [303-1143](#)

Torque: 65 Nm

Installation

1. To install, reverse the removal procedure.

Engine Cooling - TDV6 3.0L Diesel - Cooling Fan Shroud

Removal and Installation

Removal

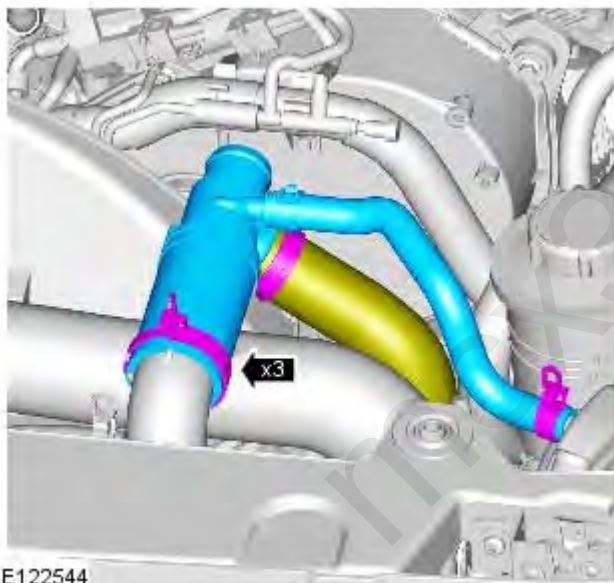
- NOTE: Removal steps in this procedure may contain installation details.

All vehicles

1.  **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

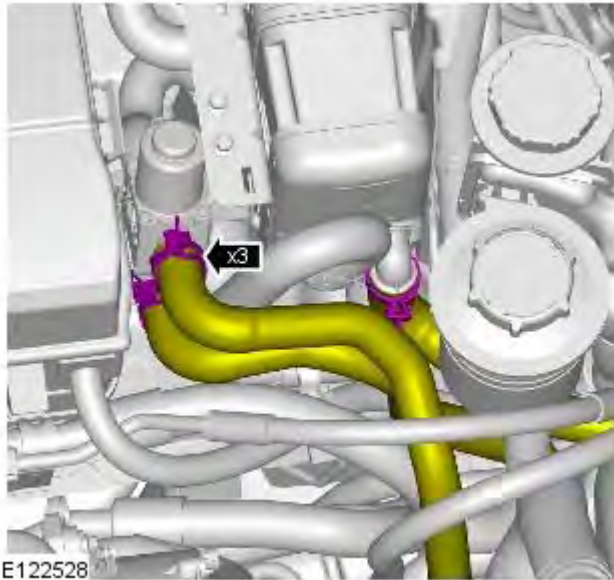
2. Refer to: [Cooling Fan](#) (303-03B Engine Cooling - TDV6 3.0L Diesel, Removal and Installation).
3. Refer to: [Turbocharger Bypass Valve](#) (303-04D Fuel Charging and Controls - Turbocharger - TDV6 3.0L Diesel, Removal and Installation).
4. Refer to: [Transmission Fluid Cooler - TDV6 3.0L Diesel](#) (307-02C Transmission/Transaxle Cooling - V8 5.0L Petrol/TDV6 3.0L Diesel, Removal and Installation).



E122544

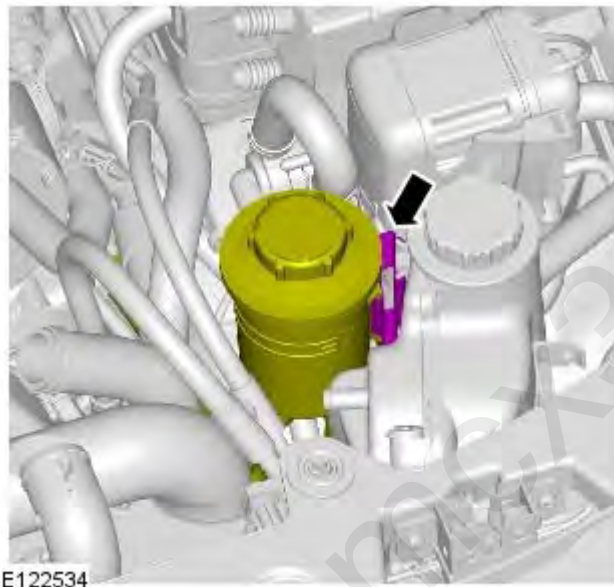
5.  **CAUTION:** Be prepared to collect escaping coolant.

Vehicles with fuel fired booster heater

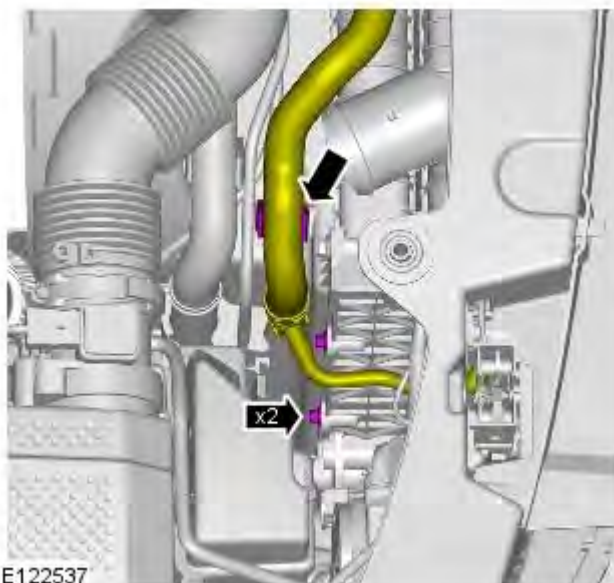


6.  **CAUTION:** Be prepared to collect escaping coolant.

All vehicles



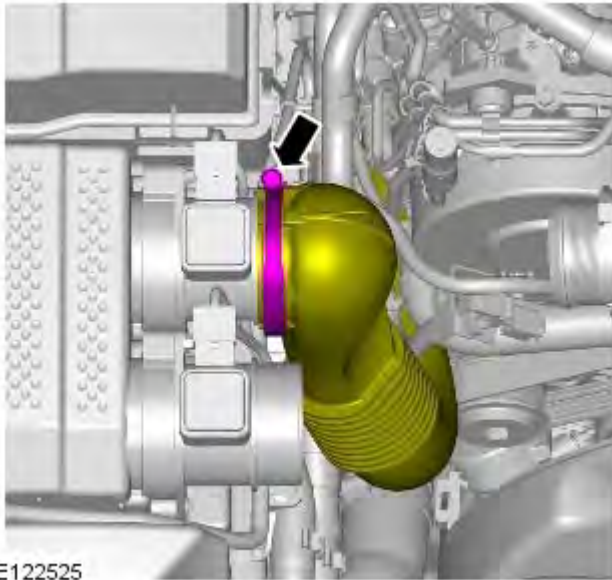
7. **NOTE:** Some variation in the illustrations may occur, but the essential information is always correct.



9. *Torque: 5 Nm*

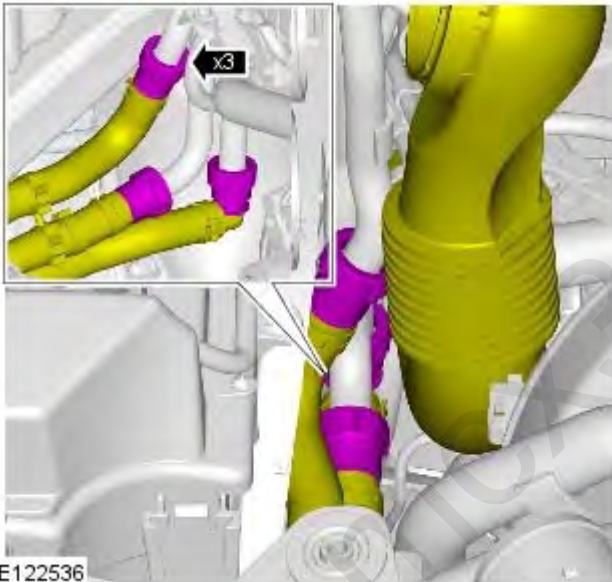
8.  **CAUTION:** Be prepared to collect escaping coolant.

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



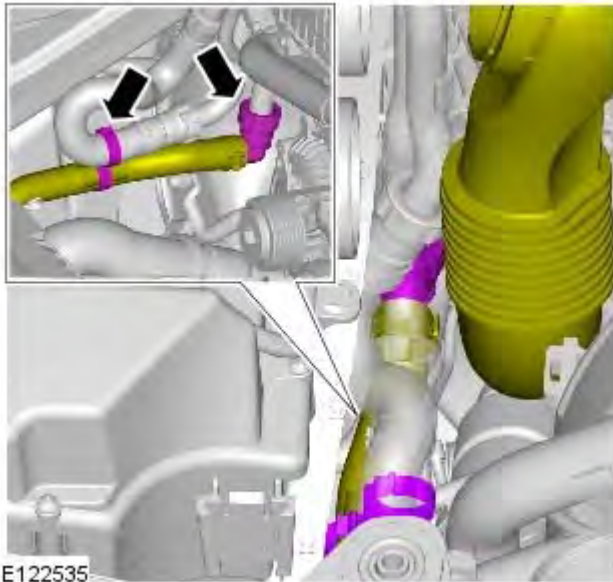
10. Torque: 3.5 Nm

Vehicles with fuel fired booster heater

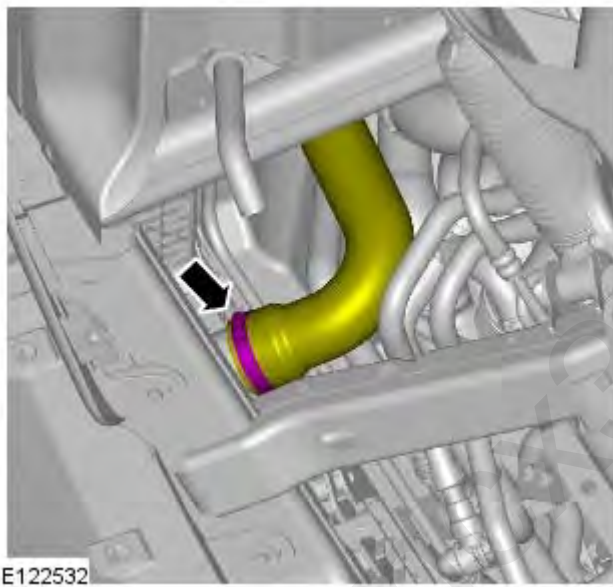


11. **11.**  CAUTION: Be prepared to collect escaping coolant.

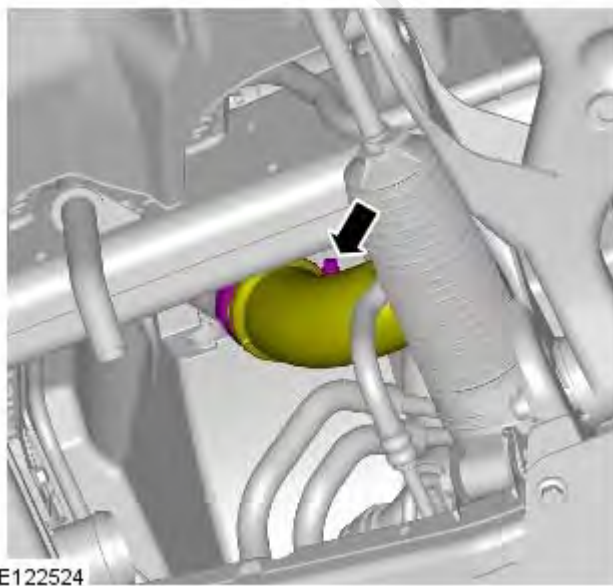
All vehicles



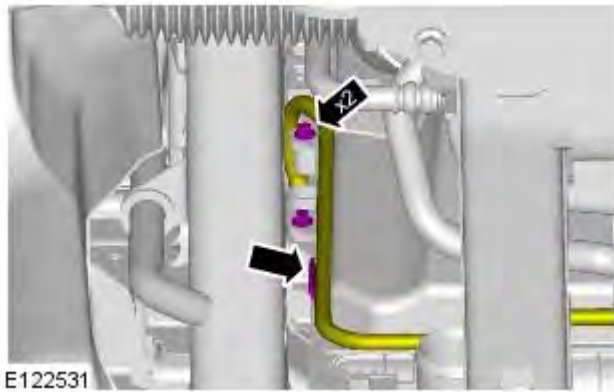
12. **12.**  CAUTION: Be prepared to collect escaping coolant.



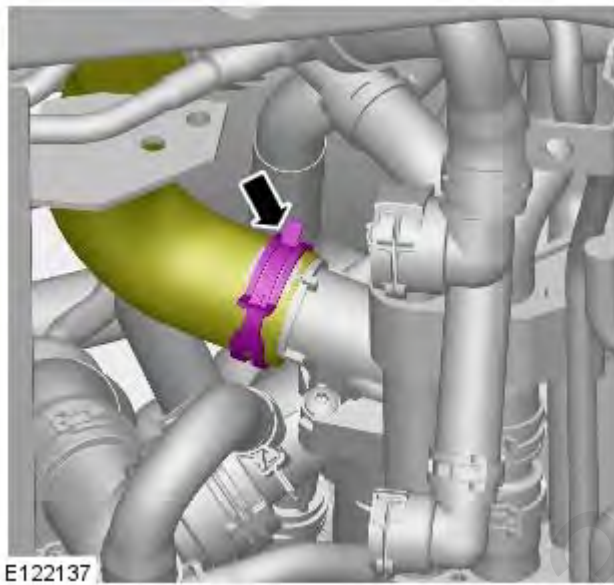
- 13.



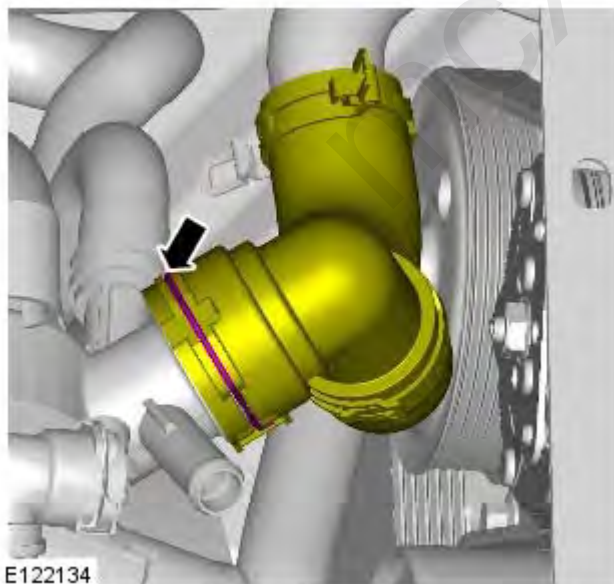
- 14.



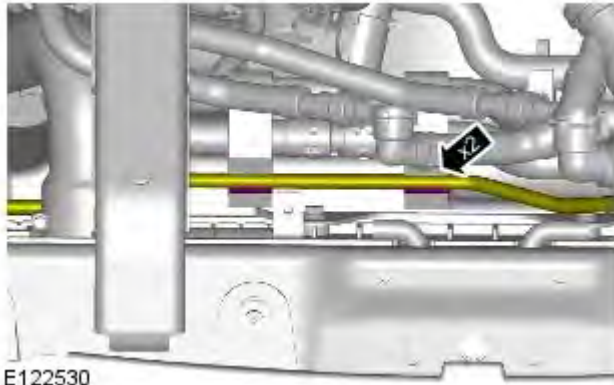
15. Torque: 5 Nm



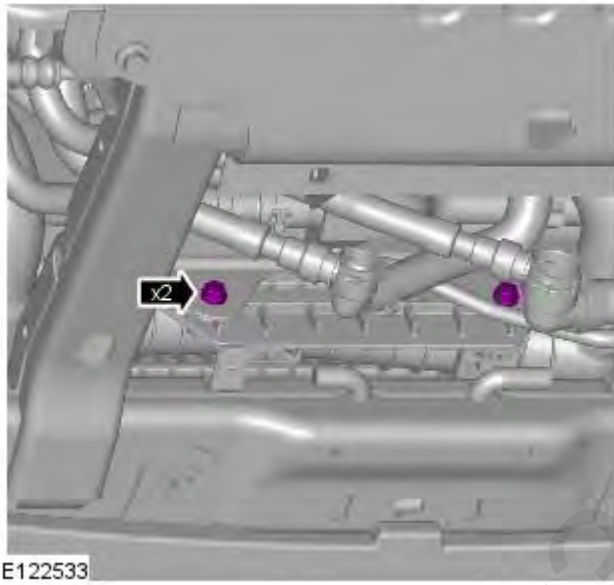
16. **16.**  **CAUTION:** Be prepared to collect escaping coolant.
- NOTE: Some variation in the illustrations may occur, but the essential information is always correct.



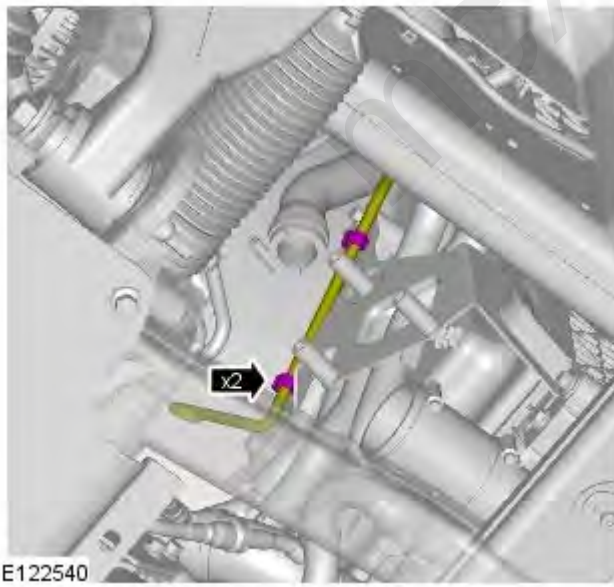
17. **17.**  **CAUTION:** Be prepared to collect escaping coolant.
- NOTE: Some variation in the illustrations may occur, but the essential information is always correct.



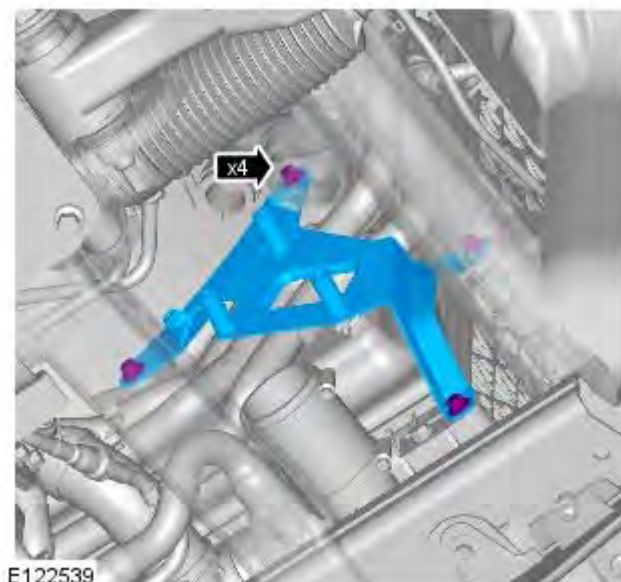
18.



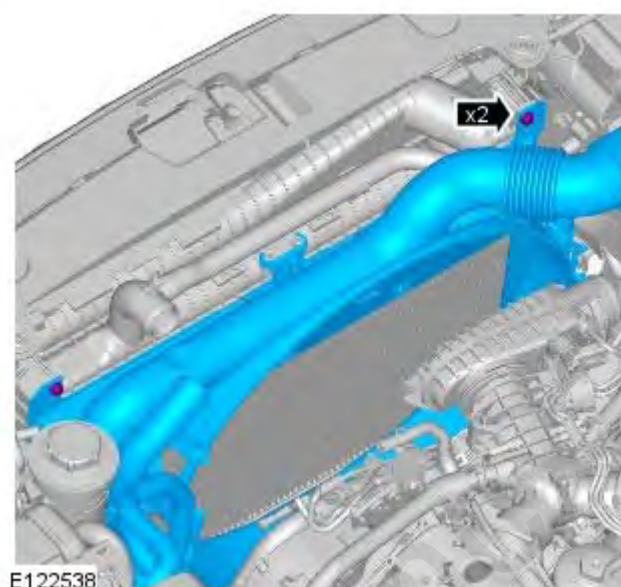
19. Torque: 15 Nm



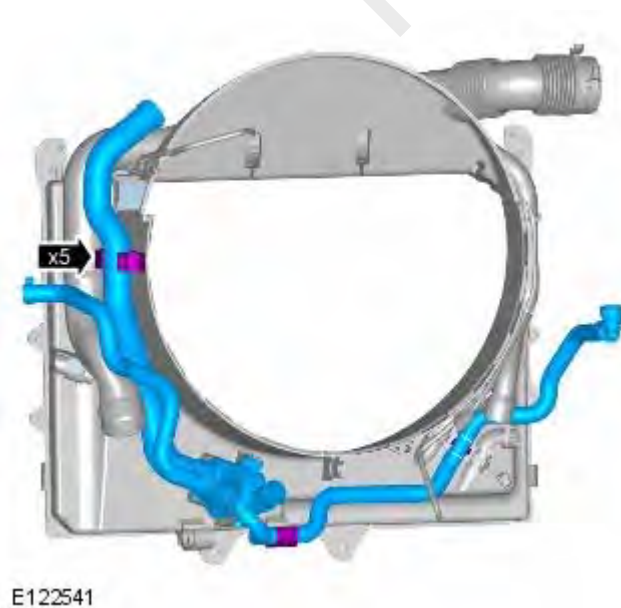
20.



21. Torque: 15 Nm

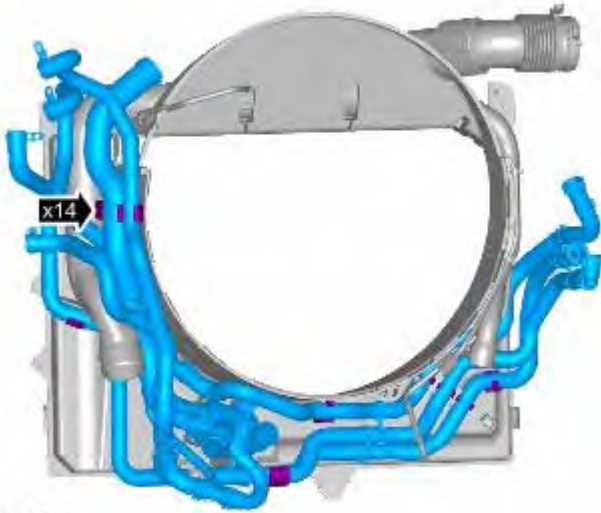


22. Torque: 15 Nm



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

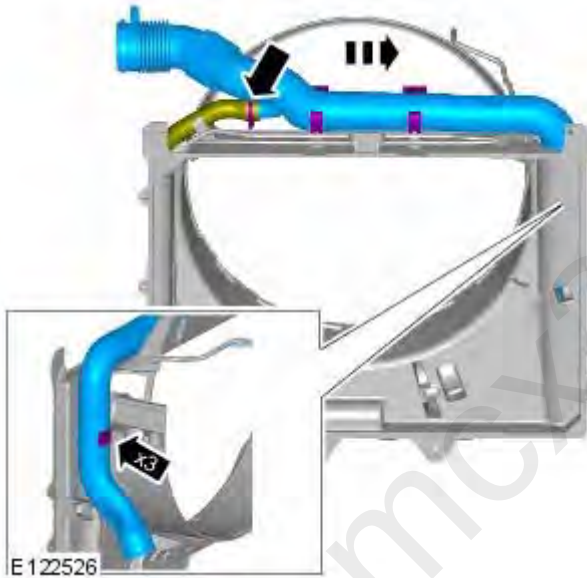
24.



E122542

All vehicles

25.



E 122526

Installation

26.

1. To install, reverse the removal procedure.



E122527

Engine Cooling - TDV6 3.0L Diesel - Radiator

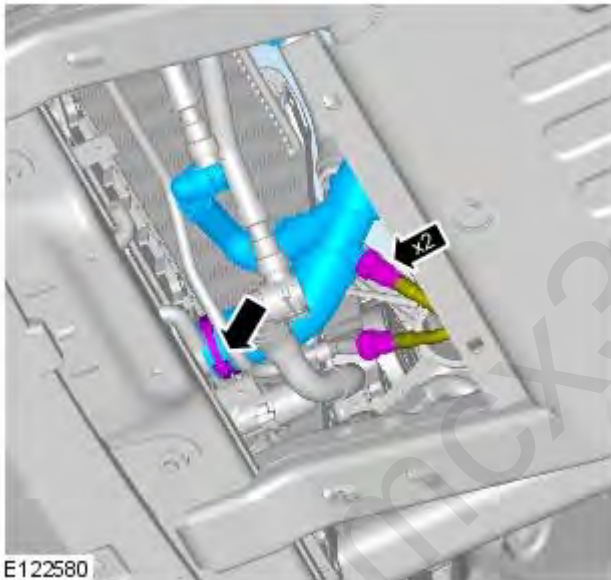
Removal and Installation

Removal

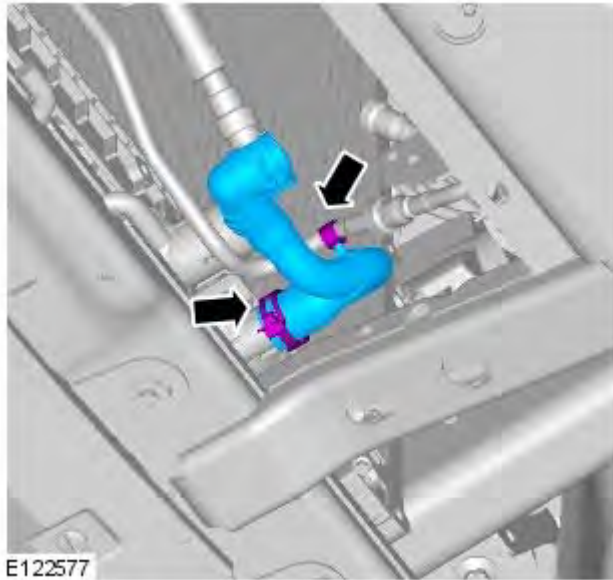
- NOTE: Removal steps in this procedure may contain installation details.

1.  **WARNING:** Make sure to support the vehicle with axle stands.

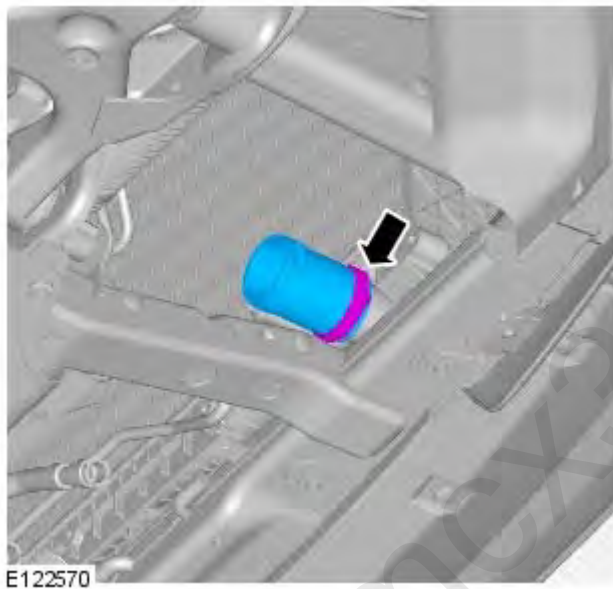
Raise and support the vehicle.
2. Refer to: [Air Conditioning \(A/C\) System Recovery, Evacuation and Charging](#) (412-00 Climate Control System - General Information, General Procedures).
3. Refer to: [Cooling Fan Shroud](#) (303-03B Engine Cooling - TDV6 3.0L Diesel, Removal and Installation).
4. Refer to: [Radiator Grille](#) (501-08 Exterior Trim and Ornamentation, Removal and Installation).



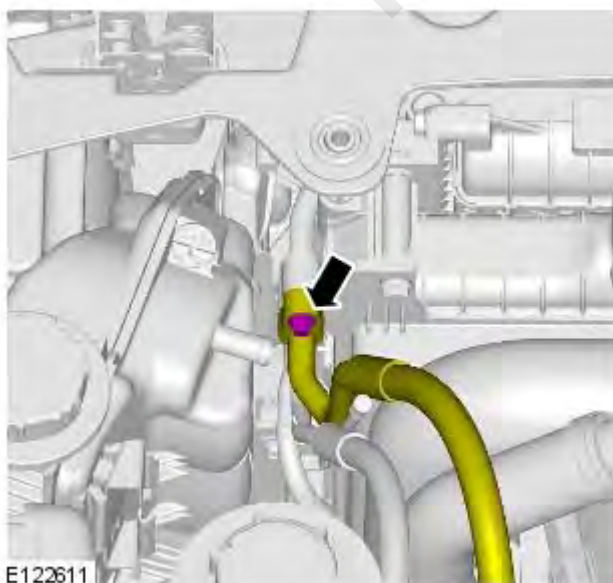
5.  **CAUTION:** Be prepared to collect escaping coolant.



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

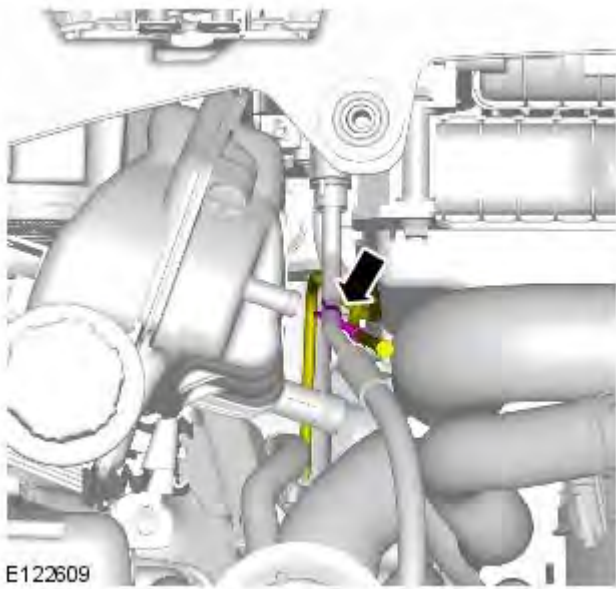


- 7.

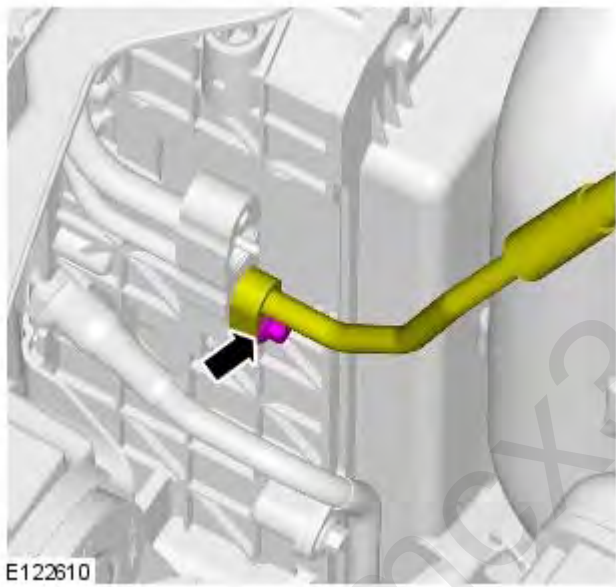


8. Torque: 6 Nm

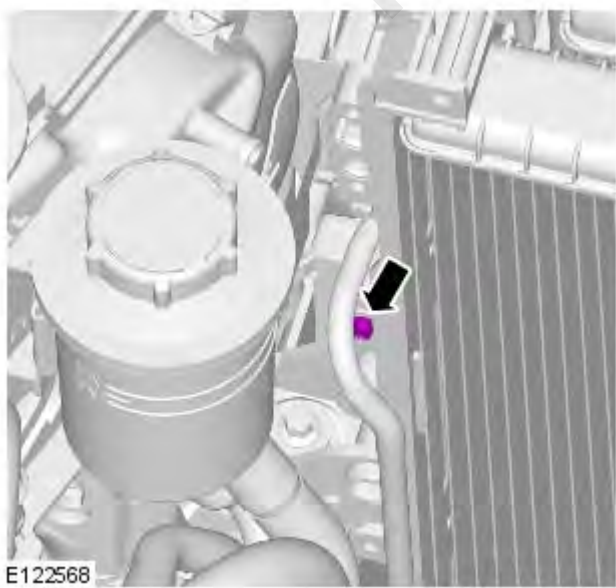
9.

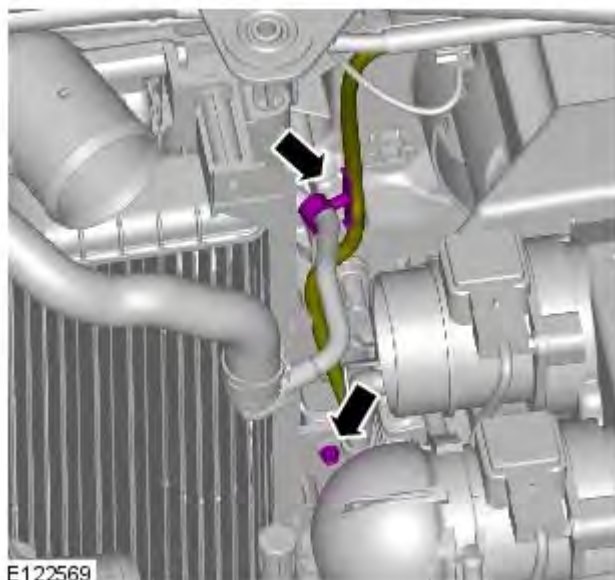


10. Torque: 6 Nm

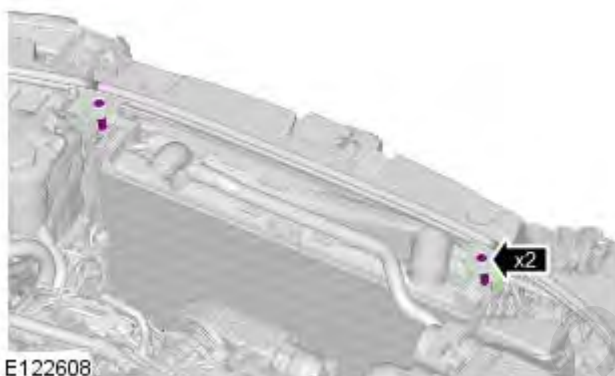


11. Torque: 5 Nm





12. Torque: 5 Nm



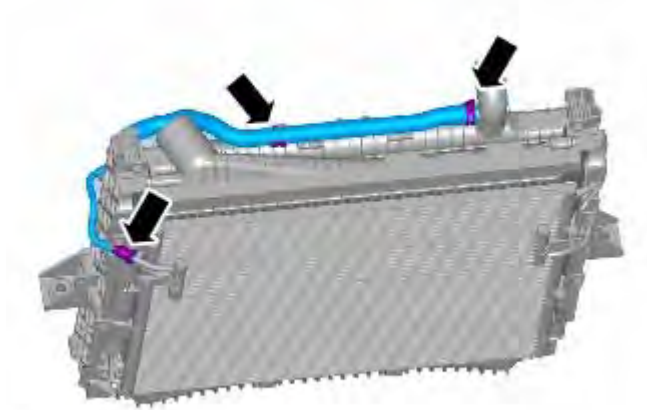
13.



14. **14.**  **CAUTION:** Always protect the cooling pack elements to prevent accidental damage.

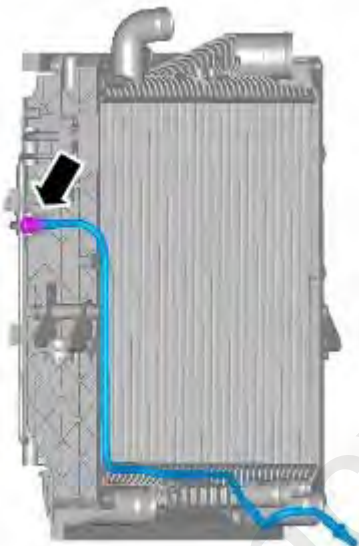
Torque: 25 Nm

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



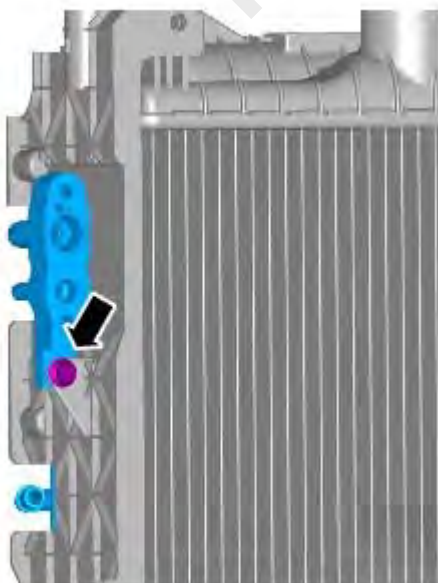
E122579

- 16.



E122578

17. Torque: 5 Nm



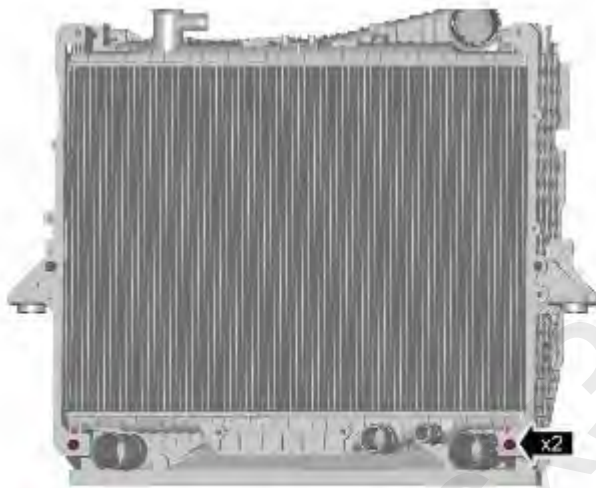
E122572

18. Torque: 5 Nm



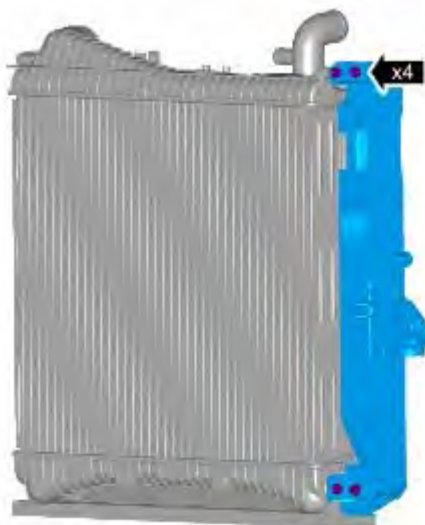
E122573

19. Torque: 15 Nm



E122575

20. Torque: 15 Nm



E122574

21. Torque: 15 Nm



E122576

Installation

1. To install, reverse the removal procedure.

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Engine Cooling - TDV6 3.0L Diesel - Thermostat

Removal and Installation

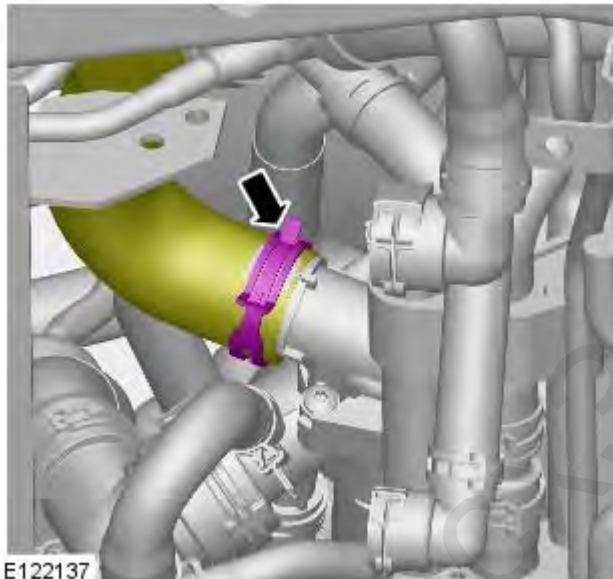
Removal

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

1.  **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

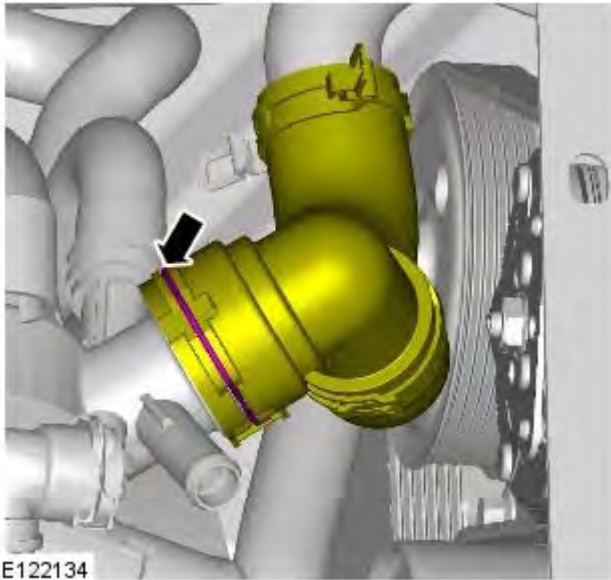
2. Refer to: [Cooling System Draining, Filling and Bleeding](#) (303-03B Engine Cooling - TDV6 3.0L Diesel, General Procedures).
3. Refer to: [Transmission Fluid Cooler - TDV6 3.0L Diesel](#) (307-02C Transmission/Transaxle Cooling - V8 5.0L Petrol/TDV6 3.0L Diesel, Removal and Installation).



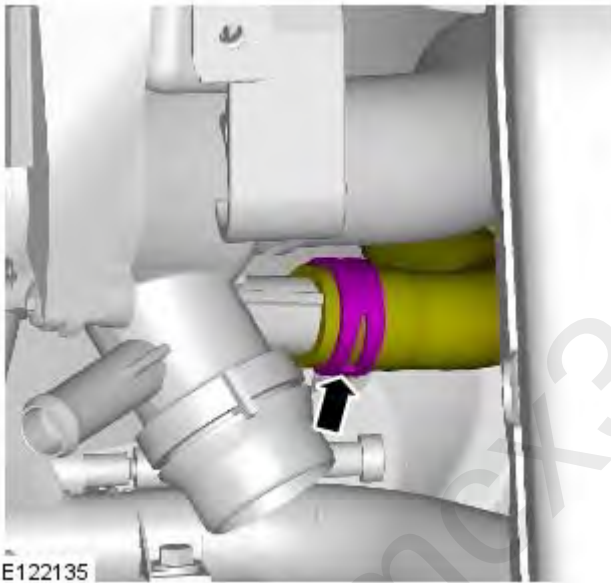
4.  **CAUTION:** Be prepared to collect escaping coolant.



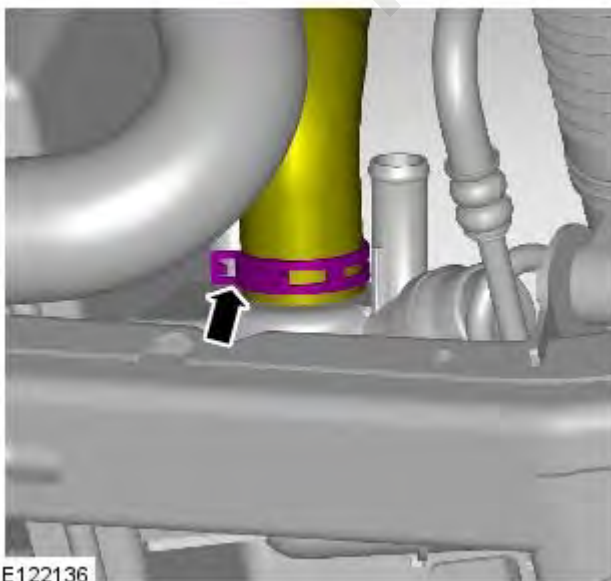
5.  **CAUTION:** Be prepared to collect escaping coolant.



6.  CAUTION: Be prepared to collect escaping coolant.

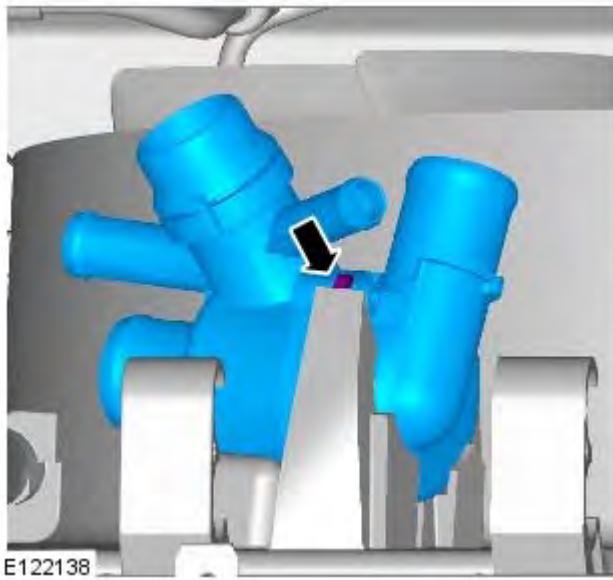


7.  CAUTION: Be prepared to collect escaping coolant.



8.  CAUTION: Be prepared to collect escaping coolant.

9.



10. Torque: 4 Nm



11. **11.**  CAUTION: Discard the seal.



Installation

1. To install, reverse the removal procedure.