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## ENGINE

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## 10.1 LUBRICATION SYSTEM

### 1 Warning and Precaution

#### 1.1 Warning

Be sure to observe the following instructions before repairing, to prevent property damage, personal injury or even death:

- (1) Prolonged and repeated contact with engine oil will result in the removal of natural oils from skin, leading to dryness, irritation and dermatitis. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer.
- (2) Wear protective clothing and gloves.
- (3) Wash your skin thoroughly with soap and water, or use waterless hand cleaner to remove any used engine oil.
- (4) Never use gasoline, thinners or solvents.
- (5) Before performing the operation. Wait for the engine to cool down completely.

#### 1.2 Precaution

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

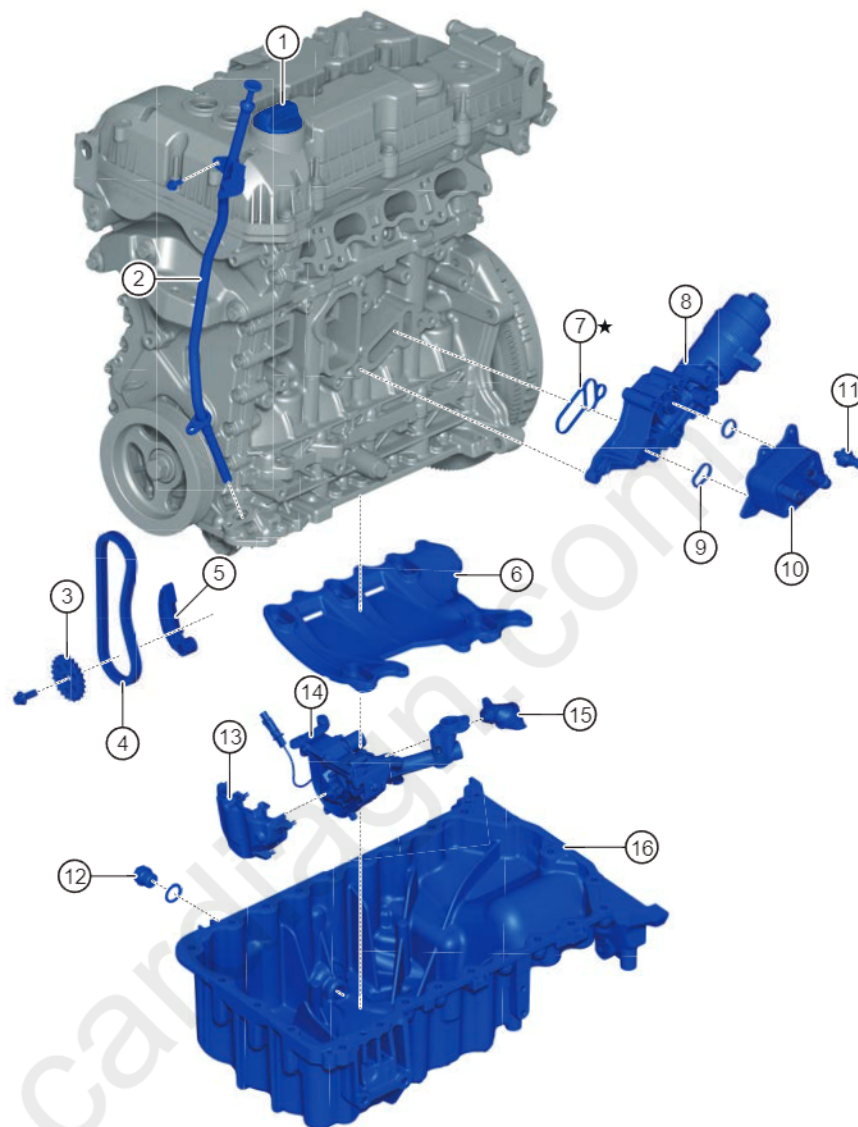
- (1) Wasted engine oil should be handled by specialized department according to local laws and regulations. Never discard it at will.
- (2) DO NOT use inferior engine oil.
- (3) DO NOT mix different types of engine oil.

### 2 System Overview

#### 2.1 System Description

When engine is operating, an oil pump driven by crankshaft, sucks oil from oil pan and pumps it at pressure through an oil filter. This filtered oil then flows through oil passages, to moving surfaces of all engine drive parts and forms oil films between moving surfaces to reduce friction and finally returns to the oil pan, thus reducing friction resistance between drive parts, power consumption and increasing reliability and durability of engine operation. Oil pump of SQR4J16 engine is installed in oil pan. Crankshaft transmits power to it through chain; Oil pump is a two-stage variable displacement pump, and its displacement is controlled by ECU through oil pressure regulating solenoid valve; Two-stage variable displacement oil pump lubrication system is composed of two-stage variable displacement oil pump, solenoid valve, variable displacement oil pump control module in vehicle ECU and feedback oil passage, etc.

## 2.2 System Components Diagram

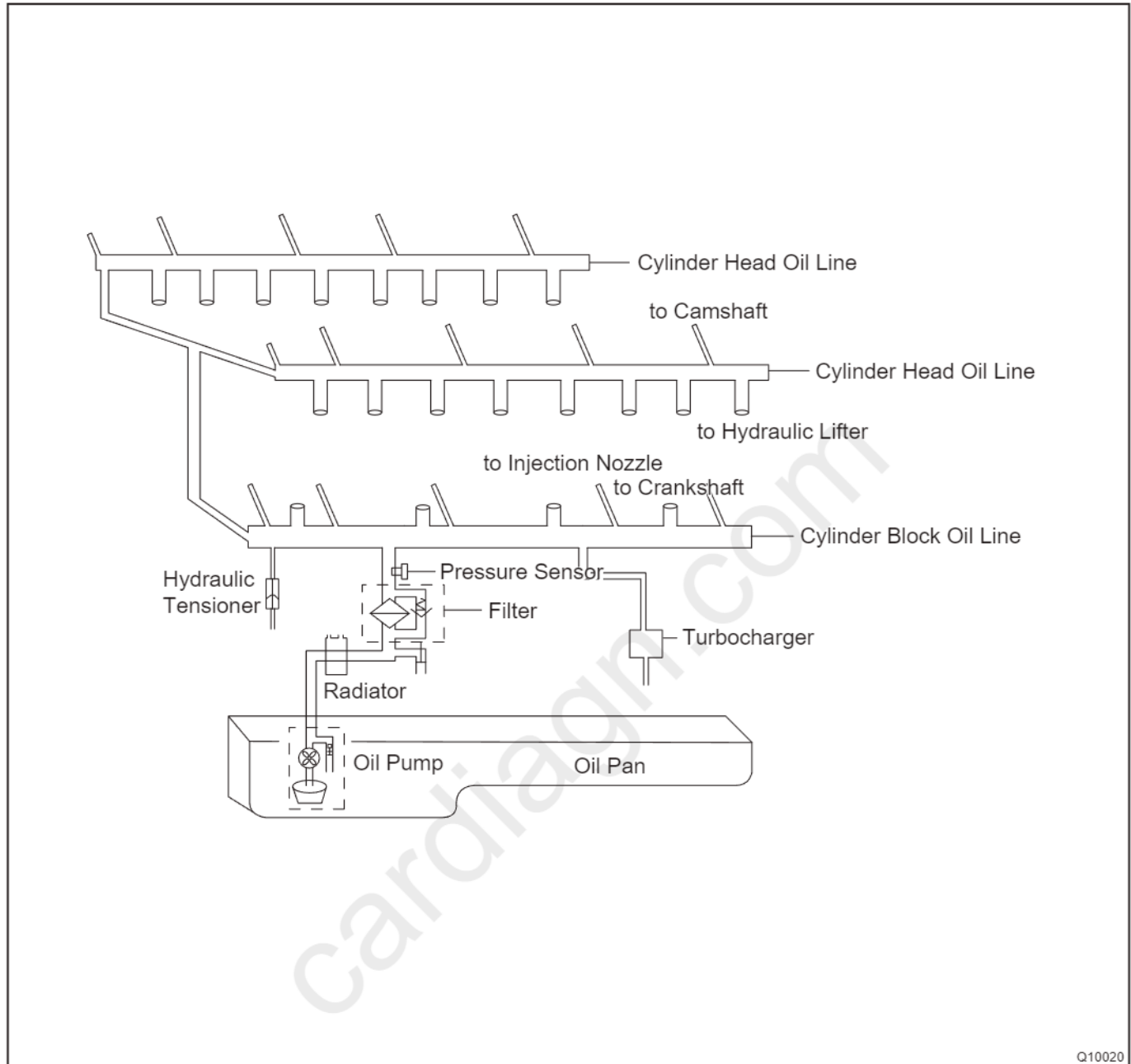


★: Indicates that it is a non-reusable part

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|   |                                      |    |                         |
|---|--------------------------------------|----|-------------------------|
| 1 | Oil Filler Cap                       | 9  | Oil Cooler Seal Ring    |
| 2 | Oil Dipstick Tube & Oil Dipstick     | 10 | Oil Cooler Assembly     |
| 3 | Oil Pump Sprocket                    | 11 | Oil Pressure Switch     |
| 4 | Oil Pump Chain                       | 12 | Drain Plug              |
| 5 | Movable Rail for Oil Pump Chain      | 13 | Oil Pump Sprocket Cover |
| 6 | Oil Deflector                        | 14 | Oil Pump Assembly       |
| 7 | Oil Filter Module Assembly Seal Ring | 15 | Oil Collector           |
| 8 | Oil Filter Module Assembly           | 16 | Oil Pan Assembly        |

### 2.3 System Schematic Diagram



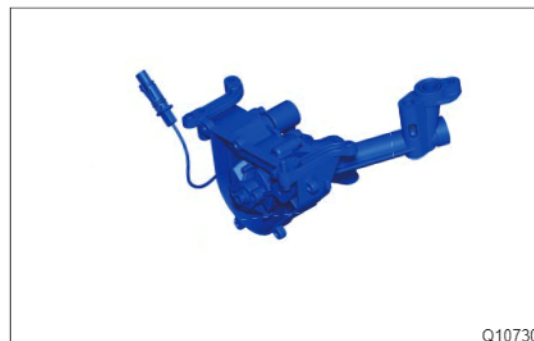
Crankshaft drives oil pump to suck oil from oil pan. The oil is filtered by oil filter and delivered to crankshaft connecting rod mechanism and cam valve mechanism, including some accessories such as turbocharger through main oil passage.

### 3 Component Operation Description

#### 3.1 Oil Pump Assembly

##### ■ Main Function

Oil pump of SQR4J16 engine is installed in oil pan. Crankshaft transmits power to it through chain. Oil pump is a two-stage variable displacement pump, and its displacement is controlled by ECU through oil pressure regulating solenoid valve. Oil pump adopts vane type variable displacement structure, and main structure is stator and rotor; There are two oil pressure chambers on the outer ring of stator to apply pressure control to the stator, so that it can deflect clockwise or counterclockwise around the fulcrum, changing the eccentricity ratio of vane pump and adjusting displacement.



Q10730

#### 3.2 Oil Cooler Assembly

##### ■ Main Function

Oil cooler is on the circulation oil passage of lubrication system. During engine running, as oil viscosity becomes lean with temperature increasing, lubricating ability is reduced. Oil cooler is used to cool the lubricant, keep the oil temperature within normal operating range, reduce oil temperature and maintain a certain viscosity of lubricant.



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#### 3.3 Oil Pressure Switch

##### ■ Main Function

Oil pressure switch is installed on the main oil passage of engine block and used to detect the value of engine oil pressure. When the value is lower than the specified value, oil pressure warning light is turned on.



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3.4 Oil Filter

■ Main Function

It is used to filter impurities in oil to protect the engine.



3.5 Oil Collector

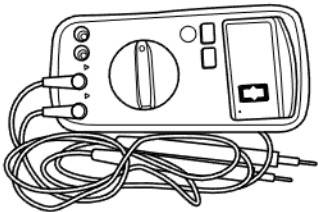
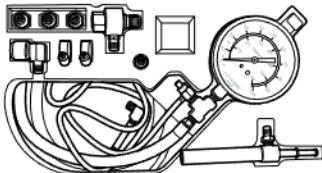
■ Main Function

In order to make oil pump work well, filter large particle impurities in lubricant before entering oil pump.



4 Special Tool and Equipment

4.1 General Tool

| Tool Name           | Tool Drawing                                                                                       |
|---------------------|----------------------------------------------------------------------------------------------------|
| Digital Multimeter  |  <p>S00002</p> |
| Oil Pressure Tester |  <p>S00035</p> |

## 4.2 Special Tool

| Tool Name       | Part No. | Tool Drawing                                                                                  |
|-----------------|----------|-----------------------------------------------------------------------------------------------|
| Oil Pan Remover | EPT-0016 | <br>S00160 |

## 5 Fasteners Torque List

### 5.1 Torque Specifications

| Item                                   | Torque                            |
|----------------------------------------|-----------------------------------|
| Drain Plug                             | $35 \pm 3 \text{ N}\cdot\text{m}$ |
| Oil Filter Cover                       | $20 + 5 \text{ N}\cdot\text{m}$   |
| Oil Pressure Switch                    | $12 - 15 \text{ N}\cdot\text{m}$  |
| Oil Pan Fixing Bolt                    | $8 + 3 \text{ N}\cdot\text{m}$    |
| Oil Deflector Fixing Bolt              | $8 + 3 \text{ N}\cdot\text{m}$    |
| Oil Collector Fixing Bolt              | $8 + 3 \text{ N}\cdot\text{m}$    |
| Oil Filter Module Assembly Fixing Bolt | $20 + 5 \text{ N}\cdot\text{m}$   |
| Oil Pump Assembly Fixing Bolt          | $8 + 3 \text{ N}\cdot\text{m}$    |
| Oil Dipstick Tube Fixing Bolt          | $8 + 3 \text{ N}\cdot\text{m}$    |

## 6 DIAGNOSIS & TESTING

### 6.1 Problem Symptoms Table

**Hint:**

Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.  
Lubrication System

| Symptom                             | Possible Cause                       |
|-------------------------------------|--------------------------------------|
| Low pressure in lubrication system  | Oil pan (dirty, leaky)               |
|                                     | Oil collector (mesh dirty, blocked)  |
|                                     | Spark plug                           |
|                                     | Line blocked                         |
| High pressure in lubrication system | Oil with high viscosity              |
|                                     | Oil passage blocked                  |
|                                     | Oil pump (non-variable displacement) |

| Symptom                             | Possible Cause                                                                                                          |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Mix oil with water                  | Oil filter module assembly internal leakage                                                                             |
|                                     | Cylinder head gasket improperly sealed                                                                                  |
|                                     | Cylinder block cracks                                                                                                   |
| High oil consumption                | Engine oil (excessive filling capacity)                                                                                 |
|                                     | Oil filter module assembly (leaky)                                                                                      |
|                                     | Crankshaft front oil seal (damaged)                                                                                     |
|                                     | Crankshaft rear oil seal (damaged)                                                                                      |
|                                     | Oil pressure switch (leaky)                                                                                             |
|                                     | Oil drain plug (leaky)                                                                                                  |
|                                     | Oil pan (leaked)                                                                                                        |
|                                     | Cylinder head gasket (damaged)                                                                                          |
|                                     | Piston ring (damaged)                                                                                                   |
|                                     | Each engine seal surface leakage                                                                                        |
| Oil pressure warning light comes on | Engine oil (insufficient oil, low oil viscosity)                                                                        |
|                                     | Oil filter element (blocked)                                                                                            |
|                                     | Oil strainer (blocked)                                                                                                  |
|                                     | Crankshaft front oil seal (damaged)                                                                                     |
|                                     | Crankshaft rear oil seal (damaged)                                                                                      |
|                                     | Oil pressure switch (damaged)                                                                                           |
|                                     | Instrument cluster (oil pressure warning light)                                                                         |
|                                     | Cylinder block (cracks occur in water jacket, resulting in coolant leaking into oil pan, which will cause oil dilution) |
|                                     | Line (blocked)                                                                                                          |

## 6.2 Lubrication Areas on Engine

| No. | Lubrication Area                                              | Lubricant Type          | Note                         |
|-----|---------------------------------------------------------------|-------------------------|------------------------------|
| 1   | Oil Collector O-ring                                          | Same type as engine oil | /                            |
| 2   | Oil Filter Cover O-ring                                       | Same type as engine oil | Operation during maintenance |
| 3   | 2 O-rings on Element Assembly and By-pass Valve Mounting Hole | Same type as engine oil | Operation during maintenance |
| 4   | Dipstick Tube O-ring                                          | Same type as engine oil | /                            |
| 5   | Dipstick Handle O-ring                                        | Same type as engine oil | /                            |

| No. | Lubrication Area                               | Lubricant Type          | Note                 |
|-----|------------------------------------------------|-------------------------|----------------------|
| 6   | Oil Pump Rotor Cavity                          | Same type as engine oil | 5 mL is recommended  |
| 7   | Oil Filter Module Inlet Port of Cylinder Block | Same type as engine oil | 50 mL is recommended |

## 7 ON-VEHICLE SERVICE

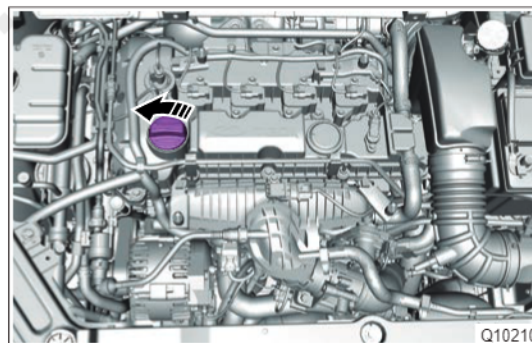
### 7.1 Engine Oil Draining, Adding and Inspection

#### ■ Engine Oil Draining

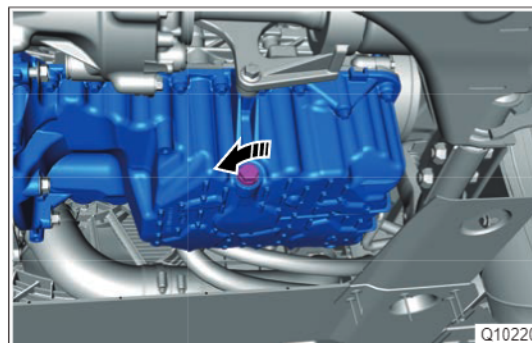
#### Warning

- Wait for the engine cool down completely before operation.
- Prolonged and repeated contact with engine oil will result in the removal of natural oils from skin, leading to dryness, irritation and dermatitis. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service. Be sure to take appropriate skin protection measures.

- (1) Connect the battery tester to battery.
- (2) Disconnect the negative battery cable.
- (3) Remove the engine compartment trim cover assembly.
- (4) Turn the oil filler door counterclockwise to open.



- (5) Raise the vehicle to a proper position.
- (6) Remove drain plug and drain the oil into a container.



**⚠ Caution**

- Apply a certain pushing force to drain plug while loosening the plug by hand, and have the drain plug attached to thread tightly to prevent oil from overflowing in advance. Move away your hand quickly to prevent burn by oil with a certain temperature.
- Wasted engine oil should be handled by specialized department according to local laws and regulations. Never discard it at will.

(7) Wipe off the drain plug and tighten it.

**Torque:  $35 \pm 3 \text{ N}\cdot\text{m}$**

**⚠ Caution**

- The drain plug gasket must be replaced each time the drain plug is removed.

**■ Engine Oil Adding****⚠ Caution**

- **DO NOT** use inferior engine oil.
- **DO NOT** mix different types of engine oil.
- **Be careful not to spill engine oil on any part of the engine when adding engine oil.**

(1) It is recommended to add lubricant to upper center of dipstick, there are several situations:

|                   | Engine Status                                                                                                   | Recommended Value                |
|-------------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------|
| Charging Capacity | Status without oil (apply to the first adding after assembling such as engine production and major maintenance) | $4.8 \pm 0.2$                    |
|                   | Replace oil filter assembly and lubricant at same time                                                          | $4.3 \pm 0.2$                    |
|                   | Do not replace oil filter assembly, only replace lubricant                                                      | $4.0 \pm 0.2$                    |
| Oil Type          | Ambient temperature is not less than $-30^{\circ}\text{C}$                                                      | SM 5W-30 or 0W-30 above SM grade |
|                   | Ambient temperature is less than $-30^{\circ}\text{C}$                                                          | 0W-30 above SM grade             |

(2) Start engine, and check the vehicle for leakage after replacing oil.

**■ Inspection Method of Lubricant Level**

- (1) Park the vehicle in a relatively horizontal position.
- (2) Keep engine running at least 2 minutes and leave is stopped for 3 ~ 5 minutes.
- (3) Pull out the dipstick, wipe off the measurement part and insert it into dipstick tube, then leave it for 3 ~ 5 s.
- (4) Pull out the dipstick steady and place the measurement part horizontally. Visually check that oil level of measurement part is within upper mark and lower mark, it indicates oil level is normal.

### ⚠ Caution

- Do not start the engine during the measurement.

## 7.2 Oil Filter

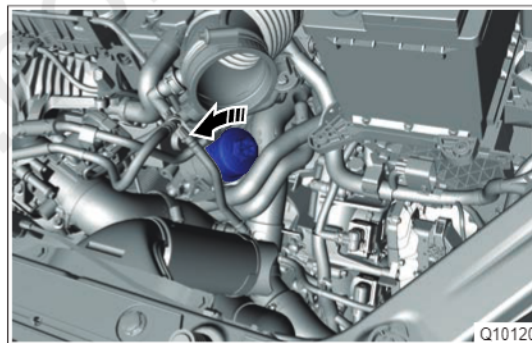
### ■ Removal

### ⚠ Warning

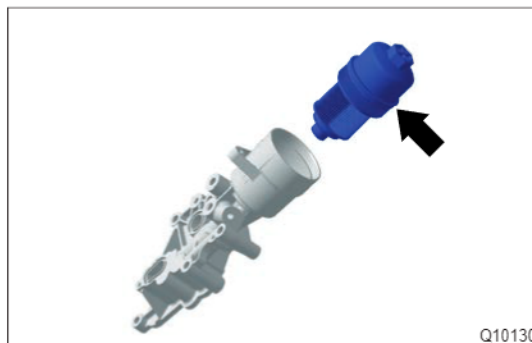
- **DO NOT** remove oil filter until engine cools down, avoiding being burned by high temperature lubricant and parts.
- **Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.**

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the air filter assembly.
- (4) Drain engine oil.

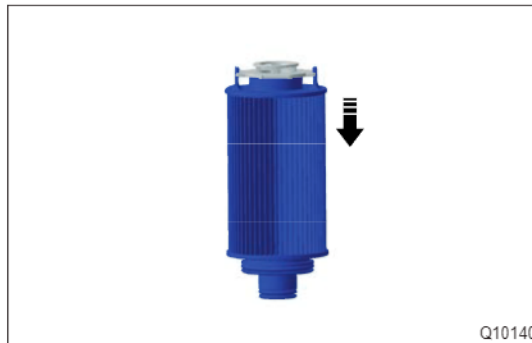
- (5) Using special tool, loosen oil filter by-pass valve and filter cover assembly until O-ring is exposed from mounting port edge of oil filter module for 2 - 3 mm (- approximately loosen 4 turns), leave it for 2 - 3 minutes and wait for used oil in element assembly flows back to crankcase.



- (6) Continue to loosen the oil filter by-pass valve and filter cover assembly until it is removed completely.



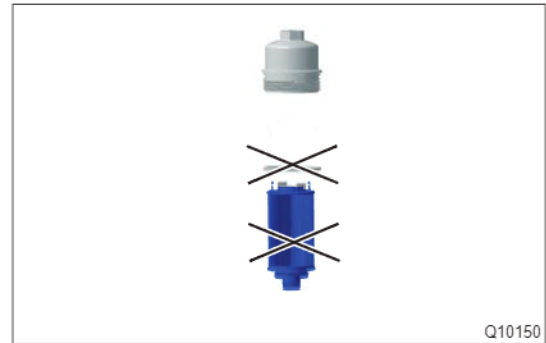
- (7) Pull out the element assembly from the clip in oil filter by-pass valve and filter cover assembly firmly in direction of arrow.



- (8) Remove oil filter cover O-ring from oil filter cover assembly, dispose of used oil filter cover O-ring and element assembly in an environmentally friendly way.

**Hint:**

Oil filter cover O-ring should be replaced during normal maintenance.

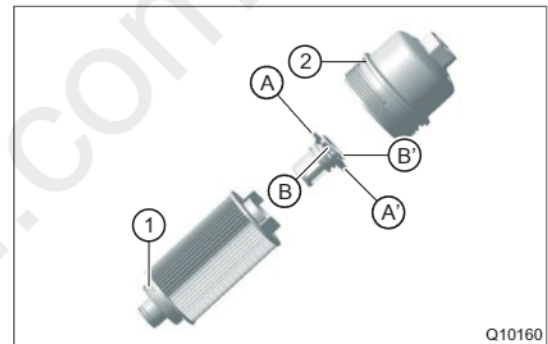


## ■ Installation

### ⚠ Caution

- **Check oil filter seal ring for defect or foreign matter. When assembling, seal ring needs to be lubricated.**

- (1) Evenly apply a circle of lubricant with small amount to 2 O-rings (1) and (2) and oil filter cover O-ring of new element assembly. Clamp 2 buckles into by-pass valve clip of oil filter by-pass valve and filter cover assembly, 2 opposite sides A-A, B-B can be selected at will.



- (2) Before installing new element assembly, it is necessary to check four clips side C and D of by-pass valve in oil filter by-pass valve and filter cover assembly for damage. If there is damage, clip on this side can not be reused, clip on another opposite side should be selected. If clips on both opposite sides are damaged, oil filter by-pass valve and filter cover assembly should be replaced with a new one.



- (3) Apply lubricant to new oil filter cover O-ring, and then put it in the seal ring groove of oil filter by-pass valve and filter cover assembly. Screw the oil filter by-pass valve and filter cover assembly, element assembly and element cover O-ring set in oil filter module assembly in the opposite direction of removal, and tighten them in place with special wrench tool.



- (4) Add engine oil, start the engine and check oil filter cover for oil leakage.

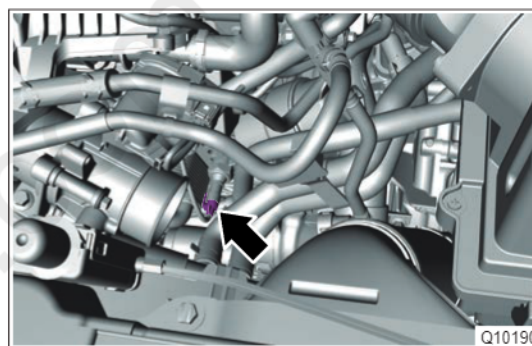
### 7.3 Oil Pressure Switch

#### ■ Removal

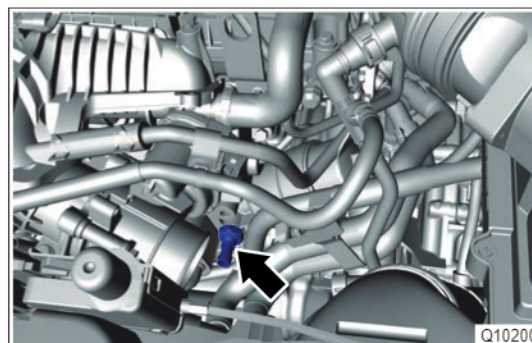
##### Caution

- **DO NOT** remove oil pressure switch until engine cools down, avoiding being burnt by high temperature lubricant and parts.
- Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Remove the engine compartment trim cover.
- (3) Disconnect the negative battery cable.
- (4) Disconnect the connection between intercooler outlet pipe assembly II and electronic throttle.
- (5) Disconnect the oil pressure switch connector.



- (6) Remove the oil pressure switch.

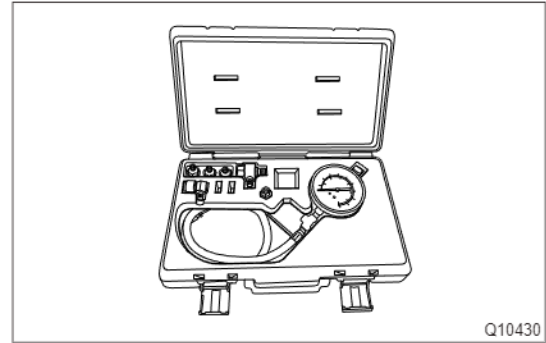


#### ■ Inspection

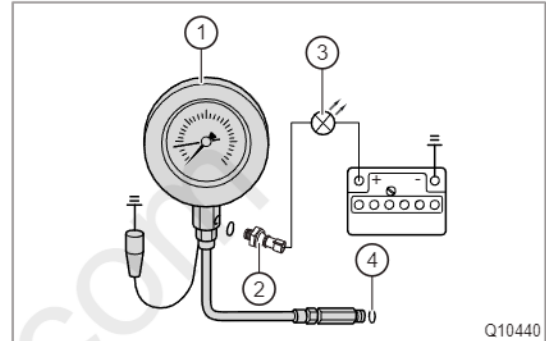
##### Caution

- Before inspecting oil pressure switch, please make sure that oil level is proper and coolant temperature is above 90°C, and that oil filter is used within 5000 Km.

- (1) Use an oil pressure gauge as shown in the illustration.



- (2) Install the oil pressure gauge into the threaded hole (4) of oil pressure switch as shown in the illustration.
- (3) Install the oil pressure switch (2) to the gauge (1), and connect the LED light (3).
- (4) When engine is not started, observe the pressure reading on gauge. Oil pressure alarm value is 30 - 50 kPa.



### ■ Installation

#### ⚠ Caution

- Apply seal gum (Loctite 577) to threads when assembling oil pressure switch.

- (1) Install the oil pressure switch.

**Torque: 12 - 15 N·m**

- (2) Connect the oil pressure switch connector.

- (3) Connect intercooler outlet pipe assembly II to electronic throttle and tighten worm clamp.

## 7.4 Oil Filter Module Assembly

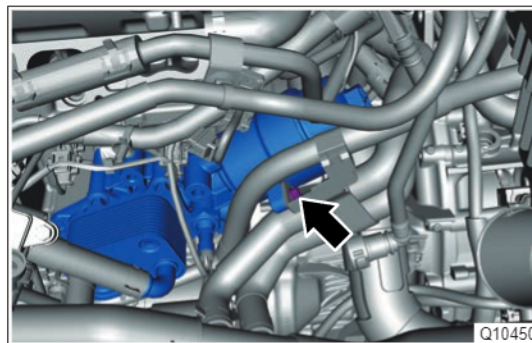
### ■ Removal

#### ⚠ Warning

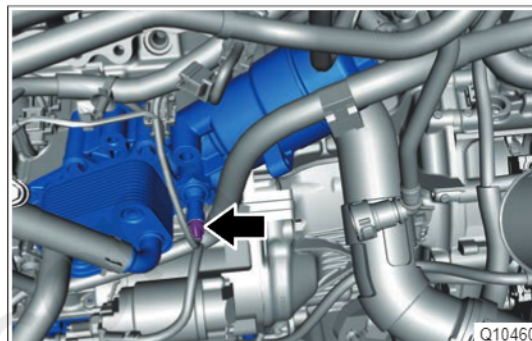
- **DO NOT** drain oil and remove oil pan until engine cools down.
- Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the engine trim cover assembly.
- (4) Remove the air filter assembly.
- (5) Remove the intake manifold assembly.
- (6) Drain the engine oil.
- (7) Drain the coolant.

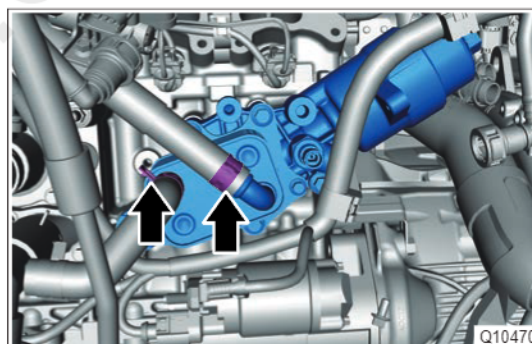
(8) Remove 1 fixing bolt from wire harness bracket.



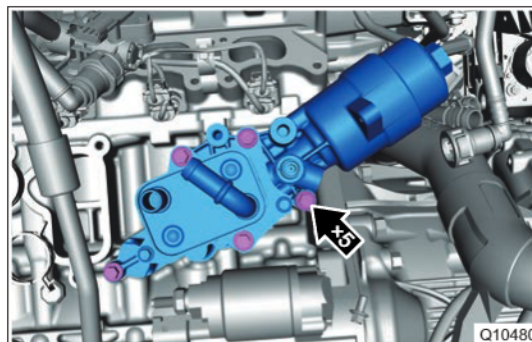
(9) Disconnect the oil pressure switch connector.



(10) Loosen elastic clamp and disconnect connection between cooling pipe and oil filter module assembly.



(11) Remove 5 fixing bolts from oil filter module assembly.



(12) Remove the oil filter module assembly.

#### ■ Installation

##### ⚠ Caution

- Clean installation surface of oil filter module assembly.
- Seal ring is a disposable part, it needs to be replaced.

- (1) Install 5 fixing bolts to oil filter module assembly.

**Torque: 20 N·m + 5°**

- (2) Connect cooling pipe to oil filter module assembly.
- (3) Connect the oil pressure switch connector.
- (4) Install 1 fixing bolt to wire harness bracket.
- (5) Install the intake manifold assembly.
- (6) Install the air filter assembly.
- (7) Add engine oil.
- (8) Add the coolant.
- (9) Install the engine trim cover assembly.

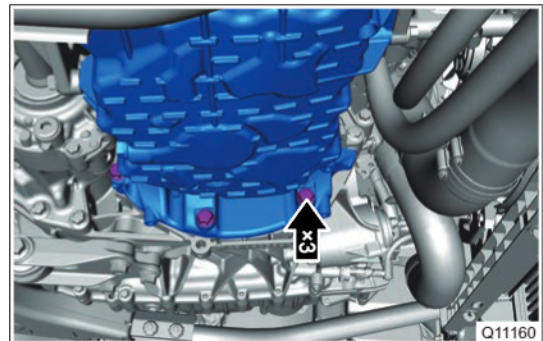
## 7.5 Oil Pan Assembly

### ■ Removal

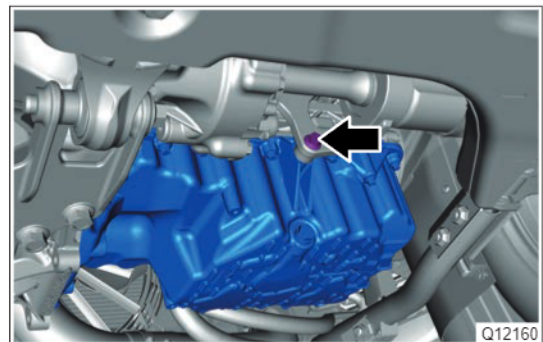
#### Warning

- **DO NOT drain oil and remove oil pan until engine cools down.**
- **Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.**

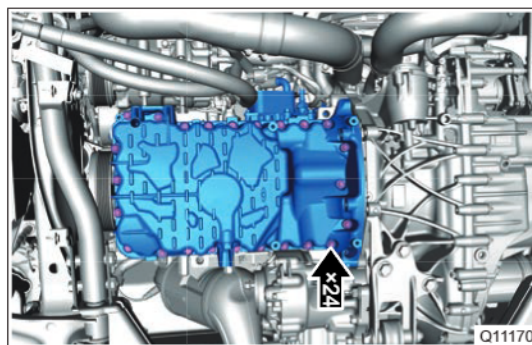
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Drain engine oil.
- (4) Remove the engine compartment lower protector assembly.
- (5) Remove the engine accessory belt.
- (6) Remove fixing bolts from the compressor assembly, and move compressor assembly to a proper position.
- (7) Remove 3 fixing bolts between oil pan and transmission assembly.



- (8) Remove 1 fixing bolt from oil pan and drive shaft bracket.



(9) Remove 24 fixing bolts from oil pan.



(10) Clamp the oil pan special tool into joint, and tap all around oil pan slightly with a rubber hammer to remove oil pan assembly.

#### Caution

- Because the seal gum is sealed between oil pan and cylinder block, never use hard objects, such as a hammer, to tap it during removal, but it can be tapped slowly from left and right with a rubber hammer.
- A transmission carrier can be used to support the oil pan during removal, to prevent personal injury from sudden dropping of oil pan.
- DO NOT damage or miss dowel pin when removing oil pan.

(11) Remove the residual seal gum on oil pan and engine frame with flat scraper.

#### Caution

- Remove residue of seal gum on installation surface between oil pan and engine frame. Threaded hole can be cleaned with cleaner properly.

#### ■ Inspection

- (1) Check the appearance of oil pan assembly for damage.
- (2) Check if the oil pan installation surface is within the specified range.

#### ■ Installation

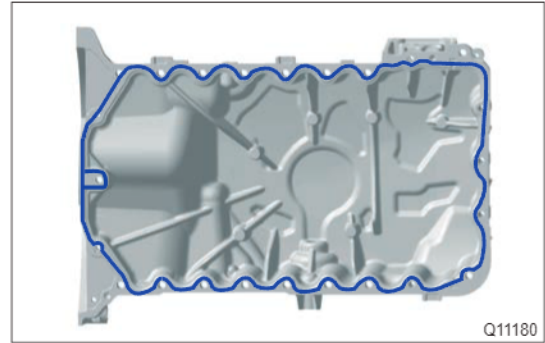
#### Caution

- When applying seal gum, check the type and expiration date of seal gum.
- Check installation surface for impact or damage.
- Remove impurities, iron chips and residue of seal gum on oil pan.
- Remove oil stain and residue of seal gum on the threaded hole of cylinder block and oil pan.
- Seal gum should not be applied too thick; otherwise it will overflow into oil pan due to squeezing, which will block the oil collector.
- Add engine oil until seal gum solidifies after installing oil pan.

- (1) As shown in illustration, apply seal gum to inside of oil pan installation bolt hole evenly.

**Recommended seal gum: Loctite 5900H**

**Seal gum line diameter: 2 - 3 mm**



Q11180

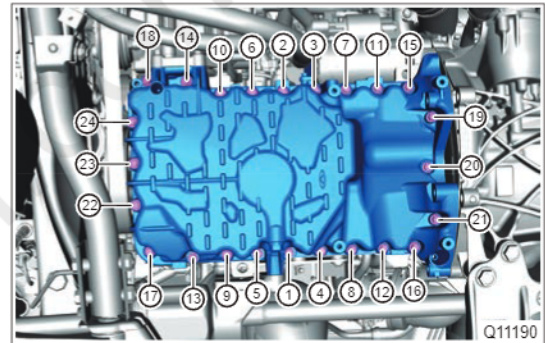
#### **⚠ Caution**

- The applied gum line should be continuous without broken.
- The assembly of oil pan must be finished within 10 minutes after applying gum.

- (2) Align oil pan with frame dowel pin, assemble oil pan and tap it slightly to fit it with frame closely.

- (3) As shown in illustration, pre-tighten oil pan fixing bolts until oil pan is pressed tightly. Then tighten bolts in order.

**Torque: 8 + 3 N·m**



Q11190

- (4) Install 1 fixing bolt to oil pan and drive shaft bracket.
- (5) Install 3 fixing bolts between oil pan and transmission assembly.
- (6) Install compressor assembly and compressor fixing bracket.
- (7) Install the accessory drive belt.
- (8) Install the front compartment lower protector assembly.
- (9) Add engine oil to specified value.

## 7.6 Oil Collector

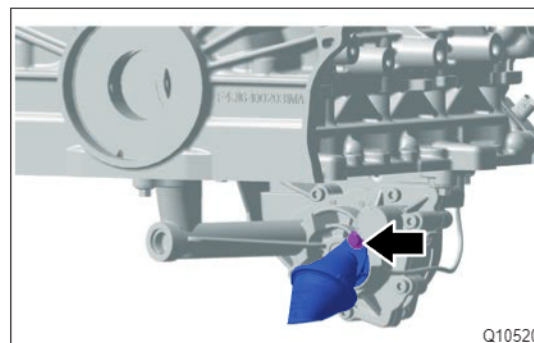
### ■ Removal

#### **⚠ Warning**

- **DO NOT** drain oil and remove oil pan until engine cools down.
- Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Drain engine oil.
- (4) Remove the oil pan assembly.

- (5) Remove 1 fixing bolt from oil collector.



- (6) Remove the oil collector carefully.

### ■ Inspection

- (1) Check collector O-ring for damage or cracks.
- (2) Check oil collector for dirty or blockage, and clean or replace it as necessary.

### ■ Installation

#### ⚠ Caution

- **Add a certain amount of lubricant to oil collector mounting hole of oil pump before installing, so that oil pump rotor cavity can be lubricated. Recommended adding amount is: 5 mL.**

- (1) Apply a small amount of lubricant to O-ring surface of the oil collector.
- (2) Install oil collector to oil pump mounting hole, and align the fixing bolt hole.
- (3) Install 1 fixing bolt to oil collector.

**Torque: 8 + 3 N·m**

- (4) Install the oil pan assembly.
- (5) Add engine engine oil to specified value.

## 7.7 Oil Pump Assembly

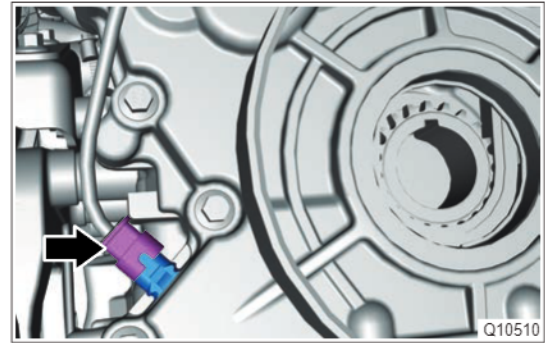
### ■ Removal

#### ⚠ Warning

- **DO NOT drain oil and remove oil pan until engine cools down.**
- **Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.**

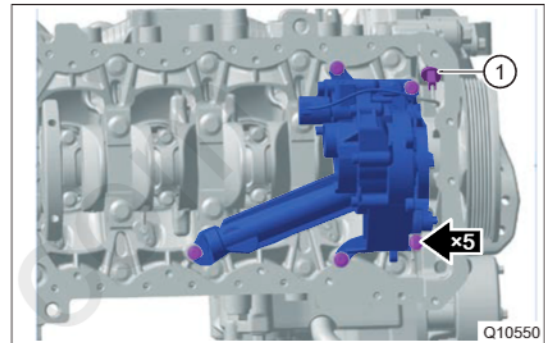
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Drain engine oil.
- (4) Remove the oil pan assembly.
- (5) Remove the oil collector assembly.

- (6) Disconnect the oil pump solenoid valve connector.



- (7) Remove 5 fixing clips and oil pump sprocket cover.

- (8) Remove 5 fixing bolts from oil pump assembly, and remove oil pump solenoid valve connector (1).



- (9) Push chain movable rail, move away chain from oil pump assembly, remove oil pump assembly carefully.

### ■ Inspection

- (1) Rotate oil pump shaft, check if rotation of oil pump is smooth.

### ■ Installation

#### ⚠ Caution

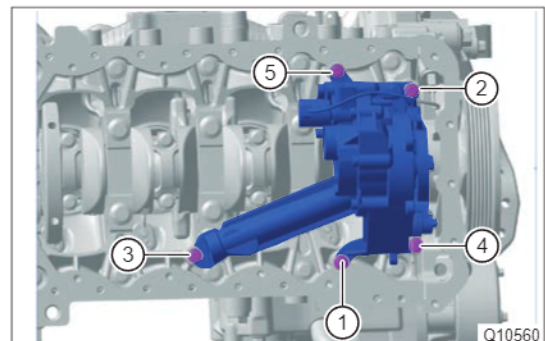
- Wasted engine oil pump assembly should be handled by specialized department according to local laws and regulations. Never discard it at will.

- (1) Apply seal gum to fixing bolt threads after installing oil pump. Ensure application amount for (3 - 5) teeth.

**Recommended lock adhesive: Loctite 243**

- (2) Tighten 5 fixing bolts of oil pump assembly in order as shown in illustration.

**Torque: 8 + 3 N·m**



- (3) Install oil collector.
- (4) Install the oil pan assembly.
- (5) Connect the oil pump solenoid valve connector.
- (6) Add engine engine oil to specified value.

## 7.8 Oil Dipstick Tube (Dipstick) Assembly

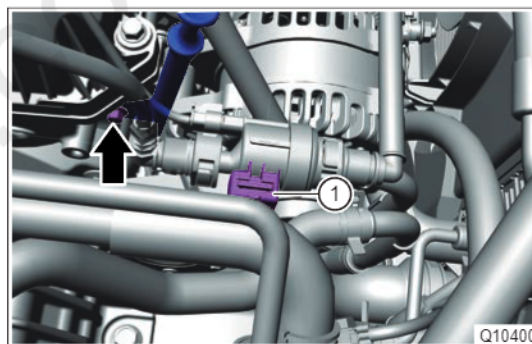
### ■ Removal

#### ⚠ Warning

- Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the engine compartment trim cover assembly.
- (4) Remove the engine trim cover assembly.

- (5) Remove canister solenoid valve (1) from bracket, and remove 1 fixing bolt between oil dipstick tube and timing chain cover.



- (6) Remove 1 fixing bolt between oil dipstick tube and frame mounting hole.



- (7) Remove the oil dipstick tube assembly carefully.

### ■ Installation

#### ⚠ Caution

- Check O-ring before assembly to make sure it is not damaged, otherwise replace with a new one.
- Apply a small amount of lubricant to dipstick tube and dipstick handle O-ring before assembly.
- When inserting dipstick tube into timing chain cover mounting hole, insert lower end as far as possible along shaft line direction. If it tilts, it may be difficult to assemble O-ring, even damage O-ring.

- (1) Install 1 fixing bolt between oil dipstick tube and frame mounting hole.

**Torque: 8 + 3 N·m**

- (2) Install 1 fixing bolt between oil dipstick and timing chain cover.

**Torque: 8 + 3 N·m**

- (3) Install the charcoal canister solenoid valve to the bracket.
- (4) Install the engine trim cover assembly.
- (5) Install the engine compartment trim cover assembly.

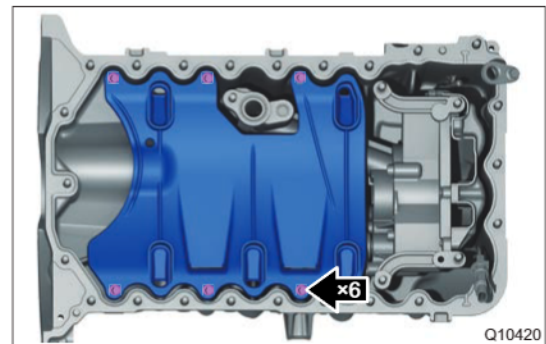
## 7.9 Oil Deflector

### ■ Removal

#### Warning

- **Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.**

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Remove the engine compartment trim cover assembly.
- (3) Disconnect the negative battery cable.
- (4) Drain engine oil.
- (5) Remove the oil pan.
- (6) Remove 6 fixing bolts from oil deflector.



- (7) Remove the oil deflector carefully.

### ■ Inspection

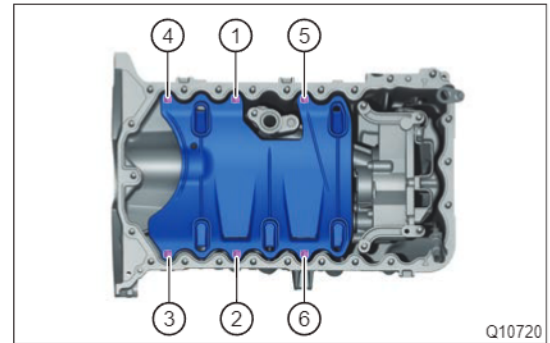
Check deflector appearance for cracks, and check bushing for missing or misalignment.

### ■ Installation

- (1) Place oil deflector on the frame with bolt hole roughly aligned.
- (2) Apply a circle of lock adhesive to bolt threads head evenly. Ensure application amount for (3 - 5) teeth.

- (3) Install and tighten 6 fixing bolts of oil deflector in order as shown in illustration.

**Torque: 8 + 3 N·m**



- (4) Install the oil pan assembly.  
(5) Add engine engine oil to specified value.