

# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 1. General Description

### A: SPECIFICATION

#### 1. HEATER SYSTEM

Item		Specifications	Condition
Heating capacity		4.8 kW (4,127 kcal/h, 16,377 BTU/h) or more	<ul style="list-style-type: none"> <li>Air flow control switch: FOOT</li> <li>Temperature control switch or dial: HI (MAX HOT)</li> <li>Temperature difference between hot water and inlet air: 65°C (149°F)</li> <li>Hot water flow rate: 360 L (95.1 US gal, 79.2 Imp gal)/h</li> </ul>
Air flow rate		300 m <sup>3</sup> (10,596 cu ft)/h	FOOT mode (FRESH), MAX HOT at 12.5 V
Max air flow rate		495 m <sup>3</sup> (17,483 cu ft)/h	<ul style="list-style-type: none"> <li>Temperature control switch or dial: LO (MAX COOL)</li> <li>Fan switch or dial: HI (MAX)</li> </ul> Auto A/C model: 6th position Manual A/C model: 4th position • FRESH/RECIRC switch: RECIRC
Heater core size (height × length × width)		264 × 100 × 27 mm (10.4 × 3.94 × 1.06 in)	—
Blower motor	Type	Magnet motor 260 W or less	12 V
	Fan type and size (diameter × width)	Sirocco fan type 150 × 75 mm (5.91 × 2.95 in)	—

#### 2. A/C SYSTEM

Item		Specifications
Type of air conditioner		Reheat air-mix type
Cooling capacity		4.18 kW [at 500 m <sup>3</sup> (17,660 cu ft)/h] (3,594 kcal/h, 14,262 BTU/h)
Refrigerant		HFC-134a (CH <sub>2</sub> FCF <sub>3</sub> ) [0.425±0.025 kg (0.94±0.06 lb)]
Compressor	Type	H4 model: Swash plate, variable volume (TSE14F) H6 model: Swash plate, variable volume (TSE14C)
	Discharge	140.6 cc (8.58 cu in)/rev
	Max. permissible speed	6,000 rpm
Pulley	Type of belt	V-belt 6 PK
	Pulley dia. (effective dia.)	110 mm (4.33 in)
	Pulley ratio	1.3
Condenser	Type	Corrugated fin (sub cool type)
	Core face area	0.186 m <sup>2</sup> (2.002 sq ft)
	Core thickness	16 mm (0.63 in)
	Radiation area	5.49 m <sup>2</sup> (59.09 sq ft)
Receiver drier		Effective inner capacity 190 cm <sup>3</sup> (11.6 cu in)
Expansion valve		Type Internally equalizing
Evaporator	Type	Double tank
	Dimensions (W × H × T)	293.1 × 171 × 38 mm (11.54 × 6.73 × 1.50 in)
Blower fan	Fan type	Sirocco fan
	Outer diameter × Width	150 × 75 mm (5.91 × 2.95 in)
	Power consumption	260 W
Condenser fan (sub fan)	Motor type	Magnet
	Power consumption	H4 model: 90 W H6 model: 200 W
	Fan outer diameter	H4 model: 300 mm (11.8 in) H6 model: 320 mm (12.6 in)

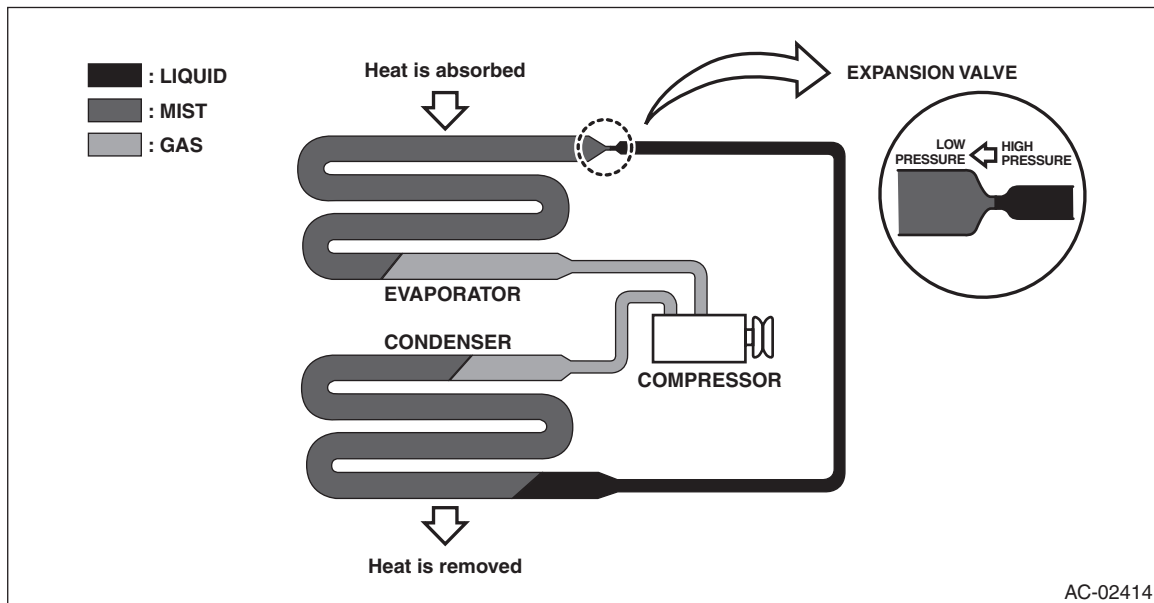
## General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

Item		Specifications	
Radiator fan (main fan)	Motor type	Magnet	
	Power consumption	H4 model: 90 W H6 model: 200 W	
	Fan outer diameter	H4 model: 300 mm (11.8 in) H6 model: 320 mm (12.6 in)	
Idle speed	MPFI model	No load	H4 MT model: 650±100 rpm H4 CVT model: 675±100 rpm H6 model: 700±100 rpm
		A/C ON	H4 MT model: 800 — 850±100 rpm H4 CVT model: 700±100 rpm H6 model: 700 — 910±100 rpm

### 3. BASIC OPERATION

The cooling system cools down the compartment by using the pipes connecting parts and cycling the evaporable liquid (refrigerant) within the sealed system in a repeated process of “vaporization — liquefaction — re-vaporization”.



Item	Operation
Compressor	Sucks and pressurizes the low temperature, low pressure refrigerant gas that was vaporized at the evaporator by absorbing heat from the compartment, and sends the high temperature, high pressure refrigerant gas to the condenser.
Condenser	Cools the high temperature, high pressure refrigerant gas sent from the compressor for condense and liquefaction.
Expansion valve	<ul style="list-style-type: none"> <li>• Sprays the high temperature, high pressure liquid refrigerant from the small hole in order to let the refrigerant expand rapidly to turn it into low temperature, low pressure mist.</li> <li>• The refrigerant amount is adjusted according to the refrigerant vaporization condition in the evaporator.</li> </ul>
Evaporator	The evaporator turns into a low temperature condition when the mist refrigerant that was turned into a low temperature, low pressure condition at the expansion valve is vaporized in large quantity in the evaporator. Passing air flow through the low temperature evaporator emits cold air.

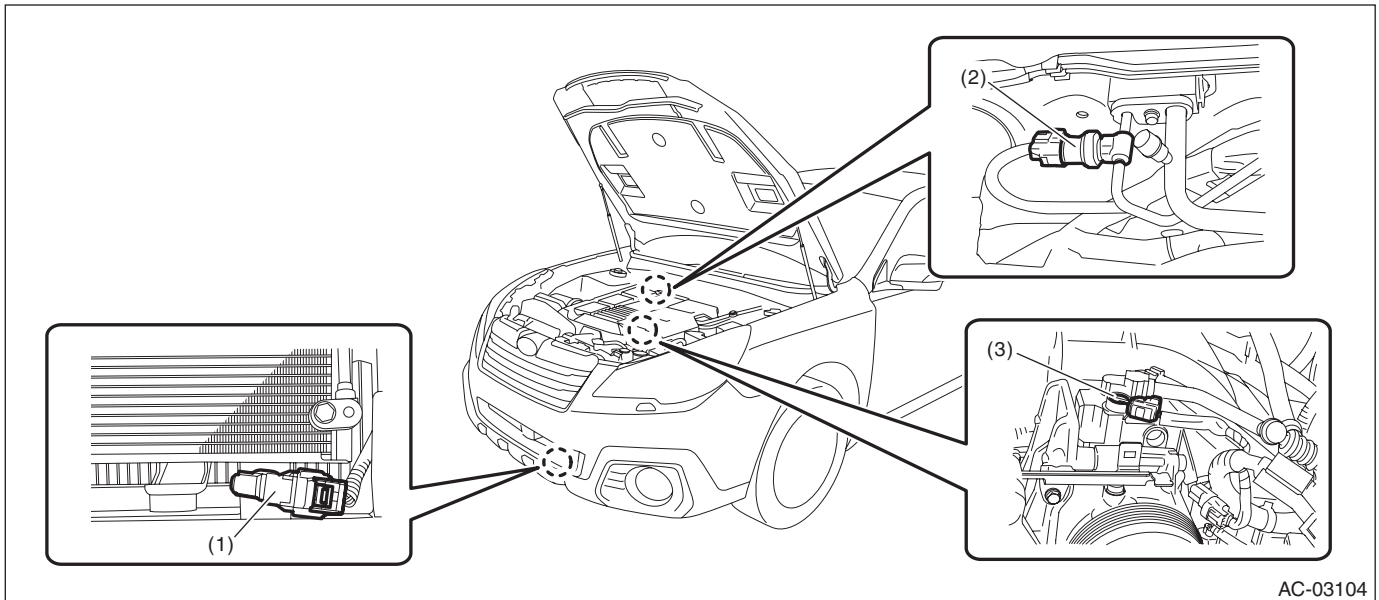
## General Description

### HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## B: LOCATION

### 1. ELECTRICAL PARTS (ACTUATORS AND SENSORS)

- Engine compartment



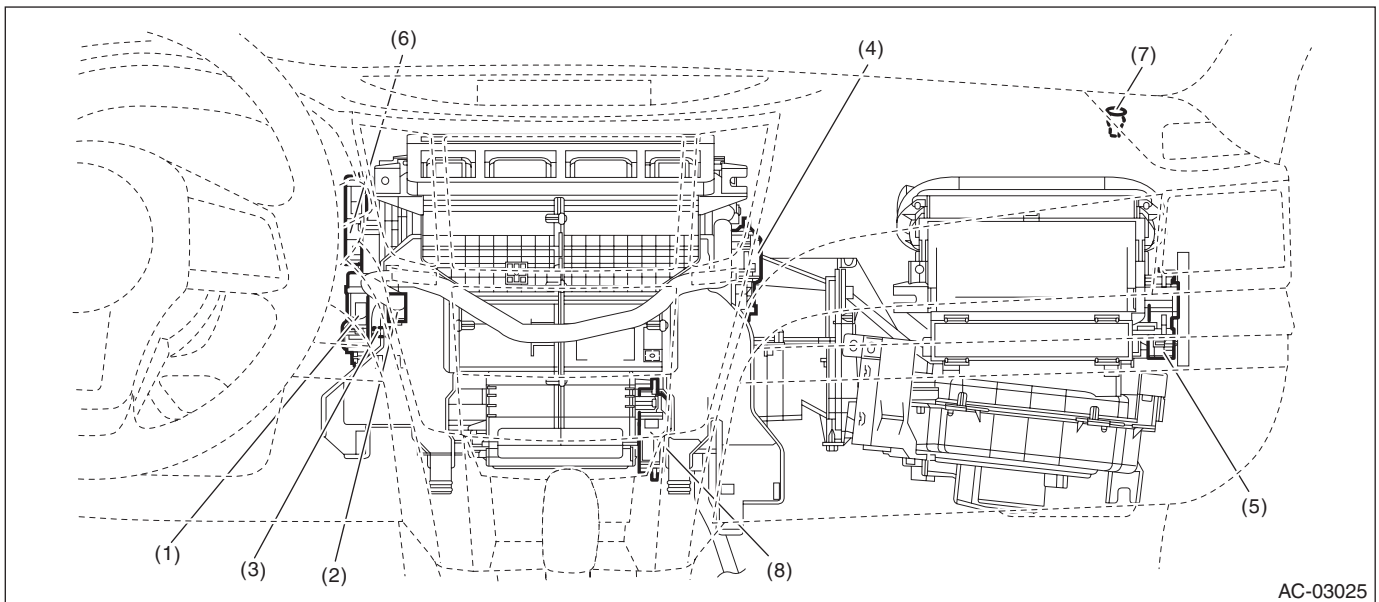
AC-03104

(1) Ambient sensor

(2) Pressure sensor

(3) Refrigerant flow sensor

- Compartment



AC-03025

(1) Air mix door actuator (driver's seat)

(4) Air mix door actuator (passenger's seat)

(7) Sunload sensor

(2) In-vehicle sensor

(5) Intake door actuator

(8) Rear vent actuator

(3) Evaporator sensor

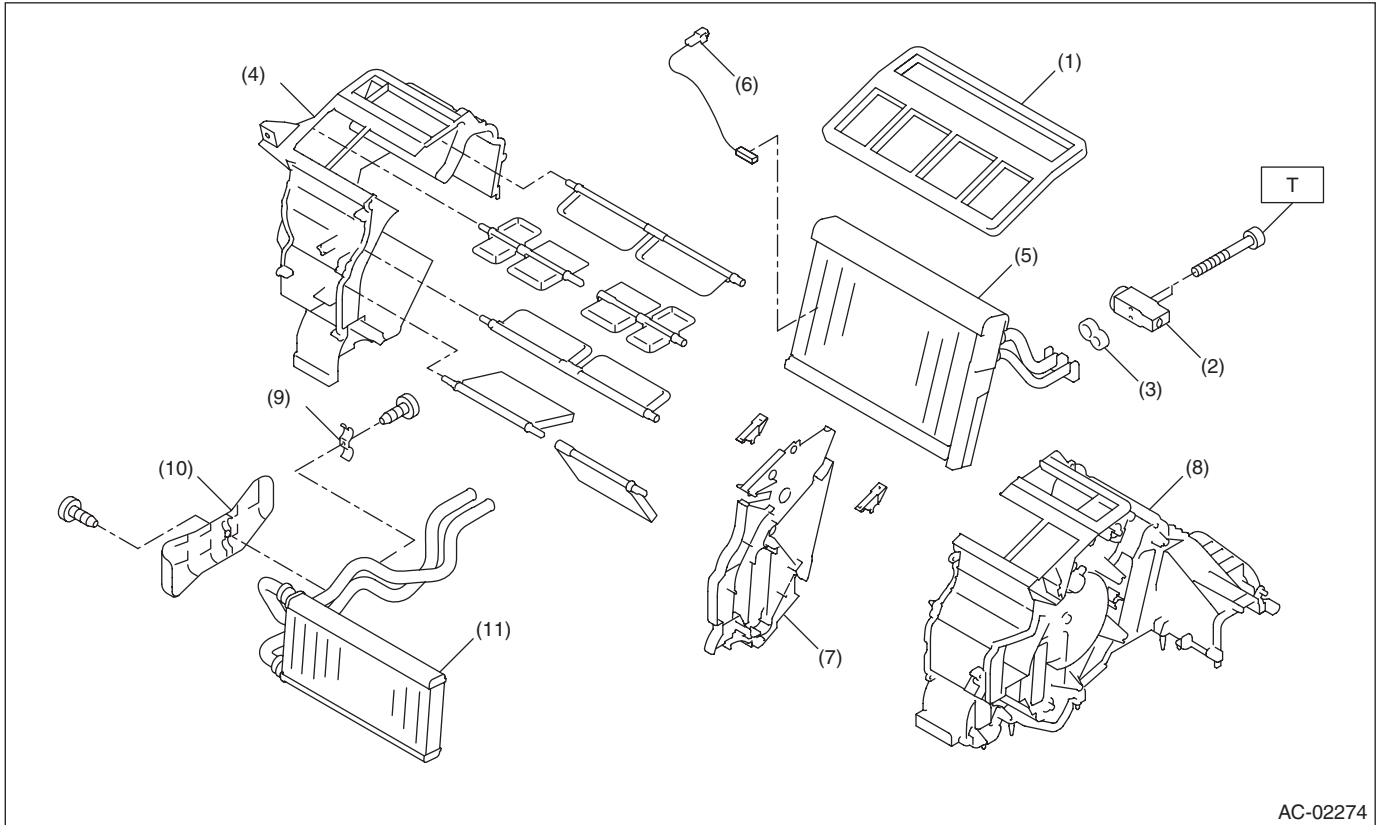
(6) Mode door actuator

# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## C: COMPONENT

### 1. HEATER COOLING UNIT



AC-02274

- |                     |                        |
|---------------------|------------------------|
| (1) Lining          | (6) Evaporator sensor  |
| (2) Expansion valve | (7) Center plate       |
| (3) Gasket          | (8) Heater case RH     |
| (4) Heater case LH  | (9) Heater pipe clamp  |
| (5) Evaporator      | (10) Heater pipe cover |

- (11) Heater core ASSY

---

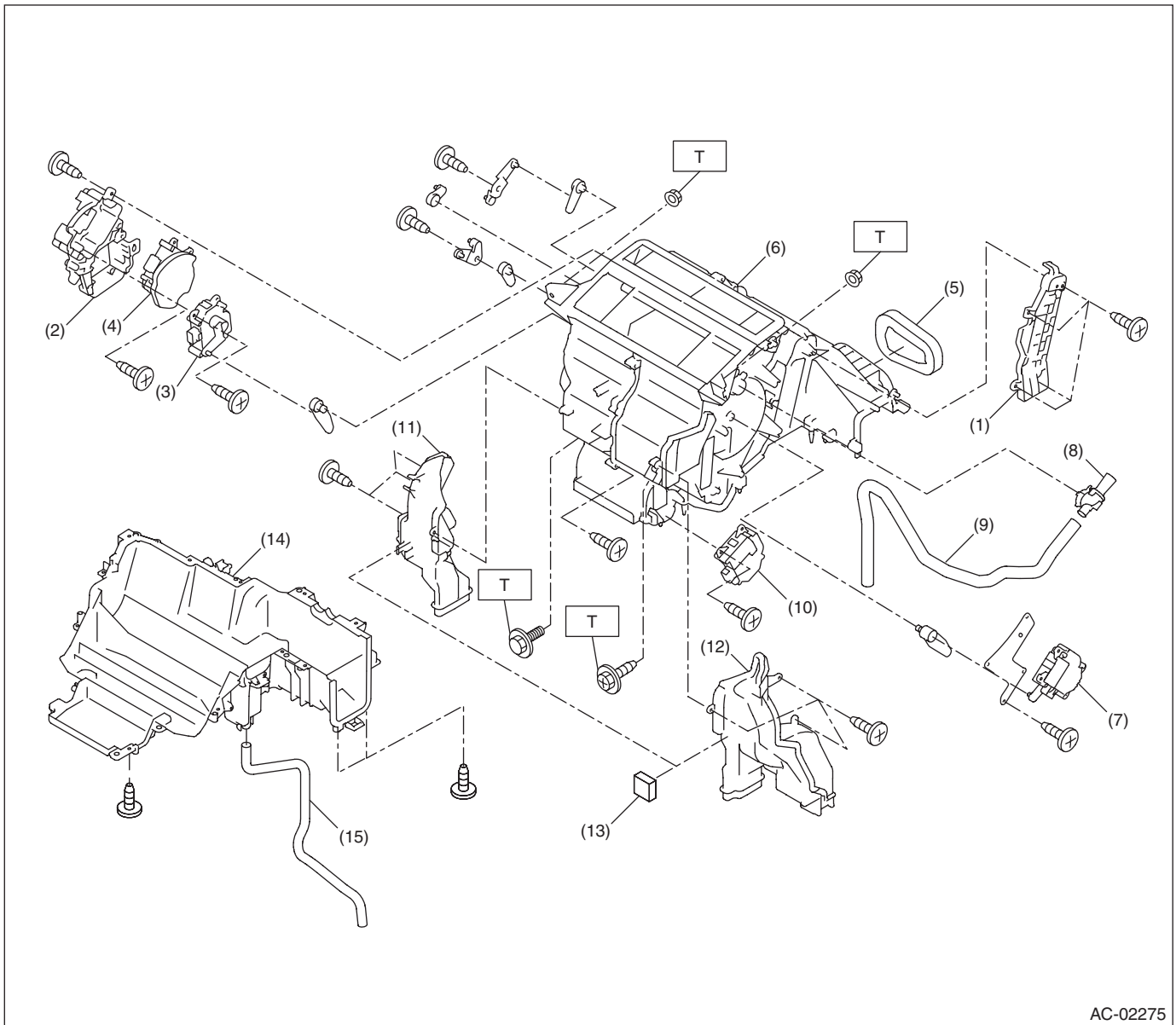
**Tightening torque: N·m (kgf-m, ft-lb)**

**T: 3.5 (0.36, 2.6)**

---

# General Description

## HVAC SYSTEM (HEATER, VENTILATOR AND A/C)



AC-02275

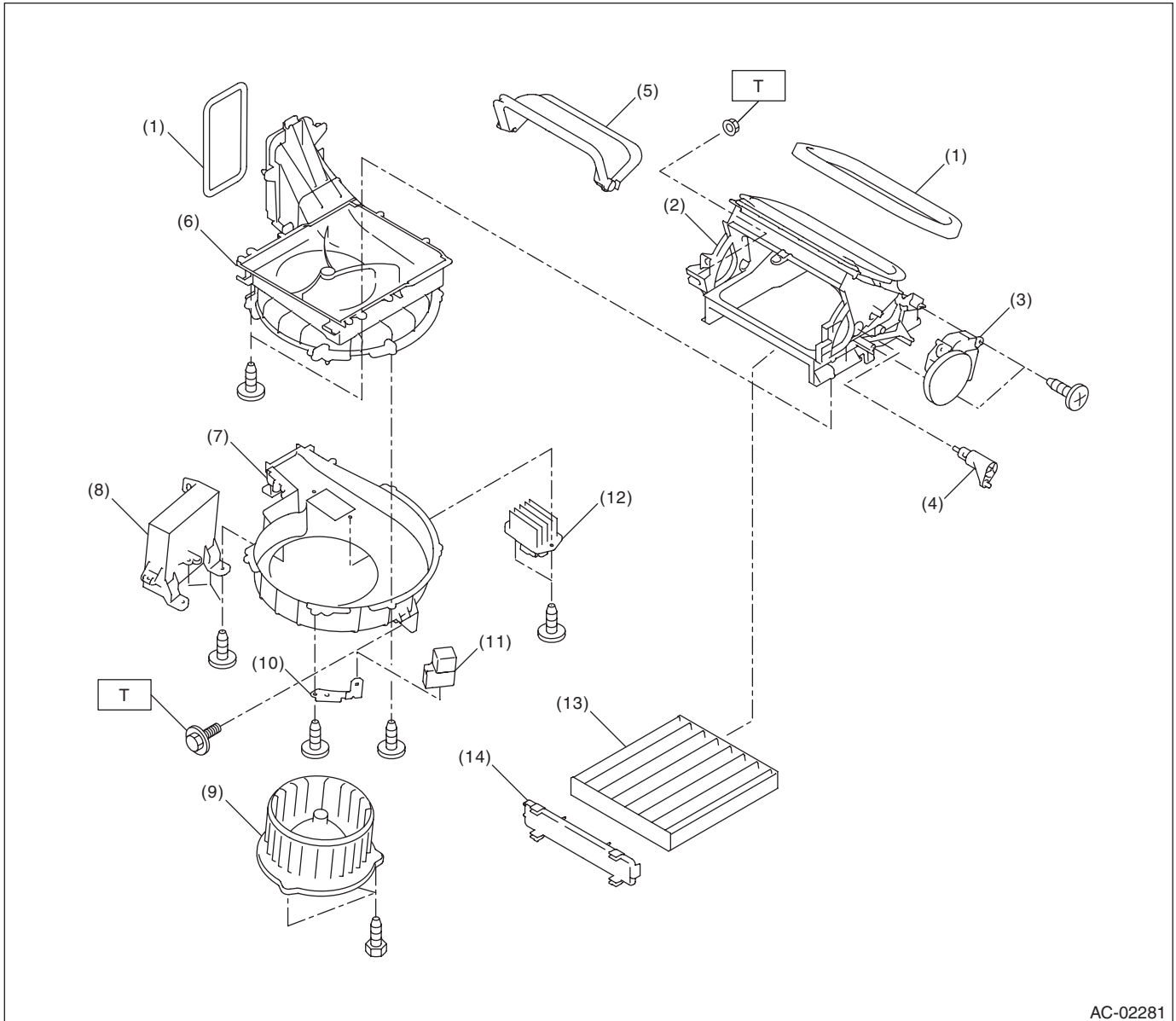
- |   |  |                        |
|---|--|------------------------|
| (1) Evaporator cover                      | (7) Air mix door actuator (passenger's seat) | (13) Gasket            |
| (2) Actuator cover                        | (8) Aspirator                                | (14) Heater case lower |
| (3) Air mix door actuator (driver's seat) | (9) Aspirator hose                           | (15) Drain hose        |
| (4) Mode door actuator                    | (10) Rear vent actuator                      |                        |
| (5) Gasket                                | (11) Foot duct LH                            |                        |
| (6) Unit ASSY                             | (12) Foot duct RH                            |                        |

**Tightening torque: N·m (kgf-m, ft-lb)**  
**T: 7.5 (0.76, 5.5)**

# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 2. BLOWER MOTOR UNIT



AC-02281

- |                          |  |                   |
|--------------------------|--|-------------------|
| (1) Packing              | (7) Lower case   | (13) Filter       |
| (2) Air duct cover ASSY  | (8) Control module   | (14) Filter cover |
| (3) Intake door actuator | (9) Blower motor ASSY  |                   |
| (4) Intake door link     | (10) Relay holder bracket  |                   |
| (5) FRESH/RECIRC door    | (11) Blower motor relay  |                   |
| (6) Upper case           | (12) Power transistor (auto A/C model)<br>or resistor (manual A/C model) |                   |

**Tightening torque: N·m (kgf·m, ft·lb)**

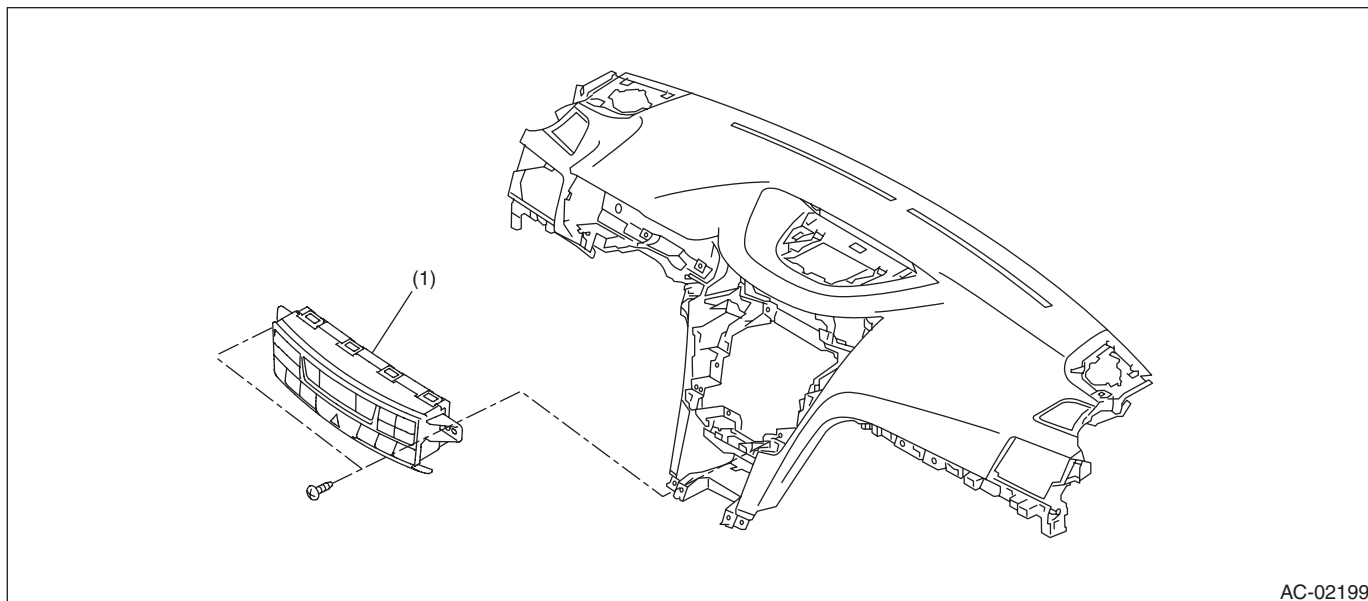
**T: 7.5 (0.76, 5.5)**

## General Description

### HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

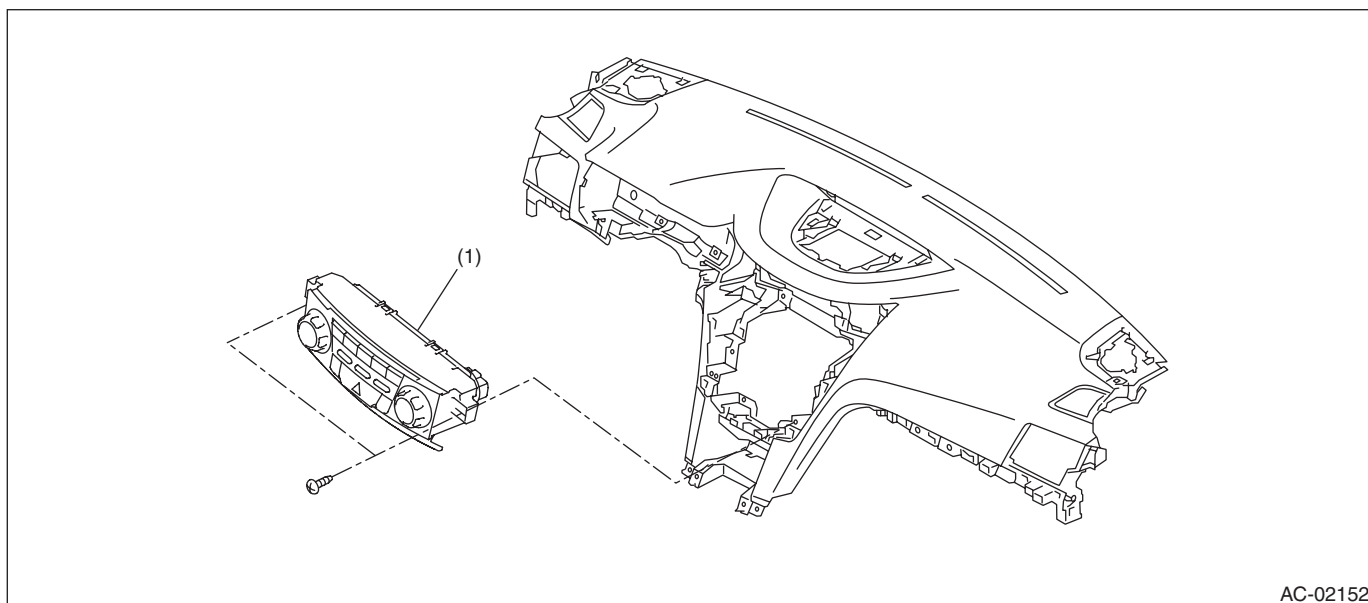
#### 3. CONTROL MODULE

- Auto A/C model



- (1) Control module

- Manual A/C model



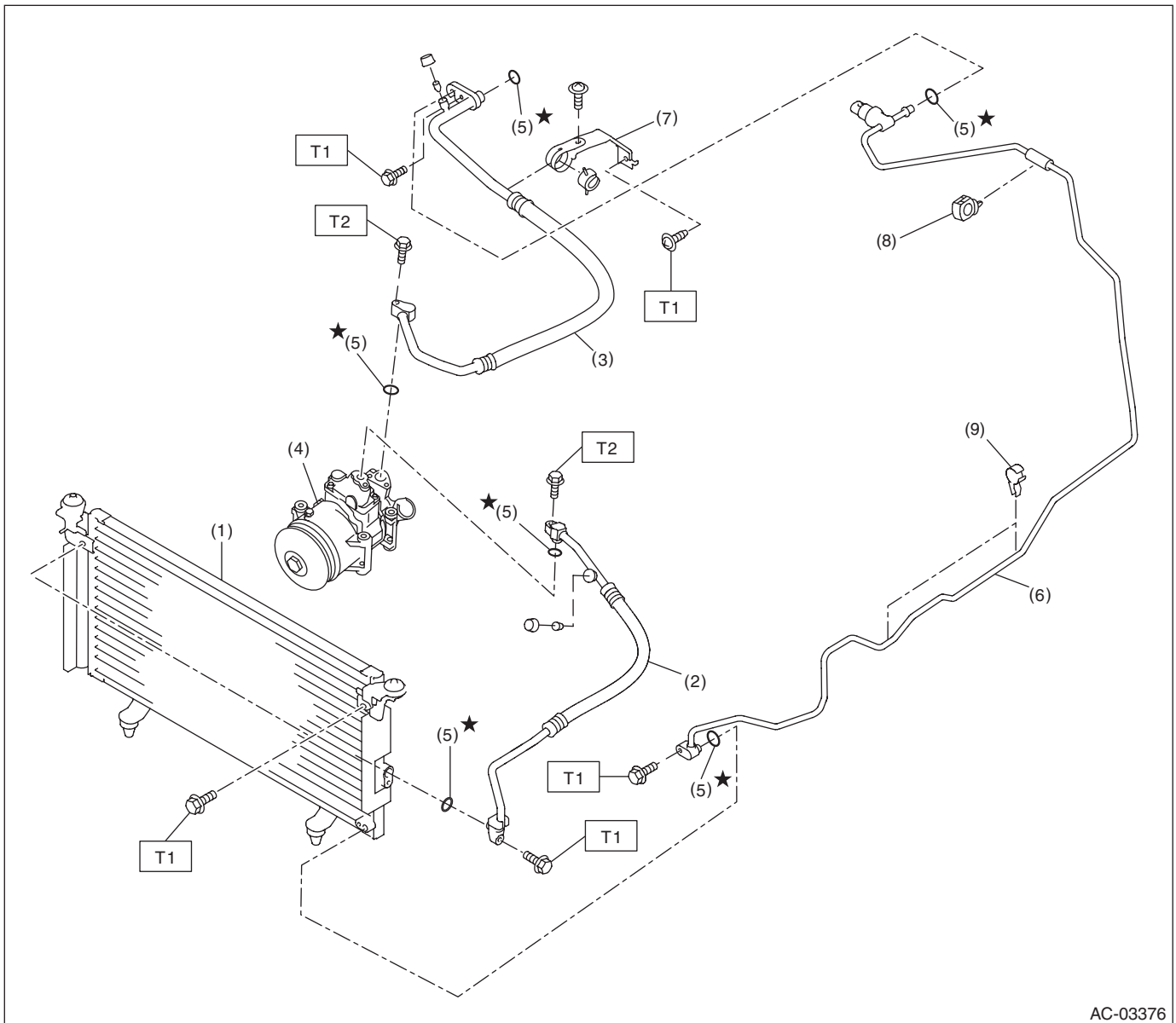
- (1) Control module

# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 4. AIR CONDITIONING UNIT

- H4 model



- (1) Condenser
- (2) Hose (high-pressure)
- (3) Hose (low-pressure)
- (4) Compressor
- (5) O-ring

- (6) Pipe
- (7) Bracket
- (8) Pipe clip
- (9) Pipe clip

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 7.5 (0.76, 5.5)**

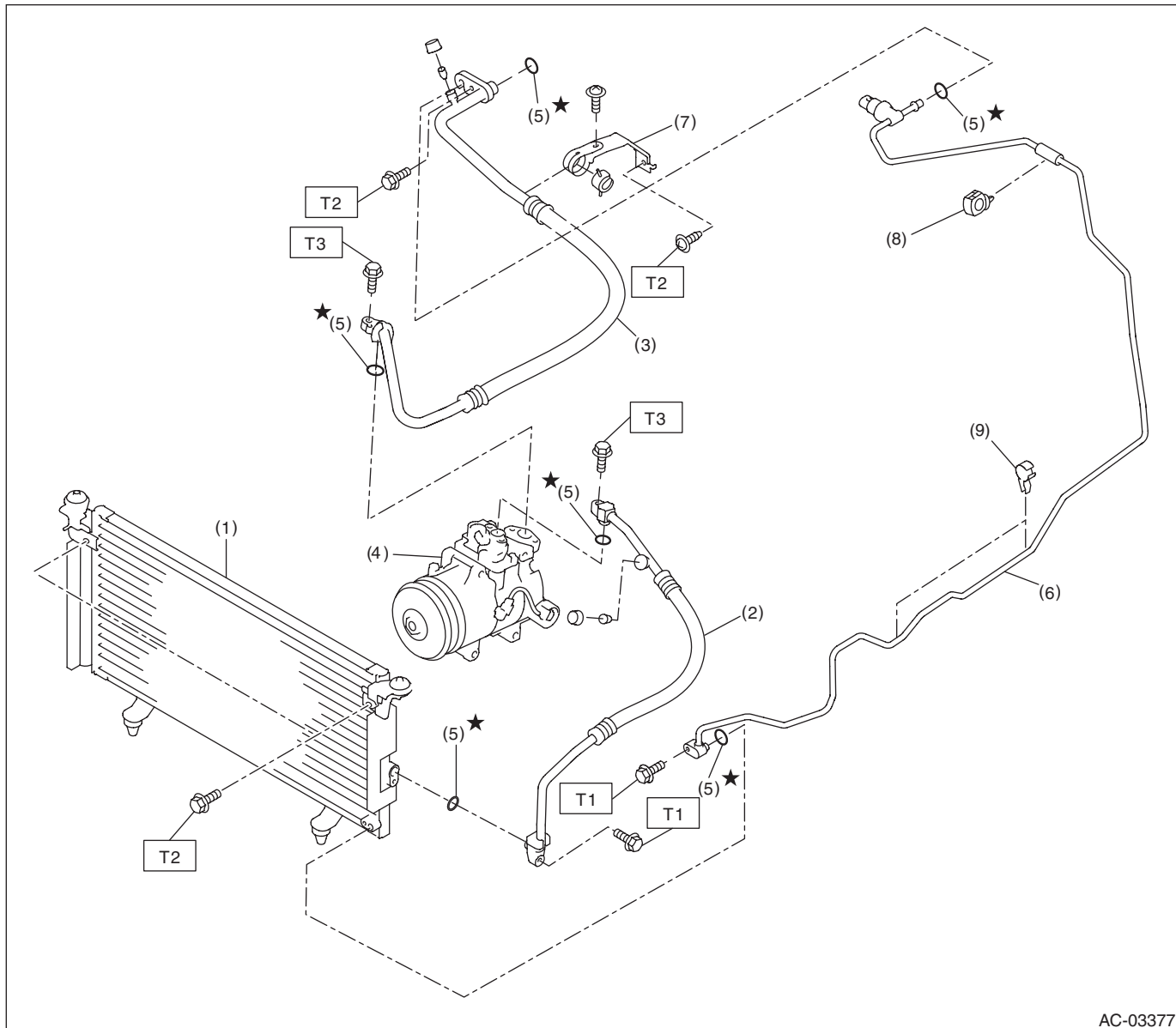
**T2: 10 (1.02, 7.4)**



## General Description

### HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

- H6 model



- (1) Condenser
- (2) Hose (high-pressure)
- (3) Hose (low-pressure)
- (4) Compressor
- (5) O-ring

- (6) Pipe
- (7) Bracket
- (8) Pipe clip
- (9) Pipe clip

**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: 5 (0.51, 3.7)**

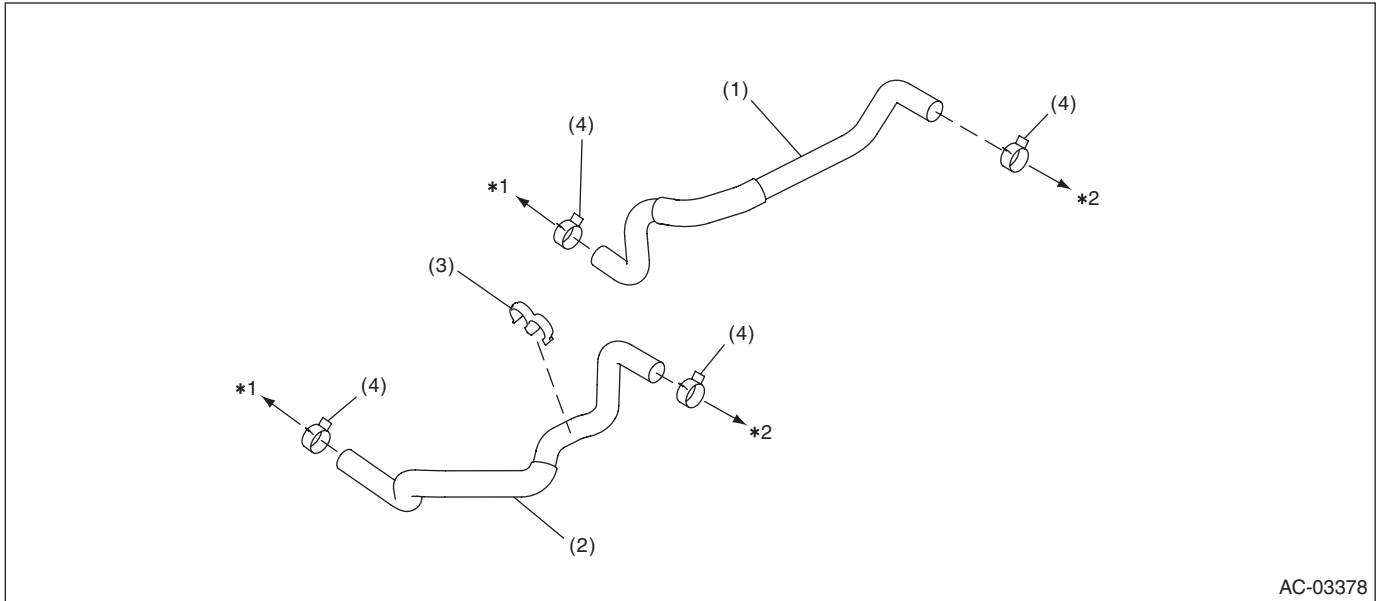
**T2: 7.5 (0.76, 5.5)**

**T3: 10 (1.02, 7.4)**

## General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

### 5. HEATER HOSE



(1) Heater outlet hose

(3) Clip

(4) Clamp

(2) Heater inlet hose

\*1: Engine side

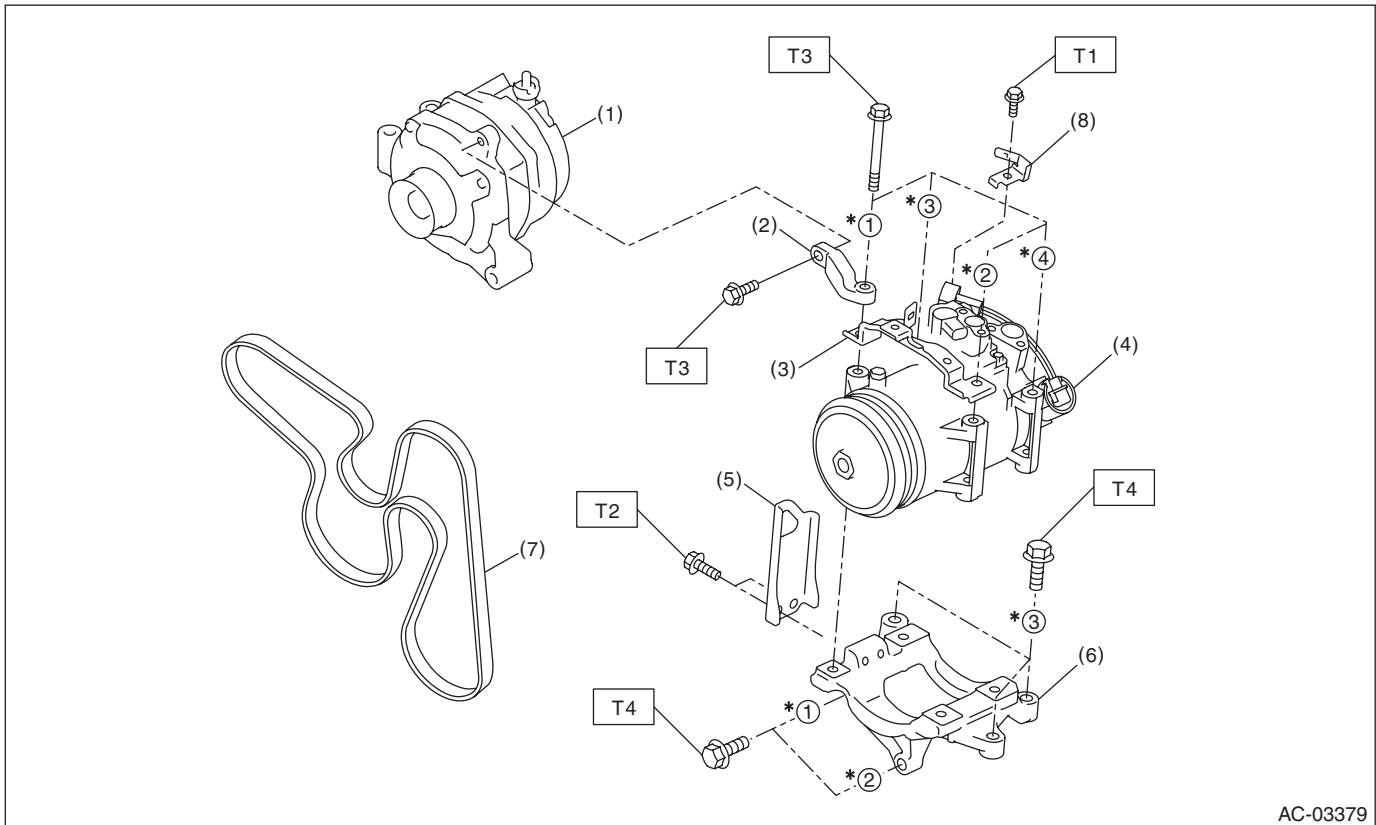
\*2: Heater core side

## General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

### 6. COMPRESSOR

- H4 model



AC-03379

- |                               |                         |
|-------------------------------|-------------------------|
| (1) Generator                 | (5) Front engine hanger |
| (2) Generator bracket         | (6) Compressor bracket  |
| (3) V-belt cover bracket stay | (7) V-belt (6 PK)       |
| (4) Compressor                | (8) Connector bracket   |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 6.4 (0.65, 4.7)**

**T2: 20 (2.04, 14.8)**

**T3: 25 (2.55, 18.4)**

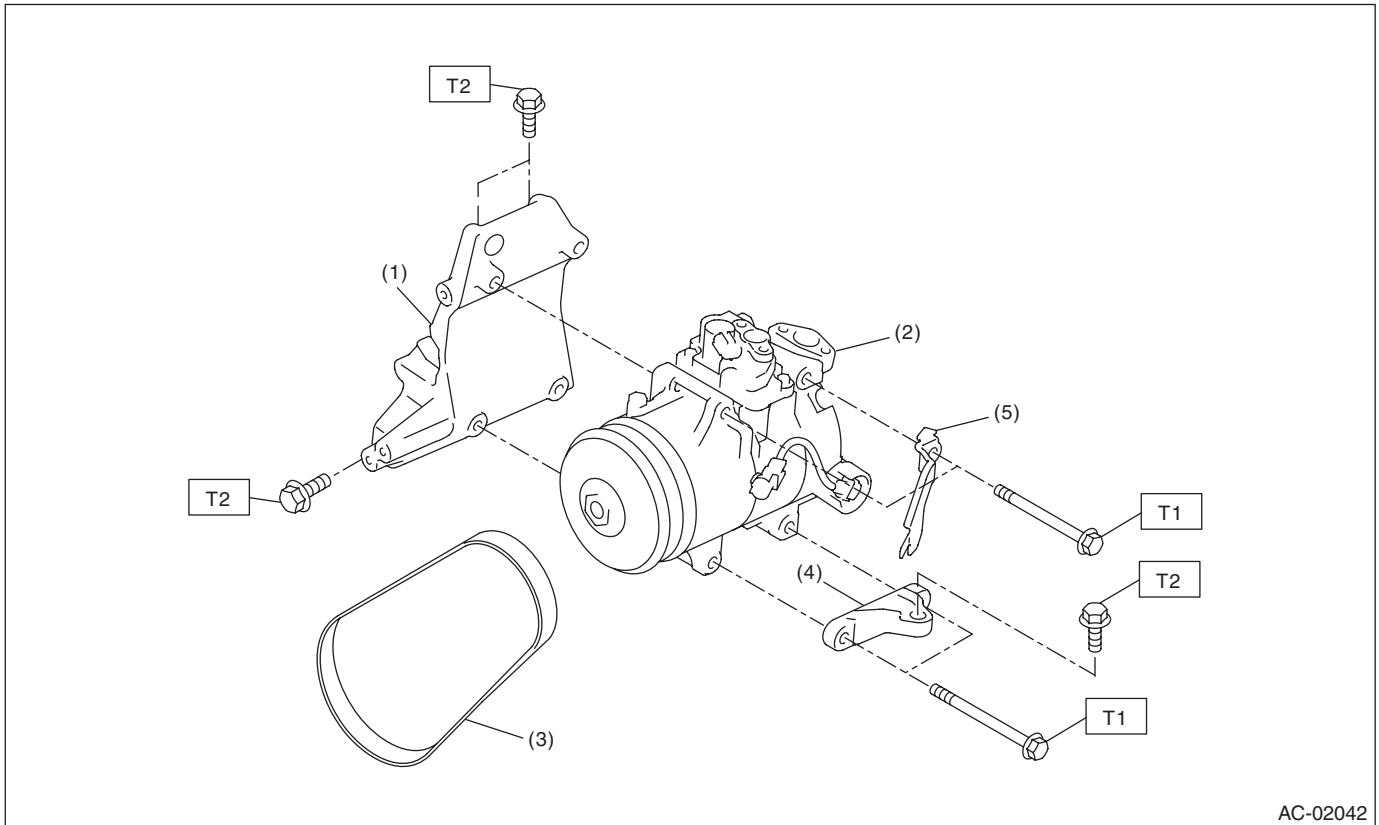
**T4: 36 (3.67, 26.6)**

\* Tighten the compressor and the compressor bracket in the numerical order as shown in the figure.

## General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

- H6 model



- (1) A/C compressor stay
- (2) Compressor
- (3) V-belt (6 PK)

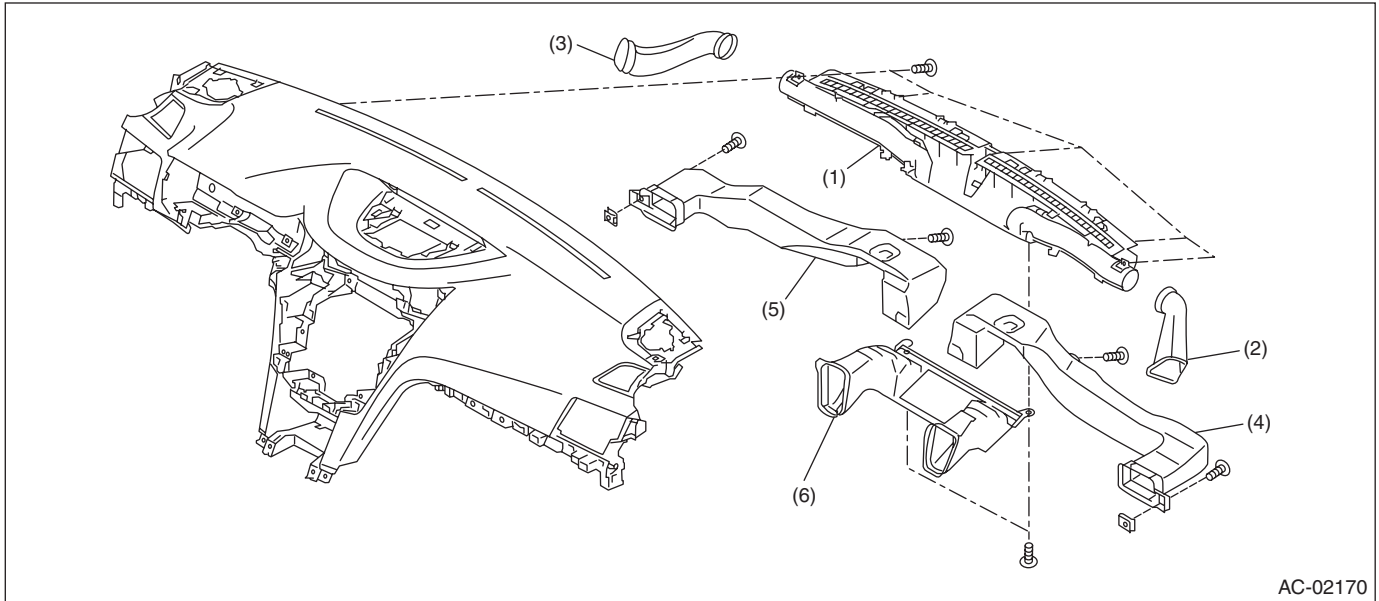
- (4) Compressor bracket
- (5) Connector bracket

**Tightening torque: N·m (kgf-m, ft-lb)**  
**T1: 26.5 (2.70, 19.5)**  
**T2: 36 (3.67, 26.6)**

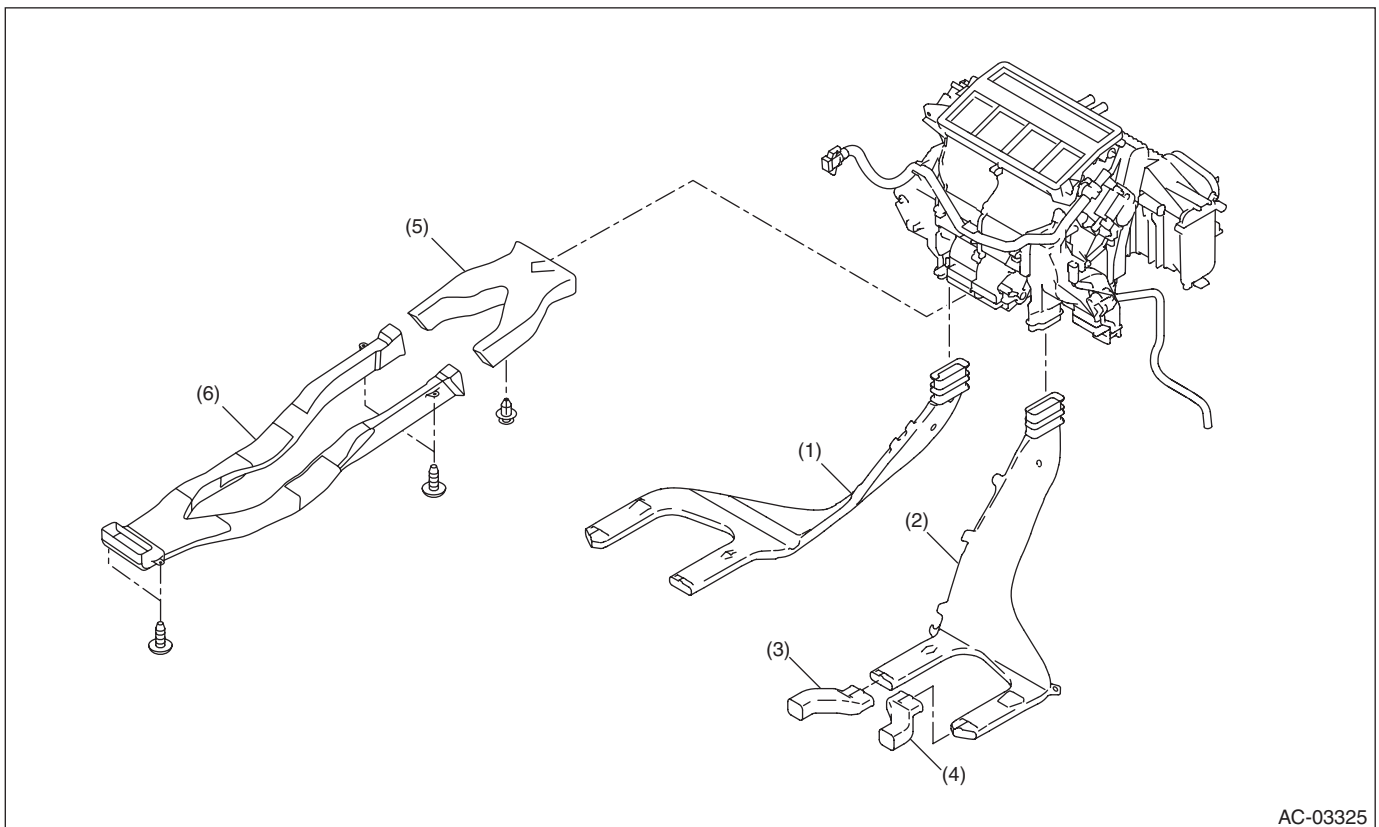
# General Description

## HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

### 7. HEATER DUCT



- |                            |                            |                       |
|----------------------------|----------------------------|-----------------------|
| (1) Defroster nozzle ASSY  | (3) Side defroster duct LH | (5) Side vent duct LH |
| (2) Side defroster duct RH | (4) Side vent duct RH      | (6) Front vent duct   |



- |                         |                       |                         |
|-------------------------|-----------------------|-------------------------|
| (1) Rear heater duct LH | (3) Extension duct LH | (5) Console front duct  |
| (2) Rear heater duct RH | (4) Extension duct RH | (6) Center console duct |

## General Description

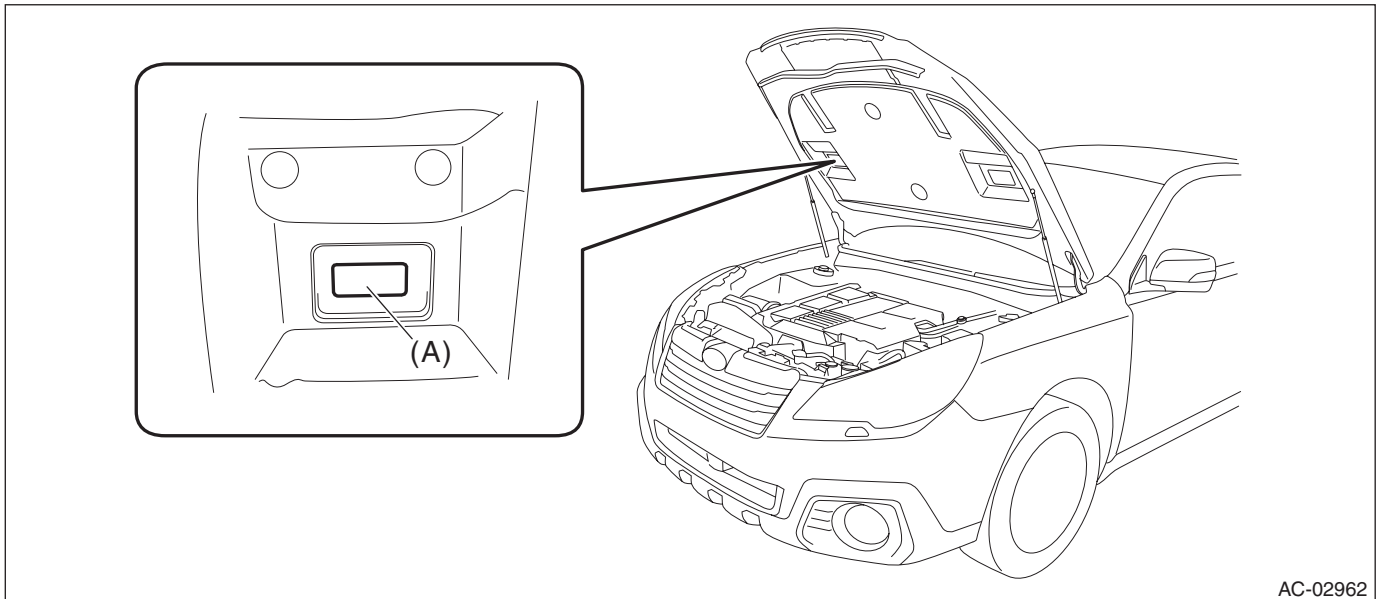
HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

### D: CAUTION

- Before disassembling or reassembling parts, always disconnect the battery ground cable from battery. When replacing the radio, control module, and other parts provided with memory functions, record the memory contents before disconnecting the battery ground cable. Otherwise, the memory is cleared.
- Reassemble the parts in the reverse order of disassembly procedure unless otherwise indicated.
- Connect the connectors securely during reassembly.
- After reassembly, make sure that the functional parts operate normally.

### 1. HFC-134A A/C SYSTEM

- The cooling system components for the HFC-134a system such as the refrigerant and compressor oil are different from the conventional CFC-12 system components and they are incompatible with each other.
  - Vehicles with the HFC-134a system can be identified by the label (A) attached to the vehicle.
- Before maintenance, check A/C system which is installed to the vehicle.



AC-02962

### 2. COMPRESSOR OIL

- HFC-134a compressor oil has no compatibility with that of CFC-12 system.
- Use only the manufacturer-authorized compressor oil, ND-OIL8, for the HFC-134a system.
- Do not mix multiple compressor oils.

If CFC-12 compressor oil is used in the HFC-134a A/C system, the compressor may become stuck due to poor lubrication, or the refrigerant may leak due to swelling of rubber parts.

On the other hand, if HFC-134a compressor oil is used in a CFC-12 A/C system, the durability of the A/C system will be lowered.

- HFC-134a compressor oil is very hygroscopic. When replacing or installing/removing A/C parts, immediately isolate the oil from atmosphere using a plug or tape. In order to avoid moisture, store the oil in a container with its cap tightly closed.

### 3. REFRIGERANT

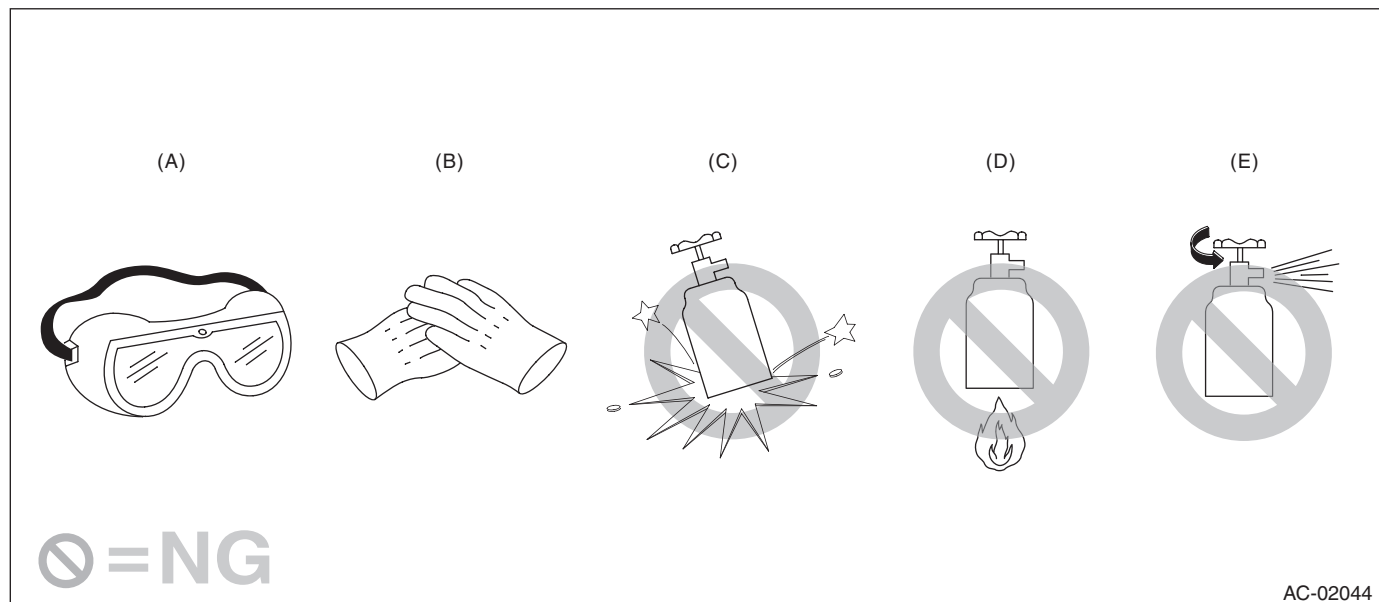
- CFC-12 refrigerant cannot be used in a HFC-134a A/C system. HFC-134a refrigerant, also cannot be used in a CFC-12 A/C system.
- If an incorrect or no refrigerant is used, it will result in poor lubrication and the compressor itself may be damaged.

## General Description

### HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

#### 4. HANDLING OF REFRIGERANT

- The refrigerant boils at approx.  $-30^{\circ}\text{C}$  ( $-22^{\circ}\text{F}$ ). When handling it, be sure to wear protective goggles and protective gloves. Direct contact of the refrigerant with skin may cause frostbite. If the refrigerant gets into your eye, avoid rubbing your eyes with your hands. Wash your eye with plenty of water, and receive medical treatment from an eye doctor.
- Do not heat a service can. If a service can is directly heated, or put into boiling water, the inside pressure will become extremely high. This may cause the can to explode. If a service can must be warmed up, use warm water of  $40^{\circ}\text{C}$  ( $104^{\circ}\text{F}$ ) or less.
- Do not drop or impact a service can. (Observe the precautions and operation procedure described on the refrigerant can.)
- When the engine is running, do not open the high-pressure valve of manifold gauge. The high-pressure gas will back-flow resulting in an explosion of the can.
- Provide good ventilation and do not work in a closed area.
- In order to prevent global warming, avoid releasing HFC-134a into the atmosphere. Using a refrigerant recovery system, discharge and recycle the gas.



(A) Goggles  
(B) Gloves

(C) Do not apply impact.  
(D) No direct heat on container

(E) Do not discharge

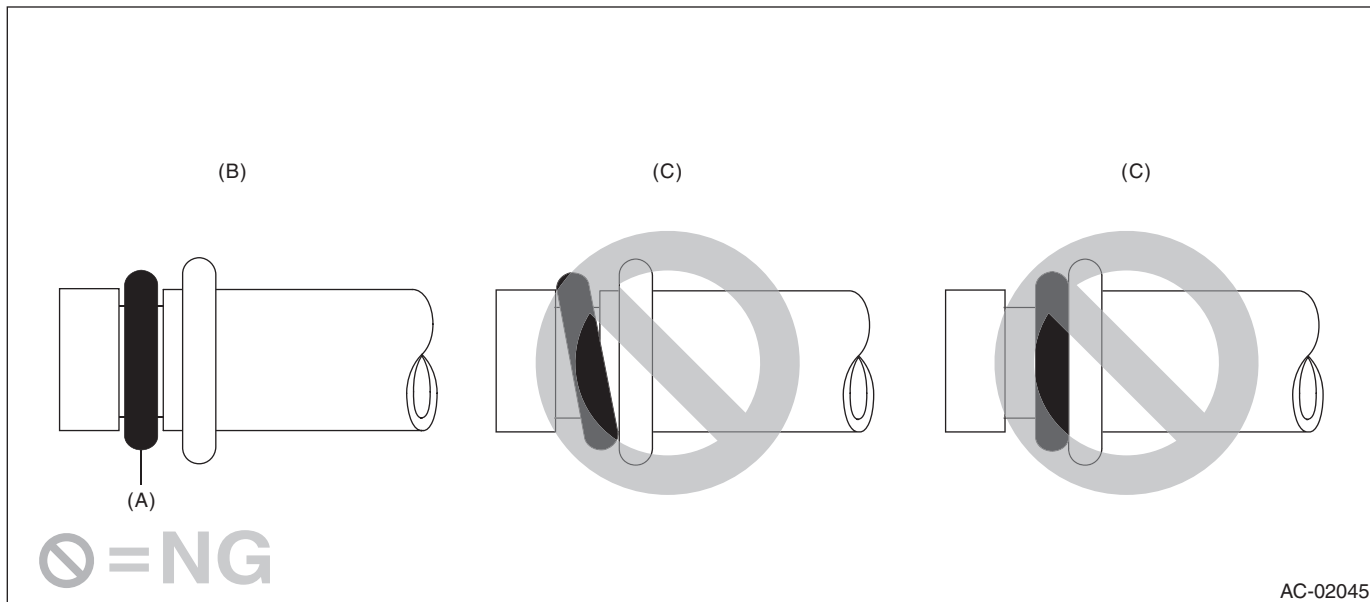
#### 5. O-RING CONNECTIONS

- Always use a new O-ring.
- In order to keep the O-rings free of lint which will cause a refrigerant gas leak, perform work without using gloves or waste cloths.
- Apply compressor oil to O-rings to avoid sticking, before installation.
- Use a torque wrench to tighten the O-ring fittings. Over-tightening will result in damage of the O-ring and deformation of the pipe end.
- If the work is interrupted before completing pipe connections, recap the pipes, components and fittings with a plug or tape to prevent foreign matter from entering.
- Visually check the surfaces and mating surfaces of O-rings, threads and connecting points. If a failure is found, replace the applicable parts.

## General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

- Install the O-rings straight against the pipe groove.

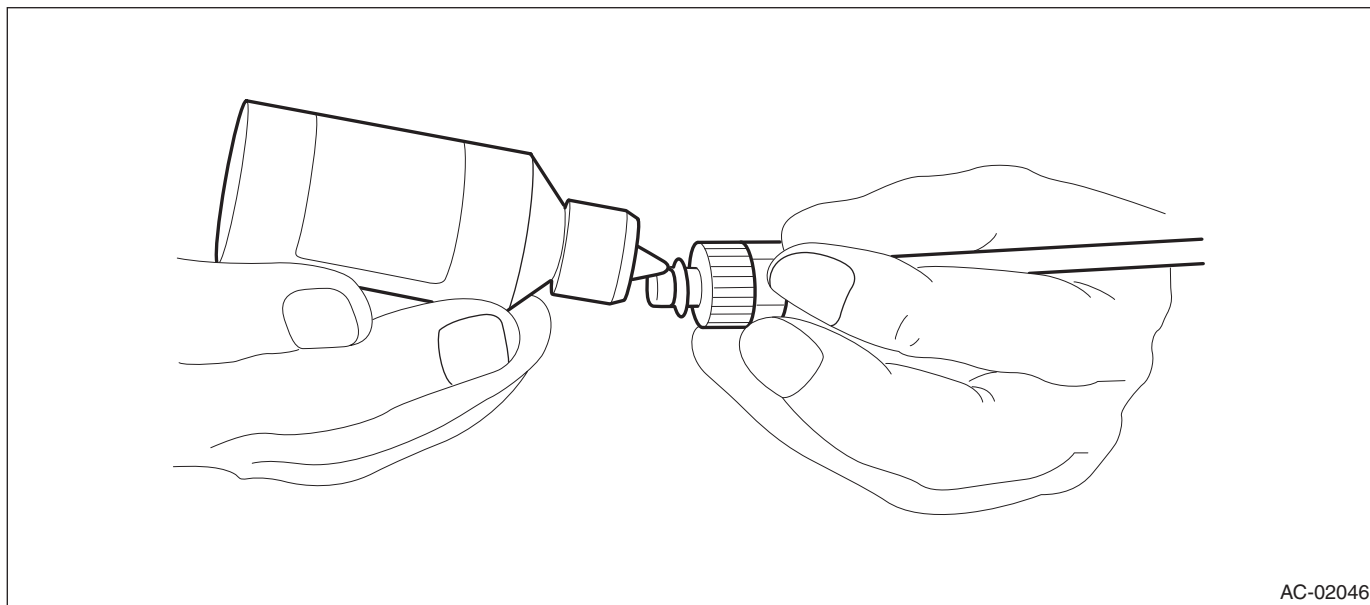


(A) O-ring

(B) OK

(C) NG

- Use compressor oil specified in the service manual to lubricate the O-rings. Apply oil to the top and sides of O-rings before installation. Apply compressor oil to the pipe grooves.



- After tightening, use a clean cloth to remove excess compressor oil from the connections and any oil which may have run on the vehicle body or other parts.
- If any leakage is suspected after tightening, do not tighten the connections further, but disconnect the connections, remove the O-rings, and check the O-rings, threads, and connections.

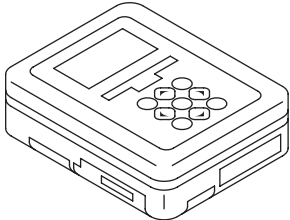


## General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

### E: PREPARATION TOOL

#### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

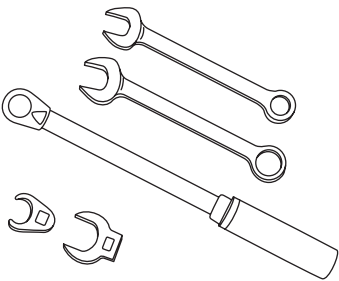

#### 2. GENERAL TOOL

##### CAUTION:

When working on vehicles with a HFC-134a system, only use HFC-134a specified tools and parts. Do not mix CFC-12 tools and parts. If HFC-134a and CFC-12 refrigerant or compressor oil is mixed, it will result in poor lubrication and the compressor itself may be damaged.

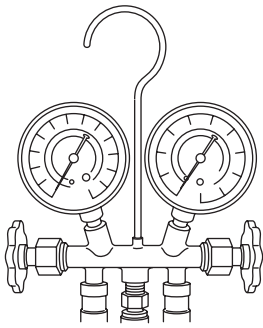
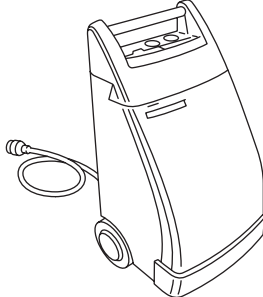
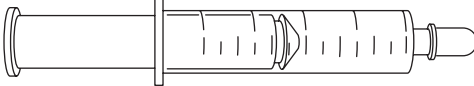
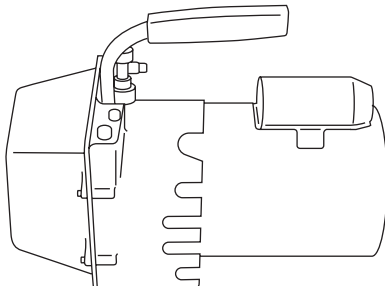
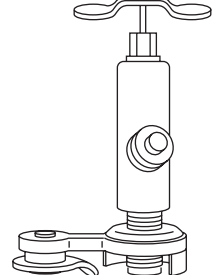
In order to prevent the mixture of HFC-134a and CFC-12 parts and liquid, the type of tool and screw, and the replacement valves used are different. The gas leak detectors for the HFC-134a and CFC-12 systems must also not be interchanged.

	HFC-134a	CFC-12
Tool & screw type	Millimeter size	Inch size
Valve type	Quick joint type	Screw-in type

Illustration	Tools and Equipment
 AC-00213	<b>Wrench</b> Various <b>WRENCHES</b> will be required to service any A/C system. 7 — 40 N·m (0.7 to 4.1 kgf-m, 5 to 30 ft-lb) torque wrench and various crow-foot wrenches will be needed. Open end or flare nut wrenches will be needed to affix the pipe and hose fittings.
 AC-00012	<b>Applicator bottle</b> A small <b>APPLICATOR BOTTLE</b> is recommended to apply compressor oil to the various parts. It can be available at a hardware store.

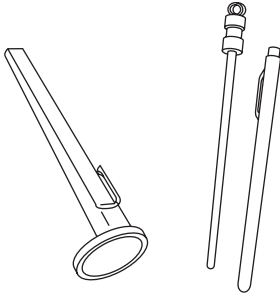
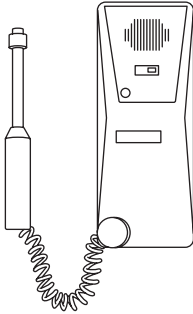

# General Description

## HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

Illustration	Tools and Equipment
 <p>AC-00013</p>	<p>Manifold gauge set</p> <p>A <b>MANIFOLD GAUGE SET</b> (with hoses) is available at either a refrigerant supplier or an automotive equipment supplier.</p>
 <p>AC-00014</p>	<p>Refrigerant recovery system</p> <p>A <b>REFRIGERANT RECOVERY SYSTEM</b> is used for the recovery and recycling of A/C system refrigerant after contaminants and moisture have been removed from the refrigerant.</p>
 <p>AC-00015</p>	<p>Syringe</p> <p>A graduated plastic <b>SYRINGE</b> will be needed to add oil into the system again. A syringe can be available at a pharmacy or drug store.</p>
 <p>AC-00016</p>	<p>Vacuum pump</p> <p>A <b>VACUUM PUMP</b> is necessary (for a good working condition), and may be available at either a refrigerant supplier or an automotive equipment supplier.</p>
 <p>AC-00017</p>	<p>Can tap</p> <p>A <b>CAN TAP</b> for the 397 g (14 oz.) can is available at an automotive equipment supplier.</p>

## General Description

### HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

Illustration	Tools and Equipment
 <p>AC-00018</p>	<p>Thermometer</p> <p>A Pocket <b>THERMOMETER</b> is available at either a industrial hardware store or a refrigerant supplier.</p>
 <p>AC-00019</p>	<p>Electronic leak detector</p> <p>An <b>ELECTRONIC LEAK DETECTOR</b> can be available at either a specialty tool supplier or an A/C equipment supplier.</p>
 <p>AC-00020</p>	<p>Weight scale</p> <p>A <b>WEIGHT SCALE</b> such as an electronic charging scale or a bathroom scale with digital display will be needed, if a 13.6 kg (30 lb) refrigerant container is used.</p>