



## 1. Description

This procedure describes methods for the removal and installation of an electrically powered cooling system fan. Inspection and evaluation requirements are also included.



## 2. Purpose

The purpose of this procedure is to provide industry-accepted requirements for performing high-quality repair of engine cooling systems. This procedure is intended for use by professionals who are qualified through training and experience.



## 3. Referenced Documents

The following documents are considered part of this procedure by reference.

### 3.1 Procedures

- EL01 Wire Repair
- EL11 Troubleshooting
- PS01 Personnel Safety

### 3.2 Other Information

Vehicle-specific repair information



## 4. Equipment And Material Requirements

### 4.1 Equipment

A digital volt ohm meter (DVOM) is used in this procedure.



## 5. Damage Analysis

### 5.1 General Damage

Inspect an electric cooling fan assembly for these conditions:

- movement from the original position
- damaged shroud or fan blades
- binding or uneven blade rotation
- damaged wiring

Damaged fan blades must be replaced. If electrical parts do not function correctly, troubleshoot the fan circuit to isolate the cause. See **EL11**. See **EL01** for wire repair procedures.



## 6. Personnel Safety

### 6.1 General Safety

General safety information is in **PS01**.

### 6.2 Cooling System Safety

To prevent injury when repairing the cooling system:

- Do not open the cooling system when it is warm and under pressure.
- Protect eyes and skin from contact with coolant under pressure.
- Work in a well-ventilated area.
- Keep away from hot or moving engine parts.
- Be aware that electric cooling fans can operate even when the ignition switch is OFF.

### 6.3 Fan Blades

Damaged fan blades must be replaced before continuing with repairs.



## 7. Environmental Safety

Does not apply.



## 8. Vehicle Protection

### 8.1 Electronic Parts

To protect computers and other sensitive parts from damage:

- Follow the vehicle maker's recommendations for recording and resetting electronic memories.
- Ensure that the ignition switch is in the LOCK position, and the key is removed.
- Disconnect and isolate the negative battery cable, and disarm the passive restraint system. Follow the vehicle maker's recommendations.
- Protect modules, connectors, and wiring from dirt, heat, static electricity, and moisture.
- Loosen or remove any wiring harnesses or electrical parts that could be damaged during the repair process.

### 8.2 Fan And Adjacent Areas

To protect an electric fan and adjacent areas:

- Use care when removing or installing fasteners.
- Do not damage the shroud, fan blades, or wiring when handling or storing the fan assembly.
- Protect adjacent areas during removal and installation.



## 9. Repair Procedure

### 9.1 Cooling Fan Test

To test the operation of an electric cooling fan:

- 1. Start the engine and allow it to warm to operating temperature.
- 2. Observe the electric cooling fan operation when the engine is warm.
- 3. Observe the electric cooling fan cycling on and off. The fan should operate when the engine is at operating temperature and the air conditioning system is ON.
- 4. Stop the engine.

**(cont'd)**



## 9. Repair Procedure (cont'd)

### 9.2 Electrical Diagnosis

Test for proper cooling fan operation by following the vehicle maker's diagnostic steps which may include these:

- 1. Check the cooling fan fuses.
- 2. Test the fan relays.
- 3. Measure the resistance of the engine temperature sensor.
- 4. Measure the resistance and voltage in the fan wiring.
- 5. Measure the voltage drop across the electrical connectors.
- 6. Measure the voltage drop across the fan ground connection.

### 9.3 Fan Removal

To remove an electric cooling fan assembly:

- 1. Disconnect and isolate the negative battery terminal. Follow the vehicle maker's recommendations.
- 2. Disconnect and isolate the cooling fan connector.
- 3. Remove the fan assembly mounting fasteners.
- 4. Remove the fan assembly from the vehicle. Be careful not to damage the radiator cooling fins.
- 5. Disassemble the fan assembly, as required. The fan assembly may include separate parts, such as the shroud, motor, and blades.

### 9.4 Fan Installation

To install an electric cooling-fan assembly:

- 1. Inspect the replacement parts for the correct type and size.
- 2. Reassemble the parts.
- 3. Reinstall the fan assembly into the vehicle. Be careful not to damage the radiator cooling fins.
- 4. Install the mounting fasteners. Torque the fasteners to the vehicle maker's recommendations.
- 5. Clean the connectors and reconnect the fan wiring.
- 6. Reconnect the negative battery terminal.
- 7. Test the cooling fan operation. See **9.1**.



## 10. Use Of Recycled (Salvage) Parts

### 10.1 Condition Of Salvage Parts

Do not install a salvage electric cooling fan with any of these defects:

- rough or uneven rotation
- damaged fan blades or other parts
- damaged or corroded wiring

Determine if the salvage cooling fan can be repaired by replacement of the fan blades, motor, shroud, or other separate parts.



## 11. Inspection And Testing

### 11.1 Inspection Of An Electric Cooling-Fan Assembly

After installation of an electric cooling-fan assembly, inspect the vehicle for these conditions:

- proper fan position and alignment
- free and even rotation of the blades
- proper installation of all mounting brackets and fasteners
- proper installation of electrical connectors and wiring
- proper cycling at operating temperature, and when the air conditioning system is ON
- proper coolant level
- proper engine operating temperature

Correct any defects.