



SP22S

Engine Cradle

**Uniform
Procedures For
Collision Repair
UPCR**

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v.4.0



1. Description

This procedure describes the repair and complete replacement of a steel engine cradle. 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 cradles. 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

- CP01S Corrosion Protection
- ME01 Three-Dimensional Measuring
- PS01 Personnel Safety
- RF01S Surface Preparation
- RF41 Finish Application
- ST01S Stress-Relieving Heat Limitations
- ST11 Structural Straightening
- WA01 Wheel Alignment, Front

3.2 Other Information

- Recycled parts information
- Vehicle-specific dimension information
- Vehicle-specific repair information



4. Equipment And Material Requirements

4.1 Straightening And Measuring Equipment

Use straightening equipment as described in **ST11**.

Use measuring equipment as described in **ME01**.



5. Damage Analysis

5.1 General Damage

Inspect an engine cradle for these types of damage:

- visible damage
- corrosion
- previous improper repairs
- dimensional misalignment
- damage to mounting locations or fasteners

Determine whether the engine cradle should be repaired or replaced. Verify the availability of replacement parts.

Note: Some vehicle makers recommend against straightening engine cradles. Refer to the vehicle maker's body repair manual for repair recommendations.



6. Personnel Safety

6.1 General Safety

General safety information is in **PS01**.

6.2 Straightening Safety

Straightening safety information is in **ST11**.



7. Environmental Safety

Does not apply.



8. Vehicle Protection

8.1 Stress-Relieving

If heat is used for stress-relieving, use temperature-measuring methods as described in **ST01S**.

Note: Some vehicle makers recommend against the use of heat for stress-relieving.

8.2 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.
- Carefully remove computer modules from the weld area when welding within 300 mm (12"), or a greater distance when recommended by the vehicle maker.
- Protect computer 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.

Remove the battery if it is in an area to be heated or welded.

8.3 Adjacent Areas

Protect glass, upholstery, and other cosmetic surfaces from welding, grinding, or cutting sparks. Remove interior trim and adjacent parts that cannot be protected.



9. Repair Procedure

9.1 Straightening

To straighten an engine cradle:

- 1. Make sure the vehicle is properly anchored to the straightening system.
- 2. Make underhood measurements to determine the location of the upper structure.
- 3. Make underbody and upperbody measurements to determine the location of the surrounding structure.
- 4. Use multiple pulls and stress-relieving to return the engine cradle and surrounding structure to proper dimensions. Follow the repair and tolerance recommendations of the vehicle maker. If no recommendations are given, use a tolerance of ± 3 mm ($\frac{1}{8}$ "). Use a three-dimensional measuring system and adjacent panels to verify that the part is properly aligned.
- 5. If heat is used for relieving stress, follow the vehicle maker's temperature and time recommendations.
Note: Some vehicle makers recommend against the use of heat for stress-relieving.
- 6. Plan to replace any areas that are kinked, have stress cracks, or develop cracks during straightening. If replacement is required, see **9.2.** and **9.3.**
- 7. Apply corrosion-resistant primer to all interior and exterior surfaces and other areas damaged by the collision, repairs, or anchoring.
- 8. Apply anti-corrosion compounds to all enclosed areas.
- 9. Refinish areas damaged by the collision, repairs, or anchoring, as required to restore the appearance.
- 10. Continue vehicle reassembly.

9.2 Engine Cradle Removal

To remove an engine cradle:

- 1. Perform underbody measurements and adjacent panel alignment and straightening. See **9.1.**
- 2. Support the drivetrain. Follow the vehicle maker's recommendations.
- 3. Remove the engine cradle mounting fasteners. Plan to replace all one-time fasteners. Inspect all fasteners that will be reused.
- 4. Remove the damaged engine cradle. Do not discard any labels until replacements are obtained.

9.3 Engine Cradle Installation

To install an engine cradle:

- 1. Apply corrosion-resistant primer to all interior and exterior surfaces, if necessary.
- 2. Refinish, if necessary to restore the appearance.

(cont'd)



9. Repair Procedure (cont'd)

- 3. Install any braces or brackets that are bolted to the engine cradle. Torque fasteners to the vehicle maker's recommendations.
- 4. Position the engine cradle under the vehicle.
- 5. Reinstall the mounting cushions and fasteners. Some vehicle makers may require the installation of new fasteners. Follow the vehicle maker's recommendations.
- 6. Use a three-dimensional measuring system and adjacent panels to verify that the cradle is properly aligned.
- 7. Torque all fasteners to the vehicle maker's recommendations.
- 8. Reconnect all drivetrain parts.
- 9. Recheck the cradle alignment using the measuring system and adjacent panels.
- 10. Apply anti-corrosion compounds to all enclosed areas.
- 11. Continue vehicle reassembly.



10. Use Of Recycled (Salvage) Parts

10.1 Inspection Of Salvage Parts

Do not install a salvage engine cradle having any of these defects:

- unrepairable damage
- corrosion that has caused pitting
- improper previous repairs
- missing mounting locations

10.2 Preparation Of Salvage Parts

To prepare a salvage engine cradle for installation:

- Clean the part to remove dirt, wax, grease, undercoatings, corrosion, etc.
- Replace any damaged brackets or other hardware.



11. Inspection And Testing

11.1 Inspection Of A Repaired Or Replaced Engine Cradle

Inspect a repaired or replaced engine cradle for these conditions:

- dimensional alignment
- proper fastener replacement and torque
- proper finish appearance and film thickness
- proper application of anti-corrosion compound

Correct any defects.

A suspension alignment is required after repairing or replacing an engine cradle.