



ST01S

Stress-Relieving Heat Limitations

**Uniform
Procedures For
Collision Repair
UPCR**

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v.4.0



1. Description

This procedure describes methods and inspection requirements for using heat to relieve stress in steel.



2. Purpose

The purpose of this procedure is to provide requirements for performing high-quality stress-relieving of steel using heat. This procedure is intended for use by professionals who are qualified through training and experience.

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



3. Referenced Documents

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

3.1 Procedures

- CP01S Corrosion Protection
- PS01 Personnel Safety
- RF01S Surface Preparation
- ST11 Structural Straightening
- ST21S Metal Repair

3.2 Other Information

- Equipment-specific information
- Product-specific information
- Vehicle-specific repair information



4. Equipment And Material Requirements

4.1 Heat Sources

The use of these heat sources is included in this procedure:

- oxyacetylene torch
- propane torch
- butane torch
- adjustable heat gun

4.2 Temperature Indicators

The use of these temperature indicators is included in this procedure:

- heat sticks or crayons
- thermal paints
- DVOM with a temperature probe
- non-contact infrared heat probe



5. Damage Analysis

Does not apply.



6. Personnel Safety

6.1 General Safety

General safety information is in **PS01**.

6.2 Burns

To avoid burns when applying heat:

- Wear protective gloves and clothing.
- Wear safety glasses.
- Do not handle metal parts until they have cooled.

6.3 Metal Fumes

Wear a chemical fume respirator when heating galvanized steel. Work in a properly ventilated area.



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.
- Carefully remove computer modules when welding or heating 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 near an area to be heated.

8.2 Flammable Parts

To protect flammable parts:

- Remove interior trim, headliners, upholstery, and other parts that may be exposed.
- Avoid applying flame to labels. Do not discard any labels until replacements are obtained.
- Do not apply flame or excessive heat to fuel system parts, fuel, or other flammable liquids.
- To avoid an explosion, do not apply flame near a battery.
- Keep a fire extinguisher in the work area while applying heat.

8.3 Adjacent Areas

Avoid heating adjacent, undamaged areas.



9. Repair Procedure

9.1 Relieving Stress With Heat

Follow the vehicle maker's recommendations for the use of heat when stress-relieving steel.

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

To relieve stress in steel:

- 1. Clean the damaged area to bare metal. Avoid removing any zinc coating.
- 2. Use temperature indicators to avoid exceeding the vehicle maker's critical temperature recommendation.
- 3. Follow the instructions with the temperature indicators to obtain proper temperature readings. If using a heat gun, set it to the desired temperature.
- 4. Apply heat while the pulling force is applied. If the temperature indicator is applied to the front side, direct the heat away from the temperature indicator. Use the proper hammering method while using heat, to assist in relieving stress. Stop heating before the critical temperature is reached. Do not exceed the vehicle maker's cumulative heating time limit.
- 5. Allow the metal to cool naturally.
- 6. Follow the vehicle maker's recommendations for repeated heating.
- 7. Restore corrosion protection to the repair area.



10. Use Of Recycled (Salvage) Parts

Does not apply.



11. Inspection And Testing

11.1 Inspection Of Repaired Area

Inspect the repaired area for any of these defects:

- cracks, in and around the repair area
- signs of oxidation or scaling, especially on the back side
- signs that corrosion protection was not restored

Note: A dye penetrant may aid in locating minor stress cracks in the repair area.

Correct any defects. If there are cracks, replacement may be required. Follow repair or replacement recommendations described in **ST11**.