

# CS01A

# Radiator Core Support, Welded-On



## 1. Description

This procedure describes the repair and complete or partial replacement of a welded aluminum radiator core support. 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 welded aluminum radiator core supports. 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

- CP01A Corrosion Protection
- EM01 Emission Label
- HM01 Hazardous Materials
- ME01 Three-Dimensional Measuring
- PS01 Personnel Safety
- RF01A Surface Preparation
- RF41 Finish Application
- ST01A Stress-Relieving Heat Limitations
- ST11 Structural Straightening
- WE01A GMA (MIG) Plug Weld
- WE11A GMA (MIG) Fillet Weld

### 3.2 Other Information

- Equipment-specific information
- Product-specific repair information
- Vehicle-specific dimension specifications
- Vehicle-specific repair information



## 4. Equipment And Material Requirements

### 4.1 Welding Equipment

Use GMA (MIG) welding equipment as described in **WE01A** or **WE11A**.

### 4.2 Welding Filler Wire

Welding filler wire must be compatible with the base metal alloy being joined. See **WE01A** or **WE11A**.

### 4.3 Straightening And Measuring Equipment

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

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

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## 4. Equipment And Material Requirements (cont'd)

### 4.4 Special Equipment

Use tools and materials, such as abrasives, that are designated for use only on aluminum, to avoid surface contamination.

A stainless steel wire brush, dedicated for use on aluminum, is recommended for cleaning aluminum before making a weld.



## 5. Damage Analysis

### 5.1 General Damage

Inspect a welded radiator core support and adjacent parts for these types of damage:

- visible damage
- corrosion
- dimensional misalignment
- misalignment with adjacent panels
- improper previous repairs

### 5.2 Mounting Locations

Inspect for damage at mounting locations, such as these:

- airbag impact sensors
- energy absorbers
- air conditioning condenser
- radiator
- headlamps
- hood latch
- engine
- suspension locations

Determine how much of the core support can be straightened and the portion that must be replaced. Verify the availability of replacement parts. Partial replacement should be made only at factory seams, unless otherwise directed by the vehicle maker.

Note: Some vehicle makers recommend against welding tears in aluminum alloys.



## 6. Personnel Safety

### 6.1 General Safety

General safety information is in **PS01**.

### 6.2 Pulling Safety

Pulling safety information is in **ST11**.

### 6.3 Welding Safety

Welding safety information is in **WE01A** or **WE11A**.

### 6.4 Safety With Power Tools And Electrical Equipment

Power tool and electrical equipment safety information is in **ST21A**.



## 7. Environmental Safety

Hazardous material safety information is in **HM01**.



## 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 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 welded or heated.

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## 8. Vehicle Protection (cont'd)

### 8.2 Adjacent Areas

Protect glass, upholstery, and other cosmetic surfaces from welding, grinding, or cutting sparks.

### 8.3 Aluminum Surfaces

To prevent damaging aluminum surfaces:

- Ensure that all tools are cleaned before, or are dedicated for, use on aluminum.
- Use an orbital or dual-action sander. Do not use a hand-held grinder.
- Use 80-grit or finer, open-coat sanding discs.
- Use foam backing pads instead of stiff backing pads.
- Apply less pressure than when sanding steel.
- Do not sand continuously in the same area.
- Keep sanding discs and other abrasives separate from those used for steel repairs.
- Make sure the faces and edges of metal hammers and dollies are smooth and polished and have rounded edges.
- Make sure the points of picks are not sharp. File or grind the tips until they are rounded or flat. An option is to use a tip made of rubber or plastic, or cover the tip with tape.
- Use a dull file.
- Do not use shrinking hammers.

### 8.4 Galvanic Corrosion

Avoid galvanic corrosion of aluminum parts by following the procedures in **CP01A**.

To prevent galvanic corrosion when straightening aluminum parts:

- Thoroughly remove steel particles from power tools before use.
- Keep hand tools separate from those used for steel repairs.
- Keep sanding discs and other abrasives separate from those used for steel repairs.

### 8.5 Use Of Heat

The application of heat on nonheat-treatable aluminum alloys can greatly reduce their strength. To avoid weakening nonheat-treatable alloys, follow the vehicle maker's recommendations for applying heat to aluminum parts. If heat is used during aluminum repairs, stay within the recommended temperatures to prevent permanent loss of strength. Use a minimum of 200° C (400° F), and a maximum of 300° C (570° F), unless otherwise directed by the vehicle maker.

If heat is used for stress-relieving, use temperature-measuring methods as described in **ST01A**.

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



## 9. Repair Procedure

### 9.1 Straightening

To straighten a welded aluminum radiator core support:

- 1. Remove or reposition the radiator, fan shroud, lamps, and other parts required for access or to prevent damage.
- 2. Make sure the vehicle is properly anchored to the straightening system.
- 3. Make underbody and upperbody measurements to determine the location of the radiator core support.
- 4. Make underhood measurements to determine the locations of the airbag sensor mounting locations, if specified by the vehicle maker.
- 5. Use multiple pulls and stress-relieving to return the radiator core support and the surrounding structure to proper dimensions. Follow the tolerance recommendations of the vehicle maker. If no recommendations are given, use a tolerance of  $\pm 3$  mm ( $\frac{1}{8}$ "). Use a three-dimensional measuring system to verify that the part is properly aligned.
- 6. If heat is used for relieving stress, follow the vehicle maker's temperature and time recommendations.
- 7. Replace any areas that are kinked, have stress cracks, or develop cracks during straightening. Use a dye penetrant to check the repair area for cracks, only if recommended by the vehicle maker. If complete core support replacement is required, see **9.2** and **9.3**. For partial replacement, see **9.4** and **9.5**.
- 8. Apply corrosion-resistant primer to all interior and exterior surfaces damaged by the collision, repairs, or anchoring.
- 9. Apply seam sealers as required to seal the joints and restore the appearance. Reprime if required by the product maker.
- 10. Apply anti-corrosion compounds to all enclosed areas.
- 11. Refinish areas damaged by the collision, repairs, or anchoring, as required to restore the appearance.
- 12. Transfer or install replacement parts such as the fan shroud, radiator, latch assembly, etc. Include spacers, washers, isolators, etc. required to prevent contact between dissimilar metals.
- 13. Install any labels previously removed.
- 14. Continue vehicle reassembly.

### 9.2 Complete Removal

To remove a complete welded aluminum radiator core support:

- 1. Remove or reposition any mechanical or electrical parts required for access or to prevent damage.
- 2. Perform underbody and upperbody measurements, and adjacent panel alignment and straightening. See **9.1**.
- 3. Locate and mark all spot weld locations.

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## 9. Repair Procedure (cont'd)

- ❑ 4. Drill out the spot welds. Do not damage any panels which are not to be replaced. Use the proper size and type of spot weld cutter.
- ❑ 5. Remove the damaged radiator core support. Keep any labels that are attached to the radiator core support. Do not discard any labels until replacements are obtained.
- ❑ 6. Remove any burrs or spot weld nuggets from the mating flanges, and repair any damage.
- ❑ 7. Straighten the mating panel edges, if required to ensure a proper fit-up with the replacement core support.

### 9.3 Complete Installation

To install a complete replacement welded aluminum radiator core support:

- ❑ 1. Verify that the proper parts are being installed by checking the part number and performing a trial fit.
- ❑ 2. Clean the mating surfaces with the proper surface cleaner.
- ❑ 3. Use a stainless steel brush, designated for use on aluminum only, to remove aluminum oxide from the weld locations.
- ❑ 4. Refer to the vehicle maker's recommendation for the location, number, and size of plug weld holes. If no recommendations are available, punch or drill 10 mm ( $\frac{3}{8}$ " ) holes in the outer panel at the same locations used originally by the vehicle maker.
- ❑ 5. Test-fit the replacement core support, straighten and align the weld surfaces, and clamp or securely hold the core support in place.
- ❑ 6. Use a three-dimensional measuring system and adjacent panels to verify that the core support is properly aligned.
- ❑ 7. Remove the replacement core support from the vehicle.
- ❑ 8. Apply weld-bond adhesive when recommended by the vehicle maker. Avoid applying the adhesive in the weld areas.
- ❑ 9. Position the core support on the vehicle and clamp it in place.
- ❑ 10. Verify that the core support is properly aligned.
- ❑ 11. Tack weld, or securely hold, the core support in position.
- ❑ 12. Recheck the alignment.
- ❑ 13. Make test welds, before welding on the vehicle, using the same type and thickness metal that will be welded on the vehicle. Make the test welds in the same position as the welds on the vehicle. Visually inspect and destructively test the welds before welding on the vehicle.
- ❑ 14. Make the required welds. Make all fillet welds as long as possible, without causing heat distortion, to avoid cold start defects.
- ❑ 15. Use the three-dimensional measuring system to verify that the core support is still properly aligned.
- ❑ 16. Dress the welds, if required.
- ❑ 17. Apply corrosion-resistant primer to all interior and exterior surfaces damaged by the collision, repairs, or anchoring.

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## 9. Repair Procedure (cont'd)

- 18. Apply seam sealers, if required to seal the joints and restore the appearance. Reprime if required by the product maker.
- 19. Apply anti-corrosion compounds to all enclosed areas.
- 20. Refinish areas damaged by the collision, repairs, or anchoring, as required to restore the appearance.
- 21. Transfer or install replacement parts such as the fan shroud, radiator, latch assembly, etc. Include spacers, washers, isolators, etc. required to prevent contact between dissimilar metals.
- 22. Install any labels previously removed.
- 23. Continue vehicle reassembly.

### 9.4 Partial Removal

To remove the damaged portion of the welded aluminum radiator core support assembly for partial replacement:

- 1. Remove or reposition any mechanical or electrical parts required for access or to prevent damage.
- 2. Perform underbody and upperbody measurements, and adjacent panel alignment and straightening. See 9.1.
- 3. Locate and mark the spot weld locations on the portion to be removed.
- 4. Drill out the spot welds. Do not damage the parts that are attached to the radiator core support if they are not to be replaced. Use the proper size and type of spot weld cutter.
- 5. Remove the damaged portion of the core support from the vehicle. Keep any labels that are attached to the part. Do not discard any labels until replacements are obtained.
- 6. Remove any burrs or spot weld nuggets from the mating surfaces, and repair all damage.

### 9.5 Partial Installation

To install a portion of the welded aluminum radiator core support assembly:

- 1. Verify that the proper parts are being installed by checking the part number and performing a trial fit.
- 2. Clean the mating surfaces with the proper surface cleaner.
- 3. Use a stainless steel brush, designated for use on aluminum only, to remove aluminum oxide from the weld locations.
- 4. Refer to the vehicle maker's recommendation for the location, number, and size of plug weld holes. If no recommendations are available, punch or drill 10 mm ( $\frac{3}{8}$ " ) holes in the outer panel at the same locations originally used by the vehicle maker.
- 5. Test-fit the partial core support, straighten and align the weld surfaces, and clamp the partial core support in place.
- 6. Use a three-dimensional measuring system and adjacent panels to verify that the core support is properly aligned.

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## 9. Repair Procedure (cont'd)

- 7. Remove the partial core support from the vehicle.
- 8. Apply weld-bond adhesive when recommended by the vehicle maker. Avoid applying the adhesive in the weld areas.
- 9. Position the partial core support on the vehicle and clamp it in place.
- 10. Verify that the partial core support is properly aligned.
- 11. Tack weld, or securely hold, the parts in position.
- 12. Recheck the alignment using the measuring system and the adjacent panels.
- 13. Make test welds, before welding on the vehicle, using the same type and thickness metal that will be welded on the vehicle. Make the test welds in the same position as the welds on the vehicle. Visually inspect and destructively test the welds before welding on the vehicle.
- 14. Make the required welds. Make all fillet welds as long as possible, without causing heat distortion, to avoid cold start defects.
- 15. Use the three-dimensional measuring system to verify that the core support is still properly aligned.
- 16. Dress the welds, if required.
- 17. Apply corrosion-resistant primer to all interior and exterior surfaces damaged by the collision, repairs, or anchoring.
- 18. Apply seam sealers, if required to seal the joints and restore the appearance. Reprime if required by the product maker.
- 19. Apply anti-corrosion compounds to all enclosed areas.
- 20. Refinish areas damaged by the collision, repairs, or anchoring, as required to restore the appearance.
- 21. Transfer or install replacement parts such as the fan shroud, radiator, latch assembly, etc. Include spacers, washers, isolators, etc. required to prevent contact between dissimilar metals.
- 22. Install any labels previously removed.
- 23. Continue vehicle reassembly.



## 10. Use Of Recycled (Salvage) Parts

### 10.1 Salvage Parts Requirements

Do not install a salvage aluminum core support having any of these defects:

- unrepairable damage
- corrosion that has caused pitting
- improper previous repairs

### 10.2 Preparation Of Salvage Parts

To prepare salvage parts for installation:

- Make any necessary repairs.
- Trim the parts to fit.
- Remove all heat-affected zones.
- Make sure the part is not deformed along the weld joints.
- Remove any corrosion.



## 11. Inspection And Testing

### 11.1 Inspection Of A Repaired Or Replaced Aluminum Welded Core Support

Inspect a repaired or replaced aluminum welded core support for these conditions:

- dimensional alignment
- weld quality
- proper application of corrosion protection
- proper finish appearance and film thickness
- proper replacement of all labels