

## Uniform Procedures For Collision Repair

# WE51 S—Squeeze-Type Resistance Spot Weld

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v.2.3



## 1. Description

This procedure describes methods for making and evaluating **squeeze-type resistance spot welds (STRSW)** on automotive sheet steel.



## 2. Purpose

The purpose of this procedure is to provide industry-accepted requirements for producing high-quality squeeze-type resistance spot welds on automotive steel, only when recommended by the vehicle maker. 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**

- PS01 Personnel Safety
- WE01S GMA (MIG) Plug Weld

#### **3.2 Other Information**

- AWS D8.7-88R Recommended Practices For Automotive Weld Quality—Resistance Spot Welding
- Equipment-specific information
- Vehicle-specific repair recommendations



## 4. Equipment And Material Requirements

### 4.1 STRSW Tip Diameter

Most vehicle makers recommend using an electrode tip that is approximately 3 mm ( $\frac{1}{8}$ ") greater than the total weld thickness. Follow the vehicle maker's recommendations. Use a tip-dressing tool to reshape and clean the tips.

Note: Do not use STRSW for welds with a total thickness greater than 3 mm ( $\frac{1}{8}$ ").



## 5. Damage Analysis

Does not apply.



## 6. Personnel Safety

### 6.1 General Safety

General safety information is in **PS01**.

### 6.2 Electric Shock

STRSW uses high voltage and current, which can be fatal. To reduce the hazard:

- Set the welding machine according to the equipment maker's instructions.
- Make sure cables and wires are in good condition.
- Make sure connections are in good condition.
- Never place the welding machine in a wet area.
- Never stand in a wet area when welding.
- Do not cool the tips by immersing them in water.
- Inspect all welding machine plugs and receptacles before each use.

### 6.3 Fumes

To minimize exposure to welding fumes:

- Wear an approved welding respirator.
- Use a welding fume extractor.
- Provide ventilation with a fan or other air circulator. A source of fresh air is necessary.

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## 6. Personnel Safety (cont'd)

### 6.4 Sparks

To help prevent burns and damage from welding sparks:

- Wear safety glasses with side shields, under the face shield.
- Wear protective clothing with long sleeves and no shirt or pant cuffs. Fasten shirt top button when welding.
- Wear leather gloves and leather cape welding sleeves.
- Do not touch hot metal or equipment.
- Wear high-top leather shoes or boots.
- Make sure clothing and shoes are free from oil, grease, or other flammable materials.
- Remove all flammable materials from the area to be welded.
- Do not carry matches or butane lighters in pockets.
- Do not weld near parts that may contain fuel or other flammable materials.
- Keep a fire extinguisher nearby while welding.



## 7. Environmental Safety

Does not apply.

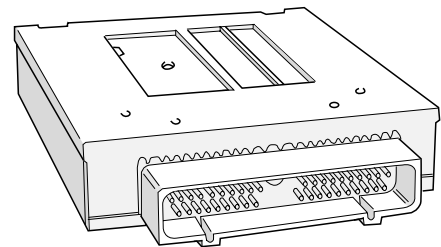


## 8. Vehicle Protection

### 8.1 Protection Of 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 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.



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## 8. Vehicle Protection (cont'd)

- ❑ 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.

### 8.2 Cosmetic Surfaces

Do not allow welding sparks to damage painted surfaces, upholstery, or glass. To protect these surfaces:

- ❑ Use welding blankets on surfaces that can be covered.
- ❑ Remove or cover interior trim, headliners, upholstery, and other parts exposed to sparks.

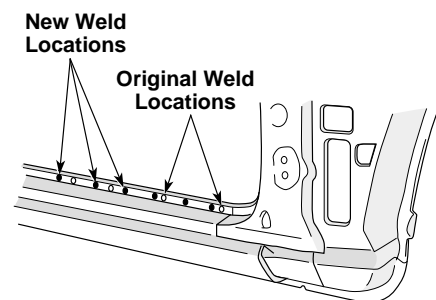


## 9. Repair Procedure

### 9.1 STRSW Procedure

To make a repair with STRSW:

- ❑ 1. Verify that the vehicle maker recommends STRSW for use at the repair location. If not, use GMA (MIG) **plug welds**.
- ❑ 2. Clean the weld surfaces. Remove paint, undercoating, rust, and dirt. Avoid removing any zinc coating. Refer to the welding machine and vehicle maker's recommendations for preparing **E-coated** panels.
- ❑ 3. Follow the vehicle makers' recommendations for the locations, size, and number of spot welds. If no recommendations are given, locate the welds in the same area, but between the original **spot welds**. See **11.6**.
- ❑ 4. Apply **weld-through primer** to all mating surfaces that do not have zinc coating or where the zinc coating was removed. Follow the vehicle maker's recommendations on the use of weld-through primer. Due to the poor adhesion property of some weld-through primers, it may have to be removed from all exposed surfaces after welding, before applying other coatings and sealants.
- ❑ 5. Clamp the mating surfaces tightly together.
- ❑ 6. Make sample test welds on scrap pieces of the same type and thickness as the parts to be welded. Make the sample welds in the same position as the welds on the vehicle, using weld-through primer if applicable. See **11.1–11.5**.



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## 9. Repair Procedure (cont'd)

- 7. Visually inspect and **destructively test** the sample welds to verify the welder settings and the weld quality. See 11.1–11.5.
- 8. Make the welds on the vehicle.
- 9. **Dress the welds**, if necessary. Do not reduce the thickness of the surrounding sheet metal or remove any zinc coating.



## 10. Use Of Recycled (Salvage) Parts

### 10.1 Preparation Of **Salvage Parts**

To prepare salvage parts for welding:

- Trim the parts to fit.
- Remove all **heat-affected zones**.
- Make sure the parts are not deformed along the weld joints.
- Clean the mating surfaces.



## 11. Inspection And Testing

### 11.1 Test Welds

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, using weld-through primer if applicable. Visually inspect and destructively test the welds before welding on the vehicle. Follow the vehicle maker's or **AWS** recommendations for the type of destructive test to perform.

### 11.2 Visual Inspection

Both sides of the spot welds must meet these requirements:

- no dents greater than 25% of the sheet metal thickness
- no welds contacting the panel edges
- no visible pin holes
- no spatter (A glove should not catch when rubbed across the weld.)

A weld is a failure if any of these requirements is not met.

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## 11. Inspection And Testing (cont'd)

### 11.3 Destructive Chisel Test

To make and destructively test spot welds using a chisel test:

- ❑ 1. Bend one coupon 90° lengthwise and position it over a flat coupon. The coupons must be the same type and thickness metal to be welded on the vehicle.
- ❑ 2. Make two spot welds in the center of the overlap area, using the recommended weld spacing and edge distances.
- ❑ 3. Securely hold the bent coupon in a vise.
- ❑ 4. Drive a chisel between the two welds until the panels separate. Do not allow the chisel to contact either weld **nugget**.
- ❑ 5. Measure the diameter of the nugget hole. The minimum acceptable hole diameter is 3 mm ( $\frac{1}{8}$ ").



### 11.4 Destructive Peel Test

To make and destructively test spot welds using a peel test:

- ❑ 1. Position one coupon on top of another coupon. The coupons must be the same type and thickness metal to be welded on the vehicle.
- ❑ 2. Make one spot weld in the center on one end, using the recommended edge distance.
- ❑ 3. Separate the coupons enough to enable the bottom coupon to be secured in a vise.
- ❑ 4. Use locking pliers to peel the top coupon from the bottom coupon.
- ❑ 5. Measure the diameter of the nugget hole. The minimum acceptable hole diameter is 3 mm ( $\frac{1}{8}$ ").



### 11.5 Destructive Twist Test

To destructively test spot welds using a twist test:

- ❑ 1. Overlap two coupons at 90° to each other. The coupons must be the same type and thickness metal to be welded on the vehicle.
- ❑ 2. Make one weld in the center of the overlap area.
- ❑ 3. Securely hold the bottom coupon in a vise.
- ❑ 4. Twist the top coupon off the bottom coupon.
- ❑ 5. Measure the diameter of the nugget hole. The minimum acceptable hole diameter is 3 mm ( $\frac{1}{8}$ ").



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## 11. Inspection And Testing (cont'd)

### 11.6 Weld Size And Location Parameters

The table below gives examples of recommended weld size, spacing, joint overlap, and edge distance, for various weld thicknesses. Verify that the welds were made following the vehicle maker's recommendations, including the location, size, and number of spot welds.

Total Weld Thickness	Minimum Weld Diameter	Minimum Weld Spacing	Minimum Joint Overlap	Minimum Edge Distance
.6 mm (.024")	3.6 mm (.14")	10 mm (.39")	11 mm (.43")	5 mm (.20")
.8 mm (.031")	3.8 mm (.15")	14 mm (.55")	11 mm (.43")	5 mm (.20")
.9 mm (.035")	3.9 mm (.15")	16 mm (.63")	12 mm (.47")	5 mm (.20")
1.0 mm (.039")	4.0 mm (.16")	18 mm (.71")	14 mm (.55")	6 mm (.24")
1.2 mm (.047")	4.2 mm (.17")	22 mm (.87")	14 mm (.55")	7 mm (.28")
1.4 mm (.055")	4.4 mm (.18")	24 mm (.94")	16 mm (.63")	8 mm (.32")