

**ALUMINUM RESISTANCE SPOT WELDING ACCEPTANCE TEST FOR WELD THROUGH ADHESIVES AND SEALERS****Application**

This procedure is used as a welding qualification test for automobile body adhesives and sealers which are used in bead form. It does not apply to protective film spray sealers. The procedure outlined herein is specific to a given aluminum alloy + pretreatment + lubricant + heat treatment + adhesive system from a specific supplier(s). The aluminum alloy and gauge + pretreatment + lubricant + heat treatment system employed for this weldability assessment must have already been pre-qualified using FLTM BB 117-01.

Chemicals, materials, parts, and equipment referenced in this document must be used and handled properly. Each party is responsible for determining proper use and handling in its facilities.

Equipment Required**Resistance Spot Welder**

This test shall be conducted using a Medium Frequency Direct Current (MFDC) inverter combined with servo-actuated force including force feedback and servo-inverter synchronization. The weld gun shall be capable of electrode forces up to 10 kN. It shall be equipped with a Ford approved aluminum resistance welding control and gun. The weld controller shall have current capacities to meet the requirements of the range of material to be tested at a minimum rate of 10 welds per minute. The welder must be equipped with electrode holders capable of sufficient water flow capacity so that a minimum of 2.0 gal/min will flow through each electrode holder with a 20 psi pressure differential. In addition, other cooling circuits (e.g. transformer, secondary conductors, and control panel) must meet the minimum manufacturer-specified flow rates and temperature requirements at the requisite duty cycle.

Welding Electrodes

Ford standard male, 3/4", "hi water flow" electrode caps, with two inch radius face (Ford part number: WC11R263), as specified in WC1-002, will be used for all tests. The electrode caps must be made from RWMA Class 2 CuCr (ISO Type A2/1) material, unless otherwise specified by the Ford Vehicle Operations Joining Supervisor. The electrode caps, adapters and holders to be used will be found under the following standards:

Identification	Ford Standard	Designation
Electrode Cap	WC1-002	WC11R263-A2/1
Cap Adapter	WB1	WB1S36-1XX

Knife Edge Caliper

Mitutoyo Absolute Digimatic Model No. CD-6"CSX or equivalent is required to measure weld button diameter.

Instrumentation

Calibrated Miyachi Weld Tester MM-380A or equivalent, capable of simultaneous measurement of force AND current and/or voltage, is required to set up and document weld schedule and test results.

Test Panels

Two sets of test panels shall be prepared—one using 1.0 mm 5ST (5754-O) and one using 1.0 mm 6HS1 (6111-T4). The supplier + pretreatment + lubricant + heat treatment material system shall exactly match

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that pre-qualified using FLTM BB 117-01. For each substrate, the material shall be sheared into 87 coupons measuring 25 mm x 76 mm and 15 panels measuring 175 mm x 76 mm. All coupons shall be clean and free from burrs or ragged edges that might provide a shunt path for the welding current.

Additional coupons shall be sheared to 25 mm x 76 mm for setup.

Conditioning and Test Conditions

All test values indicated herein are based on material conditioned in a controlled atmosphere of 23 °C +/- 2 °C and 50% +/- 5% relative humidity for not less than 24 hours prior to testing and tested under the same conditions unless otherwise specified.

Procedure

Equipment Setup

The electrode caps shall be installed in the machine so that they are in precise alignment in the vertical plane and their welding faces are parallel under the electrode force requirement for the thickness of the material under test.

Test Setup Procedure

The following procedural details shall be followed during the test setup:

- (1) Initial weld schedules are determined during substrate material pre-qualification using FLTM BB 117-01 but must be confirmed on coupons prior to commencing this *Welding Acceptance Test for Weld Through Adhesives and Sealers*.
- (2) Steps (1) – (8) in the *Test Setup Procedure* section of FLTM BB 117-01 are to be followed using the 25 mm x 76 mm setup coupons without adhesive, as shown in Figure 1.
- (3) If the requisite setup button diameter is not achieved, weld current and / or weld time may be modified. Any significant weld schedule adjustments (i.e. > ±2 kA, > ±10 ms) must be approved by the Vehicle Operations Joining Supervisor.
- (4) The set points as well as the actual delivered values of secondary current, weld time, and electrode force are to be documented.
- (5) After establishing the proper weld button diameter, electrode caps are to be changed and dressed and the test commenced without any additional modifications to the weld schedule.

Preparation of Test Panels

For each substrate, prepare 3 sets of 5 coupon assemblies with 4.0 mm +/- 0.8 mm beads of adhesive / sealer as shown in Figure 2. Test 1 set of 5 assemblies immediately. Age 1 set of 5 assemblies for 30 days at 23°C +/- 2°C. Age the final set of 5 assemblies for 30 days at 40 °C +/- 2 °C. Note that the tape at the top and bottom edges of the panels is to ensure that there is no contact of bare metal to provide a shunt path.