

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

This procedure is used to determine the flammability characteristics of adhesives and sealers when exposed to a spot welding cycle as described in this test. 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 flammability 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. A standard single point press type welder having a low inertia head or equivalent shall be used. Welder shall be operated in constant current mode.

Welding Electrodes

Two Ford standard male, 3/4", "hi water flow" electrode caps, with 6.4 mm face diameter and 45° truncated cone nose (Ford part number WC11A26B), as specified in WC1-002, shall be used for all tests. The electrode caps must be made from RWMA Class 2 material (ISO Type A2/X).

Knife Edge Caliper

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

Instrumentation

A calibrated current meter and force gage is required to document weld schedules.

Test Panels

Test panels shall be 1.0 mm 5754-O aluminum. The supplier + pretreatment + lubricant + heat treatment material system submitted shall exactly match that pre-qualified using FLTM BB 117-01. The material shall be sheared into 5 test panels measuring 38 mm x 450 mm and 5 test panels measuring 16 mm x 450 mm. All panels shall be clean and free from burrs or ragged edges that might cause localized heating at the edges of the test panel.

Test setup strips shall be sheared to 25 mm x 300 mm.

Date	Action	Revisions	Rev. 0
2014 04 01	Released	E. Hetrick / W. Moision / K. Lazer	



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) Dress or replace electrodes prior to commencing setup and after every 5 setup strips. Top and bottom electrode cap faces shall be dressed to clean, fresh copper at each dress interval.
- (2) For setup, adjustments shall be made to obtain the weld schedule specified in Table 1:

Electrode force	2500 N
Weld time	83 ms

Table 1. Weld schedule for setup of button diameter

- (3) Using 25 mm x 300 mm test strips, make six welds on the centerline approximately 35 mm–50 mm apart, as shown in Figure 1.

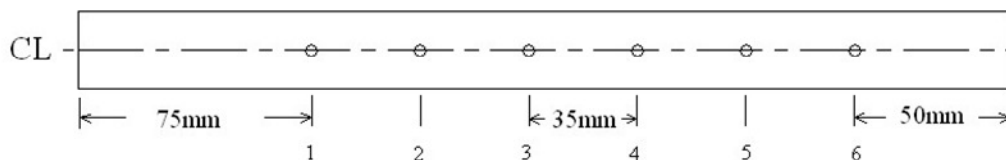


Figure 1. 25 mm x 300 mm test strip with 6 welds at 35 mm spacing

- (4) Do not measure the first weld on each test strip (the “shunt weld”).
- (5) Measure the minimum and maximum diameter of the remaining five weld buttons using a knife-edge calipers in a destructive test as shown in Figure 2 and Figure 3. The teardown weld diameter is the average of the smallest (d_{min}) and the largest (d_{max}) diameter of fused material, $(\frac{d_{min} + d_{max}}{2})$. The ratio between d_{max} and d_{min} is not to exceed 2:1. Note that only button / plug diameter is to be measured during setup. Partial thickness and interfacial fracture areas are not to be included in averages. Only a trained and certified operator shall characterize and measure weld buttons.