

**CALIFORNIA DEPARTMENT OF TRANSPORTATION
AUTHORIZATION PROCEDURE FOR RESISTANCE (FLASH) WELDED HOOPS
USING ASTM A706 REINFORCING STEEL**



- I. The supplier provides the following information for authorization and reauthorization:
 - A. Quality Control (QC) procedures for materials and manufacturing process. As a minimum, the QC manual shall include the following:
 1. The pre-production procedures for the qualification of materials and equipment.
 2. Quality Control procedures during production. (This should include regular maintenance schedules, tensile testing to verify the material and welding machine.)
 3. The calibration procedures and calibration frequency for all equipment.
 4. A signed welding procedure for each bar diameter and for each welding machine used. The resistance welding procedure must include:
 - a. Welding machine's model name/number
 - b. Welding machine's serial number
 - c. Name and signature of Quality Manager or person responsible for the quality control of resistance welding
 5. All pertinent information needed to set up the equipment, including:
 - a. Program settings
 - b. Percent heat input
 - c. Cycle time settings
 - d. Any other necessary adjustments required to successfully perform the resistance welding process
 6. A system for the identification and tracking of each lot and group of materials. Material traceability shall include heat number, lot number, group number and mill certificates. The system shall have provisions for permanently identifying each lot, group and the parameters during fabrication
 - B. Test reports from an Independent Authorized Testing Laboratory, for each rebar size and diameter size, verifying that the product meets Caltrans specifications in Section 52 of the Caltrans Standard Specifications. A list of Authorized Laboratories can be found at:

http://www.dot.ca.gov/hq/esc/Translab/authorized_laboratories_list/

- C. Mail the required paperwork to:

**Division of Materials Engineering and Testing Services – MS #5
Attention: Structural Materials Testing Branch
5900 Folsom Boulevard
Sacramento, CA 95819**

- D. Caltrans will inform you when the review is complete. If approved, you will be instructed to send in a (TL-38) request for a Caltrans inspector to review and witness the welding procedure. TL-38 Forms can be found at:

<http://www.dot.ca.gov/hq/esc/Translab/OSM/smbforms.htm>

**CALIFORNIA DEPARTMENT OF TRANSPORTATION
AUTHORIZATION PROCEDURE FOR RESISTANCE (FLASH) WELDED HOOPS
USING ASTM A706 REINFORCING STEEL**



E. For authorization, the hoops shall be resistance welded in the presence of a Caltrans inspector. After welding 15 consecutive samples, the inspector shall randomly select 10 specimens to be submitted to the Caltrans laboratory. The number of small and/or large diameter hoops to be submitted to the Caltrans laboratory for testing shall be:

1. 10 resistance welded hoops/partial hoops for **each rebar size, hoop diameter and for each welding machine used.** (When authorization is requested for a range of rebar sizes using the same welding machine, samples are only required for the smallest, mid-range, and largest rebar size. Welds should be located at the midpoint and minimum lengths are shown in the table below.)

Size of Rebar	Minimum Length Required
#3 - #9	4 feet
#10 - #18	6.5 feet

F. Retests: If any of the sizes fail, authorization will be limited to the sizes that pass and not the full range of sizes. Retest is allowed, in case of failure of any of the rebar sizes. Retesting will require that specimens from the next in size above and below the failed rebar size also be tested. If a re-test fails, each rebar size shall be tested and a **Splice Rejection Report** must be submitted prior to collecting additional samples. The **Splice Rejection Report** should examine and resolve the root cause for the failure and include any corrective actions. Individual re-testing will be allowed if the specimens fail due to a base metal defect.

II. Caltrans Evaluation:

A. Caltrans Testing requirements:

1. Sample misalignment shall not be greater than allowed by AWS D1.4 Sec 4.2.1.
2. Samples must meet the minimum ASTM A706, Grade 60 mechanical specifications.
3. Brittle failure at points where leads have been connected will be cause for rejection.
4. Metallographic examination will be done for 2 samples to determine soundness of the weld. Test results shall meet AWS D1.4 requirements.
5. Cyclical and/or tensile testing will be completed using 8 samples per Test Method CT 670. Upon completion of the cyclical tests, samples shall undergo tensile test to failure. At least six (6) of the eight (8) specimens tensile tested must pass.
 - a. When tested in conformance with the requirements of CT 670, "Necking (Option I)," **rebar hoop diameters greater than 30 inches must fracture outside of the affected zone and show visible necking. Rebar hoop diameters 30 inch and smaller may fracture at any location but must show visible necking.**

**CALIFORNIA DEPARTMENT OF TRANSPORTATION
AUTHORIZATION PROCEDURE FOR RESISTANCE (FLASH) WELDED HOOPS
USING ASTM A706 REINFORCING STEEL**



(Visible necking shall be such that there is a visible decrease in the sample's cross-sectional area at the point of fracture.)

- a. When tested in conformance with the requirements of CT 670, "Necking (Option II)," the sample shall fail anywhere provided that the sample splice has achieved the strain requirement for necking. Strain requirements for Necking Option II are as follows:

Rebar Size	Minimum Strain Required
#10 and smaller	9 %
#11 and larger	6 %

- B. Upon evaluation of results from II.A, Caltrans will issue a rejection letter or an acceptance letter valid for two years and update the Caltrans Authorized List of Resistance Welding Fabricators.
 - C. Re-Authorization is required every two years for each machine and each size of rebar. Samples should follow the requirements of Part I, Sections A - F. Caltrans must be informed if there are any changes to the manufacturing process or if any additional welding machines are going to be used.
- III. For more information, you may contact the Structural Materials Testing Branch at SMTL@dot.ca.gov.