

CALIFORNIA DEPARTMENT OF TRANSPORTATION
AUTHORIZATION PROCEDURES AND ACCEPTANCE CRITERIA FOR MECHANICAL
COUPLERS ON ASTM A706 and ASTM A615 REINFORCING STEEL



For steel reinforcement coupler authorization, refer to section I to III. To maintain authorization, refer to section IV and V.

- I. Manufacturer/Supplier provides:
 - A. Memo requesting authorization testing and authorization for “American Made” or “Foreign Made” coupler systems.
 - B. Brochures, product drawings, and other technical information that indicates:
 1. The model number/name of the product.
 2. Dimensions (drawings to show dimensions and tolerances for all components and assembled coupler)
 3. Materials specifications of all coupler components
 - C. Quality control 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.
 2. The methods and frequencies for performing QC procedures during production.
 3. The calibration procedures and calibration frequency for all equipment.
 4. Documentation of heat treatment or any special manufacturing process (i.e., forging the bar end).
 5. A signed welding procedure (If used in the fabrication process) for each bar diameter and for each welding machine used to weld bar to coupler. The welding procedure must include:
 - a. Welding machine’s model name/number
 - b. Welding machine’s serial number
 - c. All pertinent information needed to set up the equipment
 - d. Any other necessary adjustments required to successfully perform the welding process
 - e. Name and signature of Quality Manager or person responsible for the quality control of welding
 6. A signed coupler assembly/installation procedure to include:
 - a. Torque value(s) (if any) for the coupler.
 7. A system for the identification and tracking of each lot of materials. Material traceability shall include heat number, lot number, and mill certificates. The system shall have provisions for permanently identifying each lot and the parameters during fabrication.
 - D. Test report from a Caltrans Authorized Laboratory for Testing Reinforcing Steel Splices, for each coupler/rebar size, verifying that the product meets Caltrans’ tensile requirements in Section 52 of the Caltrans Standard Specifications. The list of authorized laboratories can be found at:
http://www.dot.ca.gov/hq/esc/Translab/authorized_laboratories_list/

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- E. The number of samples to be submitted to the Caltrans laboratory for testing shall be:
 - 1. Four mechanical splice samples for each rebar size. When qualification is requested for a range of bar sizes, samples are only required for the largest, smallest and the #8 bar.
 - 2. Minimum length required is as follows: 4 ft. for bar #9 or smaller and 6.5 ft. for bar #10 or larger with the mechanical splice located at midpoint.
 - 3. The alignment across the mechanical splice must be straight to within 1/2" per 3 feet of length.
 - 4. Mill certificates for mechanical splice and rebar for each sample and rebar size. Certificates must clearly show where production processes occurred. Production processes include any and all processes that alter the physical form or shape or chemical composition of the material and coating applications (rolling, machining, grinding, drilling, etc.).

- F. Ship the specimens along with the required paperwork to Caltrans' Transportation Laboratory in Sacramento:

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

II. Caltrans will:

- A. Ensure all required documentation and samples are received.

- B. Review the technical information the supplier provides.

- C. Verify that length of coupler is less than 10 times the diameter of the rebar (for ultimate splices).

- D. Verify that misalignment is not greater than allowed by California Test Method 670 (CT 670).

- E. Perform mechanical testing:
 - 1. Slip test—One of the four samples shall be tested for, and shall conform/not exceed the values in the table below. Should this sample not meet the slip requirements a retest will be allowed in which the remaining three samples will be tested and all shall meet the slip requirements, otherwise the splices will be rejected.

Total Slip	
Reinforcing Bar No.	Total Slip (inch)
#4 - #6	0.020
#7 - #9	0.028

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#10 - #11	0.036
#14	0.048
#18	0.060

2. Cyclical and fatigue test per Test Method CT 670—One sample shall be cyclic tested and another fatigue tested and then tensile tested to failure immediately after the cyclic and/or fatigue test.
3. Tensile test per Test Method CT 670—The two remaining samples shall be tensile tested to failure.

F. All samples, after axial loading must:

1. For service splices:
 - a. Exhibit a minimum tensile strength of 80 ksi independently of where the failure occurs.
2. For ultimate splices all bars must:
 - a. Fail in the reinforcing bar but outside the affected zone, provided that the sample splice has visible necking or
 - b. Fail anywhere provided that the sample splice has achieved the strain requirement for necking.
 - c. When tested in conformance with the requirements in California Test 670, "Necking (Option I)," the visible necking shall be such that there is a visible decrease in the sample's cross-sectional area at the point of fracture.
 - d. When tested in conformance with the requirements in California Test 670, "Necking (Option II)," the strain requirement for necking shall be such that the largest measured strain is not less than 6 percent for No. 11 and larger bars, or not less than 9 percent for No. 10 and smaller bars.

G. Upon evaluation of results from II.A to II.F above, issue either an acceptance letter or rejection letter. When authorization is requested for a range of mechanical splices and samples are submitted for the largest, smallest and the #8 bar, and the testing is successful, the fabricator will be authorized for all mechanical splices included between the largest and the smallest size tested. Re-testing, in case of failure of any of these splices, will require that specimens from the next in size above and below the failed mechanical splice also be tested. If a re-test fails, each bar splice size shall be tested. Individual re-testing will be allowed if the specimens fail due to a base metal defect.

H. Update the Caltrans mechanical splices prequalified list, if applicable.

III. **Authorization Expiration Date:**

A. Each authorized coupler will be assigned an expiration date after being authorized. To maintain authorization on the Authorized Materials List, manufacturers must submit documentations/test samples as specified in sections IV and V at least 60 days prior to the expiration date.

IV. **Documentations required to maintain authorization on the AML include the following:**

A. Documents specified in section IA to IB.

CALIFORNIA DEPARTMENT OF TRANSPORTATION
AUTHORIZATION PROCEDURES AND ACCEPTANCE CRITERIA FOR MECHANICAL
COUPLERS ON ASTM A706 and ASTM A615 REINFORCING STEEL



- B. A signed memo to the Department, stating/specifying modifications/revisions (if any) were made to the coupler since authorized by the Department. Revisions include but are not limited to dimensional changes, material specifications, manufacturing and installation process

- V. Upon satisfying the submittal requirements, you may be contacted by the Department to submit 4 test samples for reauthorization testing.

For more information, you may contact the Structural Materials Testing Branch at SMTL@dot.ca.gov