

July 1, 2020

By: _____
FEDERAL HIGHWAY ADMINISTRATION**REINFORCING STEEL**

The 2007 SCDOT Standard Specifications is amended as follows:

Delete every occurrence of "ASTM A 706" and replace with "AASHTO M 31, Type W."

Delete Subsection 703.2.1 in its entirety and replace it with the following:

703.2.1 Reinforcing Bars

Provide reinforcing bars (rebar) and dowels that meet the requirement of AASHTO M 31, Type W with a minimum single yield strength level of 60,000 psi, designated as Grade 60 and are from a source listed on the most recent edition of SCDOT Qualified Product List 60.

Each shipment of rebar delivered to the project must be accompanied by the manufacturer's mill test report for each heat included in the delivery. The mill test report must include the following:

- a. Producer information
- b. Heat number and size of rebar represented by the report
- c. The grade for which the steel qualifies
- d. Tensile test results including yield strength, tensile strength and elongation
- e. Statement ensuring that the steel was melted and manufactured in the United States

703.2.1.1 Quality Assurance (QA) Sample Requirements

Acceptance or rejection of all reinforcing steel, with the exception of those described in **Subsection 703.2.1.3**, is based on samples taken in the field by the SCDOT inspector or observed being taken in field by the SCDOT inspector and tested in conformance with the requirements of AASHTO T 244 by the OMR or an OMR authorized AASHTO accredited testing laboratory. Each sample must include one complete set of the bar's mill markings and must be accompanied by the sample heat's mill test report.

Once a rebar sample is obtained, the sample must remain in the custody of the SCDOT inspector until delivery to the OMR or OMR authorized AASHTO accredited testing laboratory. Samples delivered to the OMR by the contractor will not be accepted.

Any samples failing to meet the requirements of **Subsection 703.2.1** require two check samples of the same heat and rebar size. If either of the check samples fails, the heat represented is not to be used in the work and a sample must be taken from every size of every shipment of rebar produced by the same rebar producer for the remainder of the project.

703.2.1.2 Coiled Rebar

With the exception of Ultimate Butt-Welded Splices and bars included in **Subsection 703.2.1.3**, all rebar shipped in a coiled state from the producer listed on the most recent edition of SCDOT

Qualified Product List 60 must be sampled after mechanical straightening as used in the project. These samples must meet all specifications of AASHTO M 31, Type W as shipped to the project.

703.2.1.3 Reinforcing Bars Exempt from Acceptance Sampling and Testing

With the exception of Ultimate Butt-Welded Splices, reinforcing bars bent prior to shipment to the project that have no straight lengths 5-ft or longer will be accepted based upon a manufacturer's certified mill test report from a rebar producer listed on the most recent edition of Qualified Products List 60.

Delete Subsection 703.2.2 in its entirety and replace it with the following:

703.2.2 Wire and Wire Fabric

703.2.2.1 General

Provide wire and welded wire fabric for concrete reinforcement, either as such or in fabricated form conforming to the requirements of AASHTO M 336.

703.2.2.2 Wire (Non-welded) for Concrete Reinforcement

703.2.2.2.1 Quality Assurance (QA) Sample Requirements

Acceptance or rejection of wire (non-welded) for concrete reinforcement is based on samples taken in the field by the SCDOT inspector or observed being taken in field by the SCDOT inspector and tested in conformance with the requirements of AASHTO T 244 by the OMR or an OMR authorized AASHTO accredited testing laboratory. Each sample must be accompanied by the manufacturer's representative material certification and test report.

Once a wire sample is obtained, the sample must remain in the custody of the SCDOT inspector until delivery to the OMR or OMR authorized AASHTO accredited testing laboratory. Samples delivered to the OMR by the contractor will not be accepted.

Any samples failing to meet the requirements of **Subsection 703.2.1** require two check samples of the same shipment, producer and size. If either of the check samples fails, that size of wire from that producer from that shipment is rejected and not to be used in the work.

703.2.2.3 Welded Wire Fabric for Concrete Reinforcement

703.2.2.3.1 General

Any welded wire fabric provided for use on SCDOT projects must be produced by a manufacturer included on the most recent edition of QPL 85.

703.2.2.3.2 Acceptance Requirements

Acceptance of welded wire fabric for concrete reinforcement will be based upon the manufacturer's material certification and test report. The material certification and test report should indicate if the wires are deformed and the sizes of the wires in both directions. It should also contain the manufacturer's test results demonstrating that the welded wire meets the

requirements of AASHTO M 336 and the strength requirements shown in the plans. The report must also indicate that the steel was melted and manufactured in America.

Delete Subsections 703.2.4 and 703.2.5 in their entirety and replace them with the following:

703.2.4 Mechanical Couplers for Reinforcing Steel

703.2.4.1 General

Use mechanical coupler components that are compatible with the reinforcing bars specified in **Section 703** and manufacture all splices with the mechanical couplers as specified and detailed on the Plans. In selecting a coupler, consider the clearance requirements for correct installation and proper alignment of the reinforcing after installation. Use mechanical couplers listed on the most recent edition of SCDOT Qualified Product List 73 for the category of coupler required.

703.2.4.2 Materials

703.2.4.2.1 General

A LOT of mechanical couplers is defined as 150, or fraction thereof, of the same type of mechanical coupler used for each bar size and each bar deformation pattern that is used in the work. For ultimate mechanical couplers, the length of the coupler must be less than 10 times the nominal bar diameter. Use service couplers only in locations indicated on the design drawings. Ensure that mechanical couplers meet the following specifications when tested with AASHTO M 31, Type W rebar:

- a. Cyclic and Fatigue tests (current version of Caltrans Test 670)
- b. Tensile test (AASHTO T 244) – For ultimate mechanical couplers, a minimum tensile strength of 80 ksi, or 125% of the actual yield strength of the reinforcing bar, whichever is greater. For service couplers, at least 125% of the specified minimum yield strength of the reinforcing bar.
- c. Slip test – according to the table listed in Section 52-6.02B of the 2015 edition of Caltrans Standard Specifications.

703.2.4.2.2 Manufacturer's Certification

Provide to the RCE a certified statement from the manufacturer of each type of mechanical coupler used that includes the following information:

- a. A description of the device, including dimensions, designations, material specifications, and the specific model name.
- b. A description of the method of packaging and identification
- c. A statement that the product meets the requirements of **Section 703** of SCDOT specifications
- d. Detailed installation instructions

703.2.4.3 Quality Assurance (QA) Sample Requirements

Acceptance or rejection of mechanical couplers will be based upon random samples assembled by the contractor using reinforcing bars of the same heat numbers used in the work. Sample assemblies will be obtained at the project site by the RCE prior to being incorporated into the work and submitted to the OMR or OMR authorized AASHTO accredited testing laboratory for testing. If the sample fails, two check samples of coupler assemblies using couplers from the same LOT for testing are required.

If one or both of the check samples fail, the LOT of couplers is rejected and should not be used in the work.

When the lot of failing couplers is tapered and threaded bar type couplers, both the couplers and corresponding tapered and threaded rebar are rejected. If it is demonstrated to the satisfaction of the RCE that the tapering and threading on the rebar is correct, the rebar may be used with another lot of couplers, provided that a passing sample coupler assembly is obtained using the new lot of couplers. Alternatively, if it can be demonstrated to the satisfaction of the RCE that the rebar tapering and threading is incorrect and the couplers themselves are acceptable, the couplers may be used with another shipment of rebar, provided that a passing sample coupler assembly is obtained using the new shipment of tapered and threaded rebar.

Once a coupler assembly sample is obtained, the sample must remain in the custody of the SCDOT inspector until delivery to the OMR or OMR authorized AASHTO accredited testing laboratory. Samples delivered to the OMR by the contractor will not be accepted.

703.2.4.3.1 Test Criteria

The OMR will test the tensile strength of sample coupler assemblies in conformance with the requirements of AASHTO T 244 to ensure that the splice achieves an ultimate strength of at least:

- a. 75,000 psi for service splices
- b. 80,000 psi for ultimate splices

703.2.4.4 Handling and Storage

Protect exposed threaded bars on staged work by installing the threaded coupler on the in-place bar and capping the open end of the coupler per the manufacturer's instructions. Immediately before installation, check the threads and ease of rotation of any threaded parts of couplers to detect contamination that could cause binding. Regardless of the method of mechanical coupling used, prevent damage to or contamination of the reinforcing or coupling devices that will inhibit or negatively affect the certified behavior of the device. If in the opinion of the RCE, such damage or contamination exists, replace the reinforcing, couplers, or both, or remove the contamination to the satisfaction of the RCE at no additional time or cost to the Department.

703.2.5 Ultimate Butt-Welded Splices (UBWS)

703.2.5.1 Material

Use UBWS containing steel that conforms to the requirements of **Subsection 703.2.1**. Use only UBWS produced utilizing a resistance (flash) welding process by a fabricator listed on Qualified Product List 103 for the hoop diameter and bar size required.

703.2.5.2 Quality Assurance (QA) Test Requirements

703.2.5.2.1 General

A UBWS LOT is defined as a shipment of the same type of UBWS used for each bar size and each heat number that is used in the work. Acceptance or rejection will be based upon sample welded splices used in the work randomly selected by the RCE at the project site and submitted to the OMR or an OMR authorized AASHTO accredited laboratory for testing.

Once a UBWS sample is obtained, the sample must remain in the custody of the SCDOT inspector until delivery to the OMR or OMR authorized AASHTO accredited testing laboratory. Samples delivered to the OMR by the contractor will not be accepted.

Ensure that all sample test results are satisfactory before encasing any splices in concrete. If any splices are encased before receiving notification from the RCE, it is expressly understood that any material not conforming to these specifications will be subject to rejection, and the replacement of removed material shall be done at no additional time or cost to the Department.

703.2.5.2.2 Test Criteria

The OMR will test the tensile strength of the sample splice in conformance with the requirements of AASHTO T 244 to ensure that the UBWS achieves at least 100 percent of the specified ultimate tensile strength of the reinforcing bar.

If a sample fails, two check samples from the same LOT for testing by OMR are required. Any material not conforming to the requirements herein will be subject to rejection. If the sample splice fails to conform to these provisions, all splices in the LOT represented by the QA tests will be rejected.

Do not mix or combine the LOTS of UBWS being tested before the successful completion of the QA tests.

703.2.5.2.3 Corrective Action

Whenever a LOT of UBWS is rejected, fulfill the following requirements before using additional UBWS in the work:

- a. Perform a complete review of the producer's quality control process for these splices.
- b. Submit a written report to the SCDOT Structural Materials Engineer describing the cause of failure for the splices in this LOT and provisions for correcting the failure in future LOTS.
- c. Ensure that the Structural Materials Engineer has provided the RCE notification that the report is acceptable. The Structural Materials Engineer will have 15 business days to review the report and notify the RCE of the report's status. The RCE will have 10 business days after notification to determine the course of action for the project.

If a QA test for any LOT fails, replace all reinforcing bars representing failing sample splices before the RCE selects additional splices from the replacement for further testing.

When sampled bars are repaired with a pre-qualified Ultimate Mechanical Coupler as described in **Subsection 703.2.4**, QA tests are not required on the repaired splices.

Delete **Subsection 703.4.3; Paragraph 2** and replace it with the following:

- (2) Hold the reinforcement together by tie wire at all intersections except where the spacing is 12 inches or less in each direction, in which case tie alternate intersections. Hold bars projecting beyond a construction joint in place by templates during concreting to ensure proper position. Do not tack weld reinforcing bars.