Section 1

DMS-4510, Mechanical Couplers

Overview

(Formerly D-9-4510, Mechanical Couplers).


This Specification shall govern for the materials, composition, quality sampling and testing of mechanical couplers.

Notice to Suppliers

All suppliers are hereby notified that any material proposed for use on a project shall be from a prequalified manufacturer.

Prequalification

Described below are the requirements for the prequalification of mechanical couplers:

♦ Manufacturers who desire to prequalify their product should contact the Texas Department of Transportation, Construction Division, Director of Materials & Pavements Section (CP51), 125 East 11th Street, Austin, Texas 78701-2483.

♦ The manufacturer shall furnish technical information regarding the fatigue performance of the coupling system and certified test reports showing the material meets all of the specified requirements under this article.

♦ Approval for full range systems, bar sizes #3 through #11, #4 and #18; will require test reports on bar sizes #5, #7, #9, #11 and #18.

♦ Systems other than full range will require test reports on all sizes.

♦ In addition to the above, the manufacturer shall submit to The Department, five samples of each size and type for testing, evaluation and approval along with the mill test reports for the reinforcing steel.

♦ Any changes in materials, design or details on approved systems will require a resubmittal.

Mechanical Couplers

Mechanical couplers shall be prequalified as either Class A or Class B mechanical couplers as outlined below.
Class A mechanical couplers shall meet the following requirements.

♦ **Tensile Strength** - The coupler system shall develop at least 125 percent of the specified yield strength of the reinforcing bar in direct tension.

♦ **Slip** - The total slip of the reinforcing bars, within the splicing sleeve, after loading to 210 MPa (30 ksi) and relaxing to 21 MPa (three [3] ksi) in direct tension shall not exceed 0.25 millimeter (0.010 inch) for #14 bars and smaller or 0.75 millimeter (0.030 inch) for #18 bars measured between gauge points clear of the splice sleeve.

Class B mechanical couplers shall meet the requirements of Class A mechanical couplers plus the following additional requirements.

♦ **Cyclic Loading** - Cyclic loading of a spliced joint in tension from 5 percent to 90 percent of the specified yield strength of the reinforcing steel for 100 cycles using a haversine wave form at 0.7 cycles per second for #10 bars and smaller and at 0.5 cycles per second for #11 bars and larger.

♦ **Fatigue Loading** - Fatigue loading of a spliced joint from 170 MPa (25 ksi) tension to 170 MPa (25 ksi) compression for 10,000 cycles using a sine wave form at 0.35 cycles per second for #10 bars and smaller and at 0.083 cycles per second for #11 bars and larger.

For each type and size, at least one specimen shall meet the requirements for the slip test, the cyclic loading test and the tensile strength test and another specimen shall meet the requirements for the slip test, the fatigue test and the tensile strength test. After testing for slip, the specimen shall be subjected to either cyclic or fatigue loading prior to testing for tensile strength. The frequency of the cyclic and fatigue loading tests may be varied within limits of ASTM E 606 and to accommodate available test equipment.

**General Requirements**

All mechanical couplers shall be die stenciled with the manufacturer’s identification and shall be one of the following types:

♦ Sleeve-Bolted
♦ Sleeve-Filler
♦ Sleeve-Threaded
♦ Sleeve-Swaged
♦ Sleeve-Wedge.

**Sampling and Testing**

Below are the sampling and testing requirements for mechanical couplers.
Prior to sampling, the manufacturer shall complete and furnish the Engineer the Form 1818 "Form D-9-USA-1" certifying that the mechanical couplers furnished meet specification requirements and that the product complies with the "Buy America Documentation Program" requirement.

For purposes of sampling couplers for use on an individual project, a lot of couplers shall be defined as 500 couplers or fraction thereof, for each size and type.

Prior to use on the project, three test specimens shall be assembled using couplers selected at random from each lot.

- All test specimens shall be assembled from materials consigned to the project and shall be assembled in the presence of the Engineer.
- A test specimen shall consist of a coupler connecting two 525 millimeters (21 inches) or longer, bars.

The assembled test specimens shall be submitted to CST/M&P for testing.

Test specimens from each lot of couplers shall be identified with tags or markings identifying the lot from which the samples were taken.

Project samples will be tested to 125 percent of specified yield strength and for total slip requirements.

- When a test representing a lot of couplers fails to meet the requirements, four additional couplers from that lot will be tested.
- If all four (4) tests meet the requirements, the lot will be accepted for use in the work.
- If any of the four (4) tests fail to meet requirements, that lot of couplers will be rejected and not used in the work.