METHOD OF TEST
FOR
MECHANICAL CONNECTORS USED TO SPLICE STEEL REINFORCEMENT

1. SCOPE

1.1 This test method covers the test procedures for determining the slip (axial displacement) and tensile strength of mechanical connectors for splicing steel reinforcement.

1.2 Job control testing is carried out on samples assembled in the field by the Contractor.

2. RELEVANT DOCUMENT

2.1 E 4 Standard Practices for Force Verification of Testing Machines

3. DEFINITION

3.1 *Mechanical Connector*: The mechanical device used to splice reinforcing steel bar.

3.2 *Sample:* Spliced reinforcing steel bar including the mechanical connector.

3.3 *Specified Yield Strength,* σ_y*:* Yield strength for the reinforcing steel bar as specified in the governing standard, specification, or contract drawing. Typically σ_y = 400 MPa

3.4 *Mean Yield Strength,* σ*:* Average yield strength of representative reinforcing steel bars used in the test of mechanical connection. The yield strengths are obtained from the Mill Test Certificates.

3.5 Slip: The axial displacement of the reinforcing steel bar measured relative to the mechanical connector. Displacement is measured at a reinforcing steel bar stress of $0.05\sigma_y$, after the mechanical connection has been loaded to a reinforcing steel bar stress of $0.5\sigma_y$, and then unloaded to a reinforcing steel bar stress of $0.05\sigma_y$.

3.6 *Sample Strength:* The load or stress on the sample at failure.

4. APPARATUS

4.1 *Tensile Testing Machine* - A compression testing machine conforming to the requirements of ASTM E 4. The machine shall be of sufficient capacity to fully load the sample by applying force without impact.

4.2 *Dial Gauge:* The dial gauge may be analogue or digital and shall be accurate to within 0.025mm.

5. TEST SAMPLES

5.1 Samples for Designated Sources of Materials evaluation shall be supplied with the following information: model number of the mechanical connector, production date, supplier/manufacturer, and assembler's name.

5.2 Job control samples shall be supplied with the following information: contract number, model number, sublot number, connector bar size, number of connectors within the sublot, date of supply to the contract site and name of manufacturer. Mill test certificates for the steel reinforcement used in the sample shall be supplied with the job control sample.

5.3 The total length of the sample shall be between one and two meters.

6. PREPARATION OF SPECIMENS

6.1 Before testing ensure that:

a) each sample has been assembled.

b) there is room to mount dial gauges and hardware to measure slip.

6.2 No adjustments or modifications shall be made to the sample except that the reinforcing steel bar may be cut to allow the sample to fit into the test frame.

7. SLIP

7.1 Place the sample in the test machine and attach all necessary hardware for the dial gauges that are to be used for measurement. Specimen set up and gauge length shall be as illustrated in Figure 1.

7.2 Preload the sample to $0.05\sigma_y$ to set the samples in the jaws.

Example: A reinforcing steel bar with σ_y of 400MPa is preloaded to 20MPa (0.05x400)

7.3 Attach the dial gauges across the mechanical connector and establish an initial length by zeroing out the dial gauges or by recording readings on the dial gauges.

7.4 Load the sample to $0.5\sigma_y$ of the reinforcing steel bar and maintain the load until a steady reading is obtained on the dial gauges.

Example: A reinforcing steel bar with σ_y of 400M is loaded to 200MPa (0.5x400)

7.5 Reduce the load to a reinforcing steel bar stress of $0.05\sigma_y$ and take readings on the dial gauges. This will be the measured length.

7.6 Loading and unloading of the sample shall be at a rate in which σ_y is reached between one and two minutes.

Example: To reach σ_y in 90 second, the rate of loading is 4.5 MPa/Second (400/90) or 267MPa/minute (400/1.5).

7.7 Calculate slip as follows:

Slip = Measured length – Initial length

8. TENSILE STRENGTH

8.1 Remove all dial gauges and hardware from the sample.

8.2 Place sample in the test machine.

8.3 For reinforcing bars of diameters 40-55M, load the sample in tension to a load equal to $1.2\ \sigma_y$ and $1.1\ \sigma$. Observe and record condition of the sample at each load and at the end of the test. Record the maximum load or stress achieved.

Example: A reinforcing steel bar with σ_y of 400M is loaded to 480MPa (1.2x400).

Using yield strength provided in the Mill Test Certificate(s) for reinforcing steel representative of the bars used in the test, calculate mean yield strength, σ, and $1.1\ \sigma$. Use single value of yield strength where the Mill Test Certificate(s) provide a single yield strength result.

8.4 For reinforcing bars of diameters 15-35 M, load the sample in tension to a failure.

8.5 Record the maximum load or stress.

8.6 Remove the sample from the test machine.

9. REPORTING

9.1 GENERAL REPORTING

9.1.1 The contract number, sublot number.

9.1.2 Connector bar size, number of connectors within the sublot,

9.1.3 Date of supply to the contract site and name of manufacturer

9.1.4 Name of manufacturer and model number

9.1.5 Test operator's name, and date tested.

9.2 SLIP TEST REPORTING

9.2.1 The preload or prestress value and the load rate.

9.2.2 The maximum load or stress reached during the slip test.

9.2.3 Initial and measured length measurements.

9.2.4 Slip in mm.

9.3 STRENGTH TEST REPORTING

9.3.1 The load rate.

9.3.2 The required test loads, 1.2 σ_y and 1.1 σ including values σ_y and σ used to calculate these loads.

9.3.3 The maximum load or stress reached during the strength test.

9.3.4 Description of sample condition at a load of 1.2σ_y and 1.1 σ (for 40-55M bars).

9.3.5 Description of sample condition at the maximum load or stress.

9.3.6 A copy of the Mill Test Certificate(s) for the steel reinforcement used in the sample shall be attached with the report.

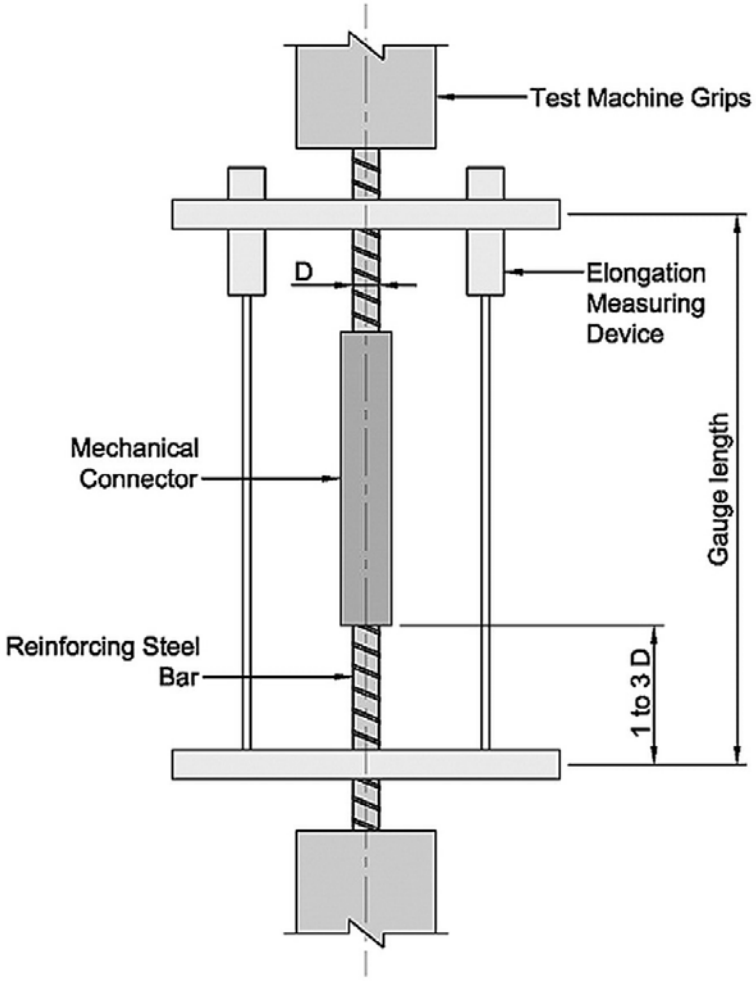

Figure 1

Specimen Set-Up and Dial Gauge Length