

## Section 10.9

# STRUCTURAL STEEL AND MISCELLANEOUS METAL COMPONENTS

### 10.9.1 Purpose

The purpose of this procedure is to provide a process for the evaluation and acceptance of fabricated structural steel and miscellaneous metal components. This procedure addresses ~~nNon-conforming~~~~plying~~ components which are defective or damaged. Repeated production of ~~nNon-complying~~~~-conforming~~ components is not ~~acceptable~~acceptable, and the cause of such problems must be resolved.

### 10.9.2 Authority

Section 334.048(3) and 20.23(3)(a), Florida Statutes

### ~~10.9.3 Reference~~

~~FHWA Approved: January 28, 2005~~

### 10.9.43 Commercial Inspection of Fabricated Items

**Specification 105-1.2.3** directs the Contractor to submit to the Engineer a fabrication schedule for all items requiring commercial inspection. The Project Administrator shall forward this schedule to the State Materials Office upon receipt from the Contractor. If the Contractor has not provided this list within 30 days prior to beginning fabrication of elements (such as mast arms, overhead signs, plate girders, etc.) to the job site, direct the Contractor to comply with this requirement. Fabricated products must be scheduled for inspection in sufficient time to allow State Materials Office inspection prior to delivery to the jobsite.

### 10.9.54 Evaluation and Disposition of Components not in Compliance with the Contract Documents

#### 10.9.45.1 General

Components containing specific defects or damage covered by pre-established procedures in the Department approved Producer QC Plan shall be repaired in accordance with said procedures.

For defects or damage to components that do not conform with the Contract Documents, the Contractor must comply with **Specification 460-4.6**, which requires the submittal of a repair proposal to the Project Administrator and specifies what the contents of the proposal shall be. Components in the fabricating facility which require repairs shall not be shipped to the project site until such repairs are complete and the member has been accepted by the Department. If the component is repaired and determined to be acceptable to the Department, the component shall be stamped or tagged by the fabricator indicating that it meets specification requirements. Producer-stamped members arriving at the job site shall not be rejected by project personnel for reasons other than obvious shipping damage which makes the member unacceptable. Questions of acceptability of stamped members, which have not incurred shipping damage, are to be resolved with proper input from the Quality Assurance Inspector (QAI) at the shipping point prior to rejection at the job site.

## **10.9.54.2 Proposal Format and Requirements**

The Contractor's proposal shall be in writing and include the following:

- (A) A cover page describing the nonconforming component and the proposed credit to the contract proportionate to the defect or specification nonconformance.
- (B) A completed **Nonconforming Structural Steel and Miscellaneous Metal Component Data Sheet (Data Sheet)**, [Form No. 675-010-10](#), prepared by the fabricator or Contractor and countersigned by the QAI to indicate agreement with the described defect or nonconformance feature. If not in agreement with the information or description, the QAI shall either reject the submittal indicating reason(s) for rejection or modify the submittal as necessary.
- (C) A list of supporting information such as sketches, documentation, calculations, etc., must be included in the appropriate space on the **Data Sheet**. Additional sheets may be attached as needed. All the supporting information required for the form must be prepared by, or be under the supervision of, the Contractor's Specialty Engineer who shall sign and seal the supporting information.

- (D) A structural and durability evaluation when nonconforming components exhibit deficiencies that affect the strength and/or serviceability of the component in the completed structure. The Contractor's Specialty Engineer must submit a signed and sealed structural and durability evaluation of the proposed repair and/or remediation of such components.

### **10.9.45.3 Review and Evaluation**

#### **(A) Resident Level Responsibilities**

The Project Administrator shall review the Contractor's proposal and enlist the assistance of the various offices within the Department, the Engineer of Record and the QAI as deemed appropriate. Upon completion of the evaluation, the Project Administrator may accept the Contractor's proposed repair method and cost reduction, ~~negotiate a fair cost for an acceptable repair method,~~ or reject the ~~unacceptable~~ repair proposal.

The Project Administrator shall send the Contractor's proposal to the Engineer of Record (EOR), the State Construction Structures Engineer (SCSE) and the State Materials Office (SMO) regarding disposition of the Contractor's proposal. The PA shall base the disposition of the Contractor's proposal upon comments and recommendations by the EOR, the SCSE and the SMO.

### **10.9.45.4 Disposition and Distribution**

#### **(A) Resident Level Responsibilities**

The Project Administrator shall indicate acceptance or rejection in the response and distribute and document the proposal and the disposition to appropriate District personnel in addition to the following ~~offices~~:

1. Collaboration ~~S~~site and/or EDMS
2. State Materials Office
3. Quality Assurance Inspector

### **10.9.65 Testing and Record Keeping for Structural Steel**

#### **10.9.65.1 Job Inspection Snug Tight Torque and Rotational Capacity Tests**

**Specification 460-5.4.8, Turn-of-Nut Tightening**, requires a Job Inspection Snug Tight Torque (JIT) test be performed for each work shift. The test consists of determining a snug tight torque for a representative sample of 5 fastener assemblies of the type used on the day of the test. During the test, the assemblies are tightened to a snug tight condition after which a prescribed degree of nut turn is applied (Turn-of-Nut). The test is performed with the aid of a Skidmore-Wilhelm Calibrator device which measures the bolt tension in kips for a given fastener assembly tightness. The bolt assembly passes the test if the final tension after turning of the nut exceeds 1.05 times the minimum required fastener tension in **Specification Table 460-6**. For example, a 7/8-inch diameter bolt passes the test if the bolt tension after turn-of-nut is equal to or greater than ~~401.95~~ 419.5 kips (1.05 times 39 kips from **Table 460-6**).

The Rotational Capacity (RC) Test required by **Specification 460-5.2.1** is performed according to **FM 5-581** or **5-582**, the Florida Methods of Test for Performing Rotational Capacity Test, Long Bolts and Short Bolts, respectively. The RC Test verifies that fastener assemblies can attain at least a 15% or greater increase in tension than the minimum required fastener tension. For example, the 15% minimum requirement of an ASTM F3125 A325 bolt is ~~445.85~~ 448.5 kips for a 7/8-inch diameter (1.15 times 39 kips from Table 460-6). The RC test does not establish how much additional tension beyond the 15% minimum that the bolt can take before it fails. Results for Rotational Capacity Testing of Long Bolts can be documented using [Form 675-010-15a](#) and likewise for Short Bolts using [Form 675-010-15b](#).

In the past, there has been confusion about how to determine the starting tension and torque for the JIT test because some testers assume that the RC test snug tight torque should also apply to the JIT test. This makes the JIT test easier because it can be started basing a torque off of a predetermined tension. The starting tension in the RC test should not automatically be used for the JIT test as “snug-tight” and is different in the context of each test. Once the JIT test is begun and an initial trial torque is determined and applied, if the tension produced after the turn-of-nut is not 5% or greater than the minimum required fastener tension, then another trial with an increased initial torque must be performed and so on until the 5% is achieved. Once an acceptable trial torque has been determined for the first bolt assembly of the five tested for that LOT then the acceptable trial tension should also work for the remaining four assemblies.

All JIT and RC tests shall be observed in-person by a CEI inspector and all test data and results must be recorded either by the Contractor or by the CEI inspector and the test procedures shall be addressed in the Contractor’s Quality Control Plan. If

test data and results are recorded by the Contractor, the CEI inspector shall verify that the data is accurate and complete. A copy shall be retained in the CEI files for the project.

## **10.9.56.2 Shear Connector Bend Tests**

**Specification 502-4.8, Testing**, requires the Contractor to perform Shear Connector Bend Tests and the article specifies how the tests are to be performed. All Shear Connector Bend tests shall be observed in-person by a CEI inspector. The location of tested connectors and the results of the tests shall be recorded either by the Contractor or by the CEI inspector and the test procedure shall be addressed in the Contractor's Quality Control Plan. If test data is recorded by the Contractor, the CEI inspector shall verify that the data is accurate and complete. A copy shall be retained in the CEI files for the project.