

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 occasional Non-complying components which are defective or damaged where replacement is deemed unnecessary. Repeated production of Non-complying components is not acceptable and the cause of such problems must be resolved.

10.9.2 Authority

Section 334.048(3), Florida Statutes

FHWA Approved: January 28, 2005

10.9.3 Definitions

Minor Defect: Any defect or damage (Non-complying work) that can be repaired using a Fabrication Facility's Approved Repair Procedure.

Major Defect: Any defect or damage (Non-complying work) that is not classified as a Minor Defect, as defined above.

Lead Verification Inspector: The representative of the Consultant CEI firm retained by the Department that is in charge of QA inspection at the fabrication facility at which the component is being produced.

10.9.4 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 2 months prior to the anticipated delivery of fabricated 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.

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

10.9.5.1 General

Non-complying components containing specific defects or damage which are classified as "Minor" shall be repaired in accordance with approved repair procedures.

For defects or damage covered by this procedure and which are classified as "Major", 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 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 Lead Verification Inspector at the shipping point prior to rejection at the job site.

10.9.5.2 Proposal Format and Requirements

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

- (A) A cover page prepared on the Contractor's letterhead describing the 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 Lead Verification Inspector to indicate agreement with the described defect or nonconformance feature. If not in agreement with the information or description, the Lead Verification Inspector 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 Engineer of Record who shall sign and seal one (1) complete copy of the supporting information.

10.9.5.3 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, the Verification Inspection Consultant (fabrication plant inspection service) 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.

If the review involves a complex superstructure member as defined in **CPAM 10.10**, the Project Administrator shall consult with the Engineer of Record (EOR), State Construction Structures Engineer (SCSE) and the Department's fabrication plant inspection consultant regarding disposition of the Contractor's proposal. The PA shall concurrently send the Contractor's proposal to the EOR, SCSE and the fabrication plant inspection service, manager in charge (Inspection Manager). The PA shall base the response to the Contractor on recommendations by the EOR and SCSE. The SCSE will respond to the PA after reviewing the comments of the EOR and Inspection Manager.

10.9.5.4 Disposition and Distribution

(A) Resident Level Responsibilities

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

Project File	1 copy (signed and sealed)
State Materials Office	1 copy
FHWA Area Engineer	1 copy (FHWA Oversight Jobs Only)
Lead Verification Inspector	1 copy

10.9.6 Testing and Record Keeping for Structural Steel

10.9.6.1 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 level 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 it has a tension that exceeds 1.05 times the minimum tension required in **Specification Table 460-6** which is 5% above the minimum tension. 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 40.95 k (1.05 times 39 k from **Table 460-6**). To avoid damaging the fastener assembly, do not exceed 15% above the required minimum tension.

The Rotational Capacity (RC) Test required by **Specification 460-5.2.1** is performed according to **FM 5-581** or **5-582**. The RC Test verifies that fastener assemblies have at least 15% higher tension strength than the minimum. The Rotational Capacity test establishes the maximum tension limit (MTL) of 15% which for example, is 44.85 k for a 7/8 inch diameter bolt. The RC test does not establish how much beyond the MTL the bolt tension can be before it fails and this is why the JIT test should not exceed the MTL.

In the past, there has been confusion about how to determine the starting tension for the JIT test because some testers assume that the RC test snug tight torque which is required to be 15% or less of minimum tension (6 kips for a 7/8" diameter bolt), should also apply to the JIT test. This makes the JIT test easier because it can be started using a predetermined tension which is usually the maximum allowed of 15%. The 15% starting tension should not automatically be used for the JIT test because it routinely results in a final tension that greatly exceeds the MTL. Instead, a trial tension well below 15% should be used for the first JIT test of the day. If the tension produced after the turn-of-nut is not 5% or greater than the limit, then another trial with an increased initial tension must be performed and so on until the 5% is achieved but the MTL is not exceeded. Once an acceptable trial tension 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.

10.9.6.2 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.