

## **Part II**

### **4. STRUCTURAL STEEL**

#### **4.1 Specification of Material**

The Contract Documents should specify the American Society for Testing and Materials (ASTM) specification and grade of steel used for all structural steel elements of the building. Any Supplementary Requirements to the ASTM steel specifications, including identification of the members of the steel frame subjected to such requirements, should be clearly defined in the construction documents.

#### **4.2 Submittals**

The Contract Documents should contain requirements for the submittal of certified material test reports for all main members of the steel frame. These reports should identify the manufacturer, size, heat number, chemistry, yield strength, and ultimate tensile strength, plus any other properties required. These properties may include Charpy V-Notch toughness or other Supplementary Requirements listed in the Contract Documents and supplied by the mill. Main members include beams, girders, columns and bracing elements.

Mill test reports for material used in the connections of the seismic-force-resisting system, including web doubler plates, stiffeners (continuity plates), and beam web connection material should be submitted to, and should be reviewed by, the designated inspector. Test reports for other connection material such as clip angles, single plate framing connections (shear tabs), gusset plates, beam web stiffeners, need not be submitted. Material used by the fabricator for such connection material may be drawn from fabricator stock of known grade, provided the stock has had material test reports previously received and reviewed by the fabricator.

#### **4.3 Material Control**

The Contract Documents should specify requirements for fabrication material control, if controls beyond the specification of the grade of steel are required.

The Fabricator should establish written procedures for fabrication material control. The minimum acceptable level of control is for steel grade identification.

#### **4.4 Quality Control - Structural Steel**

The Fabricator's Quality Control Plan for material quality control should include, as a minimum:

- procedures for visual inspection of steel material upon receipt,
- procedures for verification of heat numbers and material test reports upon receipt,
- an adequate system of material control by grade, and also by heat number when required,

- review procedures for material test reports for project requirements, and
- a filing system for material test reports for all structural steel.

A sample checklist form is provided in Figure 4-1 to assist in the development of a suitable document for use in a fabricator's QC activities.

#### **4.5 Extent of Steel Inspection**

The Quality Assurance Plan and Contract Documents should clearly identify the extent of steel material inspection to be performed by the Contractor and by the Inspector or NDT Technician. QA mill inspection, prefabrication steel inspection, testing, or verification of chemistry or mechanical properties, if required, must be designated in the Contract Documents. Steel material inspection is generally limited to visual inspection of the surface condition of the steel, as well as visual inspection of thermal cut surfaces for indications of laminations. Requirements for additional physical sampling and testing are discouraged.

#### **4.6 Structural Steel Inspection Tasks**

Prior to fabrication, the Inspector should review submitted certified material test reports.

The QA Inspector, whether a Special Inspector or other Inspector, should verify that the Contractor follows the prescribed Quality Control Plan for structural steel. Verification of the system for maintaining steel grade and heat number identification, when required, should be performed. This includes random spot checks verifying material controls by grade identification, and specific verification, including traceability when required, of material grade and any other special requirements for those elements of the structure identified by the Quality Assurance Plan as needing QA verification.

## Structural Steel Material Inspection Checklist

Project \_\_\_\_\_

Inspector Name \_\_\_\_\_ Date of Inspection \_\_\_\_/\_\_\_\_/\_\_\_\_

Producing Mill \_\_\_\_\_ Member Size \_\_\_\_\_

### ASTM Grade Identification

- A36
- A992
- A572, grade \_\_\_\_\_
- A913, grade \_\_\_\_\_
- Other \_\_\_\_\_

Heat Number \_\_\_\_\_ (Required for specified main members only)

Piece Mark(s) \_\_\_\_\_

- ASTM A6 tolerances satisfied
  - Straightness (camber, sweep)
  - Flanges out-of-square
  - Member depth
  - Flange tilt
  - Web off-center

Description and location of any unacceptable conditions \_\_\_\_\_

- Surface quality adequate – seams, laps, tears, nicks

Description and location of any surface discontinuities \_\_\_\_\_

If UT of section is required for laminations check, prior to assembly or use, provide UT inspection report.

Number \_\_\_\_\_

Page 1

**Figure 4-1 Structural Steel Material Inspection**

## Structural Steel Material Inspection Checklist

### MATERIAL TEST REPORT (MTR) REVIEW

Inspector Name \_\_\_\_\_ Date of MTR Review \_\_\_\_/\_\_\_\_/\_\_\_\_

- Material test report on file
- Material test report satisfactory
- Yield Strength
- Tensile strength
- Elongation
- Chemical analysis
- Supplementary requirements (if required)
- Technical Bulletin #3 compliance (A572, grade 50 only)
- Maximum Tensile Strength (S18)
- Carbon equivalent (weldability)(S74)
- CVN toughness (S5)
- Ultrasonic Examination (S8)
- Maximum Yield Point and Yield-to-Tensile Ratio (S75)
- Charpy V-Notch Impact Test for Group 4 and 5 Structural Shapes – All Grades (S76)
- Fine austenitic grain size (S91)
- Other \_\_\_\_\_

(On the back of this form, or below, provide information on unacceptable ASTM A6 tolerances, and a description of unacceptable surface defects and acceptance levels.)

Page 2

Figure 4-1 Structural Steel Material Inspection (continued)