

## SECTION 05210 - STEEL JOISTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. K-series steel joists.
  - 2. KCS series steel joists.
  - 3. Joist accessories.
  
- B. Related Sections include the following:
  - 1. Division 3 Section "Cast-in-Place Concrete" for installing bearing plates in concrete.

#### 1.2 DEFINITIONS

- A. SJI "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."
  
- B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.
  
- B. Design special joists to withstand design loads with live load deflections no greater than the following:
  - 1. Floor Joists: Vertical deflection of 1/360 of the span.
  - 2. Roof Joists: Vertical deflection of 1/240 of the span.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product indicated.
  
- B. Shop Drawings: Show layout, designation, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, joist accessories; splice and connection locations and details; and attachments to other construction.
  - 1. Indicate locations and details of bearing plates to be embedded in other construction.
  - 2. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.
  
- C. Welding certificates.
  
- D. Manufacturer Certificates: Signed by manufacturers certifying that joists comply with requirements.
  
- E. Mill Certificates: Signed by bolt manufacturers certifying that bolts comply with requirements.
  
- F. Qualification Data: For manufacturer.
  
- G. Field quality-control test and inspection reports.
  
- H. Research/Evaluation Reports: For joists.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables of SJI "Specifications."
    - 1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.
  - B. SJI Specifications: Comply with standard specifications in SJI's "Specifications" that are applicable to types of joists indicated.
  - C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
  - B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.
- 1.7 SEQUENCING
- A. Deliver steel bearing plates to be built into cast-in-place concrete and masonry construction.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Steel: Comply with SJI's "Specifications" for web and steel-angle chord members.
- B. Steel Bearing Plates: ASTM A 36/A 36M.
- C. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.
  - 1. Finish: Plain, uncoated.
- D. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts.
  - 1. Finish: Plain.
- E. Welding Electrodes: Comply with AWS standards.
- F. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20 ASTM A 780.

### 2.2 PRIMERS

- A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

### 2.3 K-SERIES STEEL JOISTS

- A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, under slung ends, and parallel top chord.
  - 1. Joist Type: K-series steel joists.
- B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.

- C. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- D. Provide holes in chord members for connecting and securing other construction to joists.
- E. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."
- F. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."
- G. Camber joists according to SJI's "Specifications."
- H. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

#### 2.4 JOIST ACCESSORIES

- A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.
- B. Fabricate steel bearing plates with integral anchorages of sizes and thicknesses indicated. Shop prime paint.
- C. Steel bearing plates with integral anchorages are specified in Division 5 Section "Metal Fabrications."
- D. Supply ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 2 inch of finished wall surface, unless otherwise indicated.
- E. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

#### 2.5 CLEANING AND SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.
- B. Do not prime paint joists and accessories to receive sprayed fire-resistive materials.
- C. Apply 1 coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.
- D. Shop priming of joists and joist accessories is specified in Division 9 painting Sections.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
  1. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.

- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
  - 1. Before installation, splice joists delivered to Project site in more than one piece.
  - 2. Space, adjust, and align joists accurately in location before permanently fastening.
  - 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
  - 4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads have been applied.
- C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Bolt joists to supporting steel framework using carbon-steel bolts.
- E. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
- F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

### 3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.
- B. Field welds will be visually inspected according to AWS D1.1/D1.1M.
- C. In addition to visual inspection, field welds will be tested according to AWS D1.1/D1.1M and the following procedures, as applicable:
  - 1. Radiographic Testing: ASTM E 94.
  - 2. Magnetic Particle Inspection: ASTM E 709.
  - 3. Ultrasonic Testing: ASTM E 164.
  - 4. Liquid Penetrant Inspection: ASTM E 165.
- D. Bolted connections will be visually inspected.
- E. High-strength, field-bolted connections will be tested and verified according to procedures in RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts."
- F. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.
- G. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

### 3.4 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel, and accessories.
  - 1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.

- 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 9 painting Sections.
- D. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION 05210