

**CONSTRUCTION STANDARD SPECIFICATION**

**SECTION 05210**

**STEEL JOISTS**

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**SECTION 05210**

**STEEL JOISTS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This section includes the design, fabrication and erection of the following:
1. K-Series Open Web Steel Joists
  2. LH-Series Longspan Steel Joists
  3. DLH-Series Deep Longspan Steel Joists
  4. Joist Girders
  5. VS-Series
  6. Bridging (Horizontal and Diagonal)
  7. Joist Accessories
- B. Related Sections: Refer to the following sections for related work:
1. Section 03300, "Cast-In-Place Concrete" for installing anchors set in concrete.
  2. Section 04220, "Concrete Masonry Unit" for installing anchors set in Masonry Unit.
  3. Section 05120, "Structural Steel."
  4. Section 05500, "Metal Fabrications" for loose steel bearing plates and miscellaneous steel framing.

**1.02 REFERENCES**

- A. American Society of Testing and Materials (ASTM)
- A307 Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
- A325 Standard Specification for High-Strength Bolts for Structural Steel Joints

A780 Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

B. American Welding Society (AWS)

D1.1 Structural Welding Code - Steel

D1.3 Structural Welding Code-Sheet Steel

C. Code of Federal Regulations (CFR)

Title 29 Part 1910 Labor-Occupational Safety and Health Standards

D. Federal Specification (FS)

TT-P-664 Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant

E. Steel Joist Institute (SJI)

Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders.

F. Steel Structures Painting Council (SSPC)

SP-2 Hand-Tool Cleaning

SP-3 Power-Tool Cleaning

Paint 15 Paint Specification No. 15, Steel Joist Shop Paint

G. International Building Code (IBC)

Volume 2 Structural Engineering Design Provisions

1.03 DEFINITIONS

Steel Joist: Steel joists as referred to in this section include steel joists, girders and headers.

1.04 SYSTEM DESCRIPTION

A. Structural Performance: Engineer, fabricate, and erect joists and connections to withstand design loads within limits and under conditions required. Comply with requirements of Contract documents and SJI's "Standard Specifications Load

Tables and Weight Tables for Steel Joists and Joist Girders” (referred to hereinafter as SJI Specifications.)

1. Design Loads: As indicated on the Contract Drawings.
  2. Design joists to withstand design loads with vertical deflections not to exceed the following:
    - a. Floor Joists:  $1/360$  of the span.
    - b. Roof Joists:
      - (1)  $1/360$  of the span where plaster ceiling is attached or suspended.
      - (2)  $1/240$  of the span for all other cases.
- B. Engineering Responsibility: Engage a joist manufacturer who utilizes a qualified professional engineer to prepare design calculations, shop drawings, and other structural data for steel joists.

#### 1.05 SUBMITTALS

- A. General: Submit the following in accordance with conditions of Contract and Section 01330, "Submittal Procedures."
- B. Product Data: Submit product data for each distinct type of joist accessories, and product specified.
- C. Shop Drawings: Submit detailed shop drawings showing layout of joist units, anchorage details, splice and connection details, bracing, bridging, accessories, and attachments to other work. Include mark, number, type, location and spacing of joists and bridging.
  1. Indicate locations and details of anchorage devices and bearing plates to be embedded in other construction.
  2. For special joists indicated to comply with certain design loadings, include structural analysis data signed and sealed by qualified professional engineer responsible for their preparation; include calculated reactions on the steel joist, girders and headers.
- D. Certification: Submit manufacturer's certification that joists comply with SJI "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders."

- E. Welder Certificates: Provide certification that welders to be employed in work comply with requirements specified in “Quality Assurance” article.
- F. Lead Paint-Free Certification: Provide manufacturer’s written certification that all products to be used are free of lead paint.
- G. Welding Procedures: Provide written welding procedure specification (WPS) document per AWS Code requirements.

#### 1.06 QUALITY ASSURANCE

- A. Qualification of Manufacturer: Manufacturer shall be a member of the Steel Joist Institute.
- B. SJI Design Standard: Comply with recommendations of SJI’s “Standard Specification Load Tables and Weight Tables for Steel Joists and Joist Girders,” applicable to types of joists indicated.
- C. Qualification of Field Welders: Welders shall be certified in accordance with American Welding Society (AWS) D1.1 within the last twelve (12) months. All welding shall comply with the applicable provisions of AWS D1.1 and D1.3.
- D. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installation of joists that are similar to those indicated for this project in material, design and extent.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to ensure uninterrupted progress of work. Inspect the joists for damage before unloading and note any permanent bend or deformation or broken welds on the receiving documents.
- B. Store materials to permit easy access for inspection and identification. Keep joist members off ground using pallets, skids, platforms or other supports.
- C. Protect steel members from corrosion and damage.
- D. Store packaged materials in original unbroken package or container.
- E. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures.

- F. Replace damaged shapes or members as required per Sandia Delegated Representative (SDR).

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Steel: Comply with requirements of SJI Specifications.
- B. Primer: Red oxide, lead-free and cadmium-free, corrosion inhibiting primer complying with performance requirements of FS TT-P-664 or SSPC Paint Specification No. 15, Type I.
- C. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular hexagon type, low carbon steel.
- D. High-Strength Bolts and Nuts: ASTM A325, Type I, heavy hex structural bolts, heavy hex nuts and hardened steel washers.
- E. Accessories: Provide accessories required for erection of steel joists, complying with SJI Specifications and Contract Drawings.

### 2.02 FABRICATION

- A. General: Manufacture steel joists in accordance with SJI Specification. All material shall be clean and straight.
- B. Bridging: Provide horizontal or diagonal type bridging as required by SJI Specifications or as indicated on Contract Drawings for type of joist, chord size, spacing and span.

Supply bridging to ensure stability of structure during construction period.

- C. Extended Ends: Provide extended ends on joists as indicated on Contract Drawings complying with applicable SJI Specification and load tables.
- D. Top Chord Extensions: The extensions shall be capable of withstanding the full uniform load of the joist plus any concentrated loads as shown on the Contract Drawings. The extensions shall be attached to the perimeter bracing unless shown otherwise on the Contract Drawings.
- E. Bottom Chord Extensions: Provide an extended bottom chord element of sufficient strength to support ceiling construction. Extend end to within 1/2 inch (12.7 mm) of finished wall surface unless otherwise indicated.

- F. End Anchorage: Provide end anchorage to secure joist to supports, complying with SJI Specifications unless otherwise indicated on the Contract Drawings.
- G. Miscellaneous Accessories: Supply miscellaneous accessories, including splice plates, reinforcing angles and bolts as required to complete the joist installation.

## 2.03 SHOP PAINTING

- A. Surface Preparation: Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories to be primed by either hand tool cleaning, SSPC-SP2, or power tool cleaning, SSPC-SP3.
- B. Shop Primer: Apply one coat of primer paint to steel joists and accessories by spray, dipping or other method to provide a continuous dry paint film thickness of not less than 1.0 mil (0.025 mm).

## PART 3 - EXECUTION

### 3.01 EXAMINATION

Examine supporting substrates, embedded bearing plates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of joists.

- A. Verify all elevation locations and dimensions of surfaces to receive steel joist.
- B. Furnish plates, angles and other accessories as required to secure joists.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.02 ERECTION

- A. Place and secure steel joists in accordance with SJI Specifications, approved shop drawings and as herein specified.
- B. Placing Joists: Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.
- C. Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams. Comply with OSHA requirements for bolted

bridging to be in place before slackening lines on joist longer than 40 feet (12.19 m).

- D. Fastening Joists: Field weld joists to supporting steel framework in accordance with SJI Specifications for type of joists used.
  - 1. Comply with AWS requirements and procedures for welding, appearance and quality of welds and methods used in correcting welding work.
  - 2. Coordinate welding sequence and procedure with placement of joists.
  - 3. Bolt joists to supporting steel framework where required.
  - 4. The lengths of welds applied to the top and bottom chords of joist shall not exceed half the width of the member.
- E. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A780 and manufacturer's instructions.
- F. Touch-Up Painting: Following installation, promptly clean, prepare and prime or reprime field connections, rust spots and abraded surfaces of prime-painted joists, accessories, bearing plates and abutting structural steel.
  - 1. Clean and prepare surfaces by hand tool cleaning, SSPC-SP2 or power tool cleaning, SSPC-SP3.
  - 2. Apply compatible primer of same type as used for shop painting.

END OF SECTION