

**SECTION 05 21 00  
STEEL JOIST FRAMING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

This section specifies open web, longspan, and deep longspan steel joists.

**1.2 RELATED WORK:**

- A. Structural Steel: Section 05 12 00, STRUCTURAL STEEL FRAMING.
- B. Finish Painting: Section 09 91 00, PAINTING.

**1.3 DESIGN REQUIREMENTS:**

Design all elements with the latest published version of applicable Codes.

**1.3 TOLERANCES:**

Deviation from a straight line between ends of any installed joist shall not exceed 10 mm in 3 m (3/8 inch in 10 feet).

**1.4 REGULATORY REQUIREMENTS:**

STEEL JOIST INSTITUTE: Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders, (Latest Edition).

**1.5 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop and Erection Drawings: Complete.
  - 1. Fabrication drawings including details and schedules for the fabrication and assembly of each joist.
  - 2. Erection drawings showing the size and location of each joist, bridging, cross bracing, bearing details, connections, welds, bolts and bearing plates.
- C. Certificates: STEEL JOIST INSTITUTE compliance.
- D. Design Calculations: If requested by the Resident Engineer, submit complete calculations covering the design of all members and connections. Calculations must be specifically applicable to the joists supplied.

**1.6 QUALITY ASSURANCE:**

Provide documentation that the joist manufacturer is a member of the Steel Joist Institute and has satisfactorily completed work of a similar scope and nature.

**1.7 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Institute of Steel Construction (AISC):
  - 1. Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design (Latest Edition).
  - 2. Load and Resistance Factor Design Specification for Structural Steel Buildings (Latest Edition).
- C. American Society for Testing and Materials (ASTM):
  - F1554-07.....Carbon Steel Bolts and Studs, 58-80 psi Tensile Strength
  - A325-09.....Structural Bolts, Steel, Heat Treated, 800/700 MPa (120/105 ksi) Minimum Tensile Strength
  - A490-08.....Heat-Treated Steel Structural Bolts, 1000 MPA (150 ksi) Minimum Tensile Strengths
- D. American Welding Society (AWS):
  - D1.1-08.....Structural Welding Code - Steel
- E. SSPC: The Society for Protective Coatings:
  - Steel Structures Painting Manual, Volumes 1 and 2
- F. Steel Joist Institute (STEEL JOIST INSTITUTE):
  - Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders (Latest Edition).
- G. U.S. Army Corps of Engineers:
  - CRD-C-621.....Specification for Non-Shrink Grout

**PART 2 - PRODUCTS**

**2.1 OPEN WEB STEEL JOISTS:**

K-Series conforming to STEEL JOIST INSTITUTE standard specifications.

**2.2 ACCESSORIES - FITTINGS:**

- A. Accessories and fittings, including end supports and bridging, in accordance with standard STEEL JOIST INSTITUTE specification under which joists were designed.
- B. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular hexagon type, low carbon steel.
- C. High-strength bolts, including nuts and washers: ASTM A325 or A490 heavy hexagon structural bolts.

**2.3 BEDDING MORTAR:**

- A. For joist ends bearing on concrete or masonry, provide bedding mortar as follows:
1. Non-metallic, shrinkage-resistant mortar; premixed, non-corrosive, non-staining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CRD-C-621.

**PART 3 - EXECUTION**

**3.1 FABRICATION:**

- A. Fabrication and assembly in accordance with applicable standard STEEL JOIST INSTITUTE specification:
1. Make chord splices with full penetration welds capable of developing the ultimate strength in tension of the parent material. Make no allowance for the strength of back-up bars or other material incidental to welding.
  2. Provide shop-welded connection plates at panel points to receive supplemental framing.
  3. Holes in Chord Members: Provide holes in chord members where shown for securing other work to steel joists; however, deduct area of holes from the area of chord when calculating strength of member.
  4. Extended Ends: Provide extended ends on joists where shown, complying with manufacturer's standards and requirements of applicable STEEL JOIST INSTITUTE specifications.
  5. Ceiling Extensions: Provide ceiling extension in areas having ceilings attached directly to joist bottom chord. Provide either an extended bottom chord element or a separate unit, to suit manufacturer's standards, of sufficient strength to support ceiling construction. Extend ends to within 12 mm (1/2 inch) of finished wall surface unless otherwise indicated.
  6. Bridging: Provide horizontal or diagonal type bridging for joists and joist girders, complying with STEEL JOIST INSTITUTE specifications. Provide bridging anchors for ends of bridging lines terminating at walls or beams. Provide bridging adequate to resist the loads indicated on the Contract Documents.
  7. End Anchorage: Provide end anchorages, including bearing plates, to secure joists to adjacent construction, complying with STEEL JOIST INSTITUTE specifications, unless otherwise indicated. Design all end

anchorage to resist a minimum net uplift of 1.6 kPa (35 pounds per square foot) of supported area.

8. Header Units: Provide header units to support all joists at openings in floor or roof system not framed with steel shapes.
9. Provide supplemental steel support framing for metal deck where normal deck bearing is precluded by other framing members and minor openings.

### **3.2 SHOP PAINTING:**

- A. Shop painting in accordance with applicable STEEL JOIST INSTITUTE standard specification.
- B. Shop paint joists and accessories with a rust-inhibiting primer paint. For joists which will be finish painted, limit paint to a primer which is compatible with specified finish paint. In high humidity areas, shop paint joists with a zinc-rich primer to receive top coats per the paint system manufacturer's recommendations.

### **3.3 ERECTION:**

- A. Installation of joists in accordance with applicable STEEL JOIST INSTITUTE standard specification.
- B. Handle joists in a manner to avoid damaging of joists. Remove damaged joists from site, except when field repair is approved and such repairs are satisfactorily made in accordance with manufacturer's recommendations.
- C. Accurately set joists and end anchorage in accordance with the applicable STEEL JOIST INSTITUTE standard specification. Secure joists resting on masonry or concrete bearing surfaces by welding or bolting to the steel bearing plates as indicated on the Contract Documents. Secure bridging and anchoring in place prior to application of any construction loads. Distribute any temporary loads so that carrying capacity of any joist is not exceeded. Loads shall not be applied to bridging where joist lengths are 12 m (40 feet) and longer. Where joist lengths are 12 m (40 feet) and longer, install a center row of bolted diagonal bridging to provide lateral stability before slackening of hoisting lines.

### **3.4 FIELD PAINTING:**

- A. Clean abraded, corroded, and field welded areas and touch up with same type of paint used in shop painting.
- B. Finish painting of steel surfaces is specified in Section 09 91 00, PAINTING.

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