

SECTION 052000 - STEEL JOISTS AND JOIST GIRDERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Section includes the manufacture and erection of steel joists and joist girders shown on the Drawings.

1.2 RELATED SECTIONS

- A. Section 013330 - Structural Submittals.
- B. Section 014525 - Structural Testing/Inspection Agency Services.
- C. Section 051000 - Structural Steel.
- D. Section 053000 - Metal Decking.

1.3 REFERENCES

- A. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- B. AWS D1.1 - Structural Welding Code.
- C. SJI - Standard Specifications for Open Web Steel Joists, K-Series.
- D. SJI - Standard Specifications for Joist Girders.

1.4 DESIGN REQUIREMENTS

- A. Steel joists, joist girders, and bridging shall be designed by an engineer licensed in the project state.
- B. Design joists, joist girders, and bridging in accordance with the Steel Joist Institute (SJI) Standard Specifications.
- C. Refer to Drawings for special design requirements, if any.
- D. Top chord extensions or extended ends are to be designed for the same tabulated uniform loads used in the design of the associated joists and for a concentrated load of 500 pounds at the end of the extension or extended end, unless noted otherwise on the Drawings.
- E. Design KCS-Series joists to conform to the load tables published by Vulcraft.

- F. Steel joist deflections shall be designed for L/240 under total load (dead + live) and L/360 under live load.

1.5 SUBMITTALS

- A. Submit certification letter stating compliance with SJI specifications.
- B. Submit detailed shop drawings showing layout of joist units, special connections, and accessories. Include the mark, number, type, location, and spacing of joists and bridging.
- C. Submit signed and sealed calculations by the design engineer for review.
- D. Upon request, submit mill test certificates.
- E. Upon request, submit written welding procedures for each type of welded joint used. Use prequalified joints.
- F. Upon request, submit the erection sequence and procedures to be used by the steel erector.

1.6 QUALITY ASSURANCE

- A. Structural Testing/Inspection Agency shall perform the following quality related items:
 - 1. Visual inspection of bolted and welded connections.
 - 2. Verify installation of bridging or braces.
 - 3. Verify connections for top and bottom chords.
 - 4. Verify reinforcement of members for concentrated loads.
 - 5. Verify proper bearing.
- B. The Structural Testing / Inspection Agency shall provide special inspections as required by Chapter 17 of the building code as required by Specification 01 4525.

1.7 QUALIFICATIONS

- A. Manufacturer shall verify that design and manufacture of joists and joist girders conforms with SJI Standard Specifications.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle joists as recommended in SJI Standard Specifications.

PART 2 - PRODUCTS

2.1 ROLLED STEEL PLATES, SHAPES, AND BARS

- A. Steel shall conform to SJI Standard Specifications.

2.2 UNFINISHED BOLTS, WASHERS, AND NUTS

- A. Unfinished bolts shall conform to ASTM A307, Grade A, 60 ksi minimum tensile strength. Provide compatible hexagonal nuts and plain washers.

2.3 WELD ELECTRODES

- A. E-70 series low hydrogen electrodes conforming to AWS A5.1 or A5.5, A5.17 or A5.20.
- B. Provide proper storage for electrodes to maintain flux quality.

2.4 PAINT

- A. Primer shall conform to AISC Specifications and Code of Standard Practice and SSPC Steel Structures Painting Manual.

PART 3 - EXECUTION

3.1 MANUFACTURE AND ERECTION

- A. Manufacture and erect joists in accordance with SJI Standard Specifications.
- B. Members shall have parallel top and bottom chords unless otherwise indicated.
- C. Fabricate bearings which rest on sloped surfaces with a slope which conforms to that of the support unless otherwise approved.
- D. Provide for connections of kickers and hangers to members.
- E. Provide bottom chord extensions at columns and as indicated by the Contract Drawings. Weld bottom chords to members after dead loads have been applied.
- F. Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord (not suspended ceilings). Extend ends to within 1/2 inch of the finished wall surface unless otherwise indicated.
- G. Camber joists according to SJI Standard Specifications. Negative camber and bent joists are unacceptable.
- H. Do not erect joists until supporting work is secured.
- I. Provide bridging complying with SJI Standard Specifications. Provide for connections where bridging terminates.

3.2 CONCENTRATED LOADS ON JOISTS

- A. Concentrated loads not shown on Drawings must be verified by joist manufacturer for adequacy of joist design. The necessity of any reinforcement required for concentrated loads applied to either the top or bottom chord shall be designed by joist manufacturer.

3.3 HEADER UNITS

- A. Provide header units to support openings in floor or roof system not framed with steel shapes.

3.4 SHOP PAINTING

- A. Remove loose scale, heavy rust, and other foreign materials from joists and accessories before application of shop paint.
- B. Apply one shop coat of steel joist primer paint to joists and accessories, by spray, dipping, or other method to provide a continuous dry paint film thickness of not less than 1.50 mil.

3.5 BEARING

- A. Extend ends of steel joists not less than 4 inches over masonry and concrete supports. Extend ends of joists not less than 2-1/2 inches over steel supports. Positive attachment to support shall be made by welding or bolting. In such cases where a shorter end bearing length must be used, such condition must be designed.
- B. "U" type anchors are not acceptable unless authorized in writing.

3.6 WELDING

- A. Perform welding in accordance with AWS D1.1 "Structural Welding Code". Use AWS Certified Welders.
- B. Weld ends of joists resting on steel supports with the minimum weld specified by the SJI standard specifications, unless otherwise indicated on Contract Drawings.
- C. Remove all slag and weld splatter from deposited weld material.

3.7 BRIDGING INSTALLATION

- A. Permanently fasten bridging before the application of loads.
- B. In areas where joists will be exposed to view, align bridging in straight rows to create uniform appearance.

3.8 PROTECTION

- A. Provide means for adequate distribution of concentrated loads so that carrying capacity of joists is not exceeded during construction.
- B. Provide temporary bridging, bracing, connections, and anchors to ensure lateral stability during construction.
- C. Joists damaged during construction shall be replaced or repaired with procedures submitted by the joist manufacturer.

3.9 REPAIRS

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.
- B. Touchup Painting:
 - 1. Immediately after installation, clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel, and accessories.
 - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
 - b. Apply a compatible primer of same type as primer used on adjacent surfaces.

3.10 CUTTING

- A. Do not field cut or apply heat to joists or joist girders unless authorized in writing.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Owner shall engage a qualified testing agency to perform tests and inspections.
- B. Visually inspect field welds according to AWS D1.1.
 - 1. In addition to visual inspection, test field welds according to AWS D1.1 and the following procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E165.
 - b. Magnetic Particle Inspection: ASTM E709.
 - c. Ultrasonic Testing: ASTM E164.
 - d. Radiographic Testing: ASTM E94.
- C. Visually inspect bolted connections.
- D. Prepare test and inspection reports.

END OF SECTION 052000