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USACE / NAVFAC / AFCEC / NASA UFGS-05 21 16 (August 2009)  
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Preparing Activity: USACE Superseding  
UFGS-05 21 16 (July 2007)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2014

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08/09

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### SECTION 05 21 16

#### LONGSPAN STEEL JOIST FRAMING 08/09

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NOTE: This guide specification covers the requirements for deep longspan steel joist framing and accessories.

Adhere to [UFC 1-300-02](#) Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a [Criteria Change Request \(CCR\)](#).

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#### PART 1 GENERAL

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NOTE: Use Section [05 21 23](#) for STEEL JOIST GIRDER FRAMING. Use Section [05 21 19](#) for OPEN WEB STEEL JOIST FRAMING. Use Section [05 21 13](#) for DEEP LONGSPAN STEEL JOIST FRAMING.

Show the following information on the project drawings:

1. Joist series and size, joist spacing, and kg (kip) load on each panel point, span, and slope.
2. Design loads, including uplift and lateral forces in addition to gravity (dead and live) loads.
3. Method of anchoring, framing at openings,

spacing and type of bridging.

#### 4. Accessory details as applicable.

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### 1.1 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### AMERICAN WELDING SOCIETY (AWS)

AWS B2.1/B2.1M	(2009) Specification for Welding Procedure and Performance Qualification
AWS D1.1/D1.1M	(2010; Errata 2011) Structural Welding Code - Steel

#### STEEL JOIST INSTITUTE (SJI)

SJI LOAD TABLES	(2005; Errata 1 2006; Errata 2 2007; Errata 3 2007) 42nd Edition Catalog of Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders
SJI MANUAL	(2009) 80 Years of Open Web Steel Joist Construction
SJI TD 10	(2003) Technical Digest No. 10 - Design of Fire Resistive Assemblies with Steel Joists
SJI TD 8	(2008) Technical Digest No. 8 - Welding Of Open-Web Steel Joists And Joist Girders; 2nd Edition
SJI TD 9	(2008) Technical Digest No. 9 - Handling

and Erection of Steel Joists and Joist  
Girders; 3rd Edition

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 15 (1999; E 2004) Steel Joist Shop Primer

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1200 Hazard Communication

29 CFR 1926 Safety and Health Regulations for  
Construction

29 CFR 1926.757 Steel Erection; Open Web Steel Joists

## 1.2 SYSTEM DESCRIPTION

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NOTE: The structural steel design must meet the requirements of OSHA Steel Erection Standard, 29 CFR Part 1926, Subpart R-Steel Erection, Effective Date January 18, 2002, and 29 CFR 1926.757.

Drawings must show size, spacing and method of anchoring. Indicate size by reference to appropriate SJI designations. Mechanical and electrical layout drawings and specifications for ceiling suspensions must contain notes indicating that hanger loads between panel points in excess of 222 N (50 pounds) must have the excess hanger loads suspended from panel points.

When joists or girders are to be designed to resist uplift and/or lateral forces, such joists and girders and the forces they must resist must be indicated on the drawings. Also, indicate all proper anchorages and bracing designed to resist those forces, as required.

The standard joist tables cannot be used verbatim when the depth of the joist is reduced near the ends to accommodate two-way top chord slopes in excess of 10 mm per meter (1/8 inch per foot). Before using standard designations for these joists, the designer must verify the adequacy of the joist members.

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### 1.2.1 General Requirements

Designate Longspan Steel Joists on the drawings in accordance with the standard designations of the Steel Joist Institute. Joists of other standard designations or joists with properties other than those shown may be substituted for the joists designated provided the structural properties are equal to or greater than those of the joists shown and provided all other specified requirements are met. Erect joist framing conforming to 29 CFR 1926.757. Secure all joist bridging and anchoring in place prior to the application of any construction loads. Distribute temporary loads so that joist capacity is not exceeded. Do not apply loads to bridging.

### 1.2.2 Metric Dimensions

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NOTE: Delete this paragraph for non-metric projects.  
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SI dimensioning in this section is based on a mathematical conversion of inch-pound dimensions following the SJI specification **SJI LOAD TABLES**. The SI and I-P units for the dimensions shown are as follows.

Inch-Pound Units	SI Units
20 feet	6096 mm
30 ksi	207 MPa

### 1.3 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section **01 33 00 SUBMITTAL PROCEDURES** and edit the following list to reflect only the submittals required for the project.

The Guide Specification technical editors have designated those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section **01 33 00 SUBMITTAL PROCEDURES**:

#### SD-01 Preconstruction Submittals

Welder qualification  
Material Safety Data Sheet (MSDS) in accordance with  
29 CFR 1910.1200

#### SD-02 Shop Drawings

Longspan Steel Joist Framing; G

#### SD-06 Test Reports

Erection inspection  
Welding inspections

#### SD-07 Certificates

Accessories  
Certification of Compliance

### 1.4 QUALITY ASSURANCE

Perform all work in compliance with the requirements set forth in  
29 CFR 1926.

#### 1.4.1 Drawing Requirements

Submit drawings for longspan steel joist framing including fabrication and erection details, specifications for shop painting, and identification markings of joists [and joist girders]. Show joist type and size, layout in plan, and erection details including methods of anchoring, framing at openings, type and spacing of bridging, [requirements for field welding,] and details of accessories as applicable.

#### 1.4.2 Certification of Compliance

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NOTE: Use the SJI MANUAL reference for projects  
involving existing joist girder and joist systems.  
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Prior to construction commencement, submit Material Safety Data Sheet in accordance with 29 CFR 1910.1200 for longspan steel joists , and certification for welder qualification, compliance with AWS B2.1/B2.1M, welding operation, and tacker, stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests. Submit certification of compliance for the following:

- [a. SJI MANUAL]
- b. SJI TD 8
- c. SJI TD 9
- d. SJI TD 10
- e. 29 CFR 1926
- f. 29 CFR 1926.757

## 1.5 DELIVERY, STORAGE, AND HANDLING

Handle, transport, and store joists [and joist girders] in a manner to prevent damage affecting their structural integrity. Store all items off the ground in a well drained location protected from the weather and easily accessible for inspection and handling.

## PART 2 PRODUCTS

### 2.1 LONGSPAN STEEL JOISTS

Provide longspan steel joists conforming to **SJI LOAD TABLES**, LH-Series. Joists designated LH shall be designed to support the loads given in the applicable standard load tables of **SJI LOAD TABLES**.

### 2.2 ACCESSORIES AND FITTINGS

Provide accessories and fittings, including end supports and bridging, in accordance with the standard specifications under which the members were designed.

### 2.3 SHOP PAINTING

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NOTE: The requirements of the paragraph will be coordinated with the requirements of Section **09 90 00 PAINTS AND COATINGS**. In crawl spaces and other high humidity areas where greater protection than that provided by a primer paint is required and the joists or girders will not be finish painted, the paragraph will be revised to require that the joists or girders be shop painted with a corrosion resistant type paint as recommended by SSPC.  
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Longspan Joists [, joist girders] and accessories shall be shop painted with a rust-inhibiting primer paint. For joists [and joist girders] which require finish painting under Section **09 90 00 PAINTS AND COATINGS**, the primer paint shall conform to **SSPC Paint 15**.

## PART 3 EXECUTION

### 3.1 ERECTION

Install longspan joists [and joist girders] in conformance with **SJI LOAD TABLES** for the joist series indicated, and the requirements of **29 CFR 1926** and **29 CFR 1926.757**. Handle and set joists [and joist girders] avoiding damage to the members.. Remove damaged joists [and joist girders] from the site, except when field repair is approved and such repairs are satisfactorily made in accordance with the manufacturer's recommendations. All welding shall conform to **AWS B2.1/B2.1M** and **AWS D1.1/D1.1M**.

### [3.2 BEARING PLATES

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NOTE: Use this paragraph for masonry or cast-in-place concrete applications only.  
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Provide bearing plates to accept full bearing after the supporting members have been plumbed and properly positioned, but prior to placing superimposed loads. The area under the plate shall be damp-packed solidly with bedding mortar, except where nonshrink grout is indicated on the drawings. Provide bedding mortar and grout as specified in Section 03 30 00.00 10 CAST-IN-PLACE CONCRETE.

### ] 3.3 PAINTING

#### 3.3.1 Touch-Up Painting

After erection of joists [and joist girders], touch-up connections and areas of abraded shop coat with paint of the same type used for the shop coat.

#### [ 3.3.2 Field Painting

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NOTE: Omit bracketed text when field painting is  
not required.  
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Paint joists [and joist girders] requiring a finish coat in conformance with the requirements of Section 09 90 00 PAINTS AND COATINGS.

### ] 3.4 VISUAL INSPECTIONS

Perform visual inspection according to AWS D1.1/D1.1M, Section 6. Perform erection inspection and field welding inspections with AWS certified welding inspectors. Welding inspectors shall visually inspect and mark welds.

-- End of Section --