

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05211

STEEL JOISTS

07/03

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 SUBMITTALS
- 1.3 QUALIFICATIONS FOR WELDING WORK
- 1.4 DELIVERY, STORAGE, AND HANDLING
- 1.5 PERFORMANCE REQUIREMENTS
 - 1.5.1 Allowable Design Stress
 - 1.5.2 Deflection
 - 1.5.3 Allowable Loads
 - 1.5.4 Bridging

PART 2 PRODUCTS

- 2.1 ROLLED STEEL PLATES, SHAPES, AND BARS
- 2.2 STEEL SHEETS AND STRIP
- 2.3 ELECTRODES FOR MANUAL SHIELDED METAL-ARC WELDING
- 2.4 UNFINISHED THREADED FASTENERS
- 2.5 HIGH-STRENGTH THREADED FASTENERS
- 2.6 PAINT
- 2.7 BEDDING MORTAR MATERIALS
- 2.8 EPOXY-RESIN GROUT
- 2.9 FABRICATION
 - 2.9.1 Open-Web Steel Joists
 - 2.9.2 Long-Span Steel Joists
 - 2.9.3 Holes in Chords
 - 2.9.4 Loose Bearing Plates
 - 2.9.5 Joist Extended Ends
 - 2.9.6 Ceiling Extensions
 - 2.9.7 Header Members
 - 2.9.8 Shop Painting

PART 3 EXECUTION

- 3.1 GENERAL
- 3.2 WELDING
- 3.3 ANCHORS
- 3.4 SETTING LOOSE BEARING PLATES
- 3.5 PLACING STEEL JOISTS
- 3.6 BRIDGING

- 3.7 FASTENING STEEL JOISTS
- 3.8 TOUCHUP PAINTING
- 3.9 INSPECTION AND ACCEPTANCE PROVISIONS
 - 3.9.1 Inspection and Tests
 - 3.9.2 Inspection of Welds
 - 3.9.3 Inspection of High-Strength Bolt Connections

-- End of Section Table of Contents --

NASA-05211 (July 2003)
NATIONAL AERONAUTICS NASA - KSC
AND SPACE ADMINISTRATION Superseding NASA-05211
(March 2003)

SECTION 05211

STEEL JOISTS
07/03

NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.

This section covers short-span and long-span steel joists, conforming to Steel Joists Institute specifications for floor or roof construction.

Drawings must include the following:

A complete design indicating the character of the work to be performed, showing the walls, structural framing, and other supports, steel joist sizes expressed by Steel Joist Institute markings, details of accessories, details of openings, bridging, and sufficient dimensions to convey adequately the quantity and nature of the required steel joist work

Assumed loads and other design data as required for the proper preparation of shop drawings

Roof slope and direction

For high-strength bolted construction, the type of connection, namely, friction or bearing

The location of welds requiring inspection and the type of weld inspection, if required

Fire-resistance-rated floor or roof and ceiling constructions using steel joists are described in Underwriters' Laboratories Inc., (BXUV) Resistance Ratings (included in UL "Fire Resistance Directory" and the "Fire Resistance Ratings" contained in the National Building Code recommended by the American Insurance Association. Fire-resistance-rated construction limits type, size, and spacing of steel joists; method of fastening steel joists to supporting members; type of bridging; type of floor or roof construction; and type of ceiling construction.

PART 1 GENERAL

1.1 REFERENCES

NOTE: The following references should not be manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.

The publications listed below form a part of this section to the extent referenced:

ACI INTERNATIONAL (ACI)

ACI 503R (1993) Use of Epoxy Compounds with Concrete

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC S329 (1986) Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4 (1993) Symbols for Welding, Brazing and Nondestructive Examination

AWS D1.1 (1994) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME B18.22.1 (1965; R 1990) Plain Washers

ASTM INTERNATIONAL (ASTM)

ASTM A 194/A 194M (1995) Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service

ASTM A 242/A 242M (1993; Rev A) High-Strength Low-Alloy Structural Steel

ASTM A 307 (1994) Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

ASTM A 325 (1994) High-Strength Bolts for Structural Steel Joints

ASTM A 325M (1993) High-Strength Bolts for Structural Steel Joints

ASTM A 36/A 36M (1994) Structural Steel

ASTM A 441 (1985) High-Strength Low-Alloy Structural Manganese Vanadium Steel

ASTM A 490	(1993) Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength
ASTM A 490M	(1993) Standard Specification for Heat-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric)
ASTM A 563	(1994) Standard Specification for Carbon and Alloy Steel Nuts
ASTM A 563M	(2000) Standard Specification for Carbon and Alloy Steel Nuts (Metric)
ASTM A 570/A 570M	(1995) Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
ASTM A 6/A 6M	(1995) Standard Specification for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use
ASTM A 606	(1991; Rev A) Standard Specification for Steel Sheet and Strip, Hot-Rolled and Cold-Rolled, High-Strength, Low-Alloy, with Improved Atmospheric Corrosion Resistance
ASTM C 1107	(1991; Rev A) Standard Specification for Packaged Dry, Hydraulic - Cement Grout (Nonshrink)
ASTM C 150	(1995) Standard Specification for Portland Cement
ASTM C 404	(1994) Standard Specification for Aggregates for Masonry
ASTM E 165	(1995) Standard Test Method for Liquid Penetrant Inspection Method
ASTM E 709	(1995) Standard Guide for Magnetic Particle Examination

JOHN F. KENNEDY SPACE CENTER (KSC)

KSC-SPEC-Z-0004	(Rev C; 1989) Welding, Structural, Carbon Steel, Stainless Steel, Low Alloy Steel, and Aluminum Alloys
-----------------	--

STEEL JOIST INSTITUTE (SJI)

SJI-01	(1994) Load Tables and Weight Tables for Steel Joists and Joist Girders
--------	---

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC PS 14.01 (1991) Steel Joist Shop Painting System

SSPC Paint 15 (1991) Steel Joist Shop Paint

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD 410 (Rev E; Notice 2) Nondestructive Testing
Personnel Qualification and Certification
(Eddy Current, Liquid Penetrant, Magnetic
Particle, Radiographic and Ultrasonic)

1.2 SUBMITTALS

**NOTE: Review submittal description (SD) definitions
in Section 01330, "Submittals," and edit the
following list to reflect only the submittals
required for the project. Submittals should be kept
to the minimum required for adequate quality
control. Include a columnar list of appropriate
products and tests beneath each submittal
description.**

The following shall be submitted in accordance with Section 01330,
"Submittals," in sufficient detail to show full compliance with the
specification:

SD-02 Shop Drawings

Fabrication drawings for the following items shall be in
accordance with the paragraph entitled, "Fabrication," of this
section.

- Steel Joists
- Chords
- Loose Bearing Plates
- Joist Extended Ends
- Ceiling Extensions
- Header Members

Installation drawings for Steel Joists shall include details and
layouts indicating wall, structural framing, and other supports;
location, lengths, and marking of steel joists corresponding to
sequence and procedure to be followed in placing and fastening,
location and type of fasteners, and sequence of welded
connections. Welds shall be indicated in accordance with AWS A2.4.

Drawings shall also indicate accessories and methods of
installation, details of longspan and deep longspan steel joists
with sloped top chords, if required.

SD-03 Product Data

Manufacturer's catalog data for Steel Joists shall be submitted by
the contractor prior to start.

SD-07 Certificates

Welding Procedures and Qualifications shall be in accordance with AWS D1.1.

SD-08 Manufacturer's Instructions

Installation instructions shall indicate the manufacturer's recommended method and sequence of installation for the following items:

- Steel Joists
- Epoxy-Resin Grout
- Accessories

1.3 QUALIFICATIONS FOR WELDING WORK

NOTE: Delete paragraph heading and following paragraphs when field-bolted connections only are required.

Welders shall be qualified and certified by tests in accordance with KSC-SPEC-Z-0004. If a test weld fails to meet requirements, an immediate retest of two test welds shall be made and each test weld shall pass. Failure in the immediate retest will require that the welder be retested after further practice or training and that a complete new set of test welds be made. Welding Procedures and Qualifications shall meet referenced standards within this and referenced sections.

1.4 DELIVERY, STORAGE, AND HANDLING

Joists stored at the site before erection shall be stored above the ground on platforms or other supports and covered to provide an enclosure while affording proper air circulation.

Packaged materials shall be stored in their original, unbroken packages in a dry area until needed for installation.

1.5 PERFORMANCE REQUIREMENTS

1.5.1 Allowable Design Stress

Design stress for tension in steel joist chord and web members shall conform to the requirements of the SJI-01 specifications for steel joists.

1.5.2 Deflection

NOTE: The deflection due to design load must not exceed 1/360th of the span for roofs where a ceiling of any construction (not only plaster ceilings as specified in the SJI specifications), piping, ductwork, conduit, or equipment is suspended or attached to the steel joists.

Deflection shall not exceed 1/360th of the clear span under the indicated uniform live load.

1.5.3 Allowable Loads

Total uniform dead and live load, uniform live load, and concentrated dead load for design purposes shall be as indicated.

1.5.4 Bridging

NOTE: Include one of the following two paragraphs as applicable to the project. Where open web steel joists are used in floor construction, cross-bracing-type bridging may be required.

Bridging for open web steel joists shall be horizontal type as specified in the SJI-01 specification and as indicated on the approved shop drawings.

Bridging for open web steel joists shall be cross-bracing type as specified in the SJI-01 specification and as indicated on the approved shop drawings.

NOTE: Delete the following paragraph when longspan and deep longspan steel joists are not required.

Bridging for longspan and deep longspan steel joists shall be cross-bracing type as specified in the SJI-01 specifications and as indicated on the approved shop drawings.

PART 2 PRODUCTS

2.1 ROLLED STEEL PLATES, SHAPES, AND BARS

Plates, shapes, and bars are defined in ASTM A 6/A 6M and shall conform to the following:

NOTE: Delete the first of the following paragraphs when H- or LH- series steel joists only are required. Delete the second of the following paragraphs when J-or LJ- series steel joists only are required.

Structural quality carbon steel conforming to ASTM A 36/A 36M

High-strength structural steel conforming to ASTM A 441 or ASTM A 242/A 242M with properties suitable for welding

2.2 STEEL SHEETS AND STRIP

NOTE: Delete the first of the following paragraphs when H- or LH- series steel joists only are required. Delete the second of the following paragraphs when J-or LJ- series steel joists only are required.

Sheets and strip shall be carbon steel of structural quality conforming to ASTM A 570/A 570M having minimum yield point of 40,000 psi 275 MegaPascal.

Sheets and strip shall be high-strength, low-alloy steel conforming to ASTM A 606, Type 2 having minimum yield point of 50,000 psi 345 MegaPascal.

2.3 ELECTRODES FOR MANUAL SHIELDED METAL-ARC WELDING

NOTE: Delete paragraph heading and following paragraphs when field bolted connections only are required.

Electrodes shall meet the requirements of KSC-SPEC-Z-0004.

NOTE: Delete the first of the following paragraphs when H- or LH- series steel joists only are required. Delete the second of the following paragraphs when J- or LJ- series steel joists only are required.

Electrodes shall be E60 series or E70 series for connected members both having a minimum yield point of 36,000 psi 248 MegaPascal or one having a minimum yield point of 36,000 psi 248 MegaPascal and the other having a minimum yield point greater than 36,000 psi 248 MegaPascal.

Electrodes shall be E70 series for connected members both having a minimum yield point greater than 36,000 psi 248 MegaPascal.

Electrodes having low-hydrogen-type coverings shall be dried in accordance with KSC-SPEC-Z-0004. Electrodes shall be stored immediately after drying in storage ovens held at a temperature of at least 250 degrees F 121 degrees C. Electrodes that are not used within 4 hours after removal from a drying oven shall be redried before use. Wet electrodes shall not be used.

2.4 UNFINISHED THREADED FASTENERS

Unfinished bolts and nuts shall be regular hexagon type and shall conform to ASTM A 307, Grade A.

Washers shall conform to ASME B18.22.1, Type B.

2.5 HIGH-STRENGTH THREADED FASTENERS

NOTE: Delete following paragraphs when field connections of steel joists to the structural steel framing members are welded or when high-strength bolted connections are not required, or both. High-strength bolted connections, if used, must be indicated on the drawings.

Fasteners shall consist of heavy hexagon structural bolts, heavy hexagon

nuts, and hardened washers.

NOTE: Include only one of the following paragraphs as applicable to the project. When ASTM A 325 bolts are not required, delete inapplicable paragraph.

High-strength bolts, nuts, and hardened washers shall conform to ASTM A 325
ASTM A 325M.

High-strength bolts, nuts, and hardened washers shall conform to ASTM A 490
ASTM A 490M. Nuts shall conform to ASTM A 194/A 194M, Grade 2H or ASTM A
563 ASTM A 563M, Grade DH. Washers shall conform to ASTM A 325 ASTM A 325M.

2.6 PAINT

NOTE: Select one of the following two paragraphs as required. SSPC Paint 15, Type I, is suitable as a base for a subsequent field-applied paint system. SSPC Paint 15, Type II, is not suitable as a base for field painting.

Paint shall be shop paint primer conforming to SSPC Paint 15, Type I.

Paint shall be asphalt coating conforming to SSPC Paint 15, Type II.

2.7 BEDDING MORTAR MATERIALS

NOTE: Delete paragraph heading and following paragraphs when the setting of steel bearing plates with bedding mortar will not be required.

NOTE: Delete following paragraph when cement grout type bedding mortar only is required.

Shrinkage-resistant grout shall be a premixed and packaged ferrous
aggregate mortar grouting compound conforming to ASTM C 1107,
Expansive-Cement type.

NOTE: Delete following two paragraphs when shrinkage-resistant, grout-type bedding material only is required.

Portland cement shall conform to ASTM C 150, Type I.

Aggregate for cement grout shall be clean, sharp, uniformly graded, natural
sand conforming to ASTM C 404, Size Number 2.

NOTE: The following paragraph must be included with

both of the above types of bedding mortar.

Mixing water for bedding mortar shall be potable.

2.8 EPOXY-RESIN GROUT

NOTE: Delete paragraph heading and following paragraph when the setting of steel bearing plates with epoxy-resin grout will not be required. Epoxy-resin grout may be used instead of shrinkage-resistant, grout-type bedding mortar.

Grout shall conform to applicable chapters of the ACI 503R, Manual of Concrete Practice, Part 3, Products and Processes.

2.9 FABRICATION

2.9.1 Open-Web Steel Joists

NOTE: Delete paragraph heading and following paragraphs when open web steel joists are not required.

Open-web steel joists shall be shop fabricated of the specified rolled steel plates, shapes, and bars, or the specified steel sheets and strip, or a combination thereof, in accordance with the SJI-01 specification.

SJI-01 Section 4.8 "Shop Painting": Delete SJI-01 Section 4.8 and substitute: Joists and accessories shall receive one shop coat of the paint as specified.

2.9.2 Long-Span Steel Joists

NOTE: Delete paragraph heading and the following paragraph when long-span steel joists are not required.

Long-span steel joists shall be shop fabricated of the specified rolled steel plates, shapes, and bars or of the specified steel sheets and strip, or of a combination thereof in accordance with the SJI-01 specification.

2.9.3 Holes in Chords

NOTE: Size and spacing of holes in chords for securing wood nailers and other work to the steel joists must be indicated.

Holes shall be provided in Chords where indicated for securing other work to steel joists; however, the area of a hole shall be deducted from the area of a chord when computing strength of member.

Holes shall not be made or enlarged by burning, nor will the burning of unfair holes in the shop or field be acceptable.

2.9.4 Loose Bearing Plates

NOTE: Delete paragraph heading and the following paragraph when loose bearing plates are not required.

Plates shall be provided for steel joists bearing on masonry or concrete construction. Plates shall be flat, free from warps or twists, of the proper thickness and bearing area, and drilled to receive anchor bolts.

2.9.5 Joist Extended Ends

Ends shall be provided where indicated. Extended ends shall conform to the manufacturer's standard for steel joists indicated on the approved shop drawings and descriptive data and shall conform to requirements of the applicable SJI-01 specification.

2.9.6 Ceiling Extensions

Extensions shall be provided for steel joists in spaces having suspended ceilings. Extensions shall be either an extended bottom chord element or a loose unit, whichever is the standard with the steel joist manufacturer. Extensions shall be of sufficient strength to support ceiling construction and shall extend within 1/2 inch 13 millimeter of wall surface.

2.9.7 Header Members

NOTE: When openings in the floor or roof surfaces require header members exceeding the joist spacing, such openings must be framed with steel supporting members that are provided as a part of the structural steel framing system.

Rolled steel header members shall be provided for support of steel joists at openings where indicated. Headers shall be in accordance with the manufacturer's standard for steel joists indicated on the approved shop drawings and descriptive data.

2.9.8 Shop Painting

Steel joists and Accessories shall be given one coat of the specified paint in accordance with SSPC PS 14.01.

Shop coat for J and H series joists shall be an asphalt-base paint or other protective coating standard with the manufacturer, except that asphalt base paint only shall be used over crawl spaces or other spaces of high humidity. Shop coat for LJ and LH series joists shall be a paint standard with the manufacturer. Where joists will require finish painting, the shop coat shall be a type that will not bleed through or affect the finish coat. Scale and rust shall be removed from joists prior to painting.

PART 3 EXECUTION

3.1 GENERAL

Steel joists and accessories shall be installed in accordance with the approved shop drawings and descriptive data, and as specified.

Care shall be exercised in handling and placing joists. Joists shall be fastened in place and bridging installed prior to receiving construction loads. Contractor shall coordinate joist location with access space and fixture-placing requirements of other trades.

Special fittings for openings, overhangs, and ceiling extenders shall be furnished where required and not otherwise detailed or specified.

3.2 WELDING

NOTE: Delete paragraph heading and following paragraph when field bolted connections only are required.

Welding shall be in accordance with KSC-SPEC-Z-0004 and the sections entitled "Workmanship" and "Technique" of AWS D1.1.

3.3 ANCHORS

Anchor bolts and other anchors as required for connection of steel joists supported on, attached to, or built into masonry or concrete construction shall be correctly located and built into masonry or concrete construction. Anchors shall be preset by use of templates or other methods as may be required to locate the anchors accurately.

3.4 SETTING LOOSE BEARING PLATES

NOTE: Delete paragraph heading and following paragraphs when loose bearing plates are not required for steel joists supported on masonry or concrete construction.

Plates for steel joists supported on masonry or concrete construction shall be fully bedded on wedges or shims and damp-pack bedding mortar. Installation of plates shall be as follows:

Masonry and concrete bearing surfaces shall be clean. Concrete surfaces shall be roughened. Bottom surface of plates shall be clean.

Space between top of bearing surface and bottom of plate shall be approximately 1/24th of the width of plate but not less than 1/2 inch 13 millimeter for plates that are less than 12 inches 300 millimeter wide. Bearing plate shall be supported and aligned on steel wedges or shims.

NOTE: Delete following paragraph when cement grout-type bedding mortar only is required.

Bedding mortar shall be a mix composed of the specified shrinkage-resistant grout and enough water to provide a flowable mixture without segregation or bleeding.

NOTE: Delete following paragraph when shrinkage-resistant grout-type bedding mortar only is required.

Bedding mortar shall be a mix composed of one part Portland cement, 2-1/2 parts of the specified aggregate for cement grout, and not more than 4-1/2 gallons 16 liters of water per 94-pound 43 kilograms bag of Portland cement.

Forms shall be provided to retain mortar until it is sufficiently hard to support itself.

Bedding mortar mix shall be composed of the specified shrinkage-resistant grout and enough water to provide a maximum water-to-cement ratio of 0.50 by weight.

After supporting members have been positioned and the anchor bolts tightened, space between top of bearing surface and bottom of bearing plate shall be packed with mortar mix by tamping or ramming with a bar or rod until voids are filled.

Wedges or shims shall not be removed, but when protruding they shall be cut off flush with the edge of the bearing plate prior to packing with mortar.

After mortar has received its initial set, it shall be kept damp for a minimum of 24 hours.

NOTE: Delete following paragraphs when cement grout type bedding mortar only is required. Epoxy-resin grout bedding may be used instead of shrinkage-resistant grout type bedding mortar.

Bedding mortar may be epoxy-resin grout conforming to the ACI Manual of Concrete Practice, Part 3, Products and Processes, instead of cement grout. Installation shall be as specified with the following additional requirements:

Epoxy-resin grout shall be delivered to the project site in such manner as to avoid damage or loss. Storage areas shall be a windowless and weatherproof but ventilated, insulated, noncombustible building with provisions nearby for conditioning the material to 70 to 85 degrees F 21 to 29 degrees C for a period of 48 hours before use. Ambient temperature in the storage area of the epoxy materials shall at no time be higher than 100 degrees F 38 degrees C.

Epoxy-resin grout components shall be mixed in the proportions recommended by the manufacturer. Components shall be conditioned to 70 to 85 degrees F 21 to 29 degrees C for 48 hours prior to mixing. Two

epoxy-resin grout components shall be mixed with a power-driven, explosionproof stirring device in a metal or polyethylene container having a hemispherical bottom for the mixing vessel. Polysulfide curing agent shall be added gradually to the epoxy-resin component with constant stirring until a uniform mixture is obtained. Rate of stirring shall be such that the entrained air is a minimum.

Protective clothing, gloves, and eye devices shall be provided for workmen engaged in epoxy-resin grout mixing and placing operations.

Adequate ventilation and fire protection precautions shall be maintained at mixing and placing operations.

Installation requirements not specified shall be in accordance with the epoxy-resin grout manufacturer's printed installation instructions and as approved.

3.5 PLACING STEEL JOISTS

Supporting members shall be in place before placing of joists is started. Joists shall be placed on the supporting framework and adjusted and aligned accurately, with ends bearing on supporting members, before being permanently fastened. End supports shall be as specified. Placing and aligning joists shall be done to attain the number and spacing of joists as indicated on the approved shop drawings.

[End support for shortspan steel joists shall be as specified in accordance with the SJI-01 (JH) Standard Specifications for Open Web Steel Joists, J-and H-Series.]

[End supports for longspan steel joists shall be as specified in accordance with the SJI-01 (LA) Standard Specifications for Open Web Steel Joists -Longspan or LA-Series.]

3.6 BRIDGING

NOTE: When fire-resistance-rated construction is required, consult fire-rating agency's design and material requirements for the applicable roof or floor construction.

As soon as steel joists have been placed, bridging shall be completely installed. Size of bridging members shall be as indicated on the approved shop drawings.

Bridging shall conform to requirements of the SJI Specification. Each line of bridging shall be securely anchored to walls or supports at the ends of the line and to each joist by welding or bolting.

3.7 FASTENING STEEL JOISTS

NOTE: When fire-resistance-rated construction is required, consult fire-rating agency's design and material requirements for the applicable roof or floor or ceiling construction. Delete following paragraph when field bolting only is required.

Steel joists resting on steel supporting members shall be field connected by welding. Welds shall be as specified in the SJI-01 Specification for type of joists used and as indicated on the approved shop drawings. Welding sequence and procedure shall be coordinated with placing of joists. Welding shall not damage joists.

NOTE: Delete following paragraphs when field welding only is required.

Steel joists resting on steel supporting members shall be field connected by bolting. Bolting shall be as specified in the SJI-01 Specifications for the type of joist used, as indicated on the approved shop drawings. Bolting sequence and procedure shall be coordinated with placing of joists. Bolted connections shall be as follows:

NOTE: Delete inapplicable paragraphs.

Unfinished threaded fasteners shall be used for bolted connections.

Unfinished threaded fasteners shall be used for bolted connections of joists to purlins, bearing plates on supporting walls, wall anchors, and elsewhere except where high-strength bolted connections are indicated.

High-strength threaded fasteners shall be used for bolted connections of joists to steel columns and elsewhere as indicated. High-strength bolted connections shall be installed in accordance with the AISC S329.

NOTE: Delete following paragraph when steel joists supported on masonry or concrete construction are resting on steel bearing plates specified in the paragraph entitled "Setting Loose Bearing Plates."

Joists resting on masonry or concrete bearing surfaces shall be bedded in mortar and anchored to masonry or concrete construction as specified in the SJI Specification.

3.8 TOUCHUP PAINTING

After joist installation, the Contractor shall touchup paint field welds, field bolt heads and nuts, and scarred surfaces on joists and steel supporting members. Before touchup painting, weld scars, bruises, abrasions, and rust spots shall be wire brushed and solvent cleaned. Paint used for touchup painting shall be the same as that used for shop painting.

3.9 INSPECTION AND ACCEPTANCE PROVISIONS

3.9.1 Inspection and Tests

Inspection by the Contracting Officer will include verification of proper preparation, size, and gaging location, and defects of welds;

identification marking; operation and current characteristics of welding sets in use; calibration of wrenches for high-strength bolts; and inspection for defects of welds.

Joists with cracked, improper, or damaged welds shall not be used. Field repair of damaged joists will be allowed only if approved. Method of repairs shall be in accordance with the manufacturer's recommendation.

3.9.2 Inspection of Welds

NOTE: Delete paragraph heading and following paragraphs when welded connections are not required.

Inspection of welding shall be performed in accordance with AWS D1.1, Section 6, "Inspection," and as follows:

NOTE: Delete inapplicable paragraphs. Location of welds requiring inspection and type of inspection must be indicated on the drawings.

If weld inspection is desired, the liquid penetration method is the most economical and commonly used.

Liquid penetration inspection of welds shall conform to ASTM E 165.

Magnetic particle inspection of welds shall conform to ASTM E 709.

Welding inspectors shall be certified in accordance with MIL-STD 410 and KSC-SPEC-Z-0004.

3.9.3 Inspection of High-Strength Bolt Connections

NOTE: Delete paragraph heading and following paragraph when high-strength bolt connections are not required.

Inspection of connections shall be performed in accordance with AISC S329, Section 6, "Inspection."

-- End of Section --