

**CONSTRUCTION STANDARD SPECIFICATION**

**SECTION 05310**

**STEEL DECK**

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**SECTION 05310**

**STEEL DECK**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This section includes the fabrication and erection of composite steel deck, steel roof deck, non-composite steel form deck and steel deck accessories.
- B. Related Sections: Refer to the following sections for related work:
  - 1. Section 03300, "Cast-In-Place Concrete" for concrete topping and reinforcing steel.
  - 2. Section 04220, "Concrete Masonry Unit" for steel deck bearing plates.
  - 3. Section 05120, "Structural Steel" for shop welded shear connectors.
  - 4. Section 05500, "Metal Fabrications" for framing openings and miscellaneous steel shapes.
  - 5. Section 09900, "Painting"

**1.02 REFERENCES**

- A. American Iron and Steel Institute (AISI)  
Specification for the Design of Cold-Formed Steel Structural Members
- B. American Society of Testing and Materials (ASTM)
  - A611 Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Structural Quality
  - A653 Standard Specification for Steel Sheet, Zinc-Coated or Zinc-Iron Alloy-Coated by the Hot-Dip Process

- A780 Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
- A924 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
- C. American Welding Society (AWS)
  - D1.1 Structural Welding Code - Steel
  - D1.3 Structural Welding Code - Sheet Steel
- D. Factory Mutual (FM)
  - Approval Guide
- E. Federal Specification (FS)
  - TT-P-664 Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant
- F. Military Standardization Documents (MIL)
  - P-21035B Paint, High Zinc Dust Content, Galvanizing Repair
- G. Steel Deck Institute (SDI)
  - Publication No. 29 Design Manual for Composite Decks, Form Decks, Roof Decks and Cellular Deck Floor Systems with Electrical Distribution
- H. Underwriter's Laboratories, Inc. (UL)
  - Fire Resistance Directory

### 1.03 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Section 01330, "Submittal Procedures."
- B. Product Data: Submit product data or manufacturer's specifications and installation instructions for each distinct type of decking and for accessories.
- C. Shop Drawings: Submit detailed shop drawings showing layout and types of deck panels, anchorage details, and conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing or other accessories. Include mark number, type and location of metal decking.

- D. Certification: Submit manufacturer's certification that decking complies with Steel Deck Institute (SDI) Specifications.
- E. Welders Certificates: Provide certification that all welders to be employed in work comply with requirements specified in "Quality Assurance" article.
- F. Welding Procedures: Provide written welding procedure specification (WPS) document per AWS Code requirements.
- G. Asbestos-Free and Lead-Free Paint Certification: Submit manufacturer's written certification that all materials are free of asbestos and lead paint.

#### 1.04 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated or specified:
  - AISI "Specification for the Design of Cold-Formed Steel Structural Members"
  - AWS D1.1 and D1.3.
  - SDI "Design Manual for Floor Decks and Roof Decks"
- B. Qualification of Field Welders: Welders shall be certified in accordance with AWS D1.1 and D1.3 within the last twelve (12) months.
- C. FM Listing: Provide metal roof deck units which have been evaluated by Factory Mutual System and are listed in "Factory Mutual Approval Guide" for "Class 1" fire rated construction and Class I-60 windstorm ratings.
- D. Fire Rated Assemblies: Provide deck units complying with requirements of Underwriter's Laboratories, Inc. (UL) "Fire Resistance Directory" for use in any rated design indicated.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
- B. Store materials to permit easy access for inspection and identification. Keep deck panels off ground using pallets, skids, platforms or other supports.
- C. Protect steel deck from 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 deck panels.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Uncoated (Black) Sheet Steel: Deck panels shall conform to SDI Publication No. 29, and ASTM A611. See plans for type, size and finish.
  - 1. Minimum Yield Strength: 33 ksi (230 MPa)
  - 2. Minimum Thickness: 0.028 in (0.71 mm), unless indicated otherwise.
  - 3. Grade
    - a. Composite Steel Deck: Grades C or D.
    - b. Non-Composite Steel Deck: Grades C, D, or E.
    - c. Steel Roof Deck: Grades C, D, or E.
- B. Galvanized Sheet Steel: Deck panels shall conform to SDI Publication No. 29, and ASTM A653 Structural Quality. See plans for type, size and finish.
  - 1. Minimum Yield Strength: 33 ksi (230 MPa).
  - 2. Minimum Uncoated Thickness: 0.028 in (0.71 mm), unless indicated otherwise.
  - 3. Galvanization: Conform to ASTM A924 (replaced ASTM A525) with a minimum coating class of G60 as defined in ASTM A653.
- C. Miscellaneous Finishes
  - 1. Shop Primer: Manufacturer's baked on, lead-free and chromate-free, rust inhibitive primer, conforming to performance requirements of FS TT-P-664.
  - 2. Galvanized Repair Paint: Comply with requirements of MIL P-21035B, Type I or II.
  - 3. Concrete Topping: Unless indicated otherwise, all deck to receive concrete shall be galvanized.

## 2.02 ACCESSORIES

- A. General: Provide accessory materials for steel deck that comply with requirements indicated and recommendations of the steel deck manufacturer.
- B. Column Closures, End Closures, and Z-Closures: Steel sheet, of same material and thickness as deck panels, unless indicated otherwise on the Contract drawings.
- C. Hanger Tabs: Manufacturer's standard hanger tabs for floor deck installation, where indicated on the Contract drawings.
- D. Cover Plates: Fabricate covers for abutting deck ends, of same material and gage as deck units, in matching profile, and not less than six (6) inches (152 mm) wide.
- E. Pour Stops: Shall be adequate to support concrete and any construction loads.
- F. Filler Sheets and Girder Fillers: Fabricate of same material, gage and profile, as deck units, to complete horizontal closure.
- G. Rubber Closures (Top and Underside): Manufacturer's standard synthetic rubber to match deck profile.
- H. Cant Strips and Eave Plates: Fabricate of same material and gage as deck units, with flange for attachment and of dimensions as indicated on Contract drawings.
- I. Roof Sump Pan: Fabricate of not less than 0.071 inch (1.80 mm) thick galvanized steel, with flat bottom and sloped sides, recessed 1-1/2 inches (38 mm) below deck surface, with bearing flange not less than three (3) inches (76 mm) wide, and with all joints sealed watertight.
- J. Miscellaneous Roof Deck Accessories: Steel sheet, minimum 0.0359-inch (0.91 mm) thick ridge and valley plates, finish strips, and reinforcing channels, of same materials as roof deck.
- K. Fasteners: Manufacturer's standard galvanized hardened steel, self-tapping.
- L. Weld Washers: Manufacturer's standard uncoated steel sheet weld washers, minimum thickness of 0.056 in. (1.5 mm) with a minimum 3/8-inch (9.5 mm) diameter hole.

## 2.03 FABRICATION

- A. General: Fabricate deck panels conforming to SDI Publication No. 29 and the requirements of this specification.

1. Deck units shall be selected to provide the load capacities as indicated on the Contract drawings, and as determined using the SDI construction loading criteria.
  2. Deck shall span three or more supports, unless indicated otherwise.
- B. Roof Deck Units: Provide deck panels without top-flange stiffening grooves conforming to SDI specifications, of thickness and depth as indicated on the Contract drawings.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Review all discipline drawings prior to deck installation to determine the locations of deck penetrations that will require openings. Inform the SDR or any openings that will require steel frames that are not shown on the structural drawings.
- B. All edge angles shall be in place with proper attachment prior to installation of metal deck. All roof and floor opening frames shall be installed prior to deck installation.
- C. Examine field conditions and substrates to receive metal decking, and verify that existing conditions are acceptable before commencing installation.

#### 3.02 PREPARATION

- A. Do not place decking on supporting concrete structures until concrete is fully cured and dry.
- B. Locate deck bundles to prevent overloading of structural members.
- C. Do not use floor deck units for storage or as working platforms until final connections have been made.

#### 3.03 INSTALLATION

- A. General: Install deck units and accessories in compliance with the final shop drawings, manufacturer's recommendations, SDI Specifications, and requirements of this specification.
  1. Fasten deck units to supports promptly after placement and alignment.
  2. Do not leave placed sheet unattached at end of working day.

- B. Bearing: Install deck ends over framing supports with minimum end bearing of the following; align and level deck units.
1. Non-Steel Support: 6 inches (152 mm)
  2. Steel Support: 3 inches (76 mm)
- C. Placement
1. Place deck units flat and square, secure to framing without excessive warp or deflection.
  2. Place deck units in straight alignment for entire length of run.
  3. Place deck units to permit proper attachment to perimeter deck angle. Deck shall be fully supported at all perimeter edges.  

Provide steel filler fabricated of same material as perimeter deck angle in required size and shape to provide full structural support.
  4. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.
  5. Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.
- D. End Laps: Lap ends of deck units a minimum of two inches (51 mm) over supports.
1. End laps may be staggered or on a continuous line.
  2. Butt ends only where laps would be more than two (2) layers thick or otherwise unable to be lapped and weld each panel at its ends with the specified pattern.
  3. Where deck slopes more than 1/2 inch per foot, start placement of deck units and ridge and valley plates at low end and lap ends shingle fashion with high side over low side.
- E. Butt Ends: Butt ends of deck units at stud shear connectors.
1. Stud shear connectors may not be welded through more than one thickness of deck.
  2. Tape butted ends of deck units to close gaps of 1/8 inch (3.18 mm) or less.
- F. Openings: Reinforce openings greater than the width between deck flutes made by other trades, as indicated on the Contract Drawings.



1. Reinforce openings less than 15 inches (381 mm) with flat steel sheet of the same quality as the deck units, thickness of not less than 0.0358 (0.91 mm).

Place steel sheet over opening and fusion weld to the top surface of the deck, in accordance with the Contract Drawings and this specification.

2. Reinforce openings greater than 15 inches (381 mm) with angles or channels of A36 steel framing around the opening to the adjacent deck supports in accordance, and adequate to support the loads that would normally be carried by the deck where the opening has occurred.

Weld or mechanically fasten the deck to the frame in accordance with the Contract Drawings and this specification.

- G. Provide additional metal reinforcement as shown on the Contract Drawings and as required for strength, continuity of decking and support of other work shown.
- H. Install closure strips as shown on the Contract Drawings and as recommended by the manufacturer to provide a complete installation.

Where joist ends terminate on a shear wall and the deck does not contact the wall, provide metal closure strips from deck to the wall between the joists.

### 3.04 ANCHORAGE

- A. General: Fasten deck units to supporting members including perimeter support steel and/or bearing walls by either welding or by mechanical fastening, immediately after alignment. Comply with the requirements of SDI.
  1. Comply with AWS D1.1 and D1.3 for requirements and procedures for welding.
  2. Care shall be exercised in the selection of electrodes and amperages to provide positive welds and to prevent burn through of the supporting members. If supporting membrane do become cut during deck welding, the Contractor shall repair or replace the member at no cost to Sandia National Laboratories (SNL).
- B. Weld Spacing: Weld edge ribs of panels at each support. Space welds as follows:
  1. Floor Deck: Average of 12 inches (305 mm) apart, but not more than 18 inches (457 mm).
  2. Roof Deck: Maximum 12 inches (305 mm) apart.
- C. Side Lap and Perimeter Edge Attachment: Fasten side laps and perimeter edges of units between supports at intervals not exceeding 36 inches (914 mm) on center by welding or mechanical fasteners.

Deck units with spans greater than 5 feet (1.5 m) shall have side laps and perimeter edges at perimeter support steel fastened at midspan or 36-inch (914 mm) intervals, whichever is smaller, or as shown on the Contract drawings.

3.05 CLEANING AND TOUCH-UP

- A. Clear debris from deck before floor or roof substrate is placed.
- B. Provide cleaning and touch-up painting of field welds, abraded areas and rust spots, as required for all exposed areas after erection and before proceeding with field painting.

END OF SECTION