

SECTION 05 31 13 – STEEL FLOOR DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 - Specification sections, apply to work of this section.

1.2 SCOPE OF WORK

- A. Supplier: The metal deck supplier shall furnish all metal deck materials and accessories indicated on the Architectural, Structural, and Mechanical Drawings required to produce a complete job including but not necessarily limited to deck units, cover plates, pour stops, hanger slots or clips, metal deck edge closures, cell closures, and all related accessories.
- B. Erector: The Subcontractor responsible for erecting the metal deck shall provide all labor and equipment as required to place all metal deck components and accessories as described above.

1.3 QUALIFICATIONS

The metal deck supplier shall be a manufacturer with a minimum of two years successful experience and with a minimum of two successful jobs of a comparable size and scope to this project.

1.4 QUALITY ASSURANCE

The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.

- A. Codes and Standards: Comply with provisions of the following codes and standards except as otherwise indicated or specified:
 - 1. "Design Manual for Composite Decks, Form Decks, and Roof Decks", as published by the Steel Deck Institute (SDI).
 - 2. "Specification for the Design of Cold Formed Steel Structural Members", as published by the American Iron and Steel Institute (AISI).
 - 3. "Structural Welding Code – Sheet Steel", D1.3, as published by the American Welding Society (AWS).
- B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with AWS procedures.
- C. Underwriters Label: Provide metal deck units which are listed and conform to Underwriters Laboratories "Fire Resistance Directory", with each deck unit bearing the UL label and marking for specific system detailed.
- D. Cellular Decks: Provide cellular floor deck units complying with UL 209 and listed in UL "Electrical Construction Equipment Directory" with each cellular metal floor deck unit

bearing UL labels and marking. Provide units which will permit use of standard header ducts and outlets for electrical distribution systems.

1.5 SUBMITTALS

- A. Product Certification: Submit manufacturer's specifications and installation instructions for each type of deck specified. Also submit a certificate of product compliance with SDI Standards as specified.
- B. Shop Drawings: Submit detailed shop drawings showing type of deck, complete layout, attachment details, closures, edge strips, pans, deck openings, special jointing, supplementary framing, and all other accessories.
- C. Calculations: If the submitted deck does not comply with the minimum properties shown on the drawings, the metal deck manufacturer shall submit design calculations sealed by a registered professional engineer in the state where the project is located verifying compliance with the specifications for all load and span conditions shown on the drawings.
- D. Welding Certificates: Submit Copies of certificates for welding procedures and personnel.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. See the drawings for location of metal deck types and for depth of deck, design deck properties, design deck yield strength, concrete type, total slab thickness, slab reinforcing, and design superimposed loads. The average rib width to depth of deck ratio shall be greater than or equal to 2.0. The deck properties specified are the values used for the design of the deck shown on the drawings. Provide deck with the depth as noted and other properties equal to or greater than the values stated on the drawings except that a deck with properties less than those stated, other than depth, may be used provided that the deck manufacturer take responsibility for the design of the deck. The design shall include the ability to carry the construction dead loads and design superimposed loads indicated for all the spans shown on the drawings and to meet all performance criteria as specified by the SDI. Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck".

- B. Acceptable manufacturers include the following

ASC Steel Deck
Canam Steel Corp.
CMC Joist and Deck
Steel Dynamics, Inc.
Cordeck
DACS, Inc.
Marlyn Steel Decks, Inc.
Roof Deck, Inc.
Valley Joist/Div. Ebsco Industries, Inc.
Verco Manufacturing Co.

Vulcraft/Div. Nucor Corp.
Wheeling Corrugating Co.

Other manufacturers may be used only with Architect/Engineer approval.

2.2 GRADE OF STEEL

Composite metal deck shall be cold formed from steel sheets conforming to ASTM A611 Grade C or D or ASTM A653, Structural Steel Grade, with a minimum yield strength as stated on the drawings but not less than 33 ksi. The delivered thickness of the uncoated steel shall not be less than 95% of design thickness. Sheet metal accessories shall conform to the same material specification as the deck product.

2.3 FINISH

- A. Galvanized: Composite metal deck shall be galvanized with a protective zinc coating conforming to ASTM A653 G90.
- B. Phosphatized Painted: Composite metal deck shall be phosphatized painted with the steel chemically cleaned of all oil, grease and dirt and then phosphate coated. The deck shall then receive a two coat baked-on primer on the bottom side. The contractor shall be responsible for protecting the deck from excessive oxidation that would materially reduce the concrete bond strength or decrease the strength of the deck.
- C. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Department of Defense Specifications DOD-P-21035.

2.4 RELATED PRODUCTS

- A. Flexible Closure Strips: Provide manufacturers standard vulcanized closed cell, synthetic rubber.
- B. Acoustic Sound Barrier Closures: Provide manufacturers standard mineral fiber closures.

2.5 FABRICATION

- A. Metal Deck Spans: The deck properties shown on the drawings are selected so that the spans do not exceed the maximum clear spans with unshored construction as required by SDI criteria unless indicated otherwise on the drawings. The deck manufacturer shall be responsible for supplying a deck that meets that criterion. Where possible, all metal deck shall extend over three or more spans. Simple span deck will not be permitted unless it is shored at midspan. Any additional concrete topping specified over the composite slab shall be placed after the slab has reached 75% of its design strength.
- B. Cellular Composite Units: Fabricate cellular metal floor deck units with top fluted section cells combined on a lower flat plate and interlocking side laps.
- C. Metal Cover Plates - Cellular Deck: Fabricate metal cover plates for end abutting floor deck units of not less than same thickness as decking, formed to match contour of deck units.
- D. Cell Closure at Ends of Metal Deck Flutes: Fabricate metal closure strips of not less than 0.0358" minimum (20 gage) cold formed sheet steel. Form to provide tight fitting cell

closures at open ends of cells or flutes to prevent wet concrete from leaking through open cells.

- E. Pour Stop Closures at Slab Edges: Provide sheet metal pour stop closures at all slab edges, columns, walls, and openings unless steel angles or bent plates are specified in details on the drawings. The closures shall be fabricated from light gage steel not less than the thickness shown in the table below when the slab edge is parallel to the deck span. Provide a return lip on the vertical leg in accordance with the SDI Design Manual. The overhang dimension is measured from the edge of the flange to the edge of the slab.

Overhang	=	0"-2"	2"-4"	4"-6"	6"-8"	8"-10"
<u>Slab Thickness</u>						
5.25		18	16	14	12	10
6.25		16	14	12	12	10
6.5		16	14	12	12	10
8.0		12	12	10	10	NA

2.6 COMPOSITE SLAB REINFORCEMENT

See drawings for reinforcement in composite slabs. See Section [03300] [03 30 00], "Cast-in-Place Concrete", for minimum reinforcement requirements.

2.7 OPENINGS IN METAL DECK

For unframed openings, provide block out in slab for opening with deck uncut. Cut deck at opening after concrete has reached 75% of its design strength. See Section 03 30 00, "Cast-in-Place Concrete", for reinforcing in the slab around all unframed openings in metal deck that are greater than 10" in width in either direction.

2.8 CHLORIDE ADMIXTURES

The use of admixtures in concrete containing chloride salts shall not be permitted for metal deck concrete.

2.9 EXTRA CONCRETE REQUIRED BY DECK DEFLECTION

The General Contractor shall include in his bid additional concrete required for metal deck slabs to account for deck deflection.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install deck units as accessories in accordance with manufacturers recommendations and approved shop drawings, and as specified herein:

1. Place deck units on supporting framework and adjust to final position with ends accurately aligned and bearing 1 1/2" minimum on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.
2. Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at ends of abutting units.

3. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.
 4. Do not place deck units on concrete supporting structure until concrete has cured and is dry.
 5. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
- B. Attachment of Composite Deck:
1. Typical Welding of Deck: Metal deck units shall be welded to the structural support members with 5/8" ϕ puddle welds at each end of sheet and each intermediate support at each low flute, unless more frequent attachment is specified on the drawings. Where two deck units abut each other, each unit shall be so welded. Puddle welds may be replaced with welded shear studs when applicable. The Contractor is responsible for temporary deck fastening to meet OSHA requirements to use the floor deck unit as a storage or working platform before final attachment is installed.
 2. Side Laps: Unless noted otherwise on the drawings, side laps of adjacent units shall be fastened by welding (1-1/2 inch long), sheet metal screws (No. 10 or larger) or button punching at maximum intervals not exceeding the lesser of 1/2 of the span or 36".
 3. Welding to Girder: Metal deck units shall be welded to girders (steel framing that is parallel to span of deck) with 5/8" ϕ puddle welds at 12" o.c. If the metal deck is not continuous across the girder, the deck on each side of the girder shall each be welded to the girder with 5/8" ϕ puddle welds at 12" o.c.
 4. Welding Washers: Welding washers shall be used when welding steel deck units less than 0.028" thickness.
 5. Welding of Composite Deck used on Roof: In addition to the minimum attachment specified above, typical areas of the roof deck shall be welded to resist the net uplift pressures as specified in the General Notes on the drawings
 6. Minimum Bearing: Provide a minimum deck bearing of 1 1/2" over all supports with butted end joints.
 7. Cellular Decks: Keep the interiors of cells that will be used as raceways free of welds or screw edges having sharp points or edges.
- C. Welding Requirements: Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking.
- E. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work.

- F. Hanger Slab or Clips: Provide UL approved punched hanger slots between cells or flutes of lower element where floor deck units are to receive hangers for support of ceiling construction, air ducts, diffusers or lighting fixtures.
1. Hanger clips designed to clip over male side lap joints of floor deck units may be used instead of hanger slots.
 2. Locate slots or clips at not more than 14" o.c. in both directions, not over 9" from walls at ends, and not more than 12" from walls at sides, unless otherwise shown.
 3. Provide manufacturer's standard hanger attachment devices.
 4. Loads hanging from metal deck slabs shall not exceed 100 pounds unless specifically detailed otherwise on the drawings.
- G. Joint Covers and Cell Closures: Weld steel sheet joint covers at abutting ends, except where taped joints are specified. Weld steel sheet column closures, cell closures and Z-closures to deck with 1" long weld at 12" maximum centers to provide tight-fitting closures at open ends of ribs, unless shown otherwise on the drawings.
- H. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated. Provide minimum 2" bearing over steel support.

3.2 TOUCH-UP PAINTING

- A. After deck installation, wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.
- B. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.
- C. Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.
- D. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

3.3 QUALITY ASSURANCE INSPECTION DURING CONSTRUCTION

- A. The method of attaching the deck to the frame is subject to inspection by the Owner's designated Testing Laboratory. The Contractor shall, at its own expense, remove work found to be defective and replace with new acceptable work.
- B. See Testing Laboratory Services of these Specifications for deck attachment inspection requirements.

END OF SECTION 05 31 13