

**SECTION 05 31 00
STEEL ROOF AND FLOOR DECKING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof Deck
- B. Composite Floor Deck
- C. Form Deck
- D. Vented Form Deck

1.02 REFERENCE STANDARDS

- A. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.

1.03 SCOPE OF WORK

- A. Supplier: The steel deck supplier shall furnish all steel 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,

1.04 STEEL DECK EDGE CLOSURES, CELL CLOSURES, CANT STRIPS, SUMP PANS, AND ALL RELATED ACCESSORIES.

- A. Erector: The Subcontractor responsible for erecting the steel deck shall provide all labor and equipment as required to place all steel deck components and accessories as described above.

1.05 RELATED DOCUMENTS

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

1.06 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. Welding Certificates: Submit Copies of certificates for welding procedures and personnel.
- D. Insurance Certification: Assist Architect and Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire, windstorm, and extended coverage insurance.

1.07 QUALITY ASSURANCE

1.08 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 Laboratories Classifications:
 1. Underwriters Label: Provide steel 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 fire-resistant system detailed.
 2. Provide units and construction that are found in Underwriters Laboratories' "Roofing Materials & Systems Directory" and conform to UL Wind Uplift Class 1-30/1-60/1-90 construction and with each deck unit bearing the UL label and marking for specific wind-rated system detailed.
- D. Factory Mutual Listing: Provide steel roof deck units which have been evaluated by Factory Mutual Research Corporation and are listed in "Factory Mutual Research Approval Guide 2000-Building Materials" for "Class 1" or "Non-Combustible" fire rated construction and 60/75/90/120/150/190 Windstorm Classification.

1.09 QUALIFICATIONS

- A. The steel 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.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. See General Notes on the drawings for location of steel deck types and for depth of deck, minimum deck thickness, section properties of deck, concrete type, total slab thickness, slab reinforcement, and suggested manufacturer.
- B. Acceptable deck manufacturers include the following:
 1. BHP Steel Building Products USA, Inc.
 2. Canam Steel Corp.
 3. Consolidated Systems, Inc.
 4. Epic Metals Corp.
 5. United Steel Deck, Inc.
 6. Valley Joist, Inc.
 7. Vulcraft/Div. Nucor Corp.
 8. Wheeling Corrugating Co.
- C. Other manufacturers may be used only with Architect/Engineer approval.

2.02 GRADES OF STEEL

- A. Steel Form Deck shall be manufactured from steel conforming to ASTM A611 Grades C, D, or E or ASTM A653, Structural Steel Grade Grades having a minimum yield strength of 33,000 PSI. The delivered thickness of uncoated steel shall not be less than 95% of the design thickness. Sheet steel accessories shall conform to the same material specification as the deck product.

2.03 FINISH

- A. Roof Deck: Roof deck shall be galvanized with a protective zinc coating conforming to ASTM A653 G90 class.
- B. Floor Deck:
 1. Galvanized: Floor deck shall be galvanized with a protective zinc coating conforming to ASTM A653 G90 class.
 2. Painted: Floor deck shall be phosphatized painted with the steel chemically cleaned of all oil, grease, dirt and then phosphate coated. The deck shall then receive a two-coat baked-on lead- and chromate- free rust inhibitive primer on the bottom side complying
 - a. with the performance requirements of FS TT-P-664.
- C. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanizing surfaces complying with Department of Defense Specifications DOD-P-21035.

2.04 ROOF DECK ACCESSORIES

- A. Provide minimum 20 gauge ridge and valley plates, minimum 20 gauge cant strips, minimum 14 gauge sump pans, minimum 20 gauge inside or outside closure channels, minimum 20 gauge butt strips at change of deck direction, minimum 20 gauge filler sheets and minimum 20 gauge pour stops as required to provide a finished surface for the application of insulation and roofing.

2.05 VENTING

- A. All steel form deck supporting lightweight insulating concrete shall have built in slot vents at the bottom or sides of each rib having a minimum uniformly distributed open area of 1.5%.

2.06 MECHANICAL FASTENERS

- A. Powder-Actuated or Pneumatically Driven Pins: Provide corrosion-resistant, powder-actuated or pneumatically driven fasteners manufactured from steel conforming to AISI 1060 or 1061 steel, austempered to a core hardness of 52 to 58 Rockwell C. Fasteners shall have a knurled shank and shall be zinc-plated in accordance with ASTM B633, Sc. I, Type III.
 - 1. Subject to compliance with requirements, provide products of one of the following manufacturers:
 - 2. Hilti, Inc., Tulsa, OK
 - 3. ITWBuildex, Itasca, IL
 - 4. Pneutek, Inc., Hudson, NH
- B. Self-Drilling Screw Fasteners: Provide corrosion-resistant, hexagonal head, steel self drilling screws, austempered to a core hardness of Rockwell C 50.
 - 1. Subject to compliance with requirements, provide products of one of the following manufacturers:
 - 2. ITWBuildex, Itasca, IL

2.07 SIDE-LAP FASTENERS

- A. Provide Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

2.08 FABRICATION

- A. General: Fabricate deck panels to comply with "SDI Specifications and Commentary for Non-composite Steel Floor Deck", in SDI Publication No. 29, and the following.
- B. Steel Deck Spans: Where possible, all steel deck shall extend over three or more supports. Single span deck is prohibited.
- C. Factory Mutual Windstorm Classification Requirements: Provide steel deck panels that comply with the requirements of the Factory Mutual Research Approval Guide 2000 – Building Materials for Windstorm Classification 1-90 for the following manufacturers of lightweight insulating concrete:
 - 1. Celcore, Inc.
 - 2. Cellular Concrete, LLC, Mearlcrete Div.
 - 3. Concrecel International, Inc.
 - 4. Elastizell Corp. of America
 - 5. Siplast, Inc.
- D. Underwriters Laboratories Wind Uplift Classification: Provide steel deck panels meeting the requirements of Construction No. 110/143/155/250/434 as listed in the 2000 UL Roofing Materials & Systems Directory under Roof Deck Constructions (TGKX) and rated as a Class 1-30/1-60/1-90 assembly.
- E. Cell Closure at Ends of Steel Deck Flutes: Fabricate steel 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.
- F. Pour Stop Closures at Slab Edges: Provide sheet steel 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. Provide a return lip on the vertical leg in accordance with the SDI Design Manual. The overhang is defined as the distance from the edge of the steel beam flange to the edge of the slab.

1. Overhang 0"-2" 2"-4" 4"-6" 6"-8" 8"-10" 10"-12"
2. Slab Thickness
3. 2.5 to 4 inches 20 18 16 12 12 10

2.09 FLOOR SLAB REINFORCEMENT

- A. See Section 03 30 00, "Cast-In-Place Concrete" and 03 20 00, "Concrete Reinforcing", for reinforcement in Steel Deck form slabs.

2.10 ROOF OPENINGS

- A. Provide a 20 gage galvanized flat plate to reinforce openings in roof deck that are greater than 6" and less than 10" in any one direction.

2.11 FLOOR OPENINGS

- A. For unframed openings, provide blockout in slab for opening with deck uncut. Cut deck at opening after concrete has been poured and obtained 75% of its design strength. See Section 03 30 00, "Cast-In-Place Concrete" and 03 20 00, "Concrete Reinforcing", for reinforcing in the slab around all unframed openings in steel deck that are greater than 10" width in either direction.

2.12 CHLORIDE ADMIXTURES

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

2.13 EXTRA CONCRETE REQUIRED FOR DECK DEFLECTION

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

PART 3 PRODUCTS

3.01 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 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.
 6. Do not use floor deck units for storage or working platforms until permanently secured.
- B. Attachment of Roof Form Deck:
 1. The method of attachment, attachment pattern, and side lap fastener type and spacing, shall be as shown on the drawings and comply with the requirements noted below.
 2. Method of Attachment: The deck shall be fastened to the structural support members using one of the following methods.
 - a. Welding: Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work. Weld metal shall penetrate all layers of deck material at end laps and side joints and shall have good fusion to the supporting member. Welding washers shall be used only when welding steel deck less than 0.028" thickness.

- b. Powder-Actuated or Pneumatically Driven Pins: Comply with the manufacturers requirements to install the pins through all layers of the deck material and the manufacturer's required embedment into the supporting member.
 - c. Self-Drilling Fasteners: Comply with the manufacturer's requirements to install the screws through all layers of the deck material and the manufacturer's required embedment into the supporting member.
3. Definition of Perimeter and Corner
- a. Definition of Roof Height: Roof height shall be defined as eave height for roofs that slope less than 10% and mean roof height for roofs with a greater slope.
 - b. Buildings with roof heights of 60 feet or less
 - 1) Perimeter: The width of the perimeter strip shall be the smaller of one-tenth the least building dimension and four-tenths the roof height but not less than 4 feet. The strip either side of a ridgeline shall be considered as a perimeter strip for the purposes of deck fastening for roofs that slope between 10° and 45°.
 - 2) Corner: On an exterior (not re-entrant) corner, a strip the width of a perimeter strip defined above and extending for a length equal to the dimension of one perimeter strip each direction from the exterior corner.
 - c. Buildings with roof heights greater than 60 feet
 - 1) Perimeter: The width of the perimeter strip shall be one-tenth the least dimension of the building but not less than four feet.
 - 2) Corner: On an exterior (not re-entrant) corner, a strip the width of a perimeter strip defined above and extending for a length equal to the dimension of two perimeter strips each direction from the exterior corner.
4. Underwriters Laboratories Wind Uplift Classification Requirements: Unless a more stringent attachment requirement is specified elsewhere in this specification or on the drawings, roof deck units shall be attached to the supporting structure as required by Construction Number specified elsewhere in this section.
5. Attachment to Girders: At locations where the deck flutes are parallel to the span of the steel framing and the top of the framing is at the bottom of the deck elevation, the deck shall be attached to the girder using one of the specified fastening methods at 18 inches on center.
- C. Attachment of Floor Form Deck:
- 1. Floor deck units shall be fastened to each end support at each side lap and half way in between. At each interior support floor deck units shall be fastened at each side lap.
 - 2. Method of Attachment: The deck shall be fastened to the structural support members using one of the following methods.
 - a. Welding: Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work. Weld metal shall penetrate all layers of deck material at end laps and side joints and shall have good fusion to the supporting member. Welding washers shall be used only when welding steel deck less than 0.028" thickness. Welding washers shall be a minimum thickness of 0.0568 inches and have a nominal 3/8" diameter hole. Where welding washers are not required, a nominal 5/8" diameter puddle weld shall be used.
 - b. Powder-Actuated or Pneumatically Driven Pins: An operator licensed by the manufacturer shall install all pins. Comply with the manufacturers requirements to install the pins through all layers of the deck material and the manufacturer's required embedment into the supporting member.
 - c. Self-Drilling Fasteners: Comply with the manufacturer's requirements to install the screws through all layers of the deck material and the manufacturer's required embedment into the supporting member.
 - 3. Attachment to Girders: At locations where the deck flutes are parallel to the span of the steel framing and the top of the framing is at the bottom of the deck elevation, the deck

shall be attached to the girder using one of the specified fastening methods at 18 inches on center.

- D. Side Laps: Unless required otherwise by provisions of Factory Mutual or Underwriters Laboratories, side laps of adjacent units shall be fastened by welding (on 20 gauge or heavier deck only) or #10 (min.) TEK screws so that spacing between supports and fasteners does not exceed the value prescribed on the drawings. Nest side laps one-half corrugation. Button punching is not allowable as a side-lap fastener.
- E. End Bearing: Provide a minimum end bearing of 2" over supports.
- F. End Joints: End joints of sheets shall be butted or lapped 2" minimum over supports unless a more stringent requirement is specified by Factory Mutual or Underwriters Laboratory. Decks that slope 1/4 inch or more in 12 inches in the long direction shall be erected beginning at the low side to ensure that end laps are shingle fashion.
- G. 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.
- H. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking.
- I. Reinforcement at Roof Openings: Roof openings less than 6" square or in diameter require no reinforcement. Openings 6" to 10" inclusive shall be reinforced with a 20 gauge galvanized plate welded to the deck at each corner and 6" maximum centers with a 5/8" diameter puddle weld or sheet metal screws. For openings greater than 10" in diameter or width, refer to the drawings and structural steel specifications for additional framing to support the deck around the opening.
- J. Hanger Slots 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 steel deck slabs shall not exceed 100 pounds unless specifically detailed otherwise on the drawings.
- K. 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.
- L. 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.

3.02 3.02 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.

3.03 3.03 INSPECTION

- 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 00