

SECTION 05 31 00 - METAL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Refer to other Divisions of these specifications to determine the type and extent of work therein affecting the work of this trade, whether or not such work is specifically mentioned in this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Roof deck.
 - 2. Composite floor deck.
 - 3. Shear stud connectors.
 - 4. Cutting and reinforcing of openings for predetermined holes and other holes required by other trades.
 - 5. Furnishing and installing filler plates as noted in the drawings and as may be required to close gaps between decking and structural steel or concrete.
 - 6. Hanger tabs, as required.
- B. Related Sections include the following:
 - 1. Division 1, Section 01 46 00, "Program of Structural Tests and Inspections" for testing requirements.
 - 2. Division 3, Section 03 30 00, "Cast-in-Place Concrete" for concrete fill and reinforcing steel.
 - 3. Division 5, Section 05 12 00, "Structural Steel" for shop- and field-welded shear connectors.
 - 4. Division 9, Finishes

1.3 REFERENCE STANDARDS

- A. Comply with the following general specifications for materials and workmanship not otherwise specified:
 - 1. AISI Specification for the Design of Cold-Formed Steel Structural Members.
 - 2. AWS Recommended Welding Practices.
 - 3. SDI Code of Recommended Standard Practice.
 - 4. SDI Specifications and Commentaries for Composite Steel Floor Deck.

5. SDI Specifications and commentaries for Steel Roof Deck.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. LEED Submittals:
 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings:
 1. Submit electronic shop drawings per Section 01 33 00, "Submittals."
 2. Precheck the shop drawings prior to submission to the Architect for conformity of details with the Contract Documents and as coordinated with other work. The signature of a representative of the Contractor indicating that the drawings have been prechecked will be required. The Contractor shall be wholly responsible for the conformity of dimensions and details of the shop drawings with the Contract Documents
 3. Show layout, types, gauges, and marking of all deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
 4. Show fastening methods for deck units, accessories, closure pieces, fittings, sump pans, and the type and sequence of connections, welds, or screws.
 5. Indicate any single span conditions requiring shoring.
 6. Show size, location, and spacing of field welded shear studs.
 7. Approval of shop drawings will be for size and arrangement of units and strength of connections. The Contractor is responsible for accuracy of all dimensions shown on shop drawings.
 8. Do not fabricate units prior to approval of shop drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Product Certificates: Signed by steel deck manufacturers certifying that products furnished comply with requirements.
- C. Welding Certificates: Copies of certificates for welding procedures and personnel.
- D. Product Test Reports: From a qualified testing agency indicating that each of the following complies with requirements, based on comprehensive testing of current products:
 1. Mechanical fasteners.

- E. Evaluation Reports: For steel deck.
- F. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has a minimum of three years of experience completing steel deck similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E329 to conduct the testing indicated, as documented according to ASTM E548.
- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code – Steel," and AWS D1.3, "Structural Welding Code – Sheet Steel."
- D. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those steel deck units tested for fire resistance per ASTM E119 by a testing and inspection agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
 - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- E. AISI Specifications: Calculate structural characteristics of steel deck according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members."
- F. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
- C. Clean metal deck and accessories of dust, grease, oils, loose materials, and any other material that impairs the adhesion of insulation and accessories, sprayed-on fireproofing, and the adhesion of concrete.

1.8 COORDINATION

- A. General Contractor or Construction Manager to coordinate installation of shoring if and as required by single span conditions indicated on the deck shop drawings.
- B. Coordinate slab edge support requirements with all construction documents and the structural typical details.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Steel Deck:
 - a. Canam United States; Canam Group Inc
 - b. Consolidated Systems, Inc.
 - c. Epic Metals Corp.
 - d. New Millennium Building Systems, LLC.
 - e. Nucor Corp.; Vulcraft Group.
 - f. Roof Deck, Inc.
 - g. Verco Manufacturing Co.
 - h. Wheeling Corrugating Co.; Div. of Wheeling-Pittsburgh Steel Corp.
- C. Uncoated Thickness: Conform to SDI Specifications for minimum thickness for the gauge specified.

2.2 ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and the following:
 - 1. 3 inch Roof Deck
 - a. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 50, G90 zinc coating.
 - b. Deck Profile: NS
 - c. Profile Depth: 3 inches
 - d. Design Uncoated-Steel Thickness: As indicated.
 - e. Span Condition: Double span or more.
 - f. Side Laps: Overlapped.

2.3 COMPOSITE FLOOR DECK

- A. Composite Steel Floor Deck: 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," in SDI Publication No. 31, the minimum section properties indicated, and the following:
1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 33, G60 zinc coating.
 2. Profile Depth: As indicated.
 3. Design Uncoated-Steel Thickness: As indicated.
 4. Span Condition: Double span or more.

2.4 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated. Design and provide galvanized sheet steel closures and cover plates as required at columns, to close panels, and at conditions where panels change direction, abut or end; including perimeters of all stair openings mechanical openings, slab depressions, and other areas where edge forms are required. Provide miscellaneous light angles to support closures wherever required.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, minimum diameter as indicated.
- D. Roof Deck Side-Lap Fasteners: Sizes as indicated.
1. Dril-Flex by Elco Industries.
 2. Kwik-flex by Hilti.
 3. Approved fastener with same or greater strength, toughness, resistance to embrittlement, and durability.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Steel Sheet Accessories: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- G. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile indicated
- H. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- I. Non-Piercing Hanger Tabs: Provide integral hanger tabs where indicated.

- J. Weld Washers: As required by SDI criteria for puddle weld deck fastening. Uncoated steel sheet, shaped to fit deck rib, with factory-punched hole of 3/8-inch minimum diameter.
- K. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch wide flanges and level recessed pans of 1-1/2- inch minimum depth. For drains, cut holes in the field.
- L. Flat Sump Plate: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- M. Shear Connectors: ASTM A108, Grades 1010 through 1020 headed stud type, cold-finished carbon steel, AWS D1.1, Type B, with arc shields. Length and diameter as indicated. Head dimensions to comply with AISC Specifications. Provide arch shields specifically designed for welding through hot dipped galvanized metal deck of the type specified.
 - 1. Nelson Stud Welding Company Type S3L with Nelson welding process.
- N. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after any unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to manufacturer's approved shop drawings, applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels, if indicated on the shop drawings for single span conditions or if required to meet deflection limitations.
- C. Locate decking bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to decking.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Field Welding: Perform field welding with prequalified personnel executing prequalified procedures referenced in "Quality Assurance" Section.

3.3 ROOF DECK INSTALLATION

- A. Fasten roof deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter, but not less than 1-1/2 inches (38 mm) long, and as follows:
 - 1. Weld Diameter: 5/8 inch, nominal.
 - 2. Weld Spacing: Space welds as indicated but never further apart than 24 inches on center.
 - 3. Weld Washers: Install weld washers at each weld location as required.
 - 4. Side-Lap and Perimeter Edge Fastening: As indicated.
- B. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches on steel and 2 inches on concrete, with end joints as follows:
 - 1. End Joints: Lapped 2 inches minimum or butted at Contractor's option.
- C. Roof Sump Pans and Sump Plates: Install over openings provided in roof decking and weld flanges to top of deck. Space welds not more than 12 inches apart with at least 1 weld at each corner.
- D. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FLOOR DECK INSTALLATION

- A. Fasten floor deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
 - 1. Weld Diameter: 5/8 inch, nominal.
 - 2. Weld Spacing: Space and locate welds as indicated.
 - 3. Weld Washers: Install weld washers at each weld location as required.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels as indicated, and as follows:
 - 1. Mechanically fasten with self-drilling No. 12 diameter or larger carbon-steel screws.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches on steel and 2 inches on concrete, with end joints as follows:
 - 1. End Joints: Butted.
- D. Shear Connectors: Weld shear connectors through deck to supporting frame according to AWS D1.1 and manufacturer's written instructions. Butt end joints of deck panels; do not overlap. Remove and discard arc shields and related debris after welding shear connectors.
- E. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- F. Floor Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of decking. Weld cover plates at changes in direction of floor deck panels, unless otherwise indicated.

3.5 FIELD QUALITY CONTROL AND QUALITY ASSURANCE

- A. The Owner will employ Special Inspector and an independent Testing Agency to perform special inspections and testing, and to submit full reports of each inspection and test conducted. The Contractor will provide access to the Special Inspector, the Testing Agency, and the SER, as required. Inspections and tests by the Special Inspector and the Testing Agency will not relieve the Contractor of responsibility for supervision and quality control of the Work. Refer to Specification Section 01 46 00 "Program of Structural Tests and Inspections" for testing and inspection program requirements.
- B. Field welds will be subject to inspection.

- C. Shear connector stud welds will be inspected and tested according to AWS D1.1 for stud welding and as follows:
 - 1. Shear connector stud welds will be visually inspected.
 - 2. Bend tests will be performed if visual inspections reveal less than a full 360-degree flash or welding repairs to any shear connector stud.
 - 3. Tests will be conducted on additional shear connector studs if weld fracture occurs on shear connector studs already tested according to AWS D1.1.
- D. Testing agency will report test results promptly and in writing to Contractor and Architect.
- E. Remove and replace work that does not comply with specified requirements.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.6 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 31 00