SECTION 05310
STEEL DECK

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

A. The general provisions of the Contract, including General and Supplementary Conditions and Division 1 - General Requirements, apply to this Section.

1.02 SUMMARY

A. Work Included:
   1. Steel deck units for floor applications.
   2. Steel deck units for roof applications.

B. Work installed under this section but furnished under another section:
   1. Roof sump pans.

C. Related Work Specified in Other Sections:
   1. Concrete fill for steel deck: Section 03310.
   2. Structural steel: Section 05120.
   3. Fabrication of roof sump pans: Division 15140, Plumbing specifications.

1.03 SUBMITTALS

A. Product Data : Submit manufacturer's specifications and installation instructions for each type of decking and accessories. Provide engineering and physical properties or all deck types required.
   1. Provide test data for mechanical fasteners used in lieu of welding for fastening deck to supporting structures.

B. Shop Drawings: Show layout and types of deck units, anchorage details, and conditions requiring closure strips, pour stops, supplementary framing, sump pans, cant strips, cut openings, special jointing, and other accessories.

C. Shop drawings showing shear stud layout over floor and roof framing.

1.04 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated:
   1. American Iron and Steel Institute (AISI), "Specification for the Design of Cold-Formed Steel Structural Members."
   2. American Welding Society (AWS), D1.3 "Structural Welding Code - Sheet Steel."
   3. Steel Deck Institute (SDI), "Design Manual for Composite Decks, Form Decks and Roof Decks."

B. Qualification of Field Welding: Use qualified welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS.

1. Welded decking in place is subject to inspection and testing. Owner will bear expense of removing and replacing portions of decking for testing purposes if welds are found to be satisfactory. Remove work found to be defective and replace with new acceptable work.

C. FM Listing: Provide steel roof deck units that have been evaluated by Factory Mutual System and are listed in "Factory Mutual Approval Guide" for "Class I" fire-rated construction.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
1. Bowman Metal Deck Div., Cyclops Corp.
3. Epic Metals Corp.
4. United Steel Deck, Inc.
5. Vulcraft Div., Nucor Corp.
6. Wheeling Corrugating Co.

2.02 MATERIALS

A. Steel for Galvanized Metal Deck Units: ASTM A 446, grade as required complying with SDI specifications.

B. Miscellaneous Steel Shapes: ASTM A 36.

C. Shear Connectors: Headed stud type, ASTM A 108, Grade 1015 or 1020, cold-finished carbon steel, with dimensions complying with AISC specifications.

D. Sheet Metal Accessories: ASTM A 526, commercial quality, galvanized.

E. Galvanizing: ASTM A 525, G60.

F. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

G. Flexible Closure Strips: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.

2.03 FABRICATION

A. General: Form deck units in lengths to span three or more supports, with flush, telescoped, or nested 3-inch laps at ends and interlocking or nested side laps, of metal thickness, depth, and width as indicated.

1. Compute section properties in accordance with the AISI Specification for the Design of Light Gauge Cold-Formed Steel Structural Members.

2. Provide roof deck configurations that comply with SDI "Specifications and Commentary for Steel Roof Deck."

B. Roof Deck Units: 1-1/2 inches deep, 20 gage, Type B, galvanized steel roof deck with a minimum yield strength of 33,000 psi, and as follows:

1. Section Properties: Minimum section properties per foot:
   a. $I = .213^4$
   b. $Sp = .252\ in.^3$
   c. $Sn = .265\ in.^3$

2. Flexural Stress: Support the design live load plus the dead load on a simple span with a maximum flexural stress of 20,000 psi.

3. Deflection: Not to exceed 1/240 of the span, due to the live load on a simple span basis.

C. Composite Steel Floor Deck: Fabricate deck units with integral embossing or raised pattern to furnish mechanical bond with concrete slabs. Fabricate open-beam deck units with fluted section having interlocking side laps.

1. Size and Material: 2.0 inch deep, 20 gauge (minimum), galvanized steel with a minimum yield strength of 33,000 psi.

2. Section Properties: Minimum section properties per foot of width:

   a.. $I = .409\ in.^4$
   b. $Sp = .353\ in.^3$
   c. $Sn = .383\ in.^3$

3. Flexural Stress, Wet Concrete: Under the weight of wet concrete and construction loads, the maximum flexural stress shall not exceed 20,000 psi, and deflection shall not exceed 1/240 of the span.

4. Flexure Stress, Dry Concrete: Composite floor decking acting with the hardened concrete shall carry the superimposed live loads shown on Drawings without exceeding a flexural stress of 20,000 psi, nor a deflection of 1/360 of the span.

D. Metal Cover Plates: Fabricate metal cover plates for end-abutting floor deck units of as decking. Form to match contour of deck units and not less than same thickness approximately 6 inches wide.

E. Metal Closure Strips: Fabricate metal closure strips, for cell raceways and openings between decking and other construction, of not less than 0.045-inch min. (18 gage) sheet steel. Form to provide tight-fitting closures at open ends of cells or flutes and sides of decking.

F. Roof Sump Pans: Specified in Section 15400, Plumbing.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install deck units and accessories in accordance with manufacturer's recommendations, approved shop drawings, and these specifications.

A. General: Install deck units and accessories in accordance with manufacturer's recommendations, approved shop drawings, Factory Mutual requirements, and these specifications.

B. 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.

C. Align deck units for entire length of run of cells and with close alignment between cells at ends of abutting units.

D. Place deck units flat and square, secured to adjacent framing without warp or deflection.

E. Do not place deck units on concrete supporting structure until concrete has cured and is dry.

F. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

G. Do not use floor deck units for storage or working platforms until permanently secured.

H. Fastening Deck Units:

1. Roof Deck: Weld sheets 12 inches on center to all structural supports, unless otherwise noted, using 5/8 inch or larger puddle welds. Exercise care in welding to avoid burning the sheets. Where ends of sheet lap, weld the upper sheet to the lower along the support at 12 inches on center, unless otherwise noted. Lap ends of sheets only over the supports with sheets overlapping a minimum of 3 inches. Weld deck around openings, along braced frame grid lines, and around the perimeter of the building at 6 inches on center, including the sides of the deck. Overlap sheets and at side laps. Fasten side lap joints together with No. 12 x 1/2 inch minimum cadmium plated self-tapping screws located at third points (2 screws per span) between supports, unless otherwise noted.
   a. Uplift Loading: Install and anchor roof deck units to comply with Factory Mutual Systems (FM) 1-90 requirements.

2. Composite floor deck: Weld sheets 12 inches on center to all structural supports with 5/8 diameter or larger puddle welds. Exercise care in welding to avoid burning of the sheets. Screw side lap joints at 24 inches maximum on center.

3. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work. Use welding washers where recommended by deck manufacturer.

4. Mechanical fasteners, either powder-actuated or pneumatically driven, may be used instead of welding. The fastener manufacturer shall design the fastener sizes and spacing to provide an attachment equal to or greater than that provided by the welded attachment indicated above. Locate mechanical fasteners and install in accordance with deck manufacturer's instructions.

I. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.

J. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.

K. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units, except where taped joints are required.

L. Roof Sump Pans: Place over openings provided in roof decking and weld to top decking surface. Space welds not more than 12 inches o.c. with at least one weld at each corner.

M. Shear Connectors: Weld shear connectors to supports through decking units in accordance with manufacturer's instructions. Do not weld shear connectors through two layers (lapped ends) of decking units. Weld only on clean, dry deck surfaces.

N. Closure Strips: Provide metal closure strips at open uncovered ends and edges of roof decking and in voids between decking and other construction. Weld into position to provide a complete decking installation.

O. Touch-Up Painting: After decking installation, wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.

1. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.

3.02 FIELD TESTING AND INSPECTION

A. Owner will engage an independent testing and inspection agency to inspect decking attachments and prepare inspection reports.

B. Provide access for testing agency to places where steel deck work is being performed so that required inspection and testing can be accomplished.

C. Testing agency may inspect steel deck at plant before shipment.

D. Specific duties of the testing laboratory will be determined by the Architect. As a minimum these duties shall include:

1. Visual inspection of all field welding operations.

2. Visual inspection of mechanical fasteners (including side lap screws).

3. Verification of welder certification.

E. Correct deficiencies in steel deck work that inspections have indicated to be not in compliance with requirements. Perform additional inspections or tests, at contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.

END OF SECTION 05310