

**SECTION 05 36 00
COMPOSITE METAL DECKING**

SPEC WRITER NOTE: Delete between // // if not applicable to project. Also delete any other item or paragraph not applicable in the section and renumber the paragraphs.

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies material and services required for installation of composite steel decking including // shear connector studs and // miscellaneous closures required to prepare deck for concrete placement as shown and specified.

1.2 RELATED WORK:

- //A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS.//
- B. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.

1.3 DESIGN REQUIREMENTS:

- A. Design steel decking in accordance with AISI S-100, except as otherwise shown or specified.

SPEC WRITER NOTE: Provide applicable Codes utilized for structural design of project.

- B. Design steel decking to comply with // // codes.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- //B. Sustainable Design Submittals, as described below:
- //1. Combined recycled content as specified in PART 2 - PRODUCTS.// //
- C. Shop Drawings: Shop and erection drawings showing decking unit layout, connections to supporting members, and information necessary to complete the installation as shown and specified, including supplementary framing, cant strips, cut openings, special jointing or other accessories.
1. Show welding, side lap, closure, deck reinforcing and closure reinforcing details.
 2. Show openings required for work of other trades, including openings not shown on structural drawings.

3. Indicate where temporary shoring is required to satisfy design criteria.
- D. Manufacturer's Literature and Data: Showing steel decking section properties and specifying required structural characteristics.
- E. Manufacturer's written recommendations for:
 1. Shape of decking section.
 2. Cleaning of steel decking prior to concrete placement.
- F. Test Report - Establishing structural characteristics of composite concrete and steel decking system.
- G. Test Report - Stud base qualification.
- H. Welding power setting recommendation by shear stud manufacturer.
- I. Shear Stud Layouts: Submit drawings showing the quantity, pattern, spacing and configuration of shear studs for each beam and girder.
- J. Certification: For each type and gauge of metal deck supporting concrete slab or fill, submit certification of specified fire ratings. Certify that units supplied are UL listed as a "Steel Floor and Form Unit".
- K. Manufacturers Certificates for deck units attesting compliance with specified requirements.
- L. Submit manufacturer's catalog data for Welding Equipment and Welding Rods and Accessories intended use.
- M. Power Actuated Tool Operator Certificates.
- N. Welders qualifications.

1.5 QUALITY ASSURANCE:

SPEC WRITER NOTES:

1. Delete paragraph below when UL listed composite floor decking units are not required. Coordinate required ratings with Architect/Structural Engineer.
2. Confirm locations for ratings and where deck will need spray applied fireproofing.

A. Fire Safety

//1. Underwriters' Label: Provide composite metal floor deck units listed in Underwriters' Laboratories "Building Materials Directory", with each deck unit bearing the UL label and marking for specific system detailed.//

SPEC WRITER NOTE: Delete below if FM compliance is not required for roof deck. Coordinate with "Insurance Certification" above.

//2. FM Listing: Provide composite metal roof deck units which have been evaluated by Factory Mutual Global and are listed in "Factory Mutual Research Approval Guide" for "Class 1" fire rated construction.//

SPEC WRITER NOTE: Retain below for Factory Mutual Insurance requirement or similar form by others.

3. Insurance Certification: Assist the Government in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance.

//B. Wind Storm Resistance: Provide roof construction assembly capable of withstanding an uplift pressure of // 3 // // 5 // // // kPa (// 60 // // 90 // // // pounds per square foot) when tested in accordance with the uplift pressure test described in the FM DS 1-28 or as described in the UL 580.//

C. Deck Units: Provide deck units and accessory products from a manufacturer engaged in the manufacture of steel decking for more than three (3) years. Submit manufacturer's certificates attesting that the decking material complies with the specified requirements.

D. Certification of Powder-Actuated Tool Operator: Manufacturer's certificate attesting that the operators are authorized to use the low velocity powder-actuated tool.

E. Qualifications for Welding Work: Submit qualified welder qualifications in accordance with AWS D1.1/D1.1M or under an approved qualification test.

1.6 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only. Refer to the latest edition of referenced Standards and codes.

B. American Iron and Steel Institute (AISI):
S-100-12.....North American Specification for the Design of
Cold-Formed Steel Structural Members

C. ASTM International (ASTM):
A36/A36M-14.....Carbon Structural Steel
A108-13.....Steel Bars, Carbon, Cold Finished, Standard
Quality

A653/A653M-13.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process

D. American Institute of Steel Construction (AISC):

1. Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design (Latest Edition)
2. Load and Resistance Factor Design Specification for Structural Steel Buildings (Latest Edition)

E. American Welding Society (AWS):

D1.1/D1.1M-11.....Structural Welding Code - Steel
D1.3/D1.3M-05(R2008)....Structural Welding Code - Sheet Steel

F. FM Global (FM):

APP Guide.....Approval Guide
DS 1-28-2012.....Design Wind Loads

G. Military Specifications (Mil. Spec.):

MIL-P-21035B.....Paint, High Zinc Dust Content, Galvanizing Repair

H. Underwriters Laboratories (UL):

Bld Mat Dir(Annually)...Building Materials Directory

PART 2 - PRODUCTS

SPEC WRITER NOTES:

1. For galvanizing treatment use coating class G60 for normal conditions, and G90 for extreme exposure (salt air, etc.).
2. Minimum metal thickness should be 0.35 mm (0.014 inch) for form decks and 0.75 mm (0.029 inch) for roof and composite decks. However, for corrosive exposures, consider 0.92 mm (0.036 inch) minimum thickness.

2.1 MATERIALS:

A. Steel Decking and Flashings: ASTM A653/A653M, Structural Quality // suitable for shear stud weld-through techniques //.

//B. Recycled Content of Steel Products: Combined recycled content not less than // 75 // // // percent. //

C. Galvanizing: ASTM A653/A653M, // G60 // G90 //. Thickness not less than // indicated on drawings // // 0.35 mm (0.014 inch) // // 0.75 mm (0.029 inch) // // 0.92 mm (0.036 inch) // // //.

- D. Shear connector studs: ASTM A108, Grades 1015-1020, yield 350 Mpa (50,000 psi) minimum, tensile strength - 400 Mpa (60,000 psi) minimum, reduction of area 50 percent minimum.
1. Provide studs of uniform diameter, with heads concentric and on same axis to shaft.
 2. Provide studs, after welding, free from substance or defect which would interfere with its function as a shear connector.
 3. Do not paint or galvanize studs.
 4. Provide size of studs as shown on drawings.
 5. Provide studs manufactured by a company normally engaged in the manufacturer of shear studs, and can furnish equipment suitable for weld-through installation of shear studs.
- E. Galvanizing Repair Paint: Mil. Spec. MIL-P-21035B.
- F. Miscellaneous Steel Shapes: ASTM A36/A36M.
- G. Welding Electrode: E60XX minimum.
- H. Sheet Metal Accessories: ASTM A653/A653M, galvanized, unless noted otherwise. Provide accessories of every kind required to complete the installation of metal decking in the system shown. Finish sheet metal items to match deck including, but not limited to, the following items:
1. Metal Cover Plates: For end-abutting deck units, to close gaps at changes in deck direction, columns, walls and openings. Same quality as deck units but not less than 1.3 mm (18 gauge) sheet steel.
 2. Continuous sheet metal edging: at openings and concrete slab edges. Same quality as deck units but not less than 1.3 mm (18 gauge) steel. Side and end closures supporting concrete and their attachment to supporting steel to be designed by the manufacturer to safely support the wet weight of concrete and construction loads. The deflection of cantilever closures to be limited to a total of 3 mm (1/8 inch) maximum.
 3. Metal Closure Strips: For openings between decking and other construction, of not less than 1.3 mm (18 gauge) sheet steel of the same quality as the deck units. Form to the configuration required to provide tight-fitting closures at open ends of flutes and sides of decking.
 4. Seat angles for deck: Where a beam does not frame into a column.

2.2 REQUIREMENTS:

- A. Steel decking depth, gage, and section properties to be as shown on contract documents. Provide edges of deck with vertical interlocking male and female lip providing for a positive mechanical connection.
- B. Fabricate deck units with integral embossments to provide mechanical bond with concrete slab. Deck units combined with concrete slab to be capable of supporting total design loads.

SPEC WRITER NOTE: For high seismic area, consider using wedge anchors or slot anchors in lieu of light duty hanger.

- C. Provide integral system with single point of attachment for light duty hanger devices for flexibility for attaching hangers for support of acoustical, lathing, plumbing, heating, air conditioning electrical and similar items.
 - 1. Provide a minimum spacing pattern of 305 mm (12 inches) on centers longitudinally and 610 mm or 914 mm (24 or 36 inches) on centers transversely.
 - 2. Provide suspension system capable of safely supporting a maximum allowable load of 45 kg (100 pounds) concentrated at one hanger attachment point.
 - 3. System may consist of fold-down type hanger tabs or a lip hanger.

PART 3 - EXECUTION**3.1 ERECTION:**

- A. Do not start installation of metal decking until corresponding steel framework has been plumbed, aligned and completed, and until temporary shoring, where required, has been installed.
 - 1. Remove oil, dirt, paint, ice, water and rust from steel surfaces to which metal decking will be welded.
- B. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
- C. Do not use floor deck units for storage or working platforms until permanently secured.
 - 1. Do not overload deck units once placed.
 - 2. Replace deck units that become damaged after erection and prior to casting concrete at no additional cost to the Government.
- D. Erect steel deck in accordance with manufacturer's printed instructions.

- E. Ship steel deck units in standard widths and fabricated to proper length.
- F. Provide steel decking in sufficient lengths to extend over 3 or more spans, except where structural steel layout does not permit.
- G. Place steel decking units on supporting steel framework and adjust to final position before being permanently fastened.
 - 1. Bring each unit to proper bearing on supporting beams.
 - 2. Place deck units in straight alignment for entire length of run of flutes and with close registration of flutes of one unit with those of abutting unit.
 - 3. Maximum space between ends of abutting units is 13 mm (1/2 inch). If space exceeds 13 mm (1/2 inch), install closure plates.
- H. Ceiling hanger loops, if provided, must be flattened or removed to obtain bearing of units on structural steel.

SPEC WRITER NOTE: All UL fire tests for rated floors are run with welded side laps (not screws). Welded side laps may be mandatory in seismic areas.

I. Fastening Deck Units:

- 1. Fasten floor deck units to steel supporting members by not less than 16 mm (5/8 inch) diameter puddle welds or elongated welds of equal strength, spaced not more than 305 mm (12 inches) on center with a minimum of two welds per unit at each support. Where two units abut, fasten each unit individually to the supporting steel framework.
 - 2. Tack weld or use self-tapping No. 8 or larger machine screws at 914 mm (3 feet) on center for fastening end closures. Only use welds to attach longitudinal end closures.
 - 3. Weld side laps of adjacent floor deck units that span more than 1524 mm (5 feet). Fasten at midspan or 914 mm (3 feet) on center, whichever is smaller.
- J. Weld in conformance to AWS D1.3/D1.3M and done by qualified experienced welding mechanics.
- K. Clean and touch-up area and welds scarred during erection, and repair with zinc rich galvanizing repair paint.
- 1. Paint touch-up is not required for welds or scars that are to be in direct contact with concrete.
- L. Provide metal concrete stops at edges of deck.
- M. Cutting and Fitting:
- 1. Fabricate metal deck units to proper length prior to shipping.

2. Field cutting by the metal deck erector is restricted to bevel cuts, notching to fit around columns and similar items, and cutting openings that are located and dimensioned on the structural drawings.
3. Other penetrations shown on the approved metal deck shop drawings but not shown on the structural drawings are to be located, cut and reinforced.
4. Make cuts and penetrations neat and trim using a metal saw, drill or punchout device; cutting with torches is prohibited.
5. Do not make cuts in the metal deck that are not shown on the approved metal deck drawings.
6. If an additional opening not shown on the approved shop drawings is required, submit a sketch, to scale, locating the required new opening and other openings and supports in the immediate area. Do not cut the opening until the sketch has been reviewed and accepted by the Contracting Officer Representative (COR). Provide additional reinforcing or framing required for the opening at no additional cost to the Government.
7. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking and support of other work shown.

SPEC WRITER NOTE: If automatically timed welding equipment is permitted, include the following exception paragraph.

- N. Install shear connector studs through previously installed metal deck in conformance to AWS D1.1/D1.1M, Section 7.
- //Exception: Install studs with automatically timed welding equipment and as specified below:
1. Do not place welded wire reinforcing or other materials and equipment which will interfere with stud installation on steel deck until shear connector studs are installed.
 2. Clean steel deck sheets free of oil, rust, dirt, and paint. Release water in deck's valley so that it does not become entrapped between deck and beam. Clean and dry surface to which stud is to be welded.
 3. Rest metal deck tightly upon top flange of structural member with bottom of deck rib in full contact with top of beam flange.

4. Weld studs only through a single thickness of deck. Place decking so that a butt joint is obtained. Place studs directly over beam web, where one row of studs are required.
5. Provide ferrules specially developed for the weld-through technique, and appropriate for size of studs installed. Remove ferrules after welding.
6. Submit report of successful test program for stud base qualification as required by AWS D1.1/D1.1M, Appendix K.//

3.2 CLEANING:

- A. Clean deck in accordance with manufacturer's recommendation before concrete placement.

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