

SPECIFICATIONS FOR STEEL ROOF DECK

1. Scope

The requirements of this section shall govern only ribbed steel roof deck construction of varying configurations used for the support of roofing materials and design live loads.

Commentary: Suspended ceilings, light fixture, ducts, or other utilities shall not be supported by the steel deck.

2. Materials

2.1 Steel Roof Deck: The steel roof deck units shall be fabricated from steel conforming to Section 1.2 of the latest edition (1980) of the American Iron and Steel Institute, Specifications for the Design of Cold-Formed Steel Structural Members.

The steel used shall have a minimum yield strength of 33 ksi.

Commentary: The steel roof deck shall be manufactured from steel conforming to ASTM Designation A611, Grades C, D, or E or from A653, Structural Quality Grades 33, 37, 40, 50, or 80 or equal. Standard tolerance for ordered length is plus or minus 1/2 inch.

3. Design

3.1 Stress: The maximum working stress shall not exceed 20,000 pounds per square inch. The unit design stress shall in no case exceed the minimum yield strength of the steel divided by 1.65 for specific design uniform loads. The unit design shall be increased 33 1/3% for temporary concentrated loads provided the deck thus required is no less than that required for the specific design uniform loads.

3.2 Section Properties:

Structural adequacy of deck sections shall be established by the determination of Section Modulus and Moment of Inertia, computation for which shall be in accordance with conventional methods of structural design. Such computation shall reflect the concept of Effective Compression Flange Width as limited by the appropriate provisions of the latest edition (1980) of the American Iron and Steel Institute's Specification for the Design of Cold-Formed Steel Structural Members.

Commentary: Arbitrarily assumed effective compression flange widths

shall not be allowed. Testing shall not be used in lieu of the above in determination of vertical load carrying capacity of steel deck.

3.3 Moment and Deflection

Coefficients: A moment coefficient of 1/8 shall be used for simple and dual spans and a moment coefficient of 1/10 shall be used for 3 or more spans. Deflection coefficients shall be .013 for simple spans, .0054 for double spans and .0069 for triple spans.

3.4 Maximum Deflections:

Deflection of the deck shall not exceed L/240 under the uniformly distributed design live load. All spans are to be considered center-to-center of supports.

Commentary: The adequacy of deck edge support details should be revised. At the building perimeter, or any other deck termination or direction change, occasional concentrated loading of the roof differences in deflection between the roof deck and the adjacent stationary building component. Supplemental support such as a perimeter angle may be warranted.

Construction and maintenance Loads:

Spans are governed by a maximum deck could result in temporary stress of 36,000 psi and a maximum deflection of L/240 with a 200 pound concentrated load at mid span on a 1'-0" wide section of deck.

If the designer contemplates loads of greater magnitude, spans shall be decreased or the thickness of the steel deck increased as required.

All loads shall be distributed by appropriate means to prevent damage during construction to the completed assembly.

Cantilever Loads:

Construction phase load of 10 psf on adjacent span and cantilever plus 300 pound load at end of cantilever with stress limit of 26.67 ksi.

Service load of 45 psf on adjacent span of cantilever plus 100 pound load at end of cantilever with a stress limit of 20 ksi.

Deflection limited to 1/240 of adjacent span for interior span and deflection at end of cantilever to 1/120 of overhang.

Notes:

1. Adjacent span: Limited to those spans shown in Section 3.4 of Roof Deck Specifications. In those instances where the adjacent span the individual manufacturer should be consulted for the appropriate cantilever span.

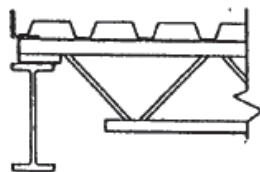
2. Sidelaps must be attached at end of cantilever and at a maximum of 12 inches on center from end.

3. No permanent suspended loads are to be supported by the steel deck.

4. The deck must be completely attached to the supports and at the sidelaps before any load is applied to the cantilever.

4. Installation

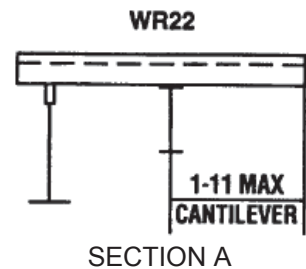
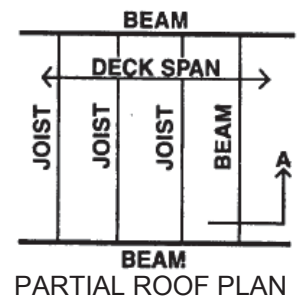
4.1 General: Steel deck units shall be anchored to supporting member, including bearing walls, to provide lateral stability to the top flange of the supporting structural members and to resist the following gross uplifts. 45 pounds per square foot for eave overhang;



BUILDING DECK EDGE OR INTERIOR TERMINATION CONDITION

STEEL DECK CANTILEVER

Recommended Maximum Spans for Construction and Maintenance Loads Standard 1 1/2-inch and 3-inch Roof Deck				
	Type	Span Condition	Span Ft.-In.	Maximum Recommended Spans Roof Deck Cantilever
Intermediate Rib Deck	F22	1	4'-6"	1'-2"
	F22	2 or more	5'-6"	
	F20	1	5'-3"	1'-5"
	F20	2 or more	6'-3"	
Wide Rib Deck	F18	1	6'-2"	1'-10"
	F18	2 or more	7'-4"	
	B22	1	5'-6"	1'-11"
	B22	2 or more	6'-6"	
Deep Rib Deck	B20	1	6'-3"	2'-4"
	B20	2 or more	7'-5"	
	B18	1	7'-6"	2'-10"
	B18	2 or more	8'-10"	
	N22	1	11'-0"	3'-6"
	N22	2 or more	13'-0"	
N20	1	12'-6"	4'-0"	
N20	2 or more	14'-8"		
N18	1	15'-0"	4'-10"	
N18	2 or more	17'-8"		



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30 pounds per square foot for all other roof areas. The dead load of the roof deck construction shall be deducted from the above uplift forces.

Commentary: In the past 1 ½ inches of end bearing was the minimum; this is still a good “rule of thumb” that will, in general, prevent slip off. If less than 1 ½ inches of end bearing is available, or if high support reaction are expected, the deck must be adequately attached to the structure to prevent slip off.

4.2 Welds. Care shall be exercised in the selection of the electrodes and amperage to provide weld and to prevent high amperage blow holes. Puddle welds shall be at least ½ inch diameter or elongated welds with an equal perimeter. Fillet welds when used, shall be at least 1 inch long. Weld metal shall penetrate all layers of deck material at end laps and side joints and shall have good fusion to the supporting members.

Commentary: The selection of welding rod and amperage are left to the preference of the individual welder. Welds are made from the top side of the deck with the welder immediately following the placement crew. Welding washers are neither necessary nor recommended for steel deck of 0.028 inches or greater.

4.3 Screws: The allowable load value per screw used to determine maximum fastener spacing for either self-drilling or standard metal type is based on a minimum size 12 and on a minimum structural support thickness of 0.06 inches.

4.4 Spacing of Attachments for Welds or Screws: The location and number of welds or screws required for satisfactory attachment of deck to supporting structural members are as follows: all side laps plus sufficient number of interior ribs to limit the spacing between adjacent points of attachment to 18 inches. For spans greater than 5 feet, the side laps shall be fastened together at a maximum spacing of 3 feet.

Commentary: The fastening requirements described in 4.4 are the minimum necessary to anchor the deck and prevent large differential deflection between deck units. Side lap fasteners can be welds, screws, crimps (button punching), or other method approved by the designer. The SDI Diaphragm Design Manual, Second

Edition, should be used to determine fastening requirements if the deck be designed to resist horizontal loads. The most stringent requirements, of either section 4.4 or the Diaphragm Design Manual, should be used.

4.5 Powder-Activated or Pneumatically-Driven Fasteners:

The allowable load value per fastener used to determine the maximum fastener spacing is based on a minimum structural support thickness of not less than 1/8 inch and on the fastener providing a 5/16 inch diameter minimum bearing surface (fastener head size). Documentation in the form of test data, design calculation, or design charts shall be submitted by the fastener manufacturer as the basis for obtaining approval.

Commentary: Powder actuated and pneumatically driven fasteners are recognized as viable anchoring method providing the type and spacing of said fasteners satisfies the design criteria.

5. Protective Coating

5.1 Finishes: All steel to be used for roof deck shall be galvanized, aluminized or shop coat painted with Marlyn’s standard grey or white shop coat. The roof deck shall be free of grease and dirt prior to the coating. The shop coat is intended to protect the steel for only a short period of exposure in ordinary atmospheric conditions and shall be considered an impertinent and provisional coating.

***Note:** Field repainting is the sole responsibility of the painting contractor to assure that the surface is properly prepared and that the coating is properly applied. Marlyn will not accept responsibility for adhesion or compatibility of the field coating or for other causes leading to unsatisfactory painting results.

Commentary: Field painting of shop coat painted deck is recommended especially where the deck is exposed. In corrosive or high moisture atmosphere, a galvanized finish is desirable in a G-60 or G-90 coating.

In highly corrosive or chemical atmospheres, special care in specifying the finish should be used.

5.2 Fireproofing: The metal deck manufacturer shall not be responsible for the cleaning of the

underside of metal deck to ensure bond of fireproofing. Adherence of fireproofing materials is dependent on many variables; the deck manufacturer (supplier) is not responsible for the adhesion ability of the fireproofing.

6. Site Storage

Steel deck shall be stored off the ground with one end elevated to provide drainage and shall be protected from the elements with waterproof covering, ventilated to avoid condensation.

7. Erection

Deck sheets will be placed in accordance with approved erection layout drawing and in conformance with the deck manufacturer’s standards. End laps of sheets shall be minimum of 2 inches and shall occur over supports.

Commentary: The deck erector normally cuts all openings in the roof deck which are shown on the erection drawings and which are less than 16 square feet in area, as well as skew cuts which are shown on the drawings. Openings not shown on the erection diagrams, such as those required for stacks, conduits, plumbing, vents, etc., shall be cut (and reinforced, if necessary) by the trades requiring the openings.

8. Insulation

Insulation board shall be sufficient strength and thickness to permit unsupported spans and edges over the deck’s rib opening. Cementitious insulating fills shall be poured only over galvanized deck. In all cases, the recommendations of the insulation manufacturer shall be followed.

9. Acoustical Steel Roof Deck

Designed to serve as a sound-absorbing ceiling as well as a structural roof deck, Marlyn’s acoustical roof deck is identical to its standard deck counterpart, except the webs fluted profiles are perforated. The perforation pattern is 5/32” diameter holes staggered 3/8” on center. Structural properties are negligibly affected by the web perforations in fluted deck (approximately 5%).

The sound absorbing elements consists of rolls of glass fiber, which are placed in the ribs between the

perforated webs on the job site by the roofing contractor.

When painting acoustical deck is preferred, shop-applied primer over galvanized is recommended.

10. Design Information

Roof deck section properties calculated in accordance with the AISI “Specification for the design of Cold-Formed Steel Structural Members.”

Roof decks loads computed in accordance with the following SDI bending moment and deflection formulas:

Bending Moment

$$\text{Simple \& Two Span } M = \frac{Wl^2}{8}$$

$$\text{Three Span or More } M = \frac{Wl^2}{10}$$

Deflection

$$\text{Simple Span } = \frac{.013Wl^4}{EI}$$

$$\text{Two Span } = \frac{.0054Wl^4}{EI}$$

$$\text{Three Span } = \frac{.0069Wl^4}{EI}$$

11.

CAUTION

Steel roof deck may be used in a variety of ways, some which do not lend themselves to a standard “steel deck” analysis for span and loading. There are, in these cases, other criteria which must be considered besides that given by the Steel Deck Institute. Make sure that this investigation starts with a review of the applicable Codes and that any special conditions are included in the design.