

ACCUFORM METAL LTD.
TECHNICAL ROOF DECK INFORMATION
(USA MARKET)

General

Presented in the Accuform Metal roof deck load tables are allowable uniformly distributed loads.

❖ **Steel**

Specification - Conforms to ASTM A653 Grade 33 yield stress 33 ksi, tensile strength 45 ksi; Grade 40 yield stress 40 ksi, tensile strength 55 ksi; Grade 50 yield stress 50 ksi, tensile strength 65 ksi.

Finishes – G60 or G90. For heavier galvanizing, refer to ASTM A653.

❖ **Design Considerations**

Strength – Allowable Strength Design (ASD) principles were used in the development of the allowable loads in accordance with AISI S100-16, *North American Specification for the Design of Cold Formed Steel Structural Members*. Bending, shear and web crippling are the strength considerations.

The allowable uniformly distributed strength load (S) in the table must be equal to or greater than

(Dead load, DL, + Live load, LL)

Web Crippling – The web crippling strength varies with the bearing length. For the AFRD 15-36US roof deck, the allowable web crippling loads are based on an end bearing length, $N_e = 1.5"$ and interior bearing length, $N_i = 3.0"$. For the AFRD 3-26US roof deck, the allowable web crippling loads are based on an end bearing length, $N_e = 3"$ and interior bearing length, $N_i = 6.0"$. If the bearing lengths are less than the specified values, the allowable uniformly distributed loads must be checked for the bearing length under consideration (See Example).

Serviceability (Deflection) – The effective moment of inertia for deflection determination is calculated based on an assumed live load stress of $0.6F_y$.

The allowable uniformly distributed deflection load (D) in the table must be equal to or greater than

(Live load, LL)

Example (Use of Load Tables)

AFRD 15-36US Roof Deck

Given:

- ❑ 3-SPAN continuous, $L = 7.5$ ft each span
- ❑ Deck thickness, $t = 0.0300$ in; $F_y = 33$ ksi
- ❑ L/240 deflection limit (table is based on L/180)
- ❑ End bearing length, $N_e = 1$ in.
- ❑ Interior bearing length, $N_i = 2$ in.
- ❑ Nominal loads

1) Dead loads (DL)

- a) deck 2.0 psf
 - b) superimposed 10.0 psf
- DL = 12.0 psf

2) Live load (LL)

$$LL = \underline{40.0 \text{ psf}}$$

Solution:

▪ ***Strength "S"***

1) Total load

$$[DL + LL] \\ [12.0 + 40.0] = \underline{52.0 \text{ psf}}$$

2) Allowable load (from Table under "S") is 55 psf

Since 55 > 52.0 OK

3) Check end web crippling ($N_e = 1$ in.)

- a) End reaction = $0.400(52.0)(7.5) = \underline{156 \text{ lb/ft}}$
- b) Allowable end reaction (from Section Property Table)

$$P_e = P_{e1} + P_{e2} \sqrt{N/t} \\ = 198 + 49.4 \sqrt{1/0.0300} = \underline{483 \text{ lb/ft}}$$

Since 483 > 156 OK

4) Check interior web crippling ($N_i = 2$ in.)

- a) Interior reaction = $1.10(52.0)(7.5) = \underline{429 \text{ lb/ft}}$
- b) Allowable interior reaction (from Section Property Table)

$$P_i = P_{i1} + P_{i2} \sqrt{N/t} \\ = 392 + 66.7 \sqrt{2/0.0300} = \underline{937 \text{ lb/ft}}$$

Since 937 > 429 OK

• ***Deflection "D"***

From Table under "D" (L/180) = 67 psf > 40 psf OK

For L/240, multiply 67 by (180/240) = 50.3 psf

Since 50.3 > 40 OK