MARLYN STEEL DECKS, INC.

Specifications Marcore-S and Marcore-SR

I. Engineering Tables

1. Scope

The engineering tables were made for composite floor deck with corrugated light gauge steel deck MARCORE, made by Marlyn Steel Decks, Inc. (Marlyn). The composite steel deck is the structural element, which is made with light gauge cold-formed steel deck and concrete that is poured over the deck. This particular type of deck can span up to 21 feet long and act as a simple supported beam or up to 25 feet long and act as a two-span beam. Inc cases where the deck lays over an intermediate support, additional reinforcement must be added into the concrete to take negative bending moment over this support. Positive bending moment is taken by the steel deck, which works at the same time as a form.

2. Materials

2.1 *Steel deck*

MARCORE steel deck is two inches deep.
This steel deck is fabricated from a steel sheet, zinc coated (galvanized) by a hot dip process in coils per ASTM A653. Performance tables are given:

2.1.1. Steel decks made with 22 and 20 gauge, steel based on yield strength of 50 ksi (grade 50).

2.1.2. Steel decks made with 18 gauge steel, steel based on yield strength of 40 ksi (grade 40).

2.2 Concrete

Composite deck contains concrete that is poured over the MARCORE deck. Performance tables are given for composite deck made with normal and lightweight concrete.

2.2.1. Normal weight concrete (145 lb/ft^3) with a compressive strength fc'=4000 psi at 28 days as per ACI 318 Building Code Requirements for Reinforced Concrete shall be used. No admixture containing chlorides is allowed.

2.2.2. Lightweight concrete (110 lb/ft^3) with a compressive strength fc'=3000 psi at 28 days as per ACI 318 Building Code Requirements for Reinforced Concrete shall be used. No admixture containing chlorides is allowed.

2.3 Reinforcing steel

In composite steel floor deck, three types of reinforcing are used:

2.3.1. "**Positive**" reinforcing, which takes tension stress in the positive bending moment. In this case, the steel deck acts as reinforcing for one and two-span conditions.

2.3.2. "**Negative**" reinforcing, which takes tension stress in the negative bending moment for two-span condition only. Bars shall be grade 60 as per ASTM A615.

2.3.3. "**Temperature**" reinforcing (for one- and two-span conditions) shall be welded wire fabric as per ASTM A 185. The type of wire mesh is given in tables for each deck thickness. The sufficient steel are is 0.075% of concrete are per foot above the flutes.

How to place reinforcing:

a. "Negative" reinforcing in composite floor deck must be located 3/4" clear below the top of the concrete and extended in each direction from the intermediate support at least one third of the span.
b. "Temperature" reinforcing is placed on the top of the steel deck.

2.4 Shoring

2.4.1. Values are based on Allowable Strength Design (ASD)
2.4.2. Construction deflection limitations are L/240. Consult your engineer for shoring on decking to be left exposed to view.
2.4.3. Runways and planking must be used for all concrete placement.
2.4.4. Bearing length must be a minimum of 4 inches at interior supports and 1.5 inches at end supports
2.4.5. Normal weight concrete (145 lb/ft^3) with a minimum Building compressive strength, f'_c, of 4000 psi at 28 days as per ACI 318 Code Requirements for Reinforced Concrete shall be used. No admixture containing chlorides is allowed.
2.4.6. Overall slab depth refers to the normal concrete depth measured from the bottom of the steel deck to the top of the concrete.
2.4.7. Construction live loads have been taken as 20 psf with a concentrated 150 plf per foot width

3. Design Assumptions

3.0 *General*

Composite steel deck was designed for two main conditions: one-span and two-span conditions. The overall thickness of the deck (for both conditions) is the sum of the thickness of the steel deck (2") and the thickness of the concrete above the corrugation height of the steel deck (varies from 2" to 6" in 0.5" increments).

3.0.1. One-span condition: A composite steel deck has two supports and was designed as a simple supported beam

3.0.2. Two-span condition: A composite steel deck that has three supports (two end supports and one intermediate) and was designed as a continuous beam with two equal spans

Notes:

1. The calculations of the moments were based on the length of the span from center to center of the supports.
2. The tables and design data in this publication are based on deck that is properly connected to the frame in accordance with SDI specifications.

3.1 *Loads*

Calculations for one and two span conditions were based on LRFD procedure.

3.1.1. Self-weight of the composite deck and construction live load was applied to calculate the unshored span:
Concrete is Normal/light weight concrete.
Steel deck gauge from 22 to 16. Construction live load is 20 pounds per square foot.

3.1.2. Superimposed loads:

<u>One-span condition:</u> In the tables, working loads are the sum of maximum superimposed dead and live loads given relative to the thickness of the composite slab thickness and its span.
Note: No additional construction load is included.

<u>Two-span condition:</u> Three working load combinations were considered relative to the thickness of the composite slab and its spans. Provided minimum “negative” reinforcing was calculated based on load combinations:

Dead Load (DL) = 25 psf: Live Load (LL) = 40 psf
Dead Load (DL) = 25 psf: Live Load (LL) = 50 psf
Dead Load (DL) = 5 psf: Live Load (LL) = 100 psf
Note: No additional construction load is included.

3.2 Deflection

All load combinations were checked for their deflection. The maximum allowable deflection was not to exceed the lowest of these three values:

1. L/180 (for Dead and Live loads).
2. L/360 (for Live loads only).
3. Or ¾”.

Where L is the span of the beam center to center between supports.

3.3 Additional calculations

Shear was checked (for one- and two-span conditions).
Combination of shear and bending moment was performed for the two-span condition assuming that the sum of the ratio of actual to allowable shear in the second power and ratio of actual and allowable moment in the second power cannot exceed 1;
$(V_{act}/V_{all})^2 + (M_{act}/M_{all})^2 \le 1$.