

# THE CHECKS BEHIND THE DECKS

By Richard Heagler, P.E.

**D**ESIGNING DECKS IS LARGELY A CHECKING PROCESS. CONSULTING AVAILABLE tables is enough to select the correct product to carry the required uniform loads, which are frequently dictated by building codes. However, there are a few additional checks that need to be done before the deck selection process is finished. These checks rapidly become second nature for most designers. But new designers may need some guidance during the process – or an old timer might like a little refresher course. For additional reference, several field checks are included.

## 1. Maximum Spans

Roof deck has a maximum recommended span based on Steel Deck Institute (SDI) loading for maintenance and construction loads. In most cases, even with snow drifting, the uniform load capacity is more than adequate for the job so construction loading frequently dictates the deck selection. Insurance considerations such as required by the Factory Mutual Corporation (FM) or Underwriters Laboratories (UL) fire ratings can also limit allowable spans.

Floor deck and form deck maximum spans are controlled by the desire not to use intermediate shores when placing the concrete. So, just as with roof deck, floor deck spans are controlled by construction loads. Service loads seldom limit spans.

Maximum spans for roof and floor decks are published by individual manufacturers as well as by the SDI and, where applicable, by FM and UL.



## 2. Fasteners

The choice of the type and number of fasteners is a design function. It wasn't too many years ago that fastening deck was almost exclusively done by welding. Now self-drilling screws and air and power driven pins are common. Each fastener type has its own uplift and shear characteristics, so it is up to the designer to specify the fastening for the deck. If a contractor wants to use alternate fastening then he is required to consult the design professional to have the request evaluated. The SDI publication Diaphragm Design Manual (Second Edition) provides fastener data for shear. The American Iron and Steel Institute (AISI) Specifications for the Design of Cold Formed Steel Structural Members provides uplift and shear values for screws and welds. SDI sponsored research provided data for welds through washers attaching the lighter gage deck products. Individual fastener manufacturers have published data for their

products. So, while the necessary information exists, it may seem scattered. Frequently, the deck manufacturer or the SDI can act as an information source to help in checking fasteners.

For composite floor deck, the fastening as specified by the SDI is enough unless there is an unusual requirement. One item frequently forgotten by designers is that shear studs can also act as deck fasteners. For non-composite decks, fire ratings may require that welds be spaced on a particular schedule.

## 3. Fire Ratings

The need for fire ratings is established by building codes and by insurance needs. A steel deck by itself is not non-combustible but does not provide a fire rating which is done with an entire assembly. For roofs, the assembly includes the supporting structural members, any "fireproofing" or suspended ceilings and deck roofing materials.

For composite deck and non-composite form deck, the slab depth and concrete type are part of the system as well as the structural supports. The designer will usually find the approval process easier if he or she can adhere to a well-defined UL rating. Manufacturers can supply fire ratings lists; these lists generally describe the main requirements of the constructions.

## 4. Concentrated Loads

Concentrated main loads are considered in the construction loads for roof and floor deck. The need to handle concentrated service loads should also be checked. Since roof decks act as the sole carrying member, the published section properties are enough to analyze the moment

and shear effects of the loading. Web crippling (or crushing) should also be considered and this may require a call to the deck manufacturer.

Floor deck slabs can be reviewed for concentrated loads by using the SDI methods shown in the SDI Composite Deck Design Handbook. Depending on the building use, a code requirement for a 1000 or 2000 pound load over 2.5' x 2.5' area may need to be checked. For the commonly used composite slabs, these loads are easily handled, but if there is a question the SDI methods can be used to check to see if the deck/slab combination is adequate.

**5. Fasteners**

Check the fasteners and require the contractor to replace any that are broken and install any that are missing.

**6. Openings**

Check both roof and floor deck for unscheduled penetrations or damage – for roof deck penetrations call for minimum reinforcement according to the SDI schedule:

Up to 6" dia.	no reinforcing needed
6" to 8" dia.	0.045" (18 ga.) plate
8" to 13" dia.	0.057" (16 ga.) plate
Over 13"	provide a designed frame

These ‘rules of thumb’ assume only one penetration occurs per deck panel; if holes are closer a frame may be needed regardless of the hole size. Consult the SDI Manual of Construction with Steel Deck for other general information about reinforcing penetrations.

The contractor should make sure that all the openings in the deck are protected according to OSHA requirements. All decks

must be attached so there are no loose sheets.

**7. Damage**

Check composite or non-composite deck for damaged areas that can be “soft” spots during concrete placement. Shore these areas. These can be areas that have been damaged by construction traffic – areas around stairs are particularly susceptible to foot damage.

**8. SIDELAPS**

Sidelap connections are important for diaphragm strength of roof deck. Floor deck sidelaps must be tight — and remain tight — when concrete is placed.

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