

JUST THE FAQs

questions we commonly
receive about ... STEEL DECKS

Steel Deck FAQs

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General Questions

Q Why do section properties decrease as the yield strength increases?

This is counter-intuitive at the surface. Standard effective deck properties are typically reported such that the section moduli used for bending are calculated assuming a maximum bending stress in the extreme fiber of the deck equal to the design yield strength (F_y) of the deck steel. Moments of inertia are typically calculated and reported at a stress level equal to $0.6F_y$, to capture the deck in its state at the maximum anticipated service level stress for serviceability limit states, like deflection. In calculating these effective section properties, effective flange and web widths are used in lieu of actual widths such that, under a given amount of compression stress, an entire flange or web may not be completely effective due to the buckling shape of the flat elements under compression stress. So, as the design yield strength increases, the effective compressed element widths tend to decrease due to the higher stress levels being analyzed. These smaller effective element widths result in smaller

effective section properties. However, the increase in design yield strength when calculating global flexural strength outweighs the reduction in section properties, so increasing design yield will nearly always increase the deck strength and associated allowable spans, even though the section properties get smaller.

Q Why do properties vary among manufacturers?

There are many reasons for this. Since effective section properties vary with design yield strength, if two manufacturers publish different design yield strengths for similar decks, the effective section properties will be different. Also, each manufacturer has their own tooling, which may have slight differences in bend radii, web angles, sidelap lips, flange widths, overall depth, flange stiffener configuration, etc. Typically, for truly comparable products, section property differences at the same yield strength are within 5% of one another. The Steel Deck Institute (SDI) publishes industry minimum effective section properties for standard profiles in its *Floor Deck Design* and *Roof Deck Design* manuals, based on all active member company data. If the deck is not the limiting component in a design, specifying SDI minimums in lieu of specific manufacturer published minimum properties will limit the amount of manufacturer specific approvals the Structural Engineer of Record has to handle for a particular project.



Q I specified 80 ksi steel; why are you providing me design information for 60 ksi design yield?

80 ksi steel and other high-strength or full-hard steel coils typically have lower ductility than lower strength steels. The American Iron and Steel Institute (AISI) S100 specification limits the maximum permissible design yield stress to 60 ksi for these lower ductility steels (with potential exceptions for the flexural yielding limit state). Neither AISI S100 nor the SDI prohibits the use of higher strength steels, we just typically cannot take advantage of the increased steel strength.

Q Can screws be used at supports in lieu of welds?

Yes; mechanical, power-driven, or powder-actuated fasteners of many types may be used in lieu of welds at the discretion of the Structural Engineer of Record (SER). It typically will not be a one-for-one substitution; it will require design consideration by the SER of the particular fastener chosen.

Q What differences are there when butting steel deck over supports as compared to lapping the ends related to the transfer of diaphragm loads, and is it stronger to lap when possible?

The Steel Deck Institute (SDI) *Diaphragm Design Manual* and American Iron and Steel Institute (AISI) S310 do not distinguish lapped ends from butted ends in the diaphragm strength and stiffness design equations, so there is no difference if using those published design equations to determine the strength and stiffness of the diaphragm. Using specific product testing, manufacturers can potentially gain additional stiffness using lapped ends as compared to butted, but often do not distinguish. Butted

deck ends require both ends of adjoining sheets over the support be welded with their own line of welds, compared to a lapped joint where a common weld line is shared by the two lapped deck ends.

Roof Deck Questions

Q Can roof deck be curved in the strong direction by the erector in the field, to fit a radiused roof?

This is dependent on the experience of the erector, gage of the deck, deck support spacing, and roof radius. Contact the deck manufacturer and erector for guidance. If it can't be field-curved, shop-curving prior to jobsite delivery may be an option depending on project location and required schedule.

Floor Deck Questions

Q Can we use a scissor lift on the slab? Where can I find information related to concentrated loads on slabs?

The slab must be designed with the required capacity to support anticipated loading, such as a scissor lift. The Structural Engineer of Record (SER) is responsible for the design of slabs on steel deck and should be made aware of any anticipated vehicle traffic as early in the design process as possible. For slabs on composite steel deck, the SER can refer to the Steel Deck Institute (SDI) C-2011 *Standard for Composite Steel Floor Deck-Slabs* for design requirements and guidance, applicable limit states, and other design considerations. The SER should refer to ACI 318 for the design of slabs on non-composite steel floor deck. The SDI *Floor Deck Design* manual is also a great resource with example problems to help guide the SER through the design of composite and non-composite steel deck-slabs.

Q Why does the required concrete volume for a slab on steel deck vary based on deck profile when the overall slab depth is the same?

The width and spacing of the deck flutes varies by profile. Wider rib openings at the top of the deck and closer spacing of open top ribs results in more concrete nested down in the profile of the deck, requiring more concrete than a profile with narrower and/or further spaced top open ribs.

Q Is higher yield strength deck available than is published by the Steel Deck Institute or individual manufacturers?

If required, this question should be asked on a project and manufacturer specific basis. Certain profiles, finishes and gages have a higher likelihood of availability than others. In general for New Millennium, heavier gages, white primer finishes and some composite decks are not always available in higher yields.

However, if higher yields than published are desired, consult the manufacturer.

Q Where do I find design information if the slab depth used on my project is not published in your catalog?

Consult the manufacturer's website or contact the manufacturer. New Millennium has additional tables available on our website, and our engineers are available to prepare tables for nearly any condition needed. ■

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