



## Important Instructions for the Trouble-free Installation of Composite Decking over Wood Framing Using SplitStop Titan III Composite Screws



The Composite industry, as a whole, provides excellent information regarding their product and the required gapping, etc., necessary for a proper installation of that product. Unfortunately, composite decking is only one of the three elements involved in a proper, long lasting and trouble-free installation. A complete understanding of the characteristics of the wood framing structure to which you will be fastening decking and the deck fasteners used are also worthy of consideration. Without a complete understanding, you and/or your installer could be using familiar wood to wood construction methods that may unwittingly result in a potential problem at a later date.

Titan Metal Werks, SplitStop™ screws are typically the least expensive component used on a deck project. Never-the-less, we feel strongly about providing you with a true expectation of what a typical deck screw is capable of and what steps are recommended to decrease any potential for problems related to the installation of composite decking over a wood framework.

Deck screws were originally designed to hold wood decking in place on a wood framing structure, NOT for structural purposes where significant lateral shear pressures come into play. Therefore their shaft and head size characteristics, as they present themselves, are based upon that original use function and are what people expect to see today. A wood deck built with wood decking boards on a wood framing structure moves in unison. That is not the case with a composite deck on a wood framing structure. The combination of composite decking and wood framing requires slight changes in installation methods which you should be most aware of as you proceed with your plans for a new composite deck. We recommend that you read the information below and pay special attention to the guidance provided in the Expansion/Contraction/Shrinkage section.

### Screw sizes recommended for different board thicknesses:

- 1-1/2" Length Screws - \*3/4" (or less) Solid Deck Boards (\*Not recommended for the application of fascia (see below)
- 2-1/2" Length Screws - 7/8" to 1 1/8" Solid Deck Boards
- 3" Length Screws - 1 1/4" to 1 1/2" Solid Deck Boards

Coverage: Titan calculates composite screw needs at 3.5 screws per square foot when used on decks constructed with standard, 16" on center joist spacing and using two screws per joist. (Example: A 10' x 10' deck surface requires 350 screws.)

Preventing Drive Issues: All SplitStop composite screws are designed with a combination of star drive recess and SplitStop patented thread technology, which allow SplitStop screws to avoid drive slippage and the ability to cut through hard dense composite materials with less torque. To prevent the insert drive bit from slipping out of the screw's drive recess, be sure that straight-line, vertical engagement is maintained between the composite screw and the screw gun. The use of a bit extension will improve your ability to monitor this in-line state by getting the screw out-in-front of the driver where you can see it. Use of a high quality, insert drive bit with a high Rockwell hardness rating, will further eliminate damage to the drive recess. (Titan III™ composite screws are packaged with one such bit in every box. Additional bits are available from your SplitStop retailer or on our website.) Our screws, having been designed with a torsional load reducing thread/shaft design, are best driven on the high speed setting of an 18 to 24 volt cordless screw gun rather than a corded drill and NOT by use of an impact driver.

Expansion/Contraction/Shrinkage: Composite decking and fascia materials expand at higher ambient temperatures causing what's referred to as thermal expansion. They will also expand when the wood fiber component of their make-up takes on moisture. This expansion is usually minimal and varies in degree by manufacturer. The thermal expansion information is usually available from your composite decking manufacture and provides the basis for their recommended gapping instructions. Hot ambient temperatures will also dry and shrink most treated wood joist materials at much higher levels. Then, as time progresses, the wood will cycle back and forth from a state of expansion while wet and shrunken when dry. The ability to absorb and later release moisture comes from the living structure inherent in wood. The diagram shown in Figure 1 depicts the straw-like nature of wood cells. Wood is dimensionally stable when the wood cells are above their saturation point. Below that point, wood shrinks or swells due to loss or gain of bound water from within the cell walls. This movement, in green lumber, from its saturated point to its completely dry state, can result in shrinkage of 0.1 - 0.2% longitudinally (board length), 3 - 5% radially (board thickness) and 6 - 10% tangentially (board width), as a general rule of thumb. *{See on-line reference information at: <http://www.wood-database.com/wood-articles/dimensional-shrinkage/>.}* This movement is very similar in treated lumber, due to the treating process, wherein the wood fibers are saturated by water-born chemicals, under pressure. The wood will often arrive on sight completely saturated and will begin the drying and shrinking process on day one. Given these figures, you can expect a nominal 2" x 10' x 16' joist, for instance, to shrink as much as 1/16" in thickness, 3/4" in width and 3/16" in length. The wood framing structure, therefore, is the element most responsible for overall project movement, due to its expansion/contraction/shrinkage and is the element that requires the most consideration while designing your deck project. It is possible, under certain conditions, for the opposing movement between composite deck board and wood framing to generate lateral shear pressures upon the fasteners that exceed the normal 1,100 - 1,200 lb shear-strength capabilities of most standard, case-hardened, #8 gauge (roughly 1/8"), carbon-steel screws. (Note that the 3/16" shrinkage in length of a 16' long board is greater, even without considering the thermal expansion of the composite deck board, than the approximate thickness of a standard #8 gauge screw.) A screw capable of exceeding these pressures would require either a larger diameter, which will not meet your expectation for visual appeal or a change to structurally graded screws, greatly increasing your cost. In the vast majority of cases, a #8 carbon-steel screw will perform admirably. But, it is wise to know and consider what circumstances need to be taken into consideration and what steps can be applied to limit your exposure to this problem. Most fasteners, like ours, are warranted against damage due to corrosion but are not warranted for breakage due to excessive load.

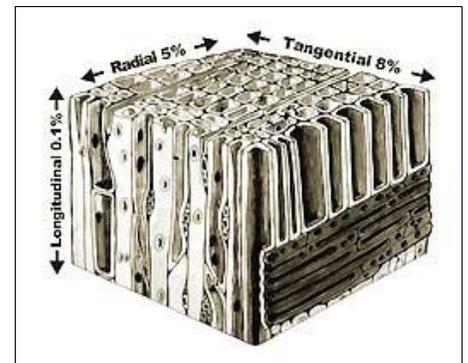


FIGURE #1

Stainless steel screws are a bit more expensive but are also more pliable than case-hardened carbon steel, resulting in a reduction of these excessive load issues.

**If you are in a climate that experiences extremes of temperature and/or moisture throughout the day, if your deck is constructed low to the ground or on top of a solid structure with little ventilation, if you use a dark color decking or if your deck boards exceed 12' in length, the following installation suggestions will limit your exposure to these potential issues.**

- 1) Always check the composite decking manufacturer's literature for specifics regarding expansion, contraction and proper board spacing.
- 2) Allow your treated framing material to thoroughly dry prior to construction or use materials kiln-dried after treatment. This will not eliminate the movement issue but it will limit the extreme movement immediately following the initial installation.
- 3) Install your decking with two screws per board, per joist. Staggered, single-screw per board, per joist, installations are not recommended by Titan for standard deck boards.
- 4) Ensure proper ventilation levels under your deck.
- 5) Pre-drill for two screws at the board ends, making sure to rock the drill bit back and forth, so as to form an elongated hole in the direction of the board's length, into which the screws should be driven.
- 6) Darker colored deck boards absorb heat faster and would benefit from a reduction in board length and/or the use of three screws at each board end, installed as outlined above. If your deck is longer than 12', consider using a border band and center break accent board, to separate the length rather than installing 16' to 20' one-piece un-interrupted spans.
- 7) Frame the decking structure with the inherent movement you will experience in mind. Combining two joist widths with smaller lengths of joist blocking as ladder-style separators is better than combining several joist widths or separating joists with a single board's width, as the dimensional stability of the ladder-style combination will be better and will shrink far less. See figure 2.
- 8) Avoid applying composite boards to vertical 4"x4" or 6"x6" posts, as the post will shrink within any boxed composite structure that you build. If you must, use stainless steel screws and stagger the locations of screws used, so as not to pull directly against one another, though not a guaranty of success, should limit your exposure to this problem.
- 9) If you use composite fascia boards to cover the rim-joists of your deck structure, remember that you are working with the least stable dimension of the wood board. Check the decking manufacturer's specific installation instructions for fascia materials. Some manufacturer's recommend the use of softer, more pliable, stainless steel nails rather than screws or the use of three rows of stainless steel screws in the board's width, often spaced 12" on center.

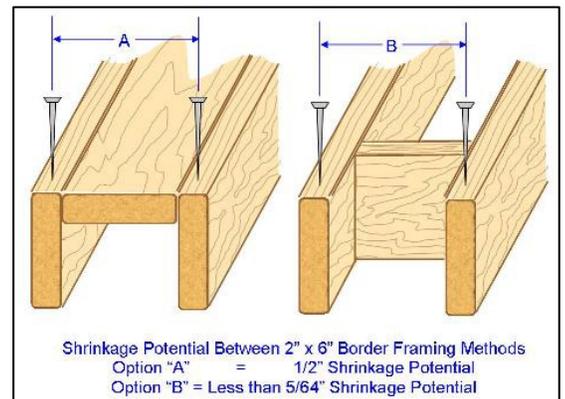


FIGURE #2

Titan recommends, if using deck screws, that you follow the manufacturer's guidelines but also offers a specially designed and tested SplitStop Fascia Installation System. Titan's fascia system employs stainless steel screws to "hang" the fascia board rather than affix it to the rim joists. This allows the board to move and allows you to use far fewer screws, as we recommend installing them in an alternating, baseball stitch, pattern. Most consider this method to provide a more aesthetically pleasing alternative.

- 10) Covering the sides of stair stringers is similar to applying fascia boards and should follow the same methodology as described above.

**Minimizing Splitting:** The incidence of splitting in composite type materials is typically higher than that experienced in natural wood products. The SplitStop™ Titan III composite screw greatly reduces, but does not eliminate, board-end splitting. The incidence of splitting varies depending on the type of composite used, variations within the composite mix, and the outside temperature during installation. Even though you may be able to drive our screw into the board-end without pre-drilling, **Titan still recommends** that you pre-drill the board-end surface using a 1/8" drill bit as show in Figure 3, to avoid splitting after expansion/contraction cycles. Pre-drill only through the deck board NOT into the joist.

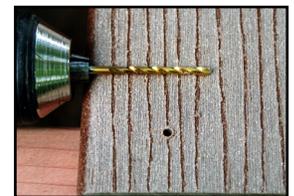


FIGURE #3

**Secondary Mushrooming:** Use a screw gun with a depth gauge or torsion adjustment to stop the screw AT the deck's surface. In harder, denser, composite deck boards, the setting of screw heads below the surface may push up a secondary mushroom or lump around the screw head. To avoid secondary mushrooming, drive composite screws into the composite material perpendicular to the decking surface and finish flush with the top of the deck board.

**Capped Decking Products:** SplitStop™ Titan III screws are one of the best methods of installing capped/cap-stock decking. All capped decking can differ from manufacturer to manufacturer therefore requiring that you test the use of our screws in your specific capped decking product. In some capped decking products, the compression of core-materials, under the head of the screw, can cause the cap-stock material to "raise" slightly around the location of the screw. Should this be the case, we recommend the use of a dimpling technique.

Dimpling amounts to the creation of a conical shaped hole everywhere you wish to place a screw. This can be done using a SplitStop™ "Dimpler" bit as shown in Figure 4a, available through Titan. Dimpling removes material from the area under the screw head, will cut cleanly through the cap-stock and reduces the compression taking place, thus eliminating any potential "raising" of the cap-stock. This same effect can be achieved using a 1/4" spade bit with a depth stop, as shown in Figure 4b. The recommendation of a pre-drill combined with use of the dimpling process is recommended whenever attaching composite boards to other composite boards as well.



FIGURE #4a



FIGURE #4b