

The Slip Bracket Connector

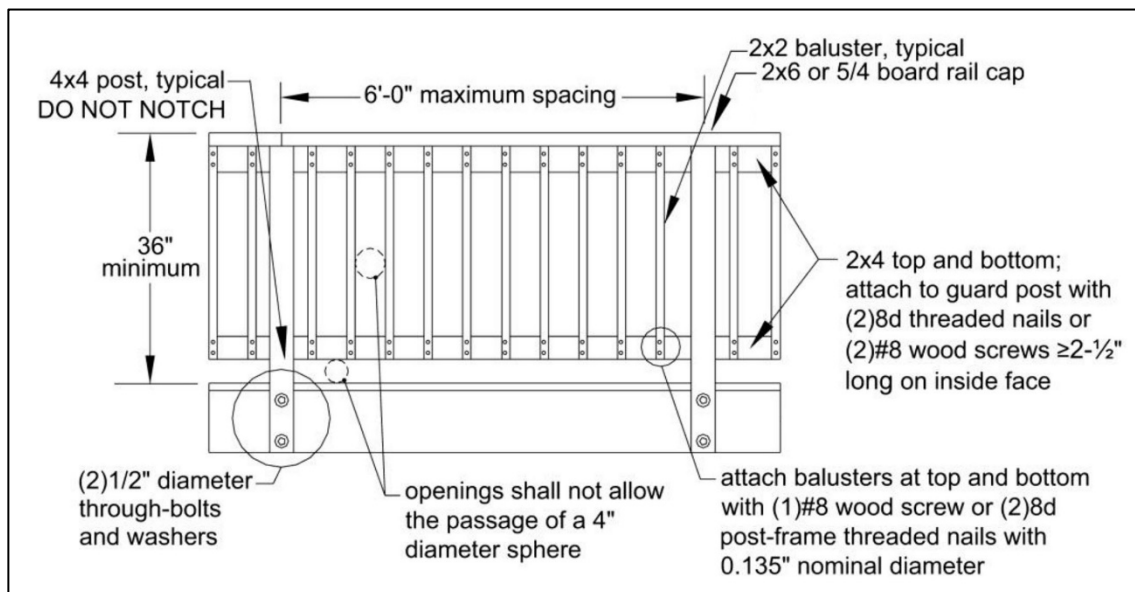
Safeguarding decks from wood shrinkage failures that may result in serious injury or death

Numerous agencies related to the wood industry such as the American Wood Council,¹ encourage architects, engineers and contractors to consider the natural shrinkage and expansion of wood members in the structures they design and build.

While many of the related shrinkage/expansion problems are often minor issues that cause subtle cosmetic concerns to home and building owners, there are other issues that create hazards that lead to risk of serious injury and death with potential ensuing liability.

Injury and death statistics relating to falls through elevated wood guard railing have been reported in *The Outdoor and Deck Injury Study*.² The significance of this study conducted by Legacy Services in 2010 is, that nationally, wood deck and porch railing related injuries are the second highest agency of injury from all injuries caused by outdoor decks and porches, that the injury rates increased over the five year period between 2003 and 2007, and that the actual numbers of injuries are significantly high.

This paper addresses some of the adverse consequences of wood movement pertaining to wood deck baluster failures. A typical wood baluster decking shown below is from the *Prescriptive Residential Wood Deck Construction Guide*³ and represents common construction practice for wood baluster decks.



Prescriptive Residential Wood Deck Construction Guide, p. 15 Based on the 2009 International Residential Code

Courtesy of American Wood Council, Leesburg, VA

You will note that the above 2" balusters are secured to both the top and bottom 2X4 deck rails using nails or screws. However, during periods of high moisture, the balusters will expand, inducing high compressive forces upon their fasteners. With subsequent periods of dryness, the balusters shrink, inducing high tension forces upon those fasteners. The cyclic expansion and shrinkage of the balusters will eventually wallow out and loosen the fastener's securement at the top and bottom deck rails. While longitudinal wood shrinkage is generally small compared with its tangential and radial shrinkage for



Baluster/rail separation

most wood construction sizes,⁴ balusters have a high length to cross sectional area ratio. Typically, a baluster length is between 36" to 48" while they are typically standard construction 2X2's. Most balusters are secured to the outside of the deck rails as shown above, where the loosening of the fasteners often occurs unnoticed by the homeowner, particularly on high decks. Secondly, the same cyclic vertical movement will also impart similar forces upon the upper and lower deck rails between the vertical deck posts. Since the posts provide for structural rigidity, the adverse shrinkage consequence shows forth more so at the center of the post span.

This secondary shrinkage problem causes the upper deck rail to bow downward and the lower deck rail to bow upward. While this bowing result is more of a cosmetic rather than a safety issue, the top rail cap resulting dip in the center allows for water to pond at its center that exacerbates both the aesthetic and other related water ponding problems.

Slip Bracket Connectors provide a simple remedy that has been developed to mitigate these baluster related shrinkage/expansion failures. This connector loosely surrounds the lower baluster allowing for vertical movement, yet safely secures it from a 300# minimum horizontal kick out force as required by prevailing construction codes.



Wood Baluster shrinkage gaps

Two SBC brackets (A and B) are currently available to be used for 2" x 2" rail balusters, or pickets, lower rail securement as shown below.

THE SLIP BRACKET CONNECTOR, SBC- A

SBC-A would normally be used for decks where access is made from outside of the deck during initial deck construction when fastening access is generally made from outside the deck.

The slip bracket connector SBC-A shown below, is the baluster slip bracket that secures the wood member in two directions (around the wood member) while allowing the length of the wood member to expand and contract (or slip) within the slip bracket. The allowance of free movement in the length dimension mitigates the high expansion and contraction forces that lead to both securement failures and other related connection problems. A typical 2"x2" baluster deck application is shown in Figs 2 and 3.

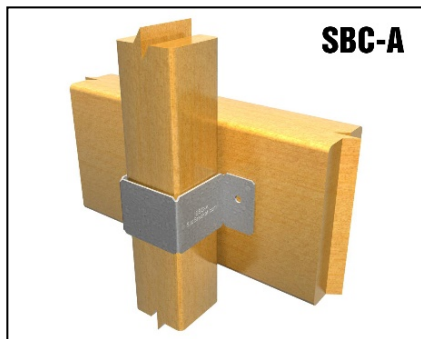


Fig. 2 Slip Bracket Connector A

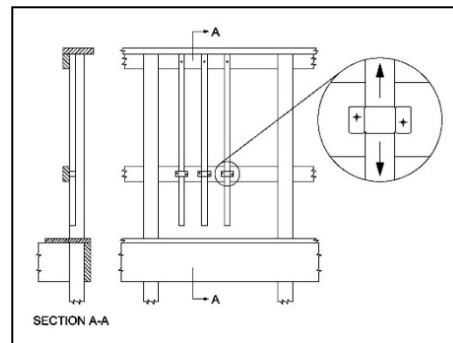


Fig. 3 Typical Wood Deck Baluster Railing

The vertical wood balusters shown above are thereby allowed vertical slip within the slip bracket while held securely at the top by the two screw fasteners. The lower slip bracket secures the baluster against a kick out force from the top deck.

THE SLIP BRACKET CONNECTOR SBC-B

SBC-B would normally be used for existing high decks or where installation is more easily made from the existing deck surface.

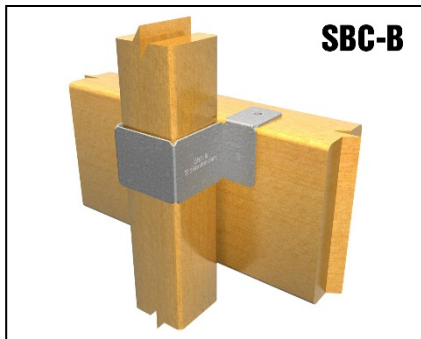


Fig.4 Slip Bracket Connector B

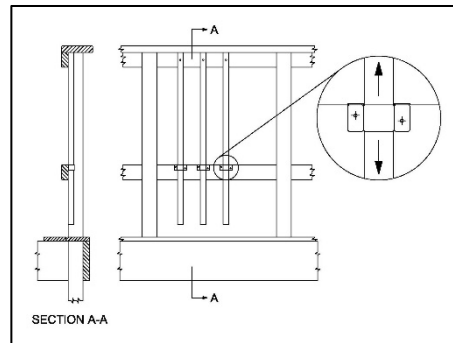


Fig. 5 Typical Application with Wood Deck Balusters

The slip bracket connector SBC-B shown above, is similarly a baluster slip bracket that secures the wood member in two directions (around the wood baluster) while allowing the length of the wood member to vertically expand and contract (or slip) within the bracket. A typical 2"x2" baluster deck application is shown in Fig 5.

The vertical wood balusters shown in Fig 5 are thereby allowed vertical slip within the slip bracket while held securely by the top screw fasteners. The lower slip bracket likewise secures the baluster against a kick out force from the top deck.

The SBC-B is made to accommodate existing decking where access to the lower deck rail makes screw attachment more difficult to access. The slip bracket tab can be simply screwed to the top face of the lower rail from inside the deck surface.

Additional slip brackets are planned to include accommodation for all of the standard wood sizes used in common construction practices.

Additional information on the Slip Bracket may be found on the website: www.slipbracket.com

References

- ¹ *Wood Structural Design Data, 1992 Rev, American Wood Council, American Forest and Paper Association*
- ² *Consumer Product Safety Commission's National Electronic Injury Surveillance System, The Outdoor and Deck Injury Study, Legacy Services, LLC, 2010*
- ³ *Prescriptive Residential Wood Deck Construction Guide, DCA 6, American Wood Council, 2010, p. 15*
- ⁴ *Longitudinal Shrinkage in Seven Species of Wood, USDA Forest Service, 1969*

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