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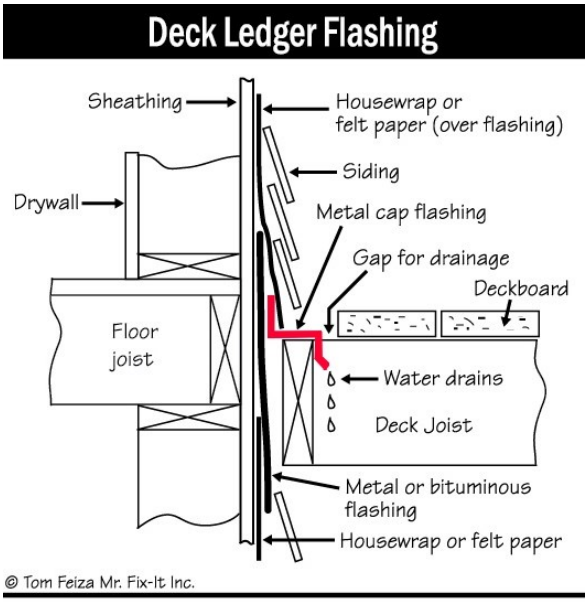
Deck Construction and Safety

A deck can be a wonderful addition to a home, providing space to enjoy the outdoors and entertain. They can also be potential hazards: every year, nearly 700 people are injured due to deck-related incidents. While about 90% of deck failures occur at the attachment to the house, many more injuries are caused by failure of the railings. During our inspections we look at all the components of the deck, along with the construction methods.

The best construction method is to construct a deck that does not rely at all on the connection to the house for support, a "Free Standing" deck with support posts and beams close to the house. This is the only construction method now permitted in some jurisdictions.

Flashing

Flashing prevents moisture from damaging the ledger board and bolts that hold the deck to the house. Without proper flashing, this connection can weaken and cause the deck to collapse, especially if there are people on it. All siding types, even vinyl and brick, should have flashing to protect deck attachments. Cap flashing, shown in red below, is crucial, and is generally the only flashing visible on a finished deck.



Fasteners

Decks fasteners need to be correctly sized, of a proper material, and spaced correctly. Most jurisdictions have regulations regarding what types of fasteners are permitted, and their installation is checked during the construction inspections. This is why it is so important to obtain proper permits for building a deck.

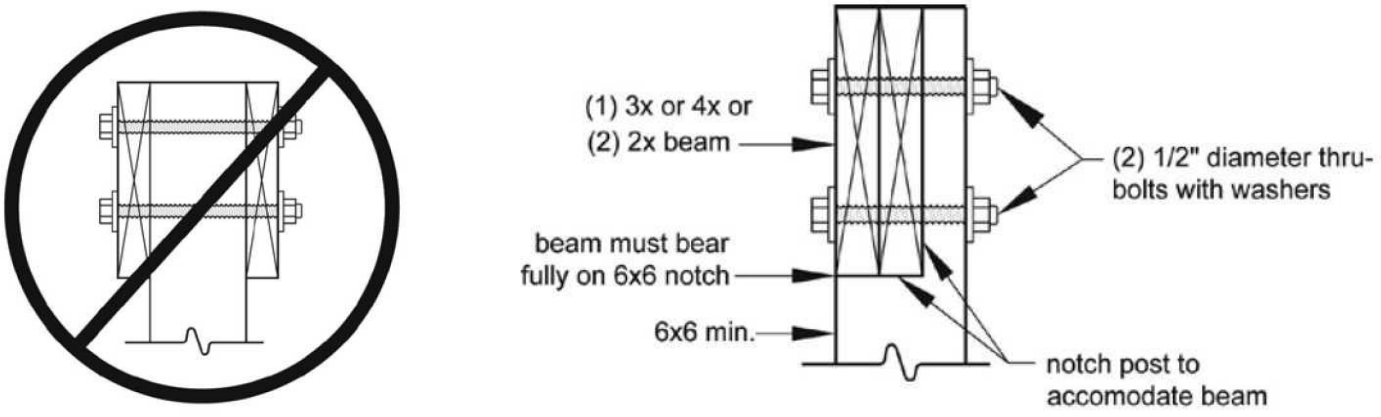
Deck-to-House Connection

Even a well-built deck can fail if the house member it is attached to isn't able to support the load of the deck. Many newer houses are built with non-structural rim boards that have no ability to maintain a pulling or withdrawal force. Overhangs or cantilevers are not engineered to carry any additional load. Plywood, I-joists, pressboard, fiberboard and other such rim board materials do not have the strength to support a deck.

A home inspector generally can't see a lot of the interior structural components; we will note in our report what was visible at the time of the inspection, and may advise further invasive testing if we suspect hidden damage.

Deck Beam Support

What a proper deck attachment looks like: staggered bolts, proper joist hangers, uncorroded fasteners, bituminous and cap flashing. We rarely see them done this well.



Deck beams should not be bolted to the sides of support posts, as shown in the drawing on the left. Instead, they should be installed as shown on right, fully in contact with the post and bolted to prevent twisting.
Illustrations from the American Forest & Paper Association's Prescriptive Residential Wood Deck Construction Guide

The main support beams of the deck should be resting directly on the notched ends of the deck posts and bolted in place. All too often we see main beams bolted to the sides of the posts. This means that all of the weight of the deck and its occupants are hanging on the bolts, rather than having the load transferred safely to the ground. Bolts have very little shear strength, and can fail under load, causing the deck to buckle and fall.

Attachment of the Railings to the Deck

A deck handrail should be able to withstand a 200-pound force applied to the top rail at any point without significant deflection. We do a "hip check" on railings at multiple places; if the rail moves more than about half an inch, we write it up as a safety hazard. Several people leaning against a railing, a running toddler, children playing, or a tripping adult can create significant forces on the guard rail system.

Example of a steel connector that prevents railing post failures.

One of the most common deck defects we see is rail posts bolted to the rim board of the deck. This does not provide a secure connection, as the board is not a structural member. Rail posts should either be continuous to the ground, or should be connected to the structural deck members with steel brackets (see picture, left).

End of Life

Like any other system in a house, a deck has a serviceable lifespan, after which it should be replaced. With proper maintenance, including checking fasteners, and painting or sealing wood elements, a deck is expected to last approximately 15 years.

Old decks can have multiple problems, such as decaying materials, corroded fasteners, or hidden damage between the deck and house. Once a deck is showing visible signs of aging, it should be completely removed, all the connection points to the house carefully inspected and repaired as needed, and a new deck constructed.

For more information about deck safety, please visit the following web sites:

The American Wood Council
www.awc.org/codes/dcaindex.html

North American Deck and Railing Association
www.nadra.org

Simpson Strongtie
www.safestronghome.com