

IS YOUR DECK SAFE OR IS IT A DEATH TRAP?

By
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As the warm weather of spring and summer finally arrive, many people choose to enjoy the use of their deck for relaxation and socializing. Numerous homeowners will schedule a graduation party, cookout or other event, and will utilize their deck as a convenient space to gather. Hopefully the party will end and people will leave with a fond memory of their party.

Unfortunately, it is also a “right of spring” that shocking stories of deck collapses, personal injury and death appear in the news. Sadly, your deck could be highly unsafe without your knowledge, and could collapse under the load imposed by us overweight Americans. People tend to gather near the deck guard rails or close to the house, and in response deck collapses often move both downward and laterally with absolutely no warning of impending disaster. When compounded with height, the collapse of an elevated deck or railing may result in more tragic falls, severe injury or death - all of which are preventable by annual inspection and maintenance.

Most people use their deck all the time without any thought of danger beneath their feet. I implore you to recognize that your deck is an important part of the home that requires a responsible management plan, which includes annual inspection and maintenance. As a home inspector, I examine decks on a daily basis, and I must report that the vast majority are not constructed properly, are in a state of disrepair, are not maintained and are candidates for disaster given the right set of circumstances. It is imperative that you learn where to look for tell-tale signs of danger for the safety of your family and friends.

You should perform an annual safety inspection of the deck starting from the ground up, remembering that deficiencies in any part can lead to an accident or personal injury. If you find any suspicious signs of faulty construction, movement or decay, you should hire a licensed contractor to perform repairs in accordance with the requirements of the building code. (Yes, a building permit is needed to build a deck and should be on file at the building department.) If want reassurance, hire a professional home inspector (www.ashi.com) to inspect your deck and issue a written report documenting its condition. Here is a list of things to check annually for signs of problems and good workmanship:

- **Footings** – they should be below the frost level as required in your geographic area, and should be level and without cracks. Posts should not be buried in the concrete footings as the practice allows water entry and causes footings to crack. Footings that are shallow, frost heaved, cracked or misaligned may need replacement.
- **Posts** - should be mechanically fastened to the footings, plumb and free of decay from top to bottom. If the deck is higher than six feet, a 4 x 6 post is preferable for support. Check the alignment of the posts by standing on the ground at one corner of the deck and sight down the row of posts. Posts that are tilted, cracked, decayed, rusted or over-notched may need replacement (4-5 foot spacing is best).
- **Lateral bracing of posts** – if the deck is higher than 2 feet, the posts should have angular braces to prevent side to side movement. You can check the stability of the deck bracing by standing on the floor next to the center of the guard rail. Spread your feet apart, grasp the guard railing and shift your weight from side to side while trying to make the deck sway. If you note movement of the deck, stop & beware – your deck may be UNSAFE!
- **Ledger joist** – the long piece of lumber beneath the deck and against the house that all the floor joists are fastened to. It should be fastened to the building with staggered bolts, and

there should be a washer beneath each bolt head. Bolts should be tightened each year. If you notice missing bolts and washers, improper alignment, signs of ledger movement, or decay, consult a carpenter. If you spot any sign of the ledger pulling away from the home, your deck is UNSAFE and URGENT repair is needed.

- **Flashing** - the ledger joist should have metal flashing under the siding and behind and / over the top edge of the ledger, to direct water away from the home. If water is not properly diverted, it will drain behind the ledger and cause siding & wall frame decay or mold problems. Check for the presence of flashing and signs of rust as some metals and wood preservatives are not compatible.
- **Outer ledger** – the long piece of lumber at the outer edge of the deck that the floor joists are secured to. The outer ledger may be cantilevered beyond a center girder or it may be supported by wood posts. The outer ledger should always be two pieces thick. If supported by posts, the inner board should rest on a notches cut into the vertical posts to provide end bearing for load support. Notches should not exceed the width of one board. The outer ledger boards should be secured to the posts with two through-drilled carriage bolts and nuts & washers at each post. If you only see no notches in the posts for end bearing and only nails used to support the ledger, or any signs of movement, you should be very wary of potential failure and should consult a carpenter as your deck may be UNSAFE.
- **Girder** – a long heavy piece of timber or built-up boards that support the deck frame. A girder may or may not be present, depending on the span or length of the floor joists. It may be aligned in the center beneath the deck or it may be near the outer 1/3 of the span, forming a cantilever. If present, check the girder for decay, alignment, signs of movement and mechanical fastening of the bottom of the joists to the top of the girder.
- **Joists** – the multiple long support boards, generally running from the house to the outer ledger board and spaced 12, 16 or 24 inches apart. The posts, ledgers, girder, and joists should all be treated lumber to resist decay. If you find that untreated materials were used to frame the deck, then you should anticipate a short service life and should anticipate early replacement. Examine the floor joists for spacing, twisting, cracks, decay, warping, splitting and above all secure attachment to the ledger joists and girder. If you find any evidence that the ledger board has moved from the home or the joists have moved from the ledger, you should hire a carpenter immediately to perform safety repairs as your deck may be UNSAFE.
- **Lateral bracing or floor frame** – if the floor joists are longer than eight feet, then it is a good practice to prevent lateral movement by installing bridging or solid blocking between the joists. Furthermore, the installation of a “W” shaped bracing boards nailed to the underside of the joists will provide great stability.
- **Joist hangers** – metal horseshoe type brackets that provide end bearing for the floor joists and secure the joists to the inner and outer ledger boards. Look under your deck and examine the ends of the joists. If you find that the ends of the joists are only nailed to the ledger joists, that metal joist hangers are not present at the end of each joist, or that each hole in the metal joist hanger is not fully nailed; your deck safety is at GREAT RISK. Urgent repair is needed as end or toe-nailing alone are inadequate for load support. If you find that the metal joist hangers are present but are rusted, then you should hire a carpenter to replace them as some metals are not compatible with the new preservatives used in the treated lumber. If you find that the metal hangers are present but have been fastened with roofing nails or screws rather than “joist hanger nails,” then you should notify the builder and demand repair as only appropriate nails conform to the manufacture’s specifications.
- **Stairs and handrails** – defective stairs cause personal injury by slips, trips and falls. Examine your stairs each year and make sure they were constructed properly and are in a safe condition for seasonal use and emergency egress. Preferably, the stairs have three stringers (notched boards) and the bottom of the stringers rest on a concrete stoop to prevent decay.

Stairs built with only two stringers tend to spread apart causing treads to detach and accidents to happen. Faulty attachment of the top ends of the stringers to the deck frame is another common dangerous condition to look for beneath the stairs. Stand back and look at the deck stairs from the ground to see if the riser heights are uniform from bottom to top, and that each tread has a nosing, no cracks, no splinters and no nail pops. A handrail may or may not be required depending on the number of steps; nevertheless a handrail does provide safety and should be considered regardless of height. Poor attachment of the handrail posts to the base of the staircase is a safety defect that you can easily check by simply trying to move the top of the post and railing from side to side. The staircase railing should be capable of withstanding 200 lbs of lateral pressure. If you can move it, the railing is UNSAFE. Balusters or railings should be present and the openings between them should not exceed 5 inches in Massachusetts (4" max. spacing in other states). Balusters are often poorly fastened with a nail gun instead of using exterior screws. Your balusters may be quite loose due to lumber shrinkage, so give each one a little twist with your hand to check each one for movement. Perhaps most important is the handrail itself, it must be graspable. A 2 x 4 or 2 x 6 handrail is UNSAFE as you cannot get your hand around it, and boards are prone to sun damage and splinter hazards. Staircase and handrail deficiencies should be considered a priority for safety repair.

- **Guard rails** – guard railings prevent people from falling from the deck floor. Like the staircase, a guard railing should withstand the same lateral pressure as people tend to lean on it, and it must be a minimum of 3-feet high to prevent people from falling over the top. Use the same “shake, rattle and roll” test to check the guard railing for signs of movement. Inspect for excessive baluster spacing and secure attachment of all guard railing / post connections. Guard rail cap boards are directly exposed to sunlight and are prone to developing dangerous splinters and nail pops. To prevent one of the worst experiences for a parent, that of removing a splinter from a child’s body, you check the deck carefully and replace any defective guard railing boards. Remember that many of your family members and guests are going to lean on the guard railing at the same time, and that their combined force could cause the guard railing to collapse. If the guard railing is loose, too low or the baluster spacing exceeds 5-inch spacing, you should hire a carpenter to perform URGENT safety repairs. Lastly, vertical balusters are preferable to horizontal rails or built-in benches as the later two are an attractive nuisance for children to climb on.
- **Floor boards** – floor boards may be composed of wood, wood composite or other plastic or aluminum materials. Like any floor, it should be capable of supporting people without sagging or spring. Give your floor frame a simple bounce test by standing in the middle and dropping your weight onto your heels. If the floor behaves like a trampoline or individual boards sag, you have a problem in need of repair. Floor boards are subjected directly to the elements, more so than any other part of the deck, and the constant wet / dry cycle causes accelerated wear, decay, nail pops and splinters. Walk the deck and look for any problems that may say “ouch!” Countersink nails below the surface of the floor boards, secure any loose boards and replace any defective boards. Full length floor boards are preferable, but are not always possible to install due to the length or width of the deck, so carpenters splice floor boards together with butt joints. When done correctly, a butt joint is no problem. However, if the butt joints are not staggered and fall on the same joist, the nails will cause the joist to split wide open. By simply walking around on the deck, you can quickly note any problems.
- **Misc. issues** –
 - Dryer vents should not discharge beneath the deck for fire safety.
 - Overhead electrical wires should be 10-feet above the deck.
 - Electrical meters should not be buried by snow on the deck.
 - Vegetation should not be present beneath the deck.
 - Soil grading beneath the deck should direct water away from the home.

- Decks built around trees should have clearance for the tree to sway.
- Carpeting on the deck is conducive for decay.
- Casement, swing out windows over the deck cause head injury.
- Decks built level with the house floor often cause leaks at doors.
- Gas grills tend to cause grease stains and melt vinyl siding.
- Windows without safety tempered glass should not be within the stairs.
- Decks must be framed differently for to support hot tubs and pools.
- Oil fill pipes should not be above a deck.
- Air conditioners should not be beneath a deck.
- Decks cannot be built over a septic tank or leaching field.

Deck maintenance:

Maintenance is important, but so are realistic expectations. No deck will last forever and each should be maintained, inspected, repaired and replaced when its service life is over. Pressure treated wood has been used to construct decks for years, but it is not impervious to deterioration. Even the manufacturer's of new composite and synthetic materials recommend maintenance specific for their products.

While deck materials age differently and require varying maintenance, each deck material has three enemies: dirt, sunlight and moisture. Each enemy can deteriorate your deck if simple protective steps are not followed.

Decks should be maintained once every year, but first you must determine what materials your deck is composed of, what the manufacturer recommends for maintenance and what types of preservatives, stains or paints have been applied in the past. Do a little research on-line, and read the labels on the preservatives, stains and paints available at your local building supply store. Appropriate preservatives, semi-transparent stains or paints should provide both UV and moisture protection.

Remove the dirt by sweeping, power washing or by simply using a garden hose and cleansers appropriate for the deck materials. Pay careful attention to removing algae growth and cleaning dirt traps between the house and deck, etc. (Note: The manufacturer's instructions must be followed for safe use of chemicals. Be sure to wear rubber gloves & safety glasses, cover arms & legs and shield nearby shrubbery during deck surface restoration, and keep children and pets away.) Follow the manufacturer's maintenance advice by only applying chemicals or finish materials that are compatible with their deck materials and follow up each year with another safety inspection.

Web resources:

<http://www.awpa.com/> American Wood-Preserver's Association

<http://www.cpssc.gov>

<http://www.treatedwood.com/>

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