Fine Homebuilding
August/September 1996 No. 104

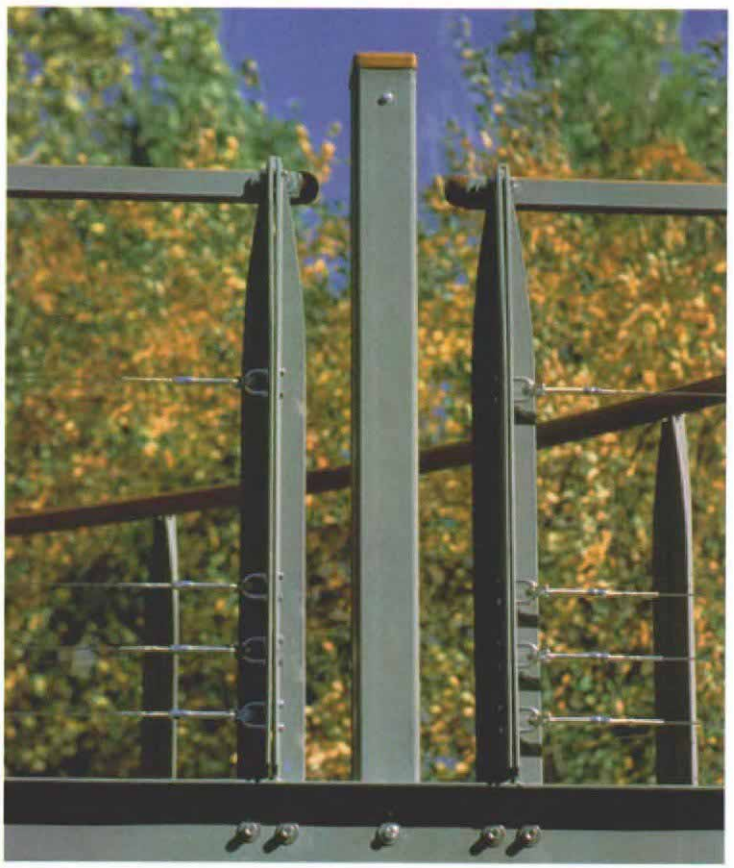
Innovative Deck Railings

Using wood, glass and steel to build deck railings that stand out from the crowd

by Andrew Wormer

One of the first decks I ever built didn't have a railing. Technically, it didn't need one because it wasn't high off the ground and didn't have stairs, but something about it always felt wrong to me. The deck looked exposed and incomplete, but I could never persuade the owners to add that railing. Maybe they thought I was looking for more work.

Not long ago, I drove by this same house, which had been bought and sold a couple of times since I worked on it. The first thing I noticed was a new deck railing on my old deck, and I realized that my intuition had been right. Although the railing itself was unremarkable, it added a real sense of completion and security to the deck. Perhaps the new owners had small children; certainly the railing would help to keep babies on board. At any rate, the deck now seemed more a part of the house rather than an afterthought.



Redwood post caps and handrails balance the industrial look of steel. Although more typically used in commercial construction, steel has a strength and versatility that makes its use appropriate in this unobtrusive residential deck rail that doesn't get in the way of the view.

Good rail design begins with building codes and common sense—In most areas, local building codes establish guidelines for rail safety. Most local codes follow the national codes such as BOCA or UBC, and their guidelines are easy to follow (see sidebar p. 53 for a summary of code requirements).

But building codes establish only minimum guidelines. Often, common sense—or intuition—is a more reliable guide. For example, Scott Schuttner, author *of Building and Designing Decks* (The Taunton Press, 1993), recommends some type of rail whenever one can fall more than the actual thickness of the deck framing. A short rail or bench can help to establish a boundary between different levels without being intrusive. Schuttner also recommends a 42-in. rather than a 36-in. rail for decks that are high off the ground for more security.

Common sense also dictates that deck railings take account of the weather. Naturally rot-resistant redwood, cedar and cypress are good, if pricey, alternatives to pressure-treated lumber. Even steel can make a good railing (sidebar facing page).

On any wood deck railing, beveling or rounding over edges helps to minimize splintering, which is especially important on a top rail that meets a lot of rumps and forearms. Making connections from underneath also helps a wood railing (sidebar p. 50) because it protects fastener holes from rain and snow. And maintaining the railing with an appropriate finish will help to keep water out and make the wood less prone to checking (see *FHB* #77, pp. 104, 106, 108).

Although there are lots of options when it comes to building deck railings, not all of them are good. One railing design that I've seen far too often always makes me cringe: a rickety 2x4 post-and-rail assembly with a balustrade of lumberyard-variety pressure-treated lattice. What's wrong? Although it looks substantial, the flimsy, stapled-together lattice can splinter easily, sharp points can catch little hands, and a toddler with a good head of steam can break through. On top of that, the lattice blocks the view (for a railing design that doesn't block the view, see sidebar p. 51).

For a look at the possibilities in railing materials and designs, check out the deck railings on the following pages. Although my New England roots make me partial to wood railings with full balustrades, other railings suggest the advantages of different materials and new design approaches. □

Andrew Wormer is an assistant editor at Fine Homebuilding. *Photos by the author, except where noted.*

Photo this page: Jacek Bogucki

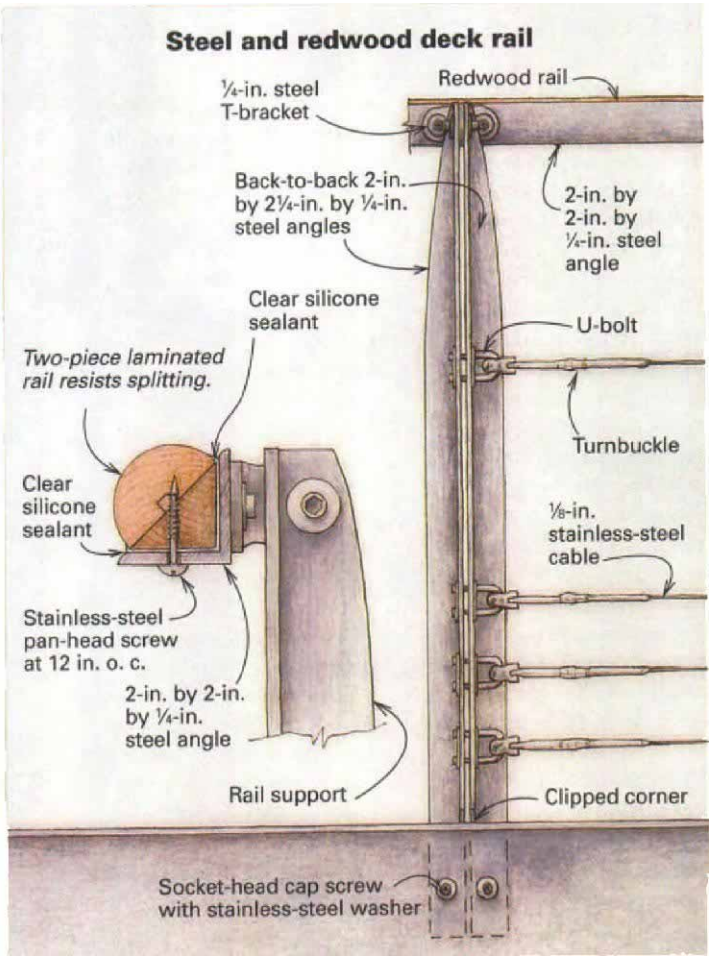
Cable railings are strong and unobtrusive

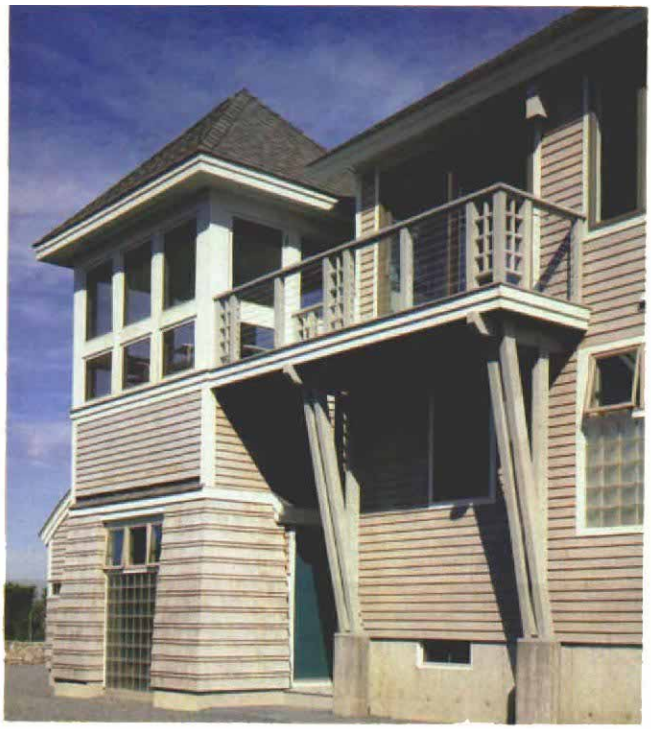
Any sailor can tell you that stainless-steel marine hardware will hold up well to the weather, a prime consideration when choosing potential deck-rail material. Long used for railings and lifelines on boats, stainless-steel cable and fasteners are strong and versatile, and they don't obscure the view.

Plastic-coated stainless-steel cable can be used in conjunction with a conventionally framed post and top-rail system. In the deck railing shown below left, the cable is attached to cedar posts with stainless I-bolts and threaded through holes drilled in the center post that are lined with plastic sleeves. A turnbuckle puts tension on the continuous cable.

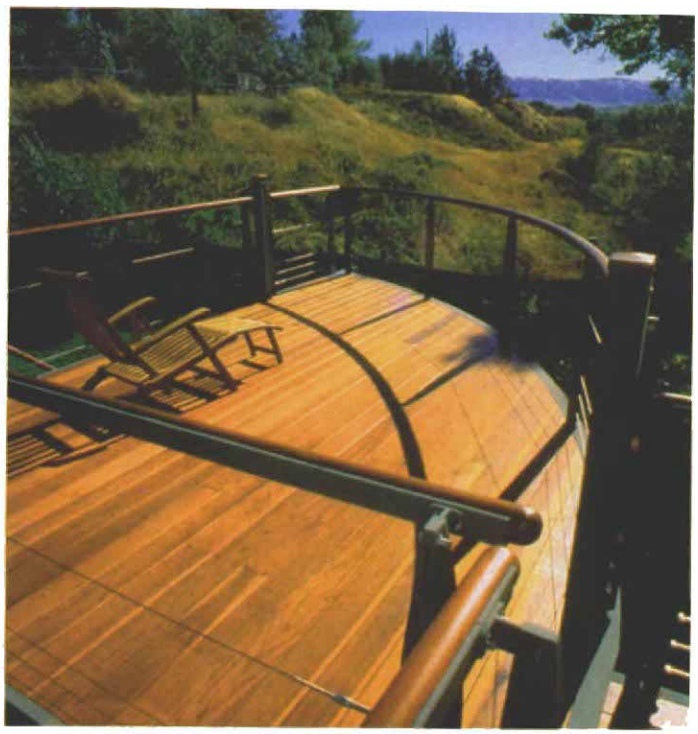
Although located far inland in central Wyoming, the redwood and steel deck designed by Eric Logan and built by Greg Pope certainly evokes images of the sea (photo bottom right). Custom-fabricated gray-painted steel posts are bolted directly to the steel framing, and stainless fasteners connect the cable to the posts (drawing right). The handrail is milled from two pieces of redwood and screwed to the ¼-in. steel angle. All of the decking, the handrails and the post caps are sealed with three coats of Sikkens polyurethane.

Although this deck and rail were designed to meet the specifications of a childless couple, it should be pointed out that most local codes would frown on this balustrade detail because of the spacing between cables. However, the balustrade could easily be brought into compliance with minimal visual impact by adding more horizontal cables and reducing the spacing between them to 4 in.—*A. W.*





Cedar and stainless steel stand up to weather. This gray-stained cedar railing designed by Clay Benjamin Smook uses stainless-steel fittings and plastic-coated stainless-steel marine cable in its balustrade. Plastic sleeves line drilled holes in the center post.



A maritime feel in a central Wyoming backyard. The gray-painted steel frame, stainless marine cable and fittings, and redwood decking and handrail evoke the feel of the sea on this deck, which was designed by Eric Logan.

Drawings: Christopher Clapp. Left photo: Anton Grassl. Right photo: Jacek Bogucki.

Battens simplify baluster assembly

by Steve Orton

I wanted to build an elegant deck railing for my small bungalow in Pasadena, California, that would be simple enough for on-site construction and not involve specially milled lumber.

Because I think that the weakest part of this rail system is the joint where bottom rail meets post, I wanted this joint to remain tight and strong. Before installing the posts, I mortised them for a slip tenon, which connected to the bottom rail in an open mortise (drawing below). This mortise allowed the rail to be dropped over the tenon and screwed to the post.

The heart of the rail system is the baluster assembly, which is simply two lengths per section of ¼-in. by 1½-in. batten cut to the length of the section. The 2x2 balusters were laid out and spaced 5½ in. o. c., and the battens nailed to the top and bottom of each created a balustrade, which could then be dropped into place on top of the bottom rail.

With a router and an adjustable fence, I next cut a plow into the center of the underside of the top rail to receive the top batten of the balusters. To finish, I installed 1-in. by 1½-in. bed molding against the balusters on both sides and under the top rail and put supports under the center of each bottom rail.

The bard part was priming and painting the railing, which took longer to do by hand than it had to build it. But this was before I bought high-volume low-pressure spray equipment, which makes finishing almost fun.

—Steve Orton, a builder in Seattle, Washington.

Slip tenons reinforce this redwood railing. The bottom rail on this redwood railing drops onto slip tenons mortised into the posts. The balusters are premounted onto ¼-in. by 1½-in. battens to make a balustrade that is then attached to the top and bottom rails.

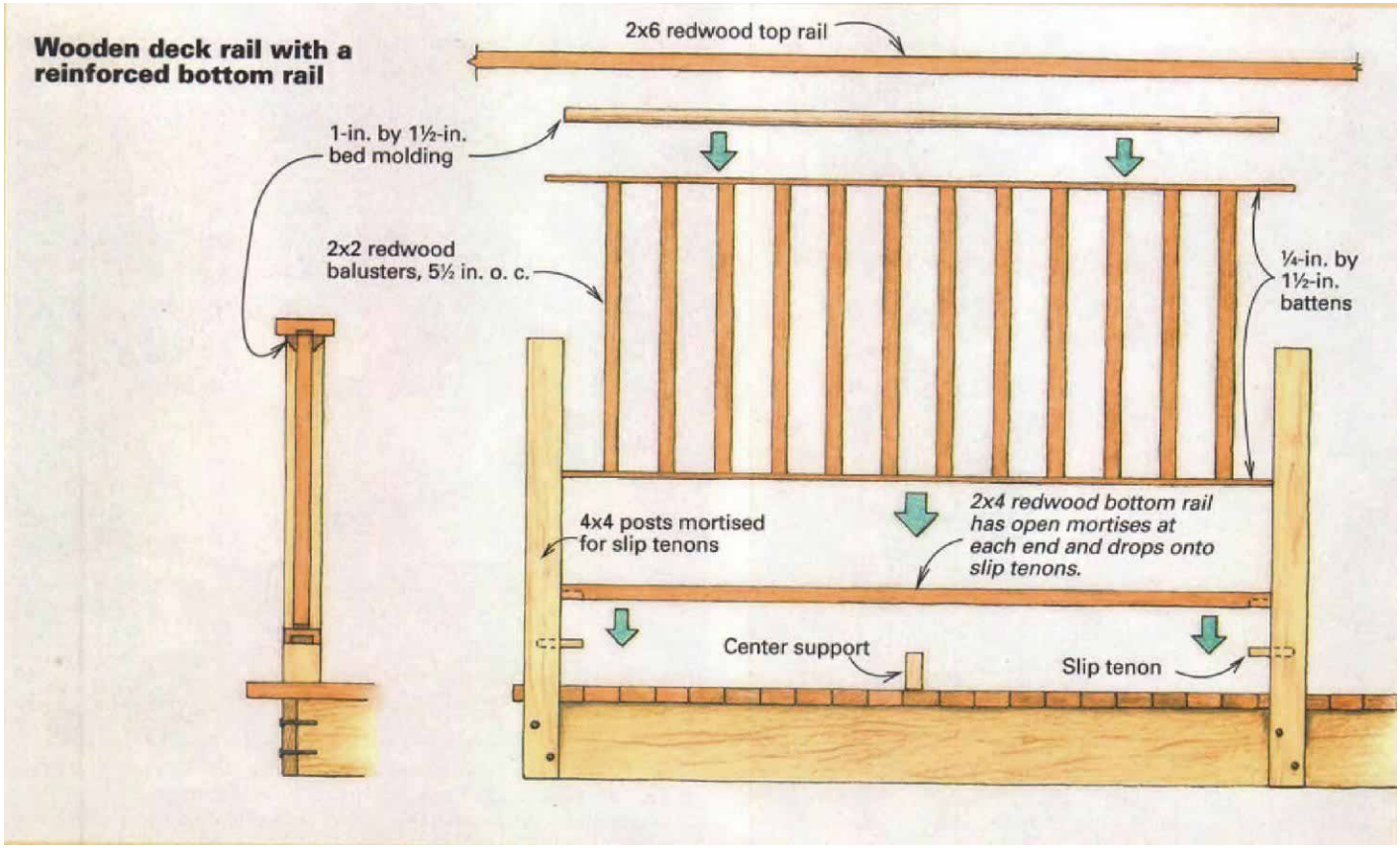


Photo this page: Dean Della Ventura

Recycle glass doors for a railing you can see through

by Ken Simmons

On a recent project my clients asked for a railing that wouldn't intrude on their exceptional views of the mountains that surround their vacation home. Because the deck was 18 ft. off the ground and had to withstand visits from their grandchildren, it had to be safe as well.

My solution was to use cast-off tempered safety glass salvaged from failed double-pane glass doors. Many glass companies keep these discarded panels, separate the glass and sell the individual tempered plates for around $20 each. Measuring 76 in. by 33 in. and nearly impossible to break, this glass is ideal for railings (photo below).

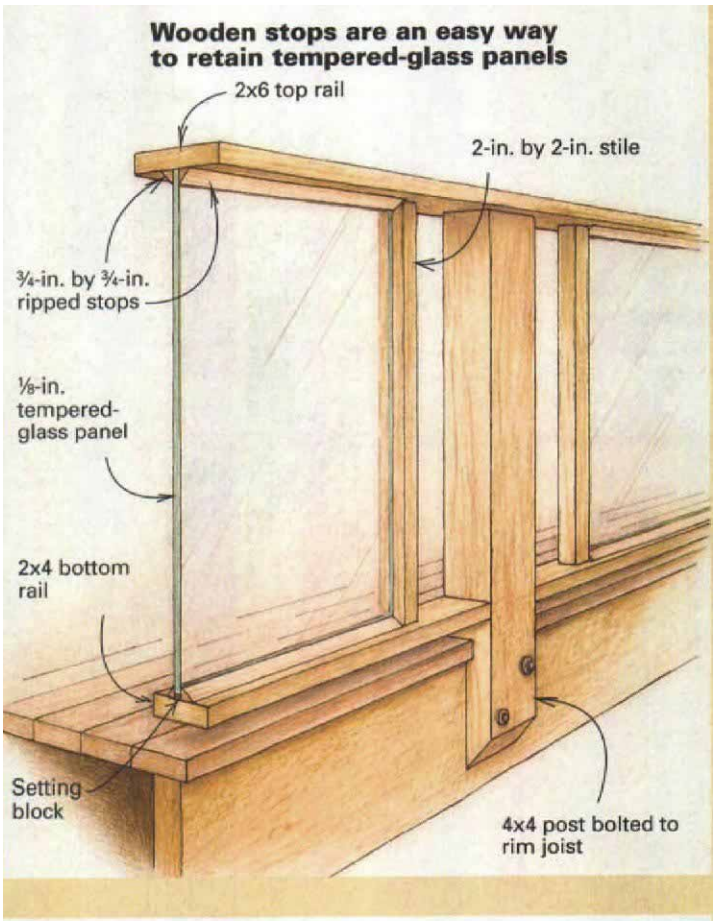
The first step is to lay out the vertical posts, remembering that tempered panels can't be cut. Although a glass company can supply smaller sizes of tempered glass, the cost per square foot goes up considerably (around $6 per sq. ft. in my area), so it makes sense to lay out the posts carefully—I use 4x4 posts 90 in. o. c.—and use full-size panels wherever it's possible.

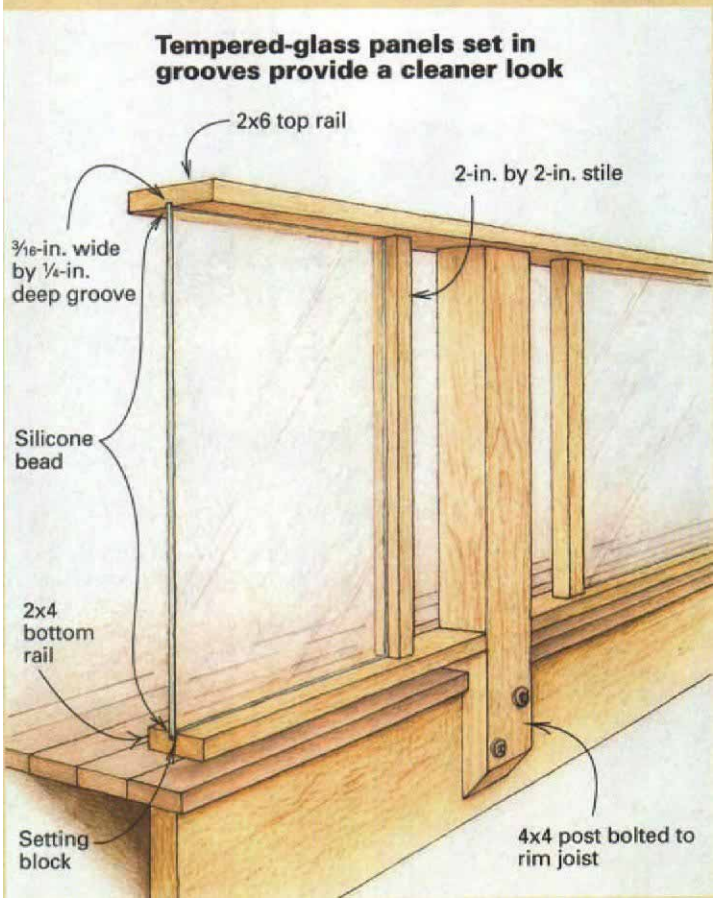
The bottom rail I use is typically a 2x4 with a support block in the middle to keep the rail rigid. The top rail is a 2x6, and the side stiles are 2x2s. I've routed out 3/16-in. wide by 1/4-in. deep grooves down the centers of the stiles and rails to accept the glass (bottom drawing), and I've also ripped 3/4-in. by 3/4-in. stops, nailed them to the stiles and rails with 4d galvanized finish nails, and set the glass that way (top drawing). Routing the stiles and rails probably requires a bit more care but results in a cleaner look. In both cases, I use beads of clear silicone around the perimeter of the glass to seal the joint against seepage and to prevent the glass from rattling in the wind.

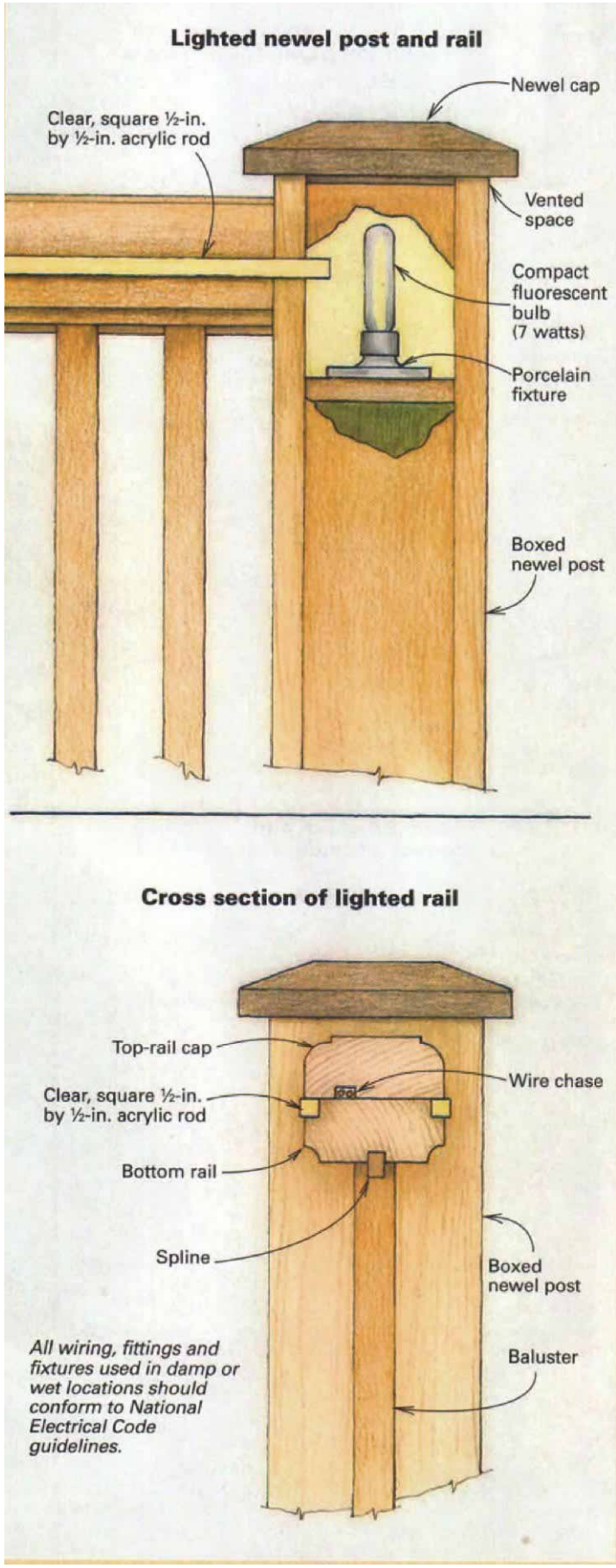
Leave about 1/8-in. extra space in the frame for expansion, and set the glass on setting blocks (you can get them from a glass company), which keep the glass from resting directly on the framing. Check with your local building code to make sure that this detail is code-compliant.

—Ken Simmons, a builder in Rumney, New Hampshire.

A glass railing doesn't obscure the view. Salvaged tempered-glass panels from failed thermopane sliders make a strong and unobtrusive deck railing.



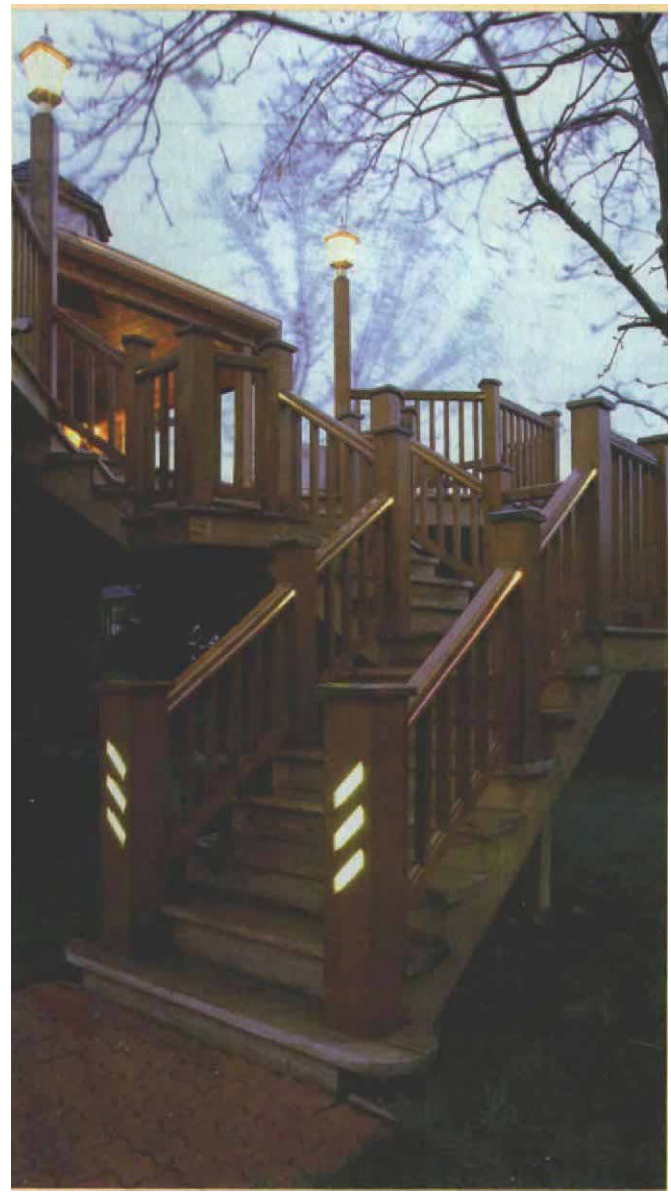




Lighted railing is pretty and safe at night

Pittsburgh-area deck designer and builder Robert Viviano's technique for illuminating an outdoor newel-post/handrail system (photo below) is an interesting blend of low- and high-tech. The central component is commercially available acrylic rod that reflects light along its length from a light source mounted in the newel post.

These rods are mounted in a routed groove cut in the handrail and are usually either ½ in. by ½ in. square or ½-in. dia. round. The tubes extend into the newel post right to the light source, which is typically a 7-watt fluorescent bulb that is mounted in a porcelain fixture, and function like oversize fiber optics (drawings,, left). Another groove routed in the two-piece handrail carries electrical cable from newel to newel.—*A. W.*



Acrylic rods help to light the way. Inset into the handrails, solid acrylic rods reflect light from fluorescent fixtures concealed in the newel posts.

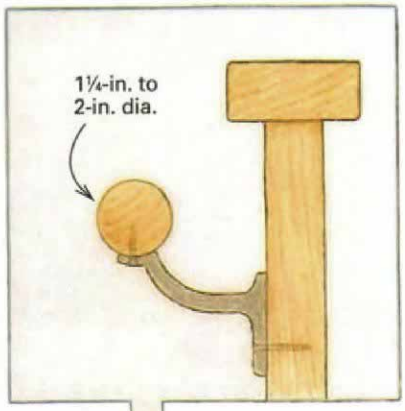
Code requirements for deck-rail safety

Most building codes require a guardrail when a deck is more than 30 in. above the ground and a handrail whenever there are more than two risers on a stairway. Guardrail height by code is usually a minimum of 36 in., and handrail height should be between 34 in. and 38 in. If there is a bottom rail on the guardrail, it should be no more than 2 in. off the deck.

Spacing between the components of a rail system should be no more than 4 in. (except at the tread, where a 6-in. opening is okay), which means that a ball 4 in. in dia. shouldn't be able to pass through the rail. Although that may seem to be a pretty small opening, children have been known to get into (and through) some pretty small spaces.

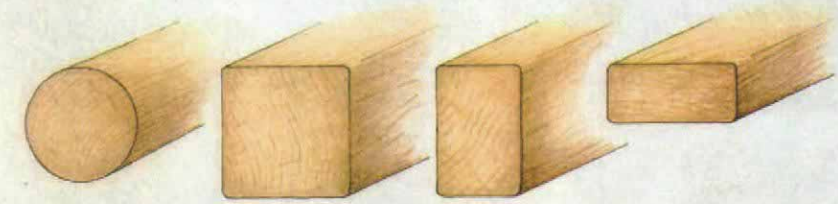
The grip size of a stairway handrail should have a circular cross section with a diameter between 1¼ in. and 2 in. Other handrail profiles are possible, but the largest cross-sectional dimension should not exceed 2¼ in., and the perimeter dimension should fall between 4 in. and 6¼ in. The essential concern for the handrail is graspability; a rail design that is appropriate on the guardrail of the deck may be inappropriate on the handrail of the stairway.—*A. W.*

Because a handrail must oftentimes serve a structural function, the graspable profiles required by code aren't always feasible. One solution is to add a second graspable handrail to the stair guardrail as shown.



Code-approvable handrail sections

Other profiles are approvable as long as they meet graspability requirements.



Handrail and guardrail guidelines