

Installing a Composite-Railing Kit

BY EMANUEL SILVA

I've installed a number of different manufactured rail systems, but on this project, my clients selected an RDI Transform composite railing, whose traditional look was a good fit for the character of the house. It has a two-part design that allows it to be installed without any visible mounting brackets or fasteners connecting the balusters to the rails or the rails to the posts. (Every rail system has its own quirks and assembly details, so I'm always careful to save and follow the manufacturer's instructions.)

Strong posts. Because of zoning regulations, the replacement porch occupies the same footprint as the old one. When I reframed it and installed new posts, I used plenty of blocking and metal hardware as required to ensure that the posts were strong enough to meet code. Most rail installation instructions are vague on these details, but the strength of any rail system is dependent on posts that can withstand 200-pound loads (500 pounds with a 2.5 safety factor applied).

In my area, 42-inch rail heights are required for multifamily homes, so I included six 54-inch-long RDI Transform 5x5 PVC post sleeves in my railing order to accommodate the additional post height needed for the taller rails. The sleeves are fitted to the smaller, 4x4 posts with pairs of HDPE spacers—one each at the top and bottom of the post—so there's little opportunity for shimming the sleeves if the posts are out of plumb (1).

One-inch-square hollow blocks are included with Transform rail kits (2). These are cut to length and used as needed (typically one at the center of the rail; for longer rail spans, the manufacturer recommends two) to support the bottom rail and prevent sagging. The actual height of the bottom rail can vary depending on the balustrade design, as long as the top rail meets minimum height requirements and there is less than 4 inches of clearance between the top of the decking and the bottom of the rail.



Each post-sleeve kit comes with a pair of HDPE spacers that lock the sleeve in place over a 4x4 post (1). The rail sections are supported by short, hollow blocks that slip over PVC trim screwed to the beam (2). After fastening the lower beam to the posts through PVC mounting brackets that slide into the ends of the beam (3), the author snaps the slotted bottom rail down over the beam (4). The precut balusters are already fitted with end plugs, which fit into the slots in the bottom rail (5).

Photos: Emanuel Silva



After verifying that the upper and lower stair posts are plumb, the author clamps them to a straightedge and repeats the procedure with the middle stair post (6). Laying the lower beam across the stair-tread noses is an easy way to find the beam's length and cut angles (7). After making a small cutout in the trim ring for the beam, the author fastens it to the posts (8). He uses an outcut to mark where the handrail intersects the post (9) and find the length of the stair balusters (10).

Level rail. The two-piece rail sections consist of beams that are fastened to the posts, and matching rails that snap over the beams, finishing and reinforcing the assembly. For longer rail lengths, up to 8 feet, an optional Resalite stiffener can be inserted into the upper beam before snapping the upper rail in place.

PVC mounting brackets are used to connect the beams to the posts. After cutting the lower beam to length, I aligned the brackets with the ends of the beam and fastened them in place with pairs of screws driven through the sides of the beam. I also screwed a short PVC block to the bottom of the beam. I sized this block to fit inside the 2-inch-long bottom rail support, although I could have omitted the block and simply screwed down through the beam and support into the decking after the beam was installed.

Finally, I slipped the support over the PVC block, set the beam in position, and fastened it to the posts using the mounting screws—three per bracket—that came with the rail kit (3). These screws are beefy, so to avoid damaging the post sleeves, I always predrill the holes whenever installing mounting screws.

The bottom rail and the top beam are slotted to accept the PVC

plugs that connect the balusters to the rails, so the baluster layout has to be considered before cutting the beam and rail to length. I just placed the uncut sections against the posts and adjusted their positions until the clearance between the posts and the baluster slots at either end was equal. To allow room for the internal PVC mounting brackets, clearance between the slots and the ends also has to be greater than 1³/₈ inches (4).

After that, it was a quick matter to insert balusters, snap the top beam into place, and fasten the beam to the posts through the mounting brackets. I aligned the plugs in the same direction when I installed the balusters so that they would all lean the same way when I installed the top beam (5).

Stairs. Building inspectors in my area want multifamily units to have graspable stair handrails, with a maximum cross-section dimension of 2.25 inches and a perimeter dimension of between 4 and 6.25 inches. The narrower RDI Emerge stair rail profile doesn't meet these dimensions, but it does have graspable finger holds on both sides of the profile and was approved by my building inspector for this project (your inspector may have a different interpretation).



After cutting the bottom rail to length and snapping it over the support beam, the author installs the stair-rail plugs (11) and balusters, then snaps the upper beam in place (12). Then he screws the beams to the posts (13) and snaps the upper rails into place (14).



To prevent the post caps from being accidentally dislodged, the author glues them to the post sleeves with elastomeric sealant (15). Masking tape holds the post caps in place while the sealant cures (16).

Before I measured or cut anything, I verified that the upper and lower stair posts were plumb, then locked them in position by clamping them to an aluminum straightedge (6). Next, I made sure the intermediate post was plumb, and clamped that in position as well. To determine cut lengths and angles, I simply laid the bottom beam across the noses of the treads and marked where the posts intersected the beam (7).

By code, the triangle created by each tread, riser, and stair rail must be smaller than a 6-inch sphere. To meet that requirement, I drop the bottom stair rail down as low as possible, which sometimes requires cutting the post trim rings to fit around the lower rail. Trim rims are flimsy and subject to damage, so I carefully cut the notch out with a multitool (8).

For a snug and precise fit, I always start with a rail-section offcut to act as a template as I determine the correct cut angle (9). Once I'm satisfied with the angle and the fit, I mark the exact locations of the upper and lower assembled rail sections right on the posts. Even after carefully measuring, I always cut stair rails slightly long and make several more incremental cuts as I sneak up on the final length. Better to spend extra time at the saw than to end up with a railing that's too short.

While upper- and lower-beam assembly for the stair rail is similar to the level-rail installation, the PVC mounting brackets are inserted into the ends of the beams prior to cutting, rather than afterward. A wrap of tape around the brackets ensures a snug fit while the cut is being made. The idea is to remove as little of the plastic on the bracket as possible while giving it the proper rake angle. If the bracket is left square, not enough of the mounting screws engage in the post, which weakens the connection between the rail and the post.

Unlike the balusters for the level sections, the stair-rail balusters had to be cut to fit so that the handrail height was between 34 inches and 38 inches above the tread nosings, as required by code (10). To make sure the balusters were all the same length, I set up a stop block on my chop-saw table. The plug design allowed them to rotate slightly within the slots in the lower rail and upper beam to accommodate different stair pitches (11, 12, 13).

Finishing up. Once I'd fitted the balusters and screwed the upper stair beams to the posts, I snapped the handrails in place (14). The post caps also snapped on, over the post sleeves, but for good measure, I put a small drop of Geocel Pro Flex elastomeric sealant at each inside corner prior to installation to make sure they didn't pop off if they were bumped. I taped the caps down with masking tape while the sealant cured overnight (15, 16).

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