

Post Attachment Appendix

Attaching 2" Square Metal Posts to Wood Structures

The framing members where wood screws are to be attached must be of a specific density equal to or greater than Southern Yellow Pine (.55). Screws must fully penetrate without splitting. Pre-drilling may be required. Structural members must be secure without any movement or fasteners may fail.

Standard Surface Mounting Posts

The standard Viewrail Surface Mounting Post has a foot plate that is 3 3/4" square. It requires a framing structure that is 4 1/2" wide or wider (triple 2x8 recommended). Each post must have (4) fasteners (5/16" x 4" screws) installed to full depth. Balcony posts must have screws in the (4) corner holes of the mounting foot. (See Diagram 1.) 36" or shorter posts installed on stairs can have screws mounted in holes as shown in Diagram 2, when the mounting plate needs to extend onto the bullnose.

Standard Surface Mounting Posts on Thick Treads

Tread material must be Red Oak (or a wood more dense than Red Oak) and at least 2 1/4" thick to mount with screws. If wood does not meet these specifications, mount posts using bolts, or bolts and a mounting plate (following instructions below).

Mounting to Thick Tread with Screws (See Diagram 3.)

Minimum tread thickness for mounting posts with screws is 2 1/4". (4) fasteners (5/16" x 2 1/2" screws) must be used. Pre-drill holes to keep wood from splitting.

Mounting to Thick Tread with Bolts (See Diagram 4.)

- Minimum tread thickness for mounting posts with bolts is 1 1/2".
- Drill 3/8" holes through treads to match the corner holes in the post foot.
 - Drill 1/2" holes 1/4" deep on bottom side of tread to allow carriage bolt to seat itself into the tread.
 - Insert 5/16" carriage bolts of appropriate length from the bottom so threads are up.
 - Tighten bolts.
 - Cut off excess threads with cutting wheel in angle grinder.

Mounting to Thick Tread with Mounting Plate (See Diagram 5.)

- Minimum tread thickness for mounting posts with a mounting plate is 1".
- Drill 3/8" holes through treads to match the hole pattern in the post foot.
 - Place mounting plate underneath tread.
 - Insert 5/16" carriage bolts of appropriate length from the bottom so threads are up.
 - Tighten bolts.
 - Cut off excess threads with cutting wheel in angle grinder.

Surface Mounting Posts on Reduced Width Structures

Only use this option when standard is not practical since the fastener strength safety factor is reduced.

One application is a double 2x10 joist where the flooring and ceiling are already installed. A special order post with a slim foot plate (3/8" thick x 3 1/4" x 3 3/4") is used and has a handrail height **limited to 36"**. This post material must be steel or stainless steel. **Aluminum is not acceptable.** (4) fasteners (3/8" x 6" screws) must be installed to full depth and inserted at a slight angle so that they will have maximum penetration into the structure. Pre-drill holes to avoid splitting wood. (See Diagram 6.)

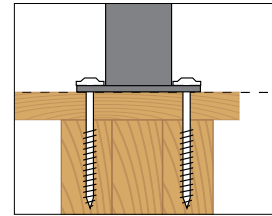


Diagram 1

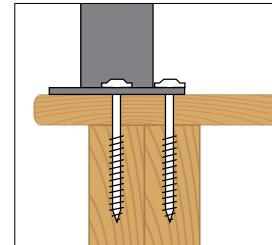


Diagram 2

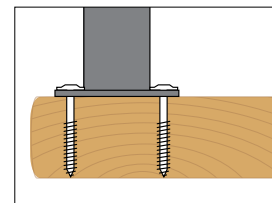


Diagram 3

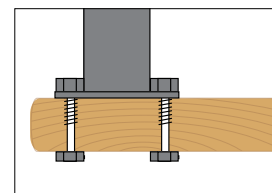


Diagram 4

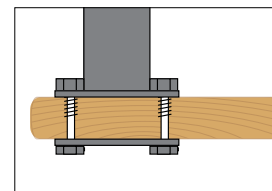


Diagram 5

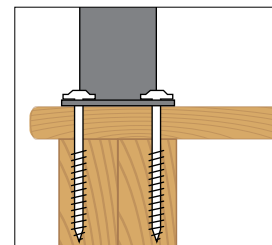


Diagram 6

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Surface Mounting Posts to Reduced Thickness Framing

(Such as sleepers over a membrane roof. See Diagram 6.)

This is a reduced safety factor installation with a safety factor of 2.75 instead of the standard 4.0 based upon a 200lb lateral load on the handrail.

The substructure must be very secure. A special order post is needed with a large area foot plate (5/16" thick x 5" x 7" with 6 holes). All (6) holes must be populated. Use (6) fasteners (5/16" x 2 1/2" screws) at least 2 1/2" in length. Use longer screws if framing material will allow. **Maximum handrail height for this method is 36". Posts must be steel or stainless steel. Aluminum is not acceptable.**

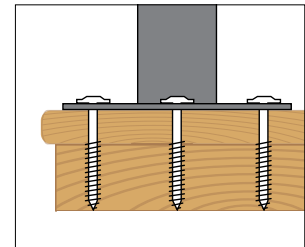


Diagram 6

Standard Side Mount Post

Mounting with Screws (See Diagram 7a.)

(4) fasteners (5/16" x 6" screws) must be used at full depth into triple 2x8 or equivalent. The side mount plate holes are slotted to allow for vertical adjustment of posts.

Mounting with Bolts (See Diagram 7b.)

(4) fasteners (3/8" carriage bolts) must be used through face with thick large area washers under the nuts. The minimum framing material required is a double 2x8.

Slim Side Mount Posts

Mounting with Screws (included with Post)

(2) fasteners (modified 3/8" coated steel screws, not for coastal use) must be used into framing material; minimum is triple 2x8. Pre-drill holes to avoid splitting wood.

Mounting with Bolts (included with Post)

(2) fasteners (5/16" x 4" stainless steel socket head bolts) must be used with rear mounting plate to prevent bolts from pulling through. Minimum framing material is a double 2x8.

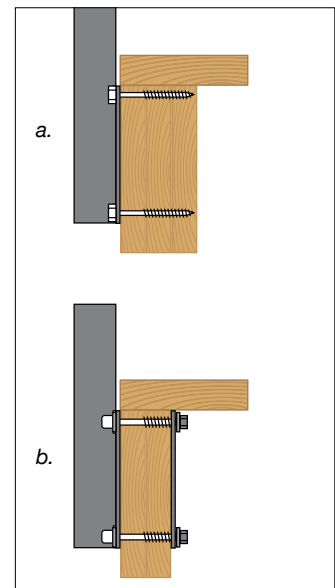


Diagram 7

All Side Mount Posts require a rear mounting plate when mounting with bolts.

Side Mount Bump Out Posts

Mounting with Screws (included with Post) (See Diagram 7.1)

(2) wood screws hold mounting block, (2) fasteners (modified 3/8" coated steel screws, not for coastal use) must be used into framing material; minimum is triple 2x8. Pre-drill holes to avoid splitting wood.

Mounting with Bolts (included with Post) (See Diagram 7.2)

(2) wood screws hold mounting block (2) fasteners (5/16" x 4" stainless steel socket head bolts) must be used with rear mounting plate to prevent bolts from pulling through. Minimum framing material is a double 2x8.

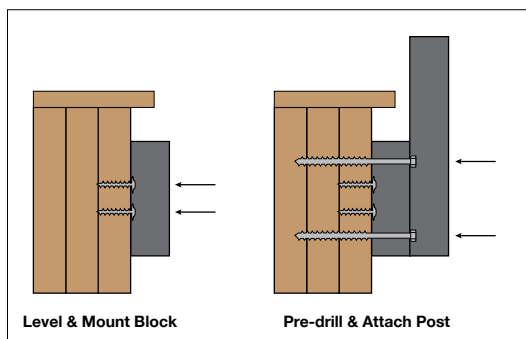


Diagram 7.1

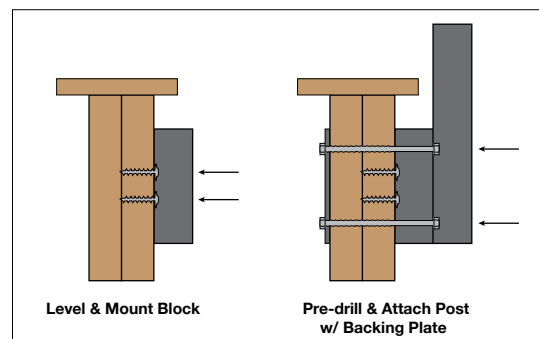


Diagram 7.2

Angle Foot Posts

(4) fasteners (5/16" x 4" screws) must be used into framing material that is at least 3 1/2" wide. Pre-drill holes and run screws at an angle toward center of beam. Maximum angle foot post height supports 10 cables. (See Diagram 8.)

Angle Foot Posts on Reduced Width Structures

A special order post with a slim foot plate (5/16" thick x 2 1/2" x 4 1/2") is used. This post must be steel or stainless steel (**aluminum is not acceptable**) and is limited to a height of 30" (not including the mounting structure). The framing material must be a minimum of 2 1/2" wide.

High Side Fasteners:

- Install 5/16" x 3" dowel screws
- Pre-drill holes
- Place post over dowel screws
- Attach with nuts on top of mounting plate

Low Side Fasteners: use standard screws (5/16" x 4" screws)
(See Diagram 9.)

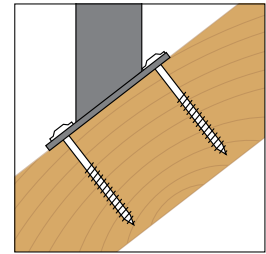


Diagram 8

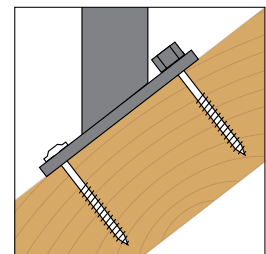


Diagram 9

Attaching 2" Square Metal Posts to Concrete

These requirements for attachment of posts to concrete are based upon information supplied by ITW Redhead Wedge Anchors, the industry leading concrete fastener. The ITW Redhead wedge anchor is IBC 2006 compliant and tested to U.S. Government Specification A-A-1923A Type 4.

Hole drilling bits and technique are critical to a safe install. Find complete information at itwredhead.com.

There are several other attachment methods such as large diameter tapcons or adhesive anchors. None of these methods have been tested. Installer may choose other methods based upon their research and experience.

Load calculations are based upon uncracked 3000 PSI concrete. If your concrete is different, please consult the tables at itwredhead.com for ratings.

Core Drilling Posts

The ultimate strength solution for attaching posts to concrete is core drilling. The downside to core drilling is that it is slower, and more difficult to change or replace posts. We provide a post with an additional 6" of length for use in a core drill application. The post may be field cut shorter to fit your application. We recommend drilling a hole 3" in diameter and filling with quikrete or epoxy. Below is an excellent article on how to core drill and attach posts.

<https://www.quikrete.com/athome/video-anchoring-handrails.asp>

Surface Mount Posts – 6 x 6 Foot Plate

Special order mounting plates (6" x 6" x 3/8" thick for concrete mounting) are required in order to achieve a standard 4 to 1 safety factor. Consult a design engineer for the safety factor needed for your project.

- 3/8" wedge anchors 4 1/2" or longer in 4 holes at the corners of mounting plate
- Anchor must be embedded 3" or deeper in concrete
- Concrete should be 4 1/2" or thicker
- Edge of concrete to fastener should be 3" or greater
- Anchors to have 5 1/4" separation
- Use a torque wrench to tighten anchor bolt to 25 foot pounds

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Surface Mount Posts – 4.5 x 4.5 Foot Plate

This special application post has an oversized 4 1/2" square foot and foot cover. This mounting application is for use in special circumstances that many of our customers encounter. Consult an engineer to see if this product fits your needs. The plate is 3/8" thick in stainless and 7/16" thick in aluminum. Installers must select and provide appropriate fasteners. Note that concrete anchor manufacturers may require a larger mounting foot for hole spacing wider than 4.5".

Side Mount Posts

Special order mounting plates (7" x 7" x 3/8" thick for concrete mounting) are required in order to achieve a standard 4 to 1 safety factor. Consult a design engineer for the safety factor needed for your project.

- 3/8" wedge anchors 4 1/2" or longer
- Anchor must be embedded 3" or deeper in concrete
- Slab must be 11 1/2" thick where side mounts are being installed
- The edge of concrete to the edge of top hole to be 3" minimum
- Concrete must be normal weight 3000 psi or stronger
- Use a torque wrench to tighten anchor bolt to 25 foot pounds

Code Compliance Information

Code Compliance For 200lb Force on a Handrail or Guardrail in Any Direction

Viewrail posts are engineered and tested to exceed the 200 lb. Force Code when properly installed. We submitted a post to Graham Engineering in Nappanee, Indiana. Doug Graham's calculations (as well as our own in-house tests) repeatedly showed that the fastener is the weakest part of the system that we provide. But the fasteners aren't weak. Installed correctly, the fasteners exceed 200 lbs. with a safety margin of over 200%. The shear strength in LBF for our 5/16" x 4" screws is 2948. The weakest point in the post installation becomes the material to which the post is being mounted. We do not provide such structures and, thus, have no control over their capacity. Lumber should have properties that meet or exceed those of Southern Yellow Pine. Each screw should be pre-drilled to avoid splitting the wood. A 7/32" drill bit is recommended. The screws must be inserted into wood for the full length of the screw, a minimum of 2x6 is recommended. In most cases, extra blocking must be installed prior to installation of posts so that (4) screws can be inserted into the deck structure. The blocking must meet or exceed the screw holding Southern Yellow Pine and it must be adequately attached to the deck structure.

In addition to the 200 lb. Force Code, installers should be concerned with the quality of fastener selected for corrosion resistance. We offer both a coated fastener and a stainless steel fastener. Both of these fasteners meet the IRC code AC257. The AC257 is the updated code related to the corrosive properties of ACQ treated lumber. It is very important that any fastener used meets or exceed AC257.

Code Compliance for 4" Sphere

Meeting the 4" sphere rule means that cables should be spaced on the standard spacing provided in the Viewrail posts. The standard spacing is 3 1/8" O.C. which allows a reasonable amount of deflection of the cable when the posts are spaced no more than 4' apart. When laying out a deck or balcony, it is tempting to space posts farther than 4' apart; however, the deflection of the cable increases dramatically and it cannot be overcome with increased tension. Do not place posts more than 4' apart and do not space cables more than 3 1/8" apart to conform to the 4" sphere rule. Often posts are placed adjacent to each other for a dual corner. When placing two posts in a corner, be sure to place them no more than 4" from each other.