Installation of Heights Tower Bases and Tower Erection

Threaded Leg Version

Thank you for choosing a Heights Tower. These are the installation guidelines for installing your free-standing aluminum tower. This installation manual covers stacked towers on Hinged Bases. Please read carefully.

Tools Needed:

- Excavation equipment like a small backhoe truck
  or manually with a shovel.
- Two or three carpenter's levels.
- Combination or ratchet wrenches; bolt-heads require 9/16" or 3/4" sockets.
- hammer and rubber hammer
- Helpful items: a tapered drift-pin for 3/8" and 1/2" holes;
  rat-tail file(s) also.

WARNING:

Installation of this product near power lines is dangerous. For your safety, follow the installation instructions. Read through these instructions once through completely before planning or beginning any work.

Make sure there are no underground power lines or any phone/cable lines near the sites where you will be digging the foundation hole. If in doubt, call your local utilities companies, and they will check the site for you or recommend someone who can.

DO NOT install, remove or repair this tower at a distance within one and one-half times its height from any electric power lines.
YOU CAN BE KILLED IF THIS PRODUCT COMES NEAR POWER LINES.

FOUNDATION INSTALLATION PROCEDURES

Rebar Caging

To conform to building codes, we specify rebar caging to be installed inside the perimeters of the footings walls. The specifications for rebar caging are listed in the Footing Design section of your tower's Calculations and its Concrete Footing Diagram for the tower. We can manufacture a prefabricated cage for your tower, if you do not wish to build your own.

The cage should be centered in the hole and raised up a few inches by propping up the bottom bars with small bricks. There should be at least 3" of clearance between the walls of the excavation and the cage frame.

Hole Excavation-- Dig the hole size according to the dimensions listed in the calculations. In most cases, the base hole needs to be between 3 and 4 ft. in diameter and from 5' to 12' in depth. These sized holes would require from 1.5 to 8 cubic yards of concrete. Concrete is to be 3000# proof or '6 bag' mix.

Our original specs and the illustrations in our brochure show a cylindrical "Sono-tube" tube being installed as forming for the hole. It is not necessary to use a "Sonotube"; you can make a box shaped forming from regular plywood (4' x 8' or similar size). Plywood is usually easier to find and buy, and you can build the excavation into a box form with it. The only disadvantage that a box shape has over a cylindrical shape base is it will require about 20 to 70% more concrete.

Another option is to use no form. This is actually the most desirable option from a

building code standpoint, if it can be done. To do this, you should not wait very long after the hole is dug to pour the concrete, so that walls will not loose their shape firmness if it rains or the hole floods.

Threaded Anchor Bolts and Hinge Clevises

It is easiest to assemble the threaded legs and rebar cage together, outside the hole. You would lay the threaded HB legs horizontally inside the rebar cage (also laying on the ground) and bolt everything in place, with the idea of lowering it all down after the legs and templates are together within the rebar cage.

When you do have the legs and cage lowered into the ground, position the three legs so that the tower will be able to hinge over in the desired direction for that installation. Tower will 'hinge' over on one of the three 'sides' of the triangle when base is completed.

Use the upper/top triangular 'templates', the ones with the thicker sides or 2-1/2" x 3/8" flatbars, for the top of the base. The rods can now be 'hung' down into the hole (the thinner templates of 3" x 1/4" will be bolted on the bottom plane). The thicker top template will support the weight as it straddles the lumber or supports on top of the hole (see diagram labeled "Hinge Base w/ Flatbar Templates in Installation Phase"). There should be 5" to 8" (inches) of threaded rod extending above the surface of the concrete when finished with a flat trowel. This length will allow for a wide range of adjustment to adjust the tower plum. If the rods vary a little below or above this range, for example at only 4" or about 9" above the concrete, you should still will have enough room to adjust the base legs without negatively impacting your installation.

Each of the three threaded rods will have four nuts: two black nuts will tighten around the bottom template bars (underground) and a pair of plated nuts will clamp around the top template bars (above the cement). Use the plated ones above the ground and the bare, unfinished nuts on the bottom, submerged in the cement. Also, there are three flat-washers with the base rods; these would be use on between one the nuts and the TOP template above ground. The bottom template will not need washers;

just tighten the two nuts around the bottom template to sandwich it on each leg.

The templates, of course, will ensure that the rods will set in the right position when the concrete is cured, eliminating the possibility of incorrect spacing, or incorrect positioning of the clevis angles (since they may be rotated 360 degrees on the anchor rods.)

When attaching the steel "U"-shaped welded clevises to the threaded ground bolts, make sure they will be rotated so that all three are in parallel alignment. This will allow the tower to be hinged over for easy erection and section assembly. Small towers may be walked up by one or two persons.

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Curing: Allow concrete to set for at least 7 to 10 days before installing the complete tower.

TOWER ASSEMBLY/ERECTION

Basic tower section assembly:

Assemble the sections in their self-evident order. If in doubt, refer to your tower 'bolt list' (look in the hardware boxes), the drawings, if you ordered them, or your Packing List or Invoice.

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If you decided to use a lubricant or grease on the tower legs, please apply before mating the tower sections together. A light lubricant like 'Alum-a-Lub' (which may be purchased with your tower order for a wholesale price) or other general utility sprays like WD-40, will only help reduce friction and prevent scarring of telescoping tube surfaces. Some sections, especially the tapering 'AJ' style sections will be much tighter fitting than the straight ones (ACs or AT). Lay the sections on fairly flat ground and attempt to slide all three legs on evenly and incrementally on each side, gradually 'wiggling' the sections together, and not cocking one side in before another.

Once the bolt-holes start approaching alignment, get out your tapered pin tool (if you do not have one, we can lend or sell you one) to align one completely and insert a bolt through them. The tip on an acceptable taper pin should come down to below 3/8" dia. and near 1/4". When you get the first hole bolted, the remaining holes should more easily be aligned.

If it is difficult to align the first hole, a tapered drift pin can help begin the process of better aligning the holes. If you use the taper to drift them into full alignment, you should be able to get at least one other bolt hole in the pattern aligned for bolt insertion. Repeat this process on each of the three legs connection, until you have one bolt in each (of the 3) leg tubes and their couplers or junctions (depending on the tower size).

Please be aware that you may not get more than 2/3rds of the holes perfectly aligned. Because we want your tower connections to remain snug and tight for the life of the tower, we do not manufacture any additional diameter tolerances into the fitting between the section. Each hole has zero tolerance, which means there will be some misalignment on some holes. Almost always, this misalignment between the holes will be less than 1/16" difference between the eclipsed holes. If the overlap is large enough so that it prevents the 'threading' insertion of the bolts, or by gently turning the bolt screws through the holes with a ratchet wrench (less than about 40 lbs. if using a torque-wrench), then *you may need to ream or drill out the slightly misaligned holes*. Before reaming or drilling any holes, you must first align one of the two to four holes in your leg pattern and insert a bolt into them, so that a stable base reference is provided. We recommend first using a small 5/16" or 3/8 dia. 'rat-tail' cylindrical file to carefully shave off the overlapping material within the hole that interferes with a 3/8" or 1/2" bolt passage (depending on the size section you are working on).

If that does not work, and you are skilled at using an electric hand-drill, you could put in a 3/8" dia. drill in the chuck, and quickly ream through the holes (use 1/2" dia drill for 1/2" holes). Be careful not to take out too much of the tube legs meat, and also how you hold your hand-drill, as it is easy to catch them in the holes and break the bit. Again, you must use the above pinning techniques to align at least one hole in each leg ***before*** drilling any off-alignment holes.

Tighten the locking nuts snugly, but do not over-tighten, as this may egg-shape and gouge the tubing. Our fastener connections do **not** depend on torqued or tightened down nuts, or what is sometimes called a 'friction fit.' All the bearing pressure is calculated for on the bolt shanks and holes, so do not worry about over tightening the nuts. Just a 'snug' fit (basically touching edges) is fine.

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Below pictures show a Stand being attached to the Hinge Base Clevises. The same procedure of connection also applies to a straight (non-Fold Over Kit) section when connecting to clevises. Our bases allow you to attach the Stand for a Fold Over Kit or a tower directly onto the same threaded legs. You could insert the Fold Over Kit and Stand later, if you desire.

OTHER BASE CONSIDERATIONS:

Grounding system: All tower structures should be grounded to prevent lightning damage. The simplest grounding system would consist of two or three copper-clad, 8 to 10 ft. long ground rods spiked into the ground near the edge of the concrete pad, connected to the tower legs with 2-⌀ stranded cable. Then, a ring around the base should be made with solid #2 size electrical wire. See 'Grounding' diagram. Heights Tower Systems can provide such a kit to meet your installation's requirements.

We do not recommend directly grounding to the steel base legs and rebar cage structure of the base. Our opinion is that a grounding arrangement like this may lead to structural damage of the base, if the base channels a strong enough lightning hit. That is why our typical installation would have the ground rods and cable/plate grounding material outside of and around the actual concrete.

Should you have any questions on these instructions, call Heights Tower Systems at 1-850-455-1210 or email at info@heightstowers.com or hts2001@bellsouth.net.