

Antenna Tower Screw Anchor Installation Pictorial

Whitham D. Reeve

1. Introduction

Anchors are part of the support system for guyed towers (figure 1). Other support elements include guy wires, guy clamps or grips and turnbuckles. These and other terms are defined in section 4. **Glossary.** A guy anchor and wire installation is not complete without earth grounding components. There are many types of anchors but this pictorial is limited to screw anchors installed by hand (the "Armstrong Method") for a 12 m lattice tower. The choice of anchor type and quantity depends on a number of engineering considerations and is beyond the scope of this article.

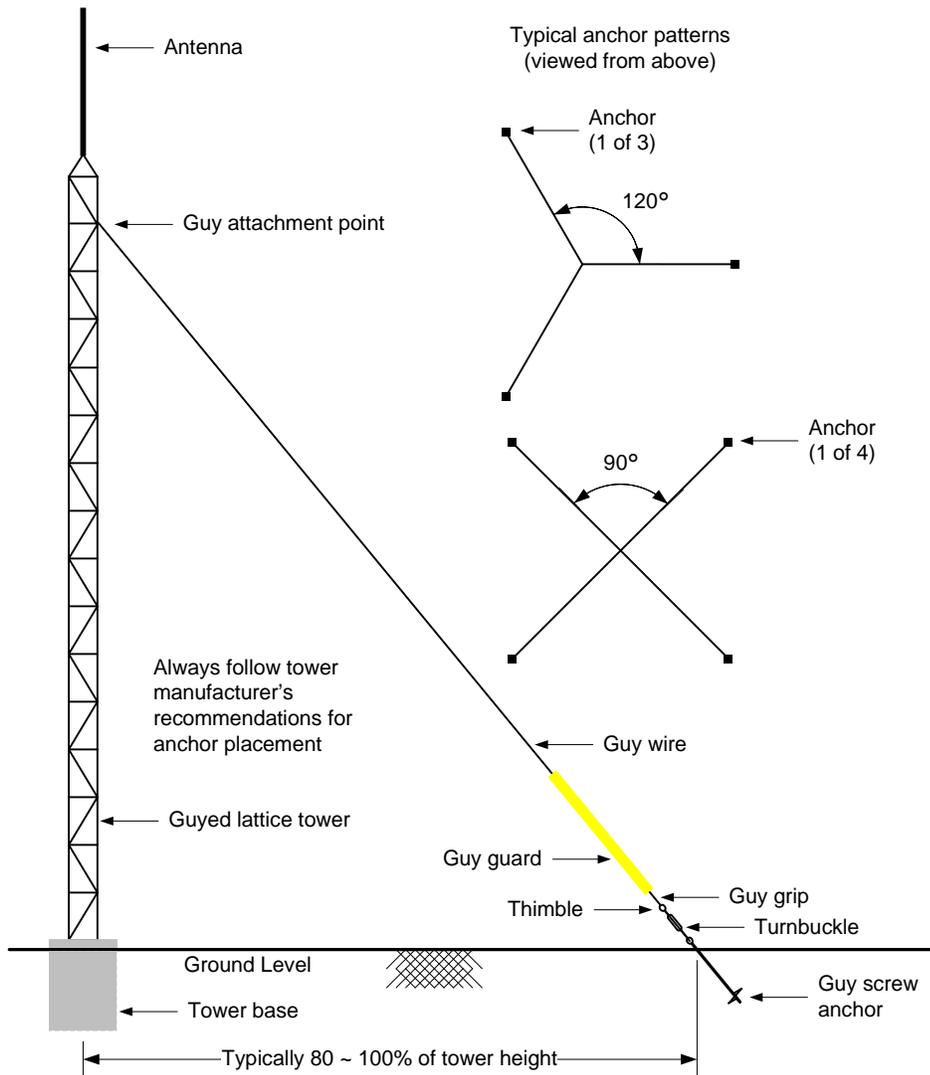


Figure 1 ~ Tower guy anchors. A typical guyed tower uses three or four anchors.

2. Anchor and guy wire material

For the sake of safety, it is essential that the proper hardware be used with tower anchors and guys. All hardware items such as guy grips, turnbuckles and wire rope can be purchased from the tower manufacturer or its distributors. By purchasing the manufacturer's hardware, one is assured of getting material that is suitable for the purpose. However, buying hardware from the tower manufacturer often is more expensive than buying from hardware stores that stock identical items. With few exceptions, anchor and guy hardware for short towers are made of ordinary galvanized steel.

No matter where it is purchased, the hardware must be properly rated. Unless the builder is able to prepare a structural analysis, it is essential to use items that are identical to what the tower manufacturer supplies with a given tower, taking into account tower type, height and wind/ice loading. All USA tower manufacturers have standard drawings that call out the proper hardware. If you have any doubt, consult the tower manufacturer or a qualified structural engineer.

3. Installation

Screw anchors can be installed by hand in many types of soils. However, they are not suitable for hard-pan or stiff soils with a lot of large rocks. Before starting, mark the anchor locations. These locations are determined with respect to the tower base and are indicated on the tower manufacturer's standard drawings for the type, height and wind loading. The basic installation process for each anchor and guy is shown in the following pictorial.



1. To start installation, gather the tools, a shovel and axe handle (not shown), and screw anchors. The screw anchor shown on the right side in the wheel barrow has a 48 in long by 5/8 in diameter shaft with 6 in auger on one end and a single eye on the other.

2. Dig a shallow starter hole, breaking through upper peat and roots. Picture shows the working end of anchor (the auger) ready to be inserted in starter hole.



3. Start the anchor by hand, screwing it into the soil until it “bites” and starts pulling itself in. In stiff soils, some downward pressure will be needed.

4. Hold anchor at an angle so that the eye points to the guy attachment point on the tower. The picture shows axe handle in-place in the screw anchor eye. The axe handle acts as a lever for turning the anchor.



5. Stop every once in a while to rest and admire your hard work. The axe handle used to turn the anchor is shown in-place in the anchor eye.

6. Screw in the anchor until the eye is just above ground level. The axe handle used here is a replacement handle made from fiberglass and fit perfectly through the eye



7. Complete the anchor installation by backfilling the starter hole and tamping the soil.

Now, you are ready to install the guy wire (or guy). You will need wire rope, turnbuckles, thimbles and guy grips or guy clamps. All must be rated for the installation as specified on the tower manufacturer's drawings.

8. Install the guy wire. A Preformed Line Products guy grip is shown here and is used to terminate the wire rope at each end of each guy. Index marks on this guy grip are shown in red. Wire rope clips (often called guy clamps) also may be used to terminate the guy wires but guy grips are much easier and convenient.



9. Another view of the guy grip showing the thimble and the upper end of a turnbuckle. The thimble protects the wire rope from chafing in the turnbuckle eye. The guy wire extends through the guy grip (see next step).

10. View of the guy grip, thimble and upper part of turnbuckle. The guy wire is long enough to be threaded through the turnbuckle, looped back and clamped. Turnbuckles are used at the anchor end of each guy to adjust tension.



11. Another view of the anchor eye, turnbuckle, thimble, guy grip, and guy wire. After all guys are installed they are tensioned by adjusting the turnbuckle.

12. After the guys are tensioned, the excess guy wire is threaded through the turnbuckle and anchor eye to prevent the turnbuckle from turning on its own. It is then bonded to an earth electrode (for example, a ground rod).



13. Guy wire bonding detail shows the 6 AWG bare copper earth electrode conductor. This picture also shows the guy strand looped through the anchor eye and back up where it is clamped. Bury the earth electrode conductor so that it does not become a tripping hazard.

14. Another guy wire bonding detail. The split-bolt clamp in middle of the picture bonds the guy strand to the earth electrode conductor. The other end of the earth electrode conductor is connected to a ground rod or other suitable grounding electrode system. Not easily seen is the corrosion prevention compound on the split-bolt clamp.



4. Glossary

Auger – Helical bit for drilling

Guy anchor – The buried element of a guy assembly that provides holding strength or resistance to guy wire pull

Guy wire (guy) – Stranded steel wire (roap) used for tension support between a pole or tower structure on one end and a fixed object (anchor) on the other

Guy clamp – A hardware assembly made from shaped galvanized steel plates and fasteners used to clamp a guy wire at a termination

Guy grip – An assembly made from galvanized steel wires used to terminate a guy wire at an attachment

Guyed tower – A tower structure that requires guy wires for support

Screw anchor – An anchor that has an auger at one end and is screwed into undisturbed soil

Thimble – A metal cap used with a guy wire or guy grip to protect it from chafing at a termination

Turnbuckle - A coupling with internal screw threads used to connect two threaded rods lengthwise and to regulate their length or tension

Wire rope clip – A U-bolt hardware assembly used to clamp guy wire at a termination

5. References and further reading

- ⚙ ANSI/TIA-222-G, Structural Standard for Antenna Supporting Structures and Antennas, August, 2005 (as amended) (http://global.ihs.com/search_res.cfm?RID=TIA&INPUT_DOC_NUMBER=TIA-222)
- ⚙ The ARRL Antenna Handbook, 21st Edition, American Radio Relay League, 2007
- ⚙ The ARRL Handbook for Radio Communications, 2012 Edition, American Radio Relay League, 2012
- ⚙ Rohn Industries, Understanding TIA-222 Revision G, 2011 (<http://www.rohnnet.com/revg>)

Document information

Author: Whitham D. Reeve

Copyright: © 2017 W. Reeve

Revisions: 0.0 (Draft started, 27 Aug 2011)

1.0 (Minor edits for distribution, 18 Nov 2017)

Word count: 1213

File size: 3544576