

**HUD’s manufactured home tie-down requirement only stipulates that tie-downs are required it does not indicate as to the type, number of or location of the tie-downs.**

**The information listed below is a minimum standard.**

***Tie Down Requirements for manufactured homes***

- Singlewide manufactured homes require both diagonal and vertical ties.
- Doublewide manufactured homes require only diagonal ties.

Length of Manufactured Home (ft)	Zone 1		Zone 2	
	Number of Vertical Tiles per Side	Number of Diagonal Tiles per Side	Number of Vertical Tiles per Side	Number of Diagonal Tiles per Side
Up to 40'	2	3	2	4
40' - 46'	2	3	2	4
46' - 49'	2	3	2	5
49' - 54'	2	3	3	5
54' - 58'	2	4	3	5
58' - 64'	2	4	3	6
64' - 70'	2	4	3	6
70' - 73'	2	4	3	7
73' - 84'	2	5	4	7

- To determine the length, do not include the draw bar.
- Numbers based on minimum working load per anchor of 3,150 pounds, with a 50% overload of 4,725 pounds.
- Diagonal ties must deviate at least 40 degrees from a vertical direction.
- If your home has special site considerations, a registered professional engineer or architect can devise an alternate anchoring system.

**Tie-Down (Anchor) Requirements**

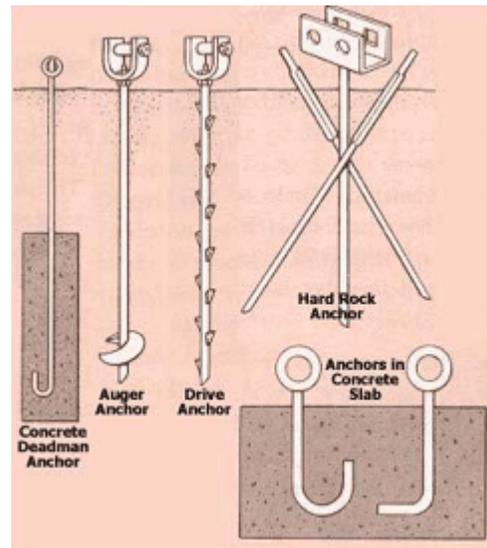
All mobile/manufactured homes are required to be tied down in accordance with the specifications provided by the manufacturer. In the case of a used home, and in the absence of the manufacturer’s tie-down instructions, the home must be tied down in accordance with the specifications provided in Department of Highway Safety and Motor Vehicles specifications Rule Chapter 15C-1, Florida Administrative Code. Each county and municipality is responsible for ensuring compliance with the tie-down regulations through permitting and onsite inspections.

## Anchoring system components

**Types of tie-downs:** The type of tie-down you select usually depends on when your manufactured home was built. Older homes often have exposed over-the-top tie-downs. This is an effective system, but it does detract from the appearance of your house. The straps are placed over the siding and roof. Until recent years, most manufactured homes came equipped with concealed over-the-top tie-downs. These straps are located just under the exterior siding and metal roof. The end of the strap hangs out under the manufactured home. Newer model homes might not have any type of over-the-top tie-down. Because of increased structural strength of manufactured homes, these models are secured with anchoring straps attached to the home's steel frame rails, called frame anchors. Doublewides are also secured with frame anchors.

**Types of anchors:** You'll find anchors available for different types of soil conditions, including concrete slab. Auger anchors have been designed for both hard soil and soft soil. Rock anchors or drive anchors allow attachment to a rock or coral base. This type of anchor is also pinned to the ground with crossing steel stakes. If you will be pouring a concrete base, you can install a concrete anchor first.

You need to know your soil type to select the right anchor. Soil classifications usually include: rock/hard pan, heavy, sandy gravel, heavy sand, silty gravel, clayey gravel, clay, silty clay, clayey silt, uncommitted fill or peat/organic clay.



Whatever type of anchors you select, carefully follow the installation instructions. Auger anchors (screw-in anchors) can be installed manually by inserting a metal bar through the top of the anchor for added leverage or with a machine designed for this purpose. It's important to screw this type of anchor in. Do not dig a hole to install.

**Hook-up and tension device:** The tie-down must be connected to the anchor with a system that allows for adjusting the tension. It must also be weather resistant and strong enough to support as much weight as the anchor and tie-down. If the tie-down is fastened to a ground anchor with a drop-forged turnbuckle, the turnbuckle should be ½ inch or larger galvanized steel. The turnbuckle should have forged or welded eyes, not hook ends.

**The roof protector:** If you have exposed over-the-top tie-downs, you must have some sort of roof protectors placed under the strap or cable at the edge of the roof. Roof protectors are also called roof brackets, buffers or thimbles. These prevent the tie-down strap or cable from damaging the roof and will prevent the edge of the roof from cutting through the tie-down. Wood blocks will work, and are better than nothing, but commercial protectors will do a better job of distributing the pressure of the cable. Commercial protectors will last longer, too.

**Specifications:** Make sure all your anchoring equipment (anchors, turnbuckles, straps, hookups) is capable of resisting an allowable working load of at least 3,150 pounds. The equipment must also be capable of withstanding a 50 percent overload, 4,725 pounds. This also applies to the attachment point on the manufactured home. Only use anchoring equipment that is weather and corrosion resistant. **YOU MUST ALIGN EXPOSED OVER-THE-TOP TIE-DOWNS WITH A ROOF RAFTER TO PREVENT DAMAGING THE ROOF.**

Tie-downs can be either cable or strap. If cable is used, it should be galvanized steel or stainless steel. Minimum diameter size is 3/8 inches for 7 x 7, or 1/4 inch for "aircraft" cable, 7 x 19. If flat steel strapping is used, it must be a minimum of 1-1/4 inches wide x .035 inches thick.

### **Tie-down and anchor installation**

Installing a tie-down and anchoring system is not too complicated for most do-it-yourselfers. It's wise, however, to seek experienced help to make sure you are using the proper anchor for your soil conditions, enough anchors for your wind conditions, the correct tension on your tie-down, and proper angle for your frame tie-downs. At the very least you should have a building inspector or a trained installer check over your finished work.

#### **STEP 1: Level house**

Make sure your home is level before anchoring it to the ground.

#### **STEP 2: Check charts**

Check the [wind zone chart](#) for your location and determine the required number of anchors recommended for your zone. You should regard this number as the minimum needed for your home.

#### **STEP 3: Determine soil type**

Merely looking at the ground under your home isn't enough. Some types of anchors need to be installed five feet deep. Talk to a building inspector to determine your soil type. If you will be attaching your tie-downs to a concrete foundation, make sure it is at least 4 inches thick.

#### **STEP 4: Select anchors**

Talk to a supplier or installer for advice. Your soil type will determine the type of anchor.

#### **STEP 5: Select hook-up**

Depending on your tie-down system, over-the-top or frame, select the appropriate hook-up and tensioning device. Make sure the entire system is certified to a 4,725 pound capacity.

#### **STEP 6: Locate wires/cables**

Mark the location of your electric, cable, gas, water, sewer and phone lines on the ground before you install anchors. Make sure you have located everything prior to digging.

#### **STEP 7: Position over-the-top tie-downs**

If you are installing an exposed over-the-top tie-down, the strap or cable should be positioned

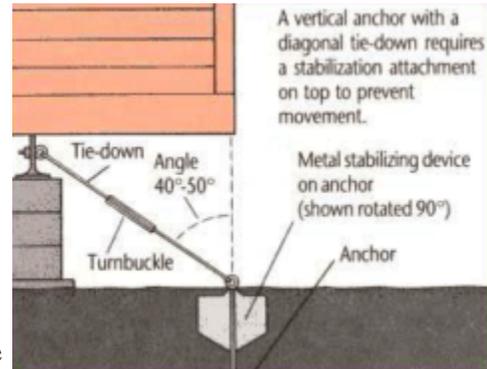
over a roof rafter. Protect the edges of your roof with a roof protector of some type. Make sure the strap or cable does not cover a window or door.

### STEP 8: Install anchor

You'll find specific installation instructions with your anchor. Follow them carefully. For a vertical tie-down, the anchor is installed vertically.

For a frame/diagonal tie-down, the anchor can be installed to the same angle as the tie-down. This angle should be at least 40 degrees. The anchor can be installed vertically if you also install a stabilization device to keep the anchor from moving sideways. A metal stabilization device can be attached to the top of the anchor and buried in the ground.

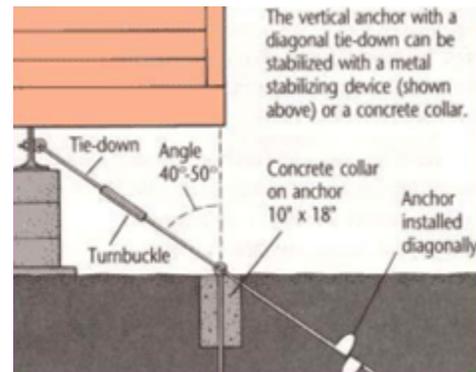
Another option is to pour a concrete collar around the top of the anchor. The collar should be at least 10 inches in diameter and 18 inches deep.



### STEP 9: Adjust tension

Alternating from side to side, adjust your tie-downs to the appropriate tension. Don't do one side of your house and then the other.

**REMEMBER:** Anchoring and tie-down systems vary greatly. It's important for you to contact the local building inspector for regulations regarding anchoring and blocking installation in your community. Regulations vary considerably from one community to the next. In some states, tie downs aren't required. In other states, tie-downs are stringently regulated and inspected.



To be tied down safely, find out from your local manufactured home association or building inspector how many tie-downs and anchors you need for your wind and soil conditions. The cost of installing additional tie-downs and anchors is small compared to the potential cost of wind damage to a manufactured home that was not properly tied down.

### Is there an average number of tie-downs?

The number of tie-downs (see chart above) depends upon the length/width of the home. 15 to 20 anchors is a general representation.

### What is the expected cost of a tie-down?

Rates vary depending primarily upon soil types. Installing a ground anchor in rock will be significantly higher than in a sandy soil. For sandy soils, typical prices range around \$40 for material and \$40 for labor, each. Thus, for 15 x 2ft anchors, a total price of \$1,200 would be typical. Please remember, 2 ft. anchors did not perform well based upon studies conducted after recent large hurricanes. Current recommendations include embedding the anchors 4 ft deep and/or concrete encasement of the anchors. This improvement will increase the anchoring cost.

### **Who can install tie-downs?**

Section 320.8249, Florida Statute, requires that anyone who will install a mobile/manufactured home must be licensed by the Manufactured Housing Section, Division of Motorist Services, Department of Highway Safety and Motor Vehicles. The law further requires that licensed installers must place an installation decal on every home they install certifying that the home was installed in accordance with state regulations. The label shall be located at the “tail light” end of each transportable section of the manufactured home approximately one foot up from the floor and one foot in from the road side. Presently, there are 377 licensed installers in Florida. A list of approved installers can be found at [www.flhsmv.gov](http://www.flhsmv.gov).

*NOTE: Manufactured homes should not be confused with modular homes! Modular homes are built in a factory (like mobile homes) and are built to the Florida Building Code and are under the control of the Department of Community Affairs. A Certified General Contractor must install a modular home. Modular home guidelines are found in Florida Statute Chapter 553, Part 1 and Rule 9B-1. Modular homes will have an approval label/data plate located in the electrical distribution panel.*

### **The Tie-Down Timeline – How did we get here?**

1973	First tie-down requirements; the four corners only
6/15/1976	HUD assumes the mobile home program. Added additional requirements
8/24/1992	Hurricane Andrew
7/13/1994	HUD strengthens structural requirements
10/1/1996	Florida requires installers to be licensed
2/23/1998	Tornados’ hit Orlando area
3/29/1999	Major changes to Rule 15C-1
1/1/2009	HUD standardizes installation guidelines nationwide

### **What is Over-the-Top strapping?**

Typically, homes manufactured prior to July 13, 1994, where factory installed roof ties are not evident and it cannot be determined that the mobile/manufactured home is “Hurricane Resistant” without such ties, then vertical roof ties are required.

1. Single-wide homes less than or equal to 60 ft: 3 roof ties
  2. Single-wide homes greater than 61 ft: 4 roof ties
  3. Double-wide homes: roof ties required only if installed by manufacturer
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I hope this publication has been informative. Mobile and manufactured homes built after 1999 have greatly improved wind resistance and thereby are far safer homes provided they have been installed properly. As a Florida licensed Home Inspector, I continue to find reasons to doubt the installation methods were fully and properly upheld. The materials used in the anchoring are nearly always in compliance as Florida requires only approved materials/methods can be utilized. The biggest issue is in the anchoring method used in relation to the soils classification. Installers are required to perform a "Torque Probe Test". This tool is turned into the soil to a depth of four feet and a reading is taken. Based upon the reading, the soils are classified as Type 4A or 4B. This test, in and of itself, provides a good baseline for the compressive strength of the soils to hold the anchor. The problem is the relation of whether the test was conducted in wet or dry conditions! Soils which are overly saturated will not hold as well as dry soils. Further, the standard torque test does not distinguish between loamy soils and fine sands. Even a five feet anchor, by itself, may not hold in a wet, saturated condition. Optimally, a geotechnical engineer would be consulted and soils samples would be collected and analyzed to facilitate the type of anchoring needed. Obviously, this would be an added expense (about \$500.00) and this is rarely utilized. Bear in mind, the person determining the anchoring requirement during installation is generally the man who is physically strong enough to work the auger (gas or electric powered, about one inch in diameter). If it augers easily without much resistance, its considered Type 4B for the most part. The State of Florida has done a great job in establishing minimum standards for materials and training, but recognize one standard cannot and will not fit all situations. If your home is located within a flood zone, please consider consulting a geotechnical engineer. You can always exceed the state standard and improve your safety while protecting your investment.