

Feeling Strapped And Going Nowhere? Part I

By George Porter

This is exactly the feeling you want if you happen to be a HUD code home with people in it. Unfortunately, that is not always the case. As a matter of fact, in my experience, it very seldom is the case. Having been in the business more than twenty years, and having installed hundreds and hundreds of homes C all of them in a hurricane zone C I thought I knew a little something about anchoring. Then I met two people who caused little beads of sweat to break out all over my forehead.

About four years ago, I attended a meeting in which Robert Fuller (now Director of Manufactured Housing, at Housing & Urban Development) gave a talk about installation. At the time, he was in charge of compliance and he said HUD had conducted a survey of one hundred homes across the country and all one hundred homes were found to be incorrectly installed. Furthermore, the most common mistake found was that the homes were improperly anchored. He then asked the audience of several hundred if they ever used concrete collars. We all looked at each other with the puzzled expression of “concrete what.” It seems these little items have been required under certain circumstances by HUD since 1976. It sure was news to me and everyone else there too. Mr. Fuller made a very big impression on me that day; the meeting was being held in Delaware and all of Delaware as well as the entire Eastern Shore of Maryland and Virginia are located squarely in the middle of the hurricane zone. According to what we had just heard, very few of the homes were properly anchored.

I think everyone there was kind of hoping that what Mr. Fuller was talking about didn't really apply to them and he was discussing some strange condition in say, Kansas. Unfortunately he was not, there's nothing quite as discomfoting as when a government official is right, you're wrong, and he is talking to you.

When I decided to write my textbook on the installation of manufactured housing, I needed to go find an expert. That's when I met a fine fellow named Locke Jones from Minuteman Anchors. Locke was a very big help in writing the section on anchoring in my book, I could not have done it without him. He told me more about anchoring than I ever dreamed anybody would need to know. Locke was giving seminars for Minuteman on the proper anchoring of manufactured housing in the early '70's, long before the HUD code ever existed. He in fact was promoting the standards that HUD and NCSBCS promote today. So how in the world did most of us in this industry get so far off the mark?

If you think your homes are properly anchored, here's little test for you. I've done it hundreds of times and actions speak much louder than words. If the anchors were installed after the home was blocked, they run in at an angle underneath the edge of the home. The steel straps from the tops of the anchors go to the frame of the home. Bear in mind that there are criteria for anchoring systems. The entire system must be rated at a working load of 3,150 lbs. with no more than 2% stretch C and should withstand a brief 50% overload or a momentary surge of 4,725 lbs. Reach under the home with your foot and step on the strap somewhere about half-way between the top

of the anchor and the steel frame of the home and stand on it. If this anchor does not have the concrete collar Mr. Fuller talked about, it will probably move 3" to 6" through the top of the ground. Now if you weight more than 4,725 lbs., maybe this home was anchored.

Earth anchors are all rated according to their holding capacity, but that rating is tested by pulling them straight out in exactly the same direction that they went in. The metal plate or helix at the bottom of the anchor is what does the holding, not the rod. The rod can easily slice sideways through softer ground and allow the home to come off of its foundation. If the entire anchor was pointed in the direction of the steel frame it was tied to, as in the illustration, it would be an entirely different story. But you can't put it in that way once the home is already there, unless the home is high enough off the ground.

I have seen many people use a post hole digger to install anchors. They dig the hole, throw the anchor in the hole and put the dirt back in. After some rain runs in the hole they put the anchor in, does anybody out there think it would be hard to pull out? Even if the ground was heavily tamped as the dirt was replaced in the hole, I really don't think it would be as good as the helix screwing itself into the ground.

Some people put anchors in the wet concrete when they pour the footings. This can pose several problems. In many cases, the anchor strap goes straight up to the I-beam. while this definitely holds the home on the ground and resists any upward forces, lateral forces, or the wind blowing on the side of the house, are a major problem here, and you have to have a lateral resistance in order to keep the home on the blocks. This could be accomplished by having the anchor strap run to the opposite I-beam and one over there coming back, creating an "X" between the two frame members. Uplift is a factor and can be accounted for by keeping the angle between the bottom of the homes and the strap going to the opposite anchor at 45 degrees \pm five degrees. If the angle exceeds this and the straps start becoming more vertical, the anchor will have to be moved to achieve the 45 degrees. If the home is very close to the ground and the angle is far less than 45 degrees, it is not achieving its vertical component and it is necessary that you also install a vertical anchor strap to the beam directly above the anchor in the footing.

But even with all that, we have to talk about what the anchor is sitting in. If you have installed a concrete anchor of about 8" long with a little hook on the bottom that you imbed in wet concrete you may have a problem. Remember each strap has to be able to withstand a load of 3,150 lbs. and an occasional momentary 50% overload. So that means if you put two straps on one anchor, you have to resist a sustained load of 6,300 lbs., and an overload of 8,450 lbs! The only thing holding this anchor is the footing that is poured in the ground, and very nearly the weight of the footing is the only thing that's keeping it in the ground. It is not locked there in any way unless it is pretty deep. Consequently, if you figure how many pounds of concrete it takes to resist each strap, you will find that it takes a littler over 1.5 cubic yards. Obviously the dirt offers some resistance. However, nearly all of its resistance is a function of its weight and not many footings are that big.

There are so many engineering principles and calculations that come to bear with anchoring it is unbelievable. There are many kinds of anchors for use in many kinds of soil. There are devices for solid rock, coral, sand, and wet concrete and all things in between. If you put the wrong kind of

anchor in the wrong kind of soil, you have done little more than waste your money and create a false sense of security with the homeowner.

Anchoring is a lot more complicated than I ever thought it was, and it certainly is something that should be done right. Anchoring is a perfect example of an attitude that's fairly common in the industry. "I've been installing homes for years and I know what I am doing." I'm sure these guys mean well and maybe they really do know what they are doing, but I think it would be good if every once in awhile we all did a severe self-examination and ask ourselves how much of this stuff that we "know" could be verified by a qualified engineer. I can assure you of one thing, if there is ever a problem with wind damage due to a home that you have installed, some law firm like "Dewey, Ripum, and Howe" will come calling with their engineer, and he won't care how long you've been doing it. The local customs of anchoring may find themselves in deep trouble when they are compared to the Federal Emergency Management Agency publications on anchoring and installation. The factory whose home you are setting up also has a few ideas about anchoring and then, there's HUD, and they've got a lot of ideas about anchoring.

Next month, we'll talk more about flood hazard areas and buoyancy, other kinds of anchors and "does a home really need anchors anyway?" Any comments or suggestions, please contact George Porter, Manufactured Housing Resources, P.O. Box 9, Nassau, DE 19968.