Feeling Strapped And Going Nowhere?

By George Porter

This is exactly the feeling you want if you happen to be a person inside a HUD code home. 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 thirty years, and having installed hundreds and hundreds of homes, all of them in a hurricane zone, at least from '76 to '94, 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 eleven years ago, I attended a meeting in which Robert Fuller (then Director of Manufactured Housing, at HUD) 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 is that the homes are 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 in 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 held in Delaware and all of that state as well as the entire Eastern Shore of Maryland and Virginia are located squarely in the middle of the hurricane zone. You must realize this was using the pre >94 Wind Zone map. On July 13, 1994, HUD issued a new Wind Zone map and this area was de-rated to Wind Zone 1. (apparently we are not going to have any more hurricanes???) According to what we 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 discomforting as when a government official is right, you're wrong, and he is talking to you.

This was just about the time I decided to start giving seminars on installation and 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 needed to know. Locke was giving seminars for Minuteman on the proper anchoring of manufactured housing in the very early '70's, long before the HUD code ever existed. He, in fact, was promoting the standards that HUD eventually adopted. Locke has since gone on to other areas of the industry but I am still grateful for his help. 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 a 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. Keep in mind that there are criteria for anchoring systems.

The entire system must be rated at a working load of 3,150 lbs. and withstand a 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, or a stabilizer plate, which is much more commonly used, the head of the anchor will probably move 3" to 6" through the top of the ground. Now if your foot weights 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, 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. Additionally, at a 45 degree angle, the anchor must be 1/3 longer to be the same depth as if it were straight into the ground. This is important because it is the dirt above the anchor that keeps it in the ground and if it is not deep enough it will not work as intended.

I see 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 into this hole does anybody out there think it would be hard to pull out? Even if the ground is heavily tamped as the dirt is replaced in the hole, I really don't think it is as good as the helix screwing itself into the ground. When you screw an anchor into the soil you leave about 3 inches of undisturbed soil between each cut of the helix as it goes down. This is what makes the anchors work from the moment it is installed.

Some people put anchors in the wet concrete when they pour the footings, runners, or slabs. This can pose several problems. In many cases, the anchor strap goes straight up to the I-beam. This definitely holds the home on the ground and resists any upward forces, however lateral forces, or the wind blowing on the side of the house, are a major factor. You need some kind of lateral resistance in order to keep the home on the piers. This can be accomplished by having an additional anchor strap from the same anchor head run to the opposite I-beam of the same chassis and one over there coming back, creating an "X" between the two frame members. These lateral straps in addition to the original vertical strap from each beam down will cover both loads. A single strap could be used if the angle between the anchor and frame is 45 degrees " five degrees. If the angle exceeds this and the straps start becoming more vertical, the anchor will have to be moved away from the frame 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. So... you have two loads on the anchor, one vertical and one horizontal. At 45 degrees of strap angle from the beam to the outside of the home, you take care of both loads. If you can't get the 45 degrees then divide the load between two straps per anchor, one vertical and one horizontal.

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 at the bottom that you imbedded in wet concrete you may have a problem. Remember each strap has to be able to resist a working load of 3,150 lbs. and a momentary 50% overload. The only thing holding this anchor is the concrete footing, and the

weight of the footing is the only thing that's keeping the footing on the ground. It is not locked there in any measurable way. Consequently, if you figure how many pounds of concrete it takes to resist the load, you will find that it takes a little more than 1.17 cubic yards. Unfortunately 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 test the soil with a 5 foot rod called a soil probe) 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 a while 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 and an engineer comes to inspect it, he won't care how long you've been doing this work. 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 homes you are installing has a few ideas about anchoring as well as all manufacturers of anchoring equipment, and then there's HUD, and they've got a lot of ideas about anchoring.

There are at least a dozen ways to make an anchor not work and still have it look like the home is anchored. You might not have the strap going to the top of the beam or you might not have 4+ wraps around the split bolt or the strap might not be certified, and perhaps the anchor is the wrong class for the soil type, lateral angle from the beam to the anchor might not be 90 degrees and the beam cuts the strap...and much more.

Anchors do work, but they must be done with lots of attention to detail. Close counts in horseshoes but not in anchoring.