Manufactured Home Update

Oregon Department of Consumer & Business Services ■ Building Codes Division June 1997

New requirements for temporary storage of manufactured Homes

By Brian Lamb and Albert Endres

Section 301 (b) (2) and subsection (o) are new additions to the Oregon Manufactured Dwelling Standard, effective April 1. These sections of OMDS deal with temporary storage of manufactured homes. The new language states:

"When a manufactured dwelling is placed temporarily on display or in storage by a manufacturer, dealer or distributor in excess of 30 days, the owners shall assure the manufactured dwelling is:

(1) Adequately supported under each main frame beam by a minimum of four supports, located within 2 feet (.61 meters) from each end and within 8 feet (2.43 meters) of the front and rear axle; and

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Inside

Alternate construction (AC) update

By Anthony Clifton

For more than two years, Building Codes Division has been tracking homes produced under alternative construction (AC) approvals. Four different manufacturers produce alternative construction homes. These homes are identified by an "AC" tag and are accompanied by specific installation instructions. Once the AC home is installed at its final destination, a special inspection by BCD follows to ensure that the specific installation instructions have been followed.

In many instances, results of the special inspection have been alarming, showing that installers and contractors doing the fieldwork aren't aware of the special instructions, don't understand the special instructions, or fail to follow them.

Inside each AC home is a packet with the home's installation manual that includes all the details of the alternate construction. This packet contains all the information needed by installers or contractors to complete the alternate construction correctly.

If there are questions about AC details, contact the manufacturer or Tony Clifton at BCD. Once the alternative construction is complete, the packet must be left on-site for the special inspection. Failure to complete the installation correctly leads to costly rework and — in some cases — to reinspection fees.

To arrange for a special AC inspection or to discuss AC construction details call Tony Clifton, (503) 378-2620. ■

Unique installation requirements and the 1997 OMDS

By Al Rust

Although the OMDS covers most of the basic issues that affect home installation, many manufacturers have unique requirements for installation of portions of their homes that differ from OMDS. Requirements vary from factory to factory. If a manufacturer has unique requirements, it is important that dealers and installers know about them. The performance of the home and the warranty could be affected if unique installation requirements aren't met.

Inspectors in the installation monitoring program attempt to keep current about unique requirements and will address them in their inspection reports. They want to bring unique requirements to the attention of all involved parties to ensure the best-possible installation of homes.

When manufacturers' unique requirements are not covered by the state code, it's important that they be communicated clearly to purchasers and installers so that important details aren't missed during installation. In some cases, unique requirements have been written into the code. For example: the different ridge-beam connection details in Section 306 (c) (5) Notes.

OMDS sections 301 (e) and (f) address unique installation details and require notice to the local jurisdiction that the manufacturer's requirements will be used for a portion of the installation. When the manufacturer's requirements are used for unique installation details, the manufacturer's installation instructions are to be left on-site so that inspectors can use them to verify that unique construction details have been correctly installed. ■

New Reqirements *continued from Page 1*

(2) Sealed to resist exposure of the interior of the manufactured dwelling to the elements.

The new standard became necessary after numerous cases of home damage were directly related to improper blocking or lack of attention to inadequate close-up material, or both. Lack of blocking for an extended period leads to warping of floors, walls, beams, and trusses. It also creates stress cracks in walls and ceilings. Even frames can be affected by unsupported loads, when blocking isn't properly used to support the weight of the home. Wood under stress sometimes develops memory and does not return to its original shape when the home finally gets set. Failure to maintain close-up material leads to major water damage to homes left exposed during wet weather. Substantial damage may occur in a short time.

To meet temporary storage requirements, home manufacturers have been asked to voluntarily label homes with the date that the unit left the manufacturing facility and the name of the dealer that ordered the home. Temporary blocking requirements take effect 30 days from the date shown on the home's label, regardless of how many times the home is moved.

As with any change, it takes time to adjust to new requirements and iron out the wrinkles. For the first couple of months of implementation, Building Codes Division will work with owners to assure compliance.

BCD monitors temporary storage lots. If homes are not in compliance with OMDS 301 (o), the owner of the home (manufacturer or dealer) will be notified. Blocking or repairs (or both) are required within 30 days, per OAR 918-500-0420. BCD must be notified in writing when repairs or blocking are completed. Homes at manufacturer's facilities are monitored by in-plant BCD inspectors.

It is imperative that homes be blocked when stored longer than 30 days to assure the integrity of the home is not compromised by the elements or undue stress, especially given the present designs and weights of manufactured dwellings. It is equally important that the homes are checked on a regular basis to assure that proper close-up is maintained.

If you have further questions or comments on temporary storage requirements, please contact Brian Lamb, 503-378-3731. ■

Manufactured dwelling securement

By Patrick D. Lewis

The Technical Advisory Group (TAG) is often asked why manufactured dwellings are not required to be anchored to a foundation when site-built houses are. Some think that because a manufactured dwelling and a site-built house are both single family dwellings, they should be treated equally with respect to anchoring. This sounds reasonable until you start exploring the differences between the two structures and their codes.

Both codes are based on the same general wind speeds and the worst-case scenarios for the type of structure regulated. However, there are some significant differences:

• Site-built housing may use the foundation as an anchor or as part of shear resistance, while manufactured dwellings are engineered to resist the horizontal wind loads without depending on foundation anchoring.

• Manufactured dwellings are engineered to resist the horizontal wind loads for anywhere in Zone I, a wind zone established in federal Manufactured Housing Construction and Safety Standards. Zone I includes most of the US. Site-built housing is only required to meet the wind loads of one specific site.

• Manufactured dwellings, because they are limited to one story, a given size, shape and maximum height, have a low profile and less wind exposure. On the other hand, site-built houses, theoretically have no limitations on size, height, or roof pitch, and quite often have a high profile of two or more stories, resulting in much greater wind exposure.

Recently, anchoring requirements in the federal Manufactured Housing Construction and Safety Standards received an in-depth review. The anchoring requirements for hurricane zones — Zone II and III — were significantly upgraded. Requirements for Zone I, including Oregon, were found to be adequate for resisting horizontal wind loads.

Oregon Building Codes Division has also been studying manufactured dwelling anchoring and recently added new anchoring requirements to the 1997 Oregon Manufactured Dwelling Standard (OMDS) for recessed porches more than 70 square feet in area, regardless of the home's location in the state. DCB is also working on a new engineering analysis of the current wind zone and anchoring requirements for manufactured dwellings, because the current OMDS is based on engineering data 20 years old. For more information on current anchoring requirements, see 1997 OMDS, section 307. ■

Are the ducts tight?

By A. B. Boe

Specifications for ventilation systems in Super Good Cents/Natural Choice homes changed in April. The ventilation systems which will replace window slot vents draw outside air into the home through a fresh air duct connected to the furnace return grille. Air is distributed to each room through the heating system ducts.

Ventilation system changes took place after tracer gas and smoke testing verified that outside air actually does get delivered to each room when the whole house ventilation system runs.

In other words, duct systems in energy-efficient manufactured homes are performing two important roles: they deliver the heat (and cooling, if installed) and they deliver fresh air to the home.

By the way, the new Super Good Cents ventilation systems will not work if a HVAC installer disconnects the furnace's air duct to install an air conditioner cooling coil. If the air-intake duct is disconnected, the home gets no air. Customer service people: check the indoor unit. Do not let a HVAC person disconnect the house air. An energy-efficient home without ventilation is a recipe for disaster.

Duct tightness and energy performance

In trainings and in site inspections, we emphasize duct tightness. Most people understand that if ducts leak, the homeowner loses heat when the furnace runs. Because furnace blowers force air through ducts under extremely high pressure, small leaks result in major energy losses. Forced-air duct leaks can lose heat faster than any other building component.

Duct tightness and health

Many people do not understand that even when their furnaces are turned off, duct leaks cause problems for our budgets and our health.

In homes with leaky ducts, when the whole-house ventilation fan runs — or any other fan or dryer —

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Guest Opinion

Contractor certification: What's in it for you?

June Gray, MDI 801

Have you ever felt the satisfaction of knowing that your work meets or surpasses the standards developed by our state? Have you ever stood back to review your work and known that it was simply awesome? If so, step right up to that finished work and attach your certification tag with pride. You earned it!

By requiring all of us to attach certification tags to homes that specify what work we have completed, the code protects the integrity of our profession. A non-certified contractor performing foundation support, stand preparation, skirting, etc., is an injustice to our profession overall and each to us individually. Certified contractors, dealerships, and consumers should all refuse to tolerate non-certified contractors doing the work of certified contractors.

The guidelines are in place. It is our responsibility to make them work.

Are the ducts *continued from Page 3*

inside air pressure becomes lower than outside air pressure, and outside air comes into the home through any hole it can find, seeking to neutralize the pressure difference created by the fan.

Yes, under negative pressure conditions, air will come in through the fresh-air duct to the furnace, as we want it to. But air doesn't care. Air will come into the home through leaks in heat ducts, too. (Given a negative pressure environment in a home, air will even come down a fireplace flue!)

Because forced-air ducts are in the belly and crawlspace, the air that comes in through duct leaks is belly/crawlspace air. We should not be building and installing duct systems that bring air from the belly or crawlspace into homes.

Belly air is contaminated with microscopic fiberglass and dust that can harm lungs. The belly can contain rodent feces and urine. If plumbing leaks have occurred, or if the home has been moisture-damaged in storage or transit, molds can grow in the belly and be pulled into a home through duct leaks. Some molds cause serious respiratory problems. Duct leakage can contribute to serious health problems for some people.

Moisture in the belly, combined with heat from the ducts can lead to outgassing of formaldehyde from building products used in floor construction. Moisture itself is considered a pollutant that can lead to mold growth inside the home, if moisture levels are high enough.

Ducts should be tightly constructed at the factory. The new 15-mil butyl-backed tape needs to be carefully applied. Boots and ducts need to be aligned so the attachment can be made secure. The connection of the furnace to the duct is particularly critical. Super Good Cents technical representatives are working with manufacturers to improve duct tightness.

Installers should realize that the heat crossover connections they make are critical to heating system efficiency and health of occupants. Manufactured dwelling installers need to make sure V-boxes and elbows are tightly connected (mechanically fastened and air sealed) to duct collars. Inner duct liners must be mechanically fastened and taped to the V-boxes or elbows. The outer liner protects the duct from conductive heat loss and must be mechanically fastened to the drops and taped to the belly to minimize rodent infestation.

As one OSU inspector puts it, "The dadburn ducts better be tight." ■

Low-flow toilets in manufactured homes

By Mark Campion

In the early 1970s, national toilet standards or "watersaver standards" began limiting average water consumption to 3.5 gallons per flush, with a minimum internal trap size of 2.5 inches and a minimum water seal area of 8 inches by 7 inches. Prior to this, most toilets used 5.5-8 gallons per flush and had larger trapways and water surface areas.

There were, of course, some growing pains associated with the new standard. Toilet manufacturers initially decreased the capacity of the tank without design changes to the water seal area or trapway size. This led to inefficient extraction, blockages, and little reduction in water use because homeowners flushed twice.

By 1982, toilet manufacturers and the American National Standards Institute (ANSI) developed some minimum performance standards to insure water savings with efficient extraction and no clogged or blocked drains.

Performance problems declined for a time, then reappeared in 1994 when the National Energy Policy Act took effect (although it was no more stringent than the 1990 ANSI standard) and lowered water consumption to 1.6 gallons per flush, with a minimum trap size of 1.5 inches and an minimum water seal area of 4 inches by 5 inches. The new watersaver standard appears to have caused the reappearance of performance problems for some homeowners. So, although the factory-installed toilet meets code, poor performance may occur due to the following:

• Small trap way sizing, leading to blockages and incomplete evacuation of waste

• Small water seal surface, leaving smear marks above the seal surface on the inside of the bowl; (however, the larger the water seal surface area, the greater the reduction in performance)

• Bad casting of the bowl at the trap way, creating hang-ups or blockage of waste; (technically non-compliance with the code)

Although it's contrary to code to retrofit an older 3.5 gallon toilet instead of replacing it with a newer model, there are some solutions that dealers, factories, and homeowners should be aware of:

• Check field-installed waste-line slope. Slope should be a minimum of 1/4 inch vertical drop per foot of horizontal run. Typical 1.6 gallon toilets do not push waste down the drainline as far as 3.5 gallon toilets do — 40 feet vs. 50 feet. Please note that even a correctly graded waste line will not necessarily solve the performance problems.

• Check the level of the float. Adjust the float so that the maximum amount of water is being used per flush.

Flush twice. Unfortunately, this defeats the purpose of the watersaver standard and the homeowner has to wait while the tank refills. And of course this can be awkward if the toilet trapway is blocked.

• Assume bad casting in the trapway is responsible and replace the toilet with one of the same type.

• Replace the unit with a toilet that has a larger trapway (typically 2 inches) or of different trapway design. Not all toilets are equal

• Replace unit with a toilet that has an air pressure tank. These are effective, but more expensive and noisier. These are typically called flushometer toilets, differing from standard gravity-fed fixtures. ■

Reminder about new minimum clearance requirements

By Anthony Clifton

A new minimum clearance of 18 inches, measured from the top of the continuous footing or slab to the underside of the frame is now required by the 1997 Oregon Manufactured Dwelling Standard, effective April 1.

In homes supported by individual footings, the measurement is taken from the ground to the underside of the frame. Last year's standard allowed a 12-inch minimum clearance. Twenty-five percent of the home may have less than 18 inches of clearance.

In addition, the minimum clearance between the lowest member of the mainframe (I-beam) in the areas of the utility and heat duct crossover is now 18 inches.

See 1997 OMDS section 304 (g) and (i). ■

Constructing and reinforcing continuous footings

By Larry Giardina

Continuous footings are probably the best footings available for manufactured homes, but during inspections over the winter and this spring, I've noticed even continuous footings cracked or otherwise damaged.

In some cases, continuous footing damage seems to have resulted from bad ground conditions caused by the weather at the time the footings were constructed. In other cases, footing damage seems to have occurred during installation because too much weight got concentrated in too small an area. Also, footing damage sometimes occurs because footings have not been properly reinforced.

To repair or not to repair

A crack or break in a footing does not necessarily require repair. If the crack or break isn't directly under a pier, and the size of pieces of footing left under piers meet the minimum footing requirement, no repair is needed. If the crack is under a pier, the location of piers may be adjusted somewhat, while minimum spacing is maintained. If the pier location cannot be adjusted, a crack can be spanned with a single precast concrete pad or pressure-treated wood footing under the pier. If the footing has separated and sunk under a required pier location, a repair of the footing may be needed.

Site conditions influence footings

Ideally, site conditions at the time of footing construction and home installation should influence how footings are built. If installations occur when the ground is saturated with water, gravel may be necessary to add stability to saturated soils. Adding more cement to the concrete mix or pouring thicker footings will certainly strengthen them. Waiting longer than the seven-day minimum before moving the home onto the footing also adds strength. Adding a concrete accelerator speeds up curing time in cold weather — but adding water to the mix weakens the concrete and the footing.

Carefully ramping a home's wheels onto footings reduces the potential for edge cracking. Use wide blocking under jacks and distribute the home's weight over as many points as possible to reduce the potential for cracks at jacking points.

Footing options

Reinforcing the footing properly will also help avoid footing damage. Oregon Manufactured Dwelling Standards recognize and approve a number of different continuous footings. If 4-inch-thick footings are used, they must be a minimum of 48 inches wide, and must either be reinforced with 10-gauge 6" x 6" wire mesh centered vertically in the footing or bolstered with approved fiber. If 6-inch-thick footings are used, and the footing is 48 inches wide or wider, footings must still be reinforced with either 10-gauge 6" x 6" wire mesh approved fiber, or re-bar. If rebar is used in 6-inch-thick footings, two rows of #4 rebar must be installed, centered vertically in the footing, and centered beneath pier locations. If 6-inch-thick footings are used, and the footing is a minimum of 18 inches wide but less than 48 inches wide, reinforcement requirements call for two rows of #4 rebar, centered vertically in the footing, and located beneath pier locations.

Installing rebar

The language in OMDS about rebar location in 6-inch-thick footings says the reinforcing bars must be "centered beneath the pier locations." In response to questions about what that means, this language has been informally interpreted by the Technical Advisory Group to mean under ALL pier locations: centerline, I-beam and perimeter. If the perimeter support is provided by a block wall, or structural framed wall, rebar is required beneath them. Current language also requires a minimum 10-inch space between rows of rebar, with the first row of rebar no closer than 3 inches from the edge of a footing. The main idea is get two rows of rebar beneath each row of piers.

Centering the rebar under the piers may not be as simple as it sounds. Contractors who set and pour footings may not know where the perimeter, I-beams, or centerline will be. If a perimeter foundation will be used, rebar goes nearer the edge, to spread the perimeter loads. If inset perimeter piers are used, rebar goes further in so it can be centered beneath the inset piers. There's a real need for accurate information about home dimensions and support system strategy to be communicated to the footing installer early in the process.

Selecting the most appropriate continuous footing type, careful placement of rebar beneath the piers, observing the minimum concrete curing times and taking care while the home is positioned on the footing will help prevent most cracking and breaking problems. ■

Circuits: 15-amp vs. 20-amp

By Mark Campion

Homeowners may complain that using vacuum cleaners dims their lights momentarily, that circular saws trip exterior GFI-protected circuits, or that they can't hang five strings of Christmas lights without all the lights in the house going out. Similar problems occur when a homeowner turns an extra bedroom into a home office. Computers, fax machines, copiers, answering machines and printers cause a tripped breaker.

These problems are not always the result of electrical non-compliances. They may be simple cases of overloaded circuits. The carrying capacity of a 14-gauge, 15-amp circuit can be stressed when too many appliances and fixtures, or even a single high-load appliance, are being used. Circuits that are GFI-protected are prone to trip even sooner than an unprotected 15-amp circuit would. Once tripped, the breaker calibration is altered so that subsequent loadings may cause more frequent tripping.

Some appliances, such as vacuum cleaners, will initially draw enough power to produce momentary dimming of lights, but this is to be expected. Some homeowners aren't aware that overhead lights are on the same circuit that vacuum cleaners use.

Dealer sales personnel could inquire about the homeowner's intended electrical usage (home offices, power tools, etc.), and steer consumers to electrical upgrades offered by the factories. Homeowners may add another circuit such as a 20-amp circuit with 12-gauge cable, great for an exterior receptacle for power tools and those multiple strings of Christmas lights. Same thing for the home office. Under most conditions, a 20-amp circuit will handle even the most ambitious homeowner's power demands.

Selling electrical upgrades can be profitable and is a way of pre-empting homeowner complaints. Remember: After-sale alterations require permits, and only licensed electricians can do the work. ■

New Web site invite

The Oregon Manufactured Housing Association invites you to tour their Web site on the Internet: *www.omha.com*.

This new Web site has been generating a lot of response since its inception in June 1996. Visitors can access a wealth of information about manufactured housing, including a list of Oregon retailers, factory tour information, a construction standards code chart comparing manufactured homes to site-built homes in Oregon, consumer buying tips, and links to the manufactured housing global network. Also available for the asking is a general information packet on manufactured homes. ■

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Ridge caps and transport plastic

By Brian Lamb

Roof shingle blow-off, roof leaks, and skylight leaks are the usual reasons we conduct consumer assistance inspections. We often find that the missing shingles are not the factory-installed three-tabs, but the set-up crew's ridge caps.

High wind is always a factor in shingle failures. Installers closing the roof up with the ridge cap need to be aware which direction wind and weather come from. Ridge cap shingles can respond like kites, catching the wind on the trailing edge of the shingle. They should be installed so that prevailing winds blow the trailing edges down, not up. Ridge cap is also installed outdoors, year round in all kinds of weather and may need to be hand-tabbed in colder conditions or in high-wind areas.

Shingle blow-off also occurs during transportation of homes. To prevent this, manufacturers apply netting or plastic at the front edge of homes and at the forward side of roof dormers to combat wind.

Although it is important that the plastic be secure during transport, factory workers need to know that basic overkill with a staple gun makes life miserable for whoever has to seal the staple holes. When plastic is stapled into dormer valleys with enough staples to build a new home, chances for roof leakage are greatly increased. I've seen roofs that had to have sections cut out in order to remove the shingle securement plastic.

The minimum number of fasteners needed to secure shingles for transport should be used. More is not better.

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