



U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
WASHINGTON, DC 20410-8000

ASSISTANT SECRETARY FOR HOUSING-
FEDERAL HOUSING COMMISSIONER

APR 6 2005

REC'D APR 06 2005

MEMORANDUM FOR: Robert Solomon, Project Manager, National Fire Protection Association

FROM: Elsie Draughn, Manufactured Housing Specialist, Office of Manufactured Housing Programs

SUBJECT: Manufactured Home Construction & Safety Standards; Proposed Rule (FR-4886-P-01)

Attached are the public comments that were received on the above referenced rule. Although the AO contract does not require the consolidation of these comments for the use of the Manufactured Housing Consensus Committee, the Office of Manufactured Housing Programs is making these available for the Consensus Committee.

Attachments: 29 Public Comments

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Dece

Agency : HOUSING AND URBAN DEVELOPMENT DEPARTMENT

Title : Manufactured Home Construction and Safety Standards

Subject Category : Manufactured home construction and safety standards: Manufacturing Housing Consensus Committee recommendations

Docket ID :

CFR Citation : 24 CFR 3280

Published : December 01, 2004

Comments Due : January 31, 2005

Phase : PROPOSED RULES

How To Comment : Interested persons are invited to submit comments regarding this rule to the Regulations Division, Office of General Counsel, Room 10276, Department of Housing and Urban Development, 451 Seventh Street, SW., Washington, DC 20410-0500. Interested persons also submit comments electronically through either: The Federal eRulemaking Portal at: http://www.regulations.gov; or The HUD electronic Web site at: http://www.epa.gov/feddoc Follow the link entitled View Open HUD Dockets. Commenters should follow the instruction provided on that site to submit comments electronically. Facsimile (FAX) comments are not acceptable. In all cases, communications must refer to the docket number and title. All comments and communications submitted will be available, without revision, for public inspection and copying between 8 a.m. and 5 p.m. weekdays at the above address. Copies also available for inspection and downloading at http://www.epa.gov/feddoCKET.

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Step 1 : Comment Form

Title	First Name	Last Name
Mr.	Robert	Park's
Organization Name	Parks Mobile Air	
*Mailing Address	111 Green Rd	
*City	*State	*Postal Code
West Monroe	Louisiana	71291
*Province	*Country	
	UNITED STATES	

HUD RULES DOCKET

DEC 28 11 09 AM '04

REC'D

*Comment

Parks Mobile Air, LLC

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"Giving A Little More Than Expected"

Ph. 800-298-4023 Fax 318-397-0455 Bobby@Parksmobileair.com

Enclosed

One copy of public response to

[FR Doc. 04-26381]



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Author : Mr. Robert Parks

Organization : Parks Mobile Air

Mailing Address : 111 Green Rd
West Monroe, LA 71291
US

Comment : 3280.103(b) I would strongly disagree with these changes (in part). Specifically 3280.103(b)(1) ventilation. (b)(1) The ventilation capacity shall be permitted to be provided by a mechanical combination passive and mechanical system. The ventilation system or provisions for ventilation shall not create a positive pressure in Uo value Zone 2 and Zone 3 or a negative pressure in Uo value Zone 1 in excess of 0.03 inches of water.

First) This portion of the Standard deals with the Whole House Ventilation system which is designed to provide the positive and negative references are to determine the proper direction of the movement of air (6. 24 CFR 3280) through the ventilation system itself.

Published April 21, 1994 in the Federal Register Interpretative Bulletin for Manufactured Home Construction

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Office of the Assistant Secretary for Housing-

Federal Housing Commissioner

[Docket Nos. R-94-1497; FR-2622-N-06;

and R-94-1632; FR-3380-N-05]

24 CFR Part 3280

Interpretative Bulletin for Manufactured Home Construction and Safety Standards

(In part and directly applicable)

6. 24 CFR 3280.103(b)(3)-It is also stated that such systems must be "balanced" so as to avoid unbalanced pressure. Isn't it true that a balanced system would not have any positive or negative pressures? Is this two ways of saying the same thing, or are both stipulations necessary? If both stipulations are necessary, please refer to the answers in Questions 4 and 5 for a balanced system, for example, is considered balanced when the fan capacities are equal. A passive system, for example, is considered balanced when the fan capacities are equal. A passive system, for example, is considered balanced when the fan capacities are equal. A passive system, for example, is considered balanced when the fan capacities are equal. In actuality, however, it is recognized that the deliberate movement of air causes unbalanced pressure

the reason for the prescription on positive and negative pressures.

Secondly) A pressure imbalance is defined as the measurable difference between two ambient air bodies.

If a pressure imbalance is detectable, this would indicate that air is being forcefully displaced from one ambient air mass to another at a rate greater than the designed pathways are capable of sustaining. When this happens, air is then forced to pass through the path of least resistance in the building envelope, this often becomes areas within the structure which are not designed for such as electrical pathways, cracks in the building envelope, windows and doors.

Example:

A) A very tightly constructed home may have a detectable negative pressure caused by turning on the vent-a-hood. But, if the window is only slightly raised, the detectable negative pressure disappears.

An other scenario,

B) A home with a higher ventilation rate (ie leakier structure) and the vent-a-hood on, may have a detectable negative pressure. In fact, a HVAC duct system could be losing a considerable amount of air before any measurable pressure imbalance would be detected. While at the same time a considerable amount of outdoor air would be penetrating through the structure's envelope. In the Hot Humid Climate of Thermal Zone 1, this WILL be detrimental to the structure. Summary Due to the extremely high dew points of the Hot Humid Climate in Thermal Zone 1, the opportunity for excessive air infiltration that this allowable / detectable pressure imbalance create WILL be detrimental to homes sited within Thermal Zone 1. The opposite theory (positive pressure) applies in homes sited in Thermal Zones 2 and 3. This would be on a lesser scale for a larger variety of geographical locations.

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[FR Doc. 04-26381]

3280.103(b) I would strongly disagree with these changes (in part). Specifically ° 3280.103 Light and ventilation. (b)(1) The ventilation capacity shall be permitted to be provided by a mechanical system or a combination passive and mechanical system. The ventilation system or provisions for ventilation shall not create a positive pressure in Uo value Zone 2 and Zone 3 or a negative pressure condition in Uo value Zone 1 in excess of 0.03 inches of water.

First) This portion of the Standard deals with the "Whole House Ventilation" system which states that the "positive" and "negative" references are to determine the proper direction of the "deliberate movement of air" (6. 24 CFR 3280) through the ventilation system itself.

Published April 21, 1994 in the Federal Register Interpretative Bulletin for Manufactured Home Construction
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Office of the Assistant Secretary for Housing-
Federal Housing Commissioner

[Docket Nos. R-94-1497; FR-2622-N-06;
and R-94-1632; FR-3380-N-05]
24 CFR Part 3280

Interpretative Bulletin for Manufactured Home Construction and Safety Standards
(In part and directly applicable)

4. 24 CFR 3280.103(b)(3)-This section requires whole house ventilation, but limits the positive or negative pressures, depending on the thermal zone. What is meant by "Mechanical systems shall be balanced?" **Answer:** The capacity of the intake fans shall be the same as the exhaust fans.

5. 24 CFR 3280.103(b)(3)-Would the equipment for Zones 1 and 2 have to be different? Does this mean a house constructed to Zone 2 insulation cannot be shipped to thermal Zone 1 because of the ventilation system?

Answer: It doesn't have to be different. A Zone 2 home with a balanced mechanical system would be acceptable in Zone 1. Manual or fixed louvers would be acceptable in both zones. One way registers (i.e. those which react to pressure) have to be appropriate to the zone. In Zones 2 and 3, a one way register should be set to relieve a positive interior pressure. In Zone 1, a one-way register should be set to relieve a negative interior pressure.

6. 24 CFR 3280.103(b)(3)-It is also stated that such systems must be "balanced" so as to release any "unbalanced pressure." Isn't it true that a balanced system would not have any positive or negative pressures? Is this two ways of saying the same thing, or are both stipulations necessary?

Answer: Both stipulations are necessary. Please refer to the answers in Questions 4 and 5 for a base reference. A system, for example, is considered balanced when the fan capacities are equal. A passive system is balanced when the system can be expected to release any unbalanced pressure. In actual situations, however, it is recognized that the deliberate movement of air causes unbalanced pressures and this is the reason for the prescription on positive and negative pressures.

Secondly) A “pressure imbalance” is defined as the measurable difference between two distant ambient air bodies.

If a pressure imbalance is “detectable”, this would indicate that air is being forcefully displaced from one ambient air mass to another at a rate greater than the “designed pathways” are capable of sustaining. When this happens, air is then forced to pass through the “path of least resistance”. In a building envelope, this often becomes areas within the structure which are not designed for air passage such as electrical pathways, cracks in the building envelope, windows and doors.

Example:

A) A very tightly constructed home may have a “detectable negative pressure” caused by simply turning on the vent-a-hood. But, if the window is only slightly raised, the “detectable negative pressure” disappears.

An other scenario,

B) A home with a higher ventilation rate (ie leakier structure) and the vent-a-hood on, may have no “detectable negative pressure”. In fact, a HVAC duct system could be losing a considerable amount of air before any “measurable pressure imbalance” would be detected. While at the same time, a considerable amount of outdoor air would be penetrating through the structure’s envelope. In the “Hot Humid Climate” of Thermal Zone 1, this WILL be detrimental to the structure.

Summary

Due to the extremely high dew points of the Hot Humid Climate in Thermal Zone 1, the opportunity for excessive air infiltration that this “allowable”/“detectable” pressure imbalance would create WILL be detrimental to homes sited within Thermal Zone 1. The opposite theory (with positive pressure) applies in homes sited in Thermal Zones 2 and 3. This would be on a lesser scale due to the larger variety of geographical locations.

Defining points:

Even minor duct leakage can cause a negative pressure to develop inside the home, which causes humid outdoor air (Hot Humid Climate-Thermal Zone 1) to be pulled through the wall structure at the "path of least resistance". When this humid air makes contact with the cooler indoor surfaces, condensation occurs. If moisture persists for as little as 48 hours, fungal growth then has an opportunity to prosper.

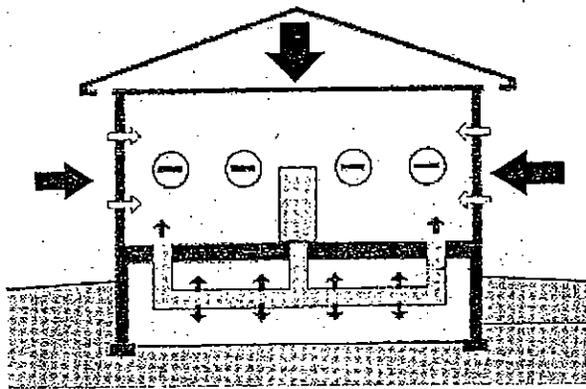


Figure 2 A home operating with a system as above will certainly operate in a "negative pressure condition".

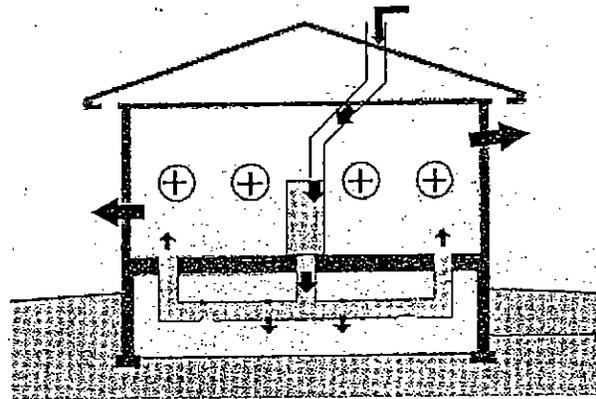


Figure 1 A fresh air vent is designed into the home's a/c system to add fresh air that can be processed before entering the living space of the home. By adding this fresh air at a greater rate than duct leakage, we are able to pressurize the home and push "mother nature" outward.

A home that is lacking the proper ventilation system as required by 3280.103(b)(3) as shown in figure 8 and therefore could not be substantiated as required by 3289.103(b)(7).

(In Part) The ventilation system or provisions shall not create a positive pressure in Uo value Zones 2 and 3 or a negative pressure condition in Uo value Zone 1.

Interpretive Bulletin: Question 24 CFR 3280.103(b)(3)-It is also stated that such systems must be "balanced" so as to release any "unbalanced pressure." Isn't it true that a balanced system would not have any positive or **negative** pressures? Is this two ways of saying the same thing, or are both stipulations necessary?

Answer: Both stipulations are necessary. Please refer to the answers in Questions 4 and 5 for a base reference. A system, for example, is considered balanced when the fan capacities are equal. A passive system is balanced when the system can be expected to release any unbalanced pressure. In actual situations, however, it is recognized that the deliberate movement of air causes unbalanced pressures and this is the reason for the prescription on positive and negative pressures.



CHAMPION

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January 25, 2005

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Washington, D.C. 20410-0500

2

HUD RULES DOCKET

JAN 26 12 17 PM '05

REC'D

Re: Docket No. FR-4886-P-01
RIN 2502-AI12

Manufactured Home Construction and Safety Standards

Dear Sir or Madam:

Champion is encouraged that HUD and the MHCC have worked together to bring forward some long awaited improvements to the HUD code. Champion is generally supportive of the proposed changes with only a few exceptions. Following are our comments in response to the proposed changes and the questions raised by HUD in the referenced December 1, 2004 publication.

1. Formaldehyde Notice. HUD should reconsider its rejection of the MHCC proposal, regarding the deletion of the Formaldehyde Health Notice, in light of current research that is available to support the MHCC recommendation. A study entitled Formaldehyde Concentrations in Manufactured Homes: The Current Situation prepared by the Manufactured Housing Research Alliance and containing data to support the MHCC recommendation was given to HUD at the August, 2004 MHCC meeting. The study concludes that the notice is not needed.

2. Truss Testing. The proposed Subpart E truss testing change should be returned to the MHCC for further evaluation, including further analysis of the cost benefit information that has recently become available. Although the revised statement of Purpose set forth in the 2000 Act requires that "the public interest in, and need for, affordable manufactured housing is duly considered in all determinations relating to the Federal standards and their enforcement." no such affordability analysis was developed by the MHCC for Subpart E.

HUD's indicated cost of \$77.28 for the cost impact of the entire proposed rule could not possibly have considered the cost of the proposed truss testing changes. Current

information from truss suppliers suggests that the actual cost impact could be several hundred dollars per home. The following changes could offset some of the added cost impact without sacrificing public safety.

Proof Load. Continue to allow the 1.75 proof load test. The added costs of eliminating this acceptable test do not appear to be offset by safety considerations.

Uplift Test. Continue to allow testing by loading the bottom cord when the truss is in the inverted position. There appears to be little advantage to the proposed change and the cost and time to implement the change would be excessive.

Deflection Measurement Points. Remove the new proposal to measure deflections "...at each panel point, and at mid-span between each panel point" and retain the current requirement to measure deflection at 1/4 points and mid-span. For short span trusses, mid-span and quarter points allow for an accurate representation of the deflection and would avoid unnecessary added cost.

Dead Load Application. Revise the proposed requirement so that dead load would be added to both the top and bottom chord of the truss only when the bottom chord dead load exceeds 5 psf. Otherwise allow the entire dead load to be applied to the top chord as is currently allowed. For small bottom chord dead loads this added step is not necessary and adds unnecessary testing costs.

Recovery Deflection. Revise the proposal to allow four (4) hours for recovery deflection to reach L/480 or better. Five minutes is adequate time to allow recovery to occur and could eliminate otherwise acceptable designs.

Load Spacing. Change 6 inches on center to an "average of not greater than 12 inches on center". 12 inches on center is more than adequate and will accommodate more of the current test fixtures.

3. Vapor Barrier – The proposed change to allow the vapor barrier on the exterior side (warm side) of the wall in hot, humid climates is very good at first reading. However, it is not practical to require a combined permeance of not less than 5.0 perms for all interior surfaces. In order to make the exception usable, HUD should exclude back splashes in the kitchen, cabinetry in the kitchen and bath, tubs and showers, and paneling below chair rails. Other building codes have no interior wall restrictions at all associated with vapor barriers.

4. One Piece Metal Roof –Footnote 9 on 3280.305(c)(1)(ii)(B) should be revised to eliminate the requirement that HUD approve the test methods. All test methods are already required to comply with 3280.303(c) and (g) and 3280.401, therefore, the addition of this language to the note serves no purpose. The independent third-party approval process is more than adequate for approving test procedures.

5. Testing Method Approvals. DAPIAs should be allowed to approve alternate test

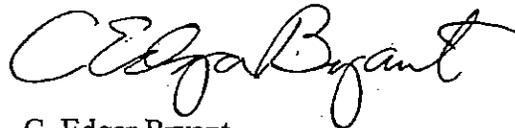
methods rather than limiting approvals to HUD. DAPIAs are already charged with the responsibility for approving all calculations and tests for the home manufacturer.

6. Testing Critical Connections. Additional requirements for testing "critical connections in high wind regions" are not required and should not be imposed. Calculations are ordinarily more conservative than testing. Many connections in all wind regions may be critical and all designs are reviewed and approved by DAPIAs.

7. Metric. HUD should not require metric equivalents. A dual system of measurement units would be confusing, cumbersome, error prone and would take up more space in the standards book. Where a specific situation would be served by use of metric unit then it should be treated as an exception (e.g. Pascals for very low pressures).

Thank you for your consideration of these comments.

Sincerely,

A handwritten signature in cursive script that reads "C. Edgar Bryant".

C. Edgar Bryant,
Vice-President Engineering



Manufactured Housing Association for Regulatory Reform

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January 21, 2005

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451 Seventh Street, S.W.
Washington, D.C. 20410-0500

3

HUD RULES DOCKET

JAN 24 1 14 PM '05

REC'D

Re: Docket No. FR-4886-P-01
RIN 2502-AI12
Manufactured Home Construction and Safety Standards

Dear Sir or Madam:

The following comments are submitted on behalf of the Manufactured Housing Association for Regulatory Reform ("MHARR"). MHARR is a national trade association of producers of manufactured housing. Organized in 1985, MHARR (formerly the "Association for Regulatory Reform") represents manufacturers from across the United States, ranging from small family-owned producers to large publicly-held enterprises. Unlike other groups and trade organizations connected with the manufactured housing industry, MHARR represents only manufacturers subject to regulation by the Department of Housing and Urban Development ("HUD") pursuant to the National Manufactured Housing Construction and Safety Standards Act of 1974 (42 U.S.C. 5401, *et seq.*) ("Act") as amended. Such manufacturers are the parties most directly affected by the cost and enterprise burdens associated with the standards modified by the present docket.

At the outset, MHARR wishes to express its appreciation to HUD for moving expeditiously to publish the initial group of modifications to the Federal Manufactured Home Construction and Safety Standards ("MHCSS" or "standards") presented to it by the Manufactured Housing Consensus Committee ("MHCC" or "Consensus Committee"). The MHCC, established by the Manufactured Housing Improvement Act of 2000 ("2000 Act"), is a vital new institution for both manufacturers and consumers of manufactured housing. It is the centerpiece of a national policy adopted by Congress in the 2000 Act to ensure the continued balance between consumer protection and the affordability of manufactured housing, while transforming the process for the development of MHCSS standards and related regulations from an insular government-based process into a transparent consensus-based process

like that long used for the development of all other residential building standards in the United States. HUD's cooperation with the MHCC, in publishing the standards modifications proposed in the present docket for comment in a timely manner, deserves due recognition.

As a participant in the MHCC consensus process, MHARR is familiar with all of the proposed standards revisions, including those rejected by HUD. With two exceptions, MHARR supports the proposed revisions as published. The exceptions, however, are significant and deserve further public debate and review. Specifically, as is explained in greater detail below, MHARR objects to: (i) the proposed Subpart E testing requirements for roof trusses; and (ii) HUD's rejection of the MHCC's proposed deletion of 24 C.F.R. 3280.309, which currently requires the "prominent" display of a Formaldehyde Health Notice in each manufactured home. **In view of these objections, MHARR asks that the proposed modifications be published as final rules with the exception of Subpart E and that the Subpart E proposal be returned to the MHCC for further consideration and development. MHARR also asks that HUD reconsider its rejection of the MHCC proposal regarding the deletion of the Formaldehyde Health Notice in light of research that has been developed (as described below) and is available to HUD. Such research fully supports the consensus recommendation for the deletion of this standard.**

A. Comments Regarding Subpart E Roof Truss Testing Requirements

Subpart E of the proposed rule would, in part, amend 24 C.F.R. 3280.402 of the current MHCSS standards. As described by HUD in its Federal Register publication, this change would

"provide more stringent initial qualification of truss designs.

* * *

In addition, the proposed rule would also expand and clarify the requirements for follow-up testing to better assure that subsequent production of trusses will meet the requirements of the Construction and Safety Standards. The revised truss testing procedures would also eliminate the present alternative for testing trusses under the non-destructive method, add provisions for limiting dead load deflection to L/480, revise uplift test requirements, and make other changes to the current test methods permitted by the Construction and Safety Standards."

As HUD acknowledges in its Federal Register publication, these amendments are derived from a 1994 study conducted by the National Association of Home Builders Research Center. The proposed revisions were also, as described by HUD, "subjected to the NFPA [National Fire Protection Association] consensus process prior to the MHCC reviewing and recommending them to HUD." **This portion of the proposed rule, however, should be severed from the remaining proposals, rejected by HUD and remanded to the MHCC for further consideration, development and economic impact analysis.**

The revised statement of Purpose set forth in the 2000 Act unambiguously requires that "the public interest in, and need for, affordable manufactured housing is duly considered in all determinations relating to the Federal standards and their enforcement." The 2000 Act implements this mandate, in part,

by requiring that MHCC proposed standards and amendments be submitted to HUD together with an economic analysis (see, section 604(a)(4)(A)(ii)). Notwithstanding this requirement, no such analysis was developed by the MHCC for Subpart E. Rather, the recommended revision was extracted from the proceedings of the NFPA consensus committee and presented to and approved by the MHCC without economic or cost-impact analysis by the MHCC.

This history is significant for two reasons. First, as HUD acknowledges in its publication, the Subpart E proposals derive from research conducted by an arm of the National Association of Home Builders ("NAHB"). NAHB is a trade organization comprised primarily of site-built housing producers and affiliated interests. This membership is in direct competition with producers of manufactured housing for a share of the domestic housing market. Furthermore, manufactured homes are constructed in accordance with Federal standards which, by law, must balance consumer protection and affordability. By contrast, no such balancing is generally required for site-built homes, which are constructed in accordance with state and local building codes. Because of these differences, the NAHB Research Center is not oriented toward the evaluation of manufactured housing technology and has no mandate whatsoever to consider cost-impact in formulating studies or proposing standards.

Second, the consideration of this proposal by the NFPA consensus committee did not result in the production of a cost-impact analysis. Such an analysis is not required by NFPA procedures, nor do NFPA procedures require any specific consideration of the impact of any proposal upon the affordability of manufactured homes to consumers. Consequently, the Subpart E amendment proposed by the MHCC and published by HUD was not developed based upon **any** consideration of the affordability of manufactured housing, was not approved by the NFPA committee based upon **any** consideration of the affordability of manufactured housing, and was not approved by the MHCC based upon **any** consideration of the affordability of manufactured housing. HUD has the opportunity to correct this problem by rejecting the proposed Subpart E standard and remanding it to the MHCC as proposed herein.

While HUD **has** conducted an omnibus cost impact analysis of the **entire** rule published on December 1, 2004 pursuant to the Regulatory Flexibility Act, indicating that the **total** cost per home of **all** the amendments contained in the published rule, including Subpart E, is \$77.28, a rapid response analysis of Subpart E (See copy attached) conducted on behalf of MHARR, however, shows that the per home cost impact of Subpart E alone, is much higher.

There are several reasons that the proposed Subpart E amendment will substantially increase the cost of manufactured homes. First, deleting the proof load test and requiring the destruction test for all tested trusses will increase truss member sizes, thereby increasing the cost of trusses by up to 25%. This result is confirmed by truss manufacturers themselves. In some cases, this will add from \$200 to \$400 to the actual cost per home from the truss manufacturer to the home producer. Of course, this figure will be higher when included as part of the retail cost of the home. Second, the proposed amendment will increase the number of test deflection readings from 3 to as many as 10. This change, according to MHARR's initial study, will increase the cost to perform the required truss testing for each truss design. Third, testing uplift in accordance with the amendment will have a significant cost impact on the truss approval process. The set-up procedure for the proposed test will take 3 to 4 times longer than the current procedure, which will increase the cost for testing a new design from \$200 - \$300 to \$800 - \$1,200 per truss design. As noted above, none of these additional costs were considered by the MHCC and were not, apparently, evaluated within HUD's omnibus cost-impact study.

Nor are these additional costs offset by safety considerations. There have been no documented cases of roof truss failures and only a minimal number of consumer complaints related specifically to roof truss design since the inception of Federal regulation in 1976. Thus, current testing procedures have not been shown to be in any way inadequate. Furthermore, the new requirements would limit existing home designs and preclude new innovative designs by increasing top and bottom cord sizes. With this change, designs such as low-sloped cathedral ceilings, which are today commonplace, would be virtually eliminated. Other limitations, costs and impediments imposed by the amendment are set forth in MHARR's report summary, attached hereto and incorporated in these comments by reference.

In view of the significant costs associated with the Subpart E amendment, its debilitating impact on roof truss and home design innovation and the absence of any failures attributable to existing test procedures, **this proposal should be rejected by HUD and should be returned to the MHCC for further evaluation, including further analysis of its cost impact and necessity.**

B. Comments Regarding the Deletion of the Formaldehyde Health Notice

As part of its initial package of standards revisions, the MHCC proposed the deletion of 24 C.F.R. 3280.309, entitled "Health Notice on Formaldehyde Emissions." This section currently requires the "prominent" display of a Formaldehyde Health Notice in every manufactured home, including sales models. The Notice states, in part:

"Some of the building materials used in this home emit formaldehyde. Eye, nose and throat irritation, headache, nausea and a variety of asthma-like symptoms, including shortness of breath have been reported as a result of formaldehyde exposure. Elderly persons and young children, as well as anyone with a history of asthma, allergies, or lung problems, may be at greater risk. Research is continuing on the possible long-term effects of exposure to formaldehyde."

In recommending the deletion of the Formaldehyde Health Notice, the MHCC correctly observed:

"The materials used in manufactured homes are the same as those used in site-built homes and modular homes, neither of which requires such a health notice. There is no evidence that this health notice is instrumental in protecting the public or in preventing litigation. Since 1985, when the formaldehyde product standards for plywood and particle board became effective, there has been significant progress in lowering formaldehyde levels in manufactured homes. **The Health Notice serves only as a sales deterrent, while contributing to existing misunderstanding by the public regarding health related issues associated with formaldehyde emissions.**"

(Emphasis added).

HUD, in its Federal Register publication of December 1, 2004, rejects this recommended consensus standard revision, stating:

“The MHCC did not provide or reference any data or studies in support of the recommendation to remove the Health Notice requirement and HUD, therefore, has no basis for taking such action. The Construction and Safety Standard that requires this Notice is supported by a substantial factual and scientific record. A determination to no longer require the notice would similarly require substantial factual and scientific support.”

Even assuming **arguendo** the validity of HUD’s legal position on this recommendation – that the Administrative Procedure Act, as construed by case law requires a “substantial factual and scientific record” to contradict the findings that led to the adoption of section 3280.309 -- such a record does, in fact, exist and is available to HUD for purposes of the present proceeding.

In July 2004, the Manufactured Housing Research Alliance (“MHRA”), a research and testing group recognized by HUD’s own Division of Policy Development and Research (“PD&R”), produced a report entitled “Formaldehyde Concentrations in Manufactured Homes: The Current Situation.” This report, provided to MHARR as a member of the MHCC, analyzes both the formaldehyde content of materials used in modern manufactured homes and the emissions levels measured in such modern homes. The report also considers the impact of both the production of larger homes and revised ventilation standards adopted by HUD in 1994. The report concludes, in relevant part:

“There appears to be no justification for maintaining the Health Notice and this provision should be repealed. The Health Notice ... is misleading and its implication that the air in manufactured homes contains dangerously high levels of formaldehyde is outdated and contradicted by the literature, contemporary data and experience. **The levels of formaldehyde present in modern manufactured homes are lower than that recommended by authoritative sources.** Posting of a health notice suggests that under certain conditions, that are not uncommon in new homes, people will suffer ill effects. **For current construction, this has not been demonstrated and no evidence has been found to substantiate such a claim.**”

(Emphasis added).

This report is available to HUD. It provides substantiation in at least three pivotal areas for the deletion of the health notice. First, the study shows that the principal formaldehyde emitting materials used in manufactured homes at the time of the adoption of 3280.309 are today absent from 95% of manufactured homes. Second, the materials that are used in today’s manufactured home construction contain 75-90% less formaldehyde than comparable materials did when this section was adopted. Third, improvements in manufactured home ventilation and the increased size of manufactured homes now help to prevent the accumulation of significant concentrations of formaldehyde. The report thus demonstrates that the factual and scientific record used to support the adoption of the original regulation is no longer

valid or aposite. The only remaining issue with respect to the notice, therefore, is not a factual or scientific question, but rather a policy issue – specifically, should a health notice continue to be required because a small sector of the population is highly sensitive to formaldehyde emissions, resulting in irritant effects but not health impairment. Given the fact that this remaining issue is one of policy, there is no reason that it cannot be addressed within the current rulemaking proceeding.

In analyzing this policy issue, HUD must act in accordance with both the intent and stated purposes of the 2000 Act. HUD, in its Federal Register statement rejecting the MHCC's recommendation, does not dispute the MHCC's finding that a similar health notice is not required for other types of residential housing, such as modular and site-built homes. Nor does HUD dispute, as the MHCC observed, that the materials used in the construction of manufactured homes are the same today as those used in other types of residential construction. As a result, the formaldehyde notice required by section 3280.309 effectively discriminates against manufactured housing and, as pointed out by the MHCC, misleads consumers while serving as a deterrent to the sale and utilization of manufactured homes.

When Congress adopted the 2000 Act, it left intact, as stated purposes of the Act, the protection of "residents of manufactured homes with respect to personal injuries and the amount of insurance costs and property damages in manufactured housing," as well as the protection of "the quality, durability [and] safety ... of manufactured homes." At the same time, however, Congress pointedly added a number of other, equally important, express purposes. The express enumeration of these additional purposes represents a considered statement of national housing policy that is binding upon HUD. Of relevance in the present context is section 602(b)(2) which states that a purpose of the Act is to "facilitate the availability of affordable manufactured homes and to increase home ownership for all Americans." The continued mandatory display Formaldehyde Health Notice, in light of the information presented in the MHRA report, violates this purpose. It impairs the availability and utilization of manufactured homes both absolutely and in relation to other types of residential construction on the basis of information that is no longer valid and based on a possibility of irritant effects that affect only limited segments of the consuming public. **The MHCC recognized this issue and called for the deletion of the mandatory notice. HUD should reconsider and approve this consensus recommendation.**

Thank you for your consideration of these comments.

Sincerely,



Danny D. Ghorbani,
President

cc: Office of Management and Budget (OMB)
Industry Manufacturers

RESULTS OF MHARR RAPID RESPONSE STUDY AND ANALYSIS ON THE
TECHNICAL AND COST IMPACT OF HUD'S PROPOSED
RULE ON 3280, SUBPART E - TESTING

The following are technical and cost concerns with HUD's proposed amendments to the Manufactured Home Construction and Safety Standards Section 3280.402, Test Procedure for Roof Trusses.

The background section of the proposed amendments states that the intent is "to encourage innovative and cost-effective construction techniques for Manufactured Homes"; however, as proposed, the new requirements will limit innovative design, eliminate existing designs, and significantly increase the cost of Manufactured Housing roof trusses.

1. HUD has deleted the reference to ANSI/TPI 1-1990, National Design Standard for Metal Plate Connected Wood Truss Construction, with no replacement reference standard.

All other model-building codes reference the ANSI/TPI as standard to use when designing metal plate connected roof trusses. Accordingly, the ANSI/TPI 1-2002 reference standard should be incorporated into the amendments to insure all designs are calculated to the same criteria.

2. HUD has deleted the 1.75 proof load test for roof trusses, which will significantly impact the industry.
 - a. This deletion is not justified since there are no documented roof truss failures and a minimum number of consumer complaints related specifically to truss designs since the inception of the HUD standard in 1976.
 - b. Deleting the proof load test and requiring the destruct test for all tested trusses will increase truss member sizes, thereby increasing the cost of trusses by up to 25%. In some cases this will add \$200 to \$400 actual cost per home from the truss manufacturer to the home manufacturer. This additional cost is unwarranted considering no truss failures have been documented due to current truss testing procedures.
 - c. Deleting the 1.75 proof tests will limit existing designs and prevent new innovative designs by increasing the top and bottom chord sizes. Designs such as low-sloped cathedrals, which are common design in the industry, will be virtually eliminated.

- d. Deleting the 1.75 proof test for uplift (wind loads) will result in criteria that is more stringent and inconsistent with the other model building codes which require only a minimum test period of 10 seconds for test loads equal to 1.5 times the design wind load. Furthermore, there have been no documented truss failures due to existing design criteria since the uplift testing procedures went into effect in 1994.
3. HUD is proposing that deflection readings be taken at the mid-span, at each panel point, and at the mid-span between each panel point. The existing standard requires deflection readings to be taken at mid-span and at 1/4 points.

Taking readings in accordance with the existing standard provides the designer/engineer with sufficient data to determine if a truss meets the design criteria.

The proposed amendments, which call for taking readings at panel points and at mid-span between panel points will increase the number of deflection readings from 3 to as many as 10. This change will significantly increase the time to perform truss testing and will increase the cost to perform the required truss testing for each truss design.

4. HUD's amendments propose a recovery deflection limit of $L/480$ for simply supported clear spans which is to be measured five minutes after the total live load has been removed.

This recovery requirement is inconsistent with the model building codes, which require recovery of not less than 75 percent of the maximum deflection within 24 hours after removal of the load.

5. HUD's proposed rules change the method for uplift testing and require pulling up on the top chord as opposed to turning the truss upside down and applying the load to the bottom chord.

In 1994 HUD and NAHB ran proficiency tests comparing test that pulled on the top chord to test in the inverted position. It was determined from these tests that pulling on the top chord was difficult, impractical, dangerous, and yield inconsistent results. It was determined that testing the truss in the inverted position provides adequate results.

Testing in accordance with existing uplift requirements (section 3280.402(2)) is simple and provides consistent results. Furthermore, there have been no documented truss failures due to the existing design criteria since the uplift testing procedures went into effect in 1994.

Testing uplift in accordance with the new HUD proposal will have a significant cost impact on the truss approval process. The set-up procedure for the proposed test will take 3 to 4 times longer, which will increase the cost for testing a new design from \$200 - \$300 to \$800 - \$1,200 per truss design.

The HUD proposal for testing uplift requires 1" wide straps attached around the top chord at 6' o.c. In some cases, truss designs with closely spaced verticals and webs will be physically impossible to test to the 6" requirement. This requirement would limit truss design and innovation.

Pulling up on straps at 12" o.c. provides the same uplift load and similar results as pulling on the uplift straps 6" o.c.

Additionally, the proposed method requires cylinders spaced at 12" o.c., to apply 6" o.c. uplift strapping. This will require some truss manufactures to redesign their current truss testing equipment which commonly has cylinders a 24" o.c. This retrofit will be costly and time consuming.

Additionally, the proposed method requires cylinders space at 12" o.c., to apply 6" o.c. uplift strapping. This will require some truss manufactures to redesign their current truss testing equipment which commonly has cylinders at 24" o.c. This retrofit will be costly and time consuming.



January 18, 2005

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Regulations Division
Office of General Counsel
Room 10276
Department of Housing and Urban Development
451 Seventh Street, S.W.
Washington, D.C. 20410-0500

HUD RULES DOCKET

JAN 26 10 50 AM '05

RE'D

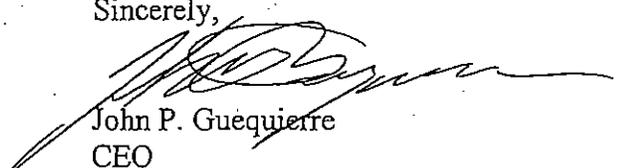
RE: Manufactured Home Construction and Safety Standards
Section 3280.402, Test Procedure for Roof Trusses.

Indiana Building Systems, LLC produces manufactured homes. We would like to express our objections to elements of the proposed changes in roof truss testing criteria.

1. HUD has a long history of incorporating useful elements of the national model codes. Rather than delete the reference to ANSI/TPI 1-1990 as proposed with no replacement, we recommend the reference be updated to ANSI/TPI 1-2002.
2. We recommend that HUD match the model building codes by requiring recovery of not less than 75% of maximum deflection within 24 hours after removal of the total live load rather than a limit of L/480 after five minutes.
3. HUD is proposing a dramatic change in the protocol for testing uplift. Among other changes, the proposal requires pulling up on the top chord (a method previously discarded as unsuitable) and strapping at 6" points rather than 12". Test costs will increase significantly. Again, we understand that there have been no documented failures since the existing protocol was adopted in 1994.
4. We believe that the proposed deletion of the 1.75 proof load test for roof trusses will add significantly to truss costs without any significant benefits. It is our understanding that there have been no documented truss failures resulting from current truss testing procedures. We believe that deleting the 1.75 proof load test will increase truss member sizes significantly, increasing truss costs by perhaps as much as 25%. The proposal will also reduce design innovation.
5. The proposal to make deflection readings at panel points and at mid-span between panel points (in contrast to mid-span and quarter-points) will significantly

increase the number of deflection readings, perhaps tripling them. This will increase testing time and cost, even though the current protocol provides sufficient data to determine whether a truss meets design criteria.

Sincerely,



John P. Guequierre
CEO



DEPARTMENT OF COMMUNITY
& ECONOMIC DEVELOPMENT

January 19, 2005

Regulations Division
Office of General Counsel
Room 10276
Department of Housing and Urban Development
451 Seventh Street, SW
Washington, DC 20410-0500

5

Ref: 24 CFR Part 3280, Proposed Rule

Dear Sirs,

This office acting as the State Administrative Agency within the Commonwealth of Pennsylvania wishes to submit the following comments in regards to the proposed changes with 24 CFR 3280, Manufactured Home Construction and Safety Standards.

We oppose the following proposed rule change:

A. *Whole-House Ventilation*

The proposed rule would provide for an alternative whole-house ventilation system by making it acceptable to utilize the bathroom exhaust fan as the whole-house ventilation system's exhaust.

This proposed rule will require a quiet and more durable fan that would eliminate noisy systems which are not often operated by occupants as intended thereby limiting their effectiveness and "expects" to reduce service calls and premature failures while making the system more acceptable to occupants.

A bath fan exhausts up to 50 cubic feet per minute, when the current requirements require 0.35 air changes per hour and introduces fresh air into the home. With this proposed change, there is no requirement indicating the introduction of additional fresh air being introduced into the home.

New manufactured homes are expected to be draft free and energy efficient. To compete with other housing markets, manufactured home manufacturers are using similar construction methods and materials such as installing wood sheathing under the exterior siding, use house wrap, use better windows and use caulk or expanding foam that tighten a home and reduce natural infiltration.

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HMD RULES
JAN 26 10 05 AM '05

January 19, 2005
Regulations Division
Page 2

This proposed rule change would now require consumer education. Under the Manufactured Home Procedural and Enforcement Regulations, consumer education is required today. The problem is lack of enforcement of the current rules. HUD has failed to require home manufacturer's to include information relating to the whole house ventilation system along with instructions on how to properly operate the system within the consumer manuals.

We communicate with many homeowners, most have no idea the current system exists and they complain about the air quality in the home. Once they are given instructions on how to operate the current system, they are receptive and use the system regularly and no longer complain about air quality.

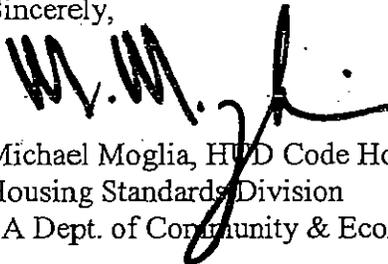
Other problems may arise from using an exhaust system without the introduction of fresh air which creates a negative pressure environment. Many fireplaces, wood stoves and gas-burning appliances are not designed to operate in a negative pressure environment.

The Whole House Ventilation System as required by the current standards serves important functions:

- Expel stale air containing water vapor, carbon dioxide, airborne chemicals and other pollutants.
- The current system draws in outside air, which depending on the surrounding area, contains fewer pollutants and less water vapor.
- Distributes fresh air throughout the home.

Alterations or a major change in the current requirements of the whole house ventilation system without the introduction of fresh air will diminish the value of the system which will result in an increase of complaints and service calls and affect the performance nature of our housing product.

Sincerely,



Michael Moglia, HUD Code Housing Administrator
Housing Standards Division
PA Dept. of Community & Economic Development

XC: Mark A. Conte, Chief

Nebraska Public Service Commission

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January 26, 2005

Regulations Division
Office of General Counsel, Room 10276
Department of Housing and Urban Development
451 Seventh St, SW
Washington, D.C. 20410-0500

6

HUD RULES DOCKET

JAN 27 12 15 PM '05

REC'D

Re: Docket No. FR-4886-P-01
Manufactured Home Construction and Safety Standards
24 CFR Part 3280

Sir or Madam:

The State of Nebraska, through the Nebraska Public Service Commission, Housing and Recreational Vehicle Department, is presently accepted by The United States Department of Housing and Urban Development's (HUD) Manufactured Housing Program as:

- An Inspection Primary Inspection Agency (IPIA),
- As a Design Approval Primary Inspection Agency (DAPIA), and
- As a State Administrative Agency (SAA).

The State of Nebraska has actively participated in all three (3) of the aforementioned aspects of HUD's manufactured home program since the program's inception in the mid 1970's. We therefore reviewed and evaluated the above referenced Docket, and respectfully offer the following observations and comments.

Item A—Whole-House Ventilation [3280.103(b)].

We disagree with the proposal. Consumers will not operate bathroom fans as often as necessary in an attempt to reduce their electrical usage, unknowingly causing other problems within their home. Consumer complaints regarding moisture reduced when whole-house ventilation became a requirement, therefore the present requirement should not be revised so extensively.

Item B—Firestopping [3280.206].

We agree with the proposal. The proposal brings the Standard into closer consistency with other building codes.

Item C—Body and Frame Requirements/Alternative Testing [3280.303(g)].

We disagree with the proposal. Alternative testing procedures should be reviewed by HUD prior to implementation.

Item C—Body and Frame Requirements/Skylight Load Requirements [3280.305(c)(3)].

We agree with the proposal. Establishes a necessary performance standard.

Item C—Body and Frame Requirements/Exterior Wood Floor and Subfloor Materials [3280.305(g)(3)].

We disagree with the proposal. The proposal will not provide the protection desired. "Exterior" rated provides protection only during the construction process. Therefore the sought-after extended life of the material is not gained.

Item C—Body and Frame Requirements/Marriage Wall Column Support Locations Identified on the Home [3280.306(b)].

We agree with the proposal. The recommendation will improve home installation compliance and subsequently improve the longevity of manufactured homes at a minimal cost to the homeowner.

Item C—Body and Frame Requirements/Formaldehyde Health Notice [3280.309].

We disagree with the proposal. Since the inception of maximum formaldehyde levels of construction, consumer formaldehyde complaints have been essentially eliminated. Leaving these maximum levels for individual products as presently required in the Standard is important; however the consumer notice itself should no longer be required.

Item F—Plumbing Systems/Restricted Flow Faucets and Showerheads and Low Water Consumption Water Closets [3280.607(a)].

We agree with the proposal. Technology has improved low water consumption fixtures and faucets, so it is a sound proposal that is also consumer friendly.

Item G—Heating, Cooling and Fuel Burning Systems/Water Heater Drip Collection and Drain Pan [3280.709].

We agree with the proposal. The proposal makes the Standard consistent with other building codes.

Item G—Heating, Cooling and Fuel Burning Systems/Air Distribution System Joint Joining [3280.715(c)].

We agree with the proposal. The proposal would greatly assist in reducing consumer complaints in this area of the home.

Item H—Electrical Systems [3280.806(d)(9) and 3280.806(808(o))].

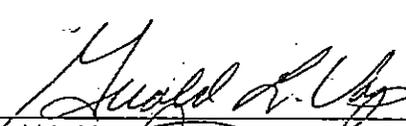
We agree with both proposals. Both enhance consumer protection with minimal cost.

Item I—Revisions to Standards Incorporated by Reference (Reference Standards).

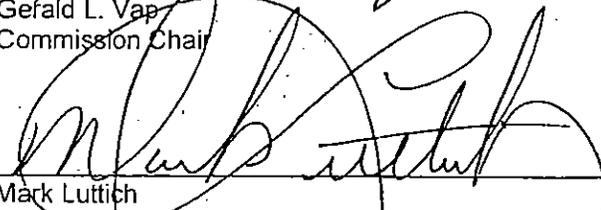
We disagree with the proposal for a single reason. The recommendation adopts an outdated National Electrical Code, the 1996 edition. The manufactured home product should meet the requirements of a more current code, and provide protection to home occupants as technology has made available since 1996. Therefore, we suggest adoption of the 2002 edition of the National Electrical Code. If there are portions of the 2002 edition found to be unnecessary for manufactured homes, those can be amended just as the Standard has done since its inception with other National Electrical Code sections.

Should you have any questions with the above stated, do not hesitate to contact Mark Luttich, Department Director, Housing and Recreational Vehicle Department, at 402-471-0518.

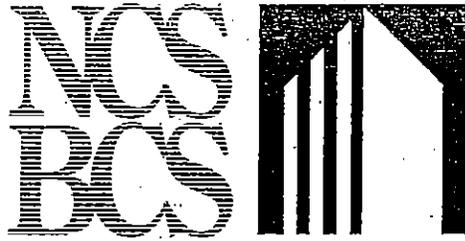
Thank you for allowing us the opportunity to comment on these proposals.



Gerald L. Vap
Commission Chair



Mark Luttich
Housing and Recreational Vehicle Dept. Director



National Conference of States on Building Codes & Standards

HUD RULES DOCKET

JAN 31 10 23 AM '05

REC'D

January 26, 2005

Regulations Division
Office of General Counsel, Room 10276
Department of Housing and Urban Development
451 Seventh St, SW
Washington, D.C. 20410-0500

Re: Docket No. FR-4886-P-01
Manufactured Home Construction and Safety Standards
24 CFR Part 3280

Sir or Madam:

The Factory Built Structures Committee of the National Conference of States on Building Codes and Standards, Inc. (NCSBCS) has reviewed the above referenced docket. In that regard, the following comments and opinions are of those proposals the committee arrived upon a consensus.

Item B—Firestopping [3280.206].

The committee supports the proposal. We find the proposal brings the Standard into closer consistency with other building codes.

Item C—Skylight Load Requirements [3280.305(c)(3)].

The committee supports the proposal. We believe the establishment of a standard is prudent.

Item C—Load Path for Foundation and Anchorage Systems [3280.305(e)].

The committee supports the proposal. The proposal provides consistency within the industry.

Item C—Steel Strapping for Wind Zones II and III [3280.305(e)(2)].

The committee does not support the proposal. Past instances of staples inadvertently driven through metal strapping of lesser thickness may reoccur should this proposal become effective.

Item C—Marriage Wall Column Support Locations Identified on the Home [3280.306(b)].

The committee supports the proposal. We believe the proposal would benefit the consumer, manufacturer, installer and inspector; assisting the home installation, aiding the homes' longevity at a very minimal cost to the consumer. Marriage wall column support location errors are one of the major problems found during installation inspection.

Item D—Truss Structural Testing [3280.3280.401 and 3280.402].

The committee supports the proposal.

Item E—Vapor Barrier Location for Homes in High Humidity Areas of the United States [3280.504(b)].

The committee supports the proposal.

Item F—Restricted Flow Faucets and Showerheads and Low Water Consumption Water Closets [3280.607(a)].

The committee supports the proposal. Technology has improved low water consumption fixtures and faucets, so it is a sound proposal that is also consumer friendly.

Department of Housing and Urban Development

January 26, 2005

Page 2

Item G—Water Heater Drip Collection and Drain Pan [3280.709].

The committee supports the proposal. The proposal will eliminate such problems caused by leaking water heaters at a minimal cost. Brings the Standard into consistency with other building codes.

Item G—Air Distribution System Joint Joining [3280.715(c)].

The committee supports the proposal. Current standards are not effective (many consumer complaints due to leaking ducts).

Item H—Bathroom Electrical Receptacle Location(s) [3280.806(d)(9)].

The committee supports the proposal. It enhances consumer protection with minimal cost.

Item H—Electrical Outlet Box Gap Clearances [3280.808(o)].

The committee supports the proposal. Reduces the risk of electrical fire and improves consumer safety at a minimal cost.

Do not hesitate to call me at 402-471-0518 if you have any questions.

Respectfully,



Mark Luttich, Chair

Factory Built Structures Committee

National Conference of States on Building Codes and Standards, Inc.



Skyline Corporation
2520 By-Pass Road (46514-1584)
P.O. Box 743
Elkhart, Indiana 46515-0743
574-294-6521

January 21, 2005

8

Regulations Division
Office of General Counsel
Room 10276
Dept. of Housing and Urban Development
451 Seventh Street, S.W.
Washington DC 20410-0500

REC'D
JAN 31 10 24 AM '05
HUD RULES DOCKET

Subject: 24 CFR Part 3280, Manufactured Home Construction Standards; Proposed Rules

Gentlemen:

We are providing the following comments to the proposed changes to the Manufactured Home Construction and Safety Standards as presented by the Federal Register on December 1, 2004:

1) Paragraph 3280.504(b)(4) Condensation Control and Installation of Vapor Barriers

The proposal permits homes sited in "humid climates" or "fringe climates" be constructed with not greater than 1.0 perm vapor retarder installed on the exterior side of the wall insulation providing the interior finish and interior wall panel materials have a combined permanence of not less than 5.0 perms.

We agree with the intent of the proposal and believe it could help prevent excess moisture within homes in humid climates. However, the proposal as presently written is not of value as it provides no exceptions to the 5 perm requirement making compliance highly impractical. Many materials having a perm rating of less than 5 perms are often placed on or attached to exterior walls at limited and specific locations and would not be allowed under the proposal. Some examples of these are kitchen back-splash materials, bathtub and shower compartments, built-in furniture, chair rails, ceramic tile and miscellaneous trim. The exceptions permitted by Paragraph 8.4.2.16 of NFPA 501-2003 should be included in the FMHCSS. These exceptions will allow for practical application of the proposal and provide a real option in reducing moisture migration to the interior of the home in warm humid climates.

HUD could provide a valuable assistance to the industry by publishing a list of combination interior finishes and interior wall panels which are deemed to comply with the 5.0 perm requirements (similar to the flame spread list in 3280.203). This list could save manufacturers thousands of dollars in certification testing.

January 21, 2005

Page 2

2) *Paragraph 3280.402 Test Procedure for Roof Trusses*

We believe that the proposed truss testing requirements need to be reconsidered as they are overly restrictive and, if incorporated, very costly. Skyline is in agreement with the overload test requirement of 2.5 times design live for gravity loads. For several years Skyline has implemented this requirement for our trusses. We are not in agreement that a 2.5 times overload test for uplift loading should be a requirement of the standard. Based upon the results of three (3) recent hurricanes, commonly used duration of load factors applicable to wooden structures, and our understanding of structural test requirements of other model building codes, we believe that the 1.75 overload for wind uplift loadings as currently required in the Standard is very adequate.

The requirement in Paragraph 3280.402(c) that deflection of the bottom chord be measured, as a minimum, at the truss midspan, panel points and midway between panel points is overly burdensome and completely unnecessary. For many trusses this requirement would result in a minimum of nine (9) or ten (10) points of deflection measurement during testing. It becomes especially difficult to obtain these deflections with dead load hanging from the bottom chord of the truss at 12 inches on center. We believe the current requirement that the bottom chord deflection be measured at the center and quarter points has proven to be adequate. Our experience has shown with a 2.5 times live load overload factor, truss deflection never controls the design.

Paragraph 3280.402(e) requires design uplift loads be applied to the top chord through tension devices not wider than 1 inch and spaced not greater than 6 inches on center. Compliance with this requirement cannot typically be achieved at panel points because of the width of connector plates. Uniform uplift loading can effectively be achieved by increasing the minimum distance between tension devices to a maximum of 12 inches.

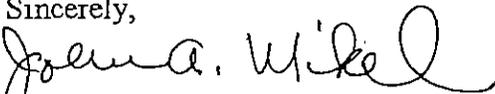
Prototype truss testing with uplift loads applied to the top chord has shown lateral buckling of the bottom chord to be the cause of several failures in the overload phase. Since the bottom chord is restrained against lateral buckling by the ceiling material and purlins during actual use, the test procedure should be revised to allow lateral support of the bottom chord or continue to allow uplift loads to be applied to the bottom chord of an inverted truss.

In summary we believe the current uplift testing procedure has been shown to be effective, should stay unchanged until a workable uplift procedure can be developed and only then if the facts demonstrate that the proposed procedure is more cost effective than the current procedure.

3) *Paragraph 3280.304 Materials*

We have also noted that the Standard ANSI/TPI-85 "Design Specifications for Metal Plate Connected Wood Trusses" has been deleted with no reference standard as a replacement. We believe the deletion was an oversight and the most recent version of this standard is intended as the replacement.

Sincerely,



John A. Mikel, P.E.



January 18, 2005

Regulations Division,
Office of the General Council
Room 10276
Department of Housing Urban
Development
451 Seventh Street, SW.
Washington, DC 20410-0500

9

HUD RULES DOCKET

JAN 31 10 29 AM '05

REC'D

RE: Proposed Rule to 24 CFR 3280 Docket No. FR-4886-P-01

To Whom It May Concern:

I am disappointed that HUD is not issuing for public comment the proposal to eliminate the requirement for the formaldehyde notice to be placed in our homes. This label is not required in any other home that is constructed in this nation even though they use the same exact materials that we are using. This requirement stigmatizes our homes and additionally adds costs that are wasteful albeit small.

The Department's argument is that there were no studies sent to The Department to show this proposal is valid is on the face arbitrary and restrictive. By their own words The Department states that "The law requires a federal agency to follow similar procedures for the rescission of rules as it does for their promulgation." If this is true, then everything that is in this proposal should have been rejected on the same basis. Using this same reasoning, all the proposals that are here for public comment didn't have full back up information to substantiate the change, especially when you look at all the proposed "Standards Revisions". The Department is accepting these on face value because they are now the standard that is in use by the industry that supplies materials. The Department is, by issuing this proposal, accepting that another third party review committee has accepted the evidence to make this the new standard. I am sure that The Department and the MHCC didn't research the changes to see if they were accepted with valid backup. The reason that the MHCC didn't provide this research is because the standard went through another consensus process. The MHCC wasn't privy to the process or documentation presented nor was there enough time to review it even if they wanted to do so.

Well the formaldehyde proposal went through two processes one with CABO and the second with MHCC. In the case of the CABO review, I was on that

committee as well as representatives from The Department and there was evidence given that showed that the requirement was not needed any longer. The reason is because of the changes of the manufacturing processes of these products to eliminate major out-gassing of formaldehyde.

I would ask The Department to reevaluate their decision on this matter and entertain putting it up for public comment again. The Department needs to be consistent with the entire program and ask for the same level of proof for all changes either rescissions or proposals. It would seem to me that The Department is being selective as to what level of backup is needed when a proposal is presented for consideration. The Department needs to be consistent on the requirements because, without consistency, how will the MHCC know what will be accepted or what will not be accepted by the Department.

I also have comments on the change to 3280.402.

Eliminating the option of 1.75 x overload ends one cost effective way of building the homes at the lower end of the manufactured housing market. This will place additional cost on a section of the market that can least afford it.

The change to the testing procedure as outlined in 3280.402 alone will cost much more than the \$77.28 that has been advanced by the Department for the entire proposal now before us. Estimates of the price increase per truss for Zone I wind that I have received from my truss supplier is in the 15 to 25 percent range. This would increase the material cost of a 24 x 60 to somewhere around \$75 per half or \$150 for the entire house. The eventual cost to the consumer would be about \$325. This is far greater than the \$77 that is proposed by the Department.

This will also create a huge backlog in truss retesting and redesign. Every truss will need to be retested or be calculated to meet this new standard. In my case we have over 400 truss designs that are being used at the plants. Each of these will need to be reviewed, retested or possibly be changed into a calculated design. If the design is calculated then the truss will need to be resubmitted to the Dapia for approval. This is an additional cost that has not been taken into consideration of my figure of \$325. The added cost even though only a one time expenditure could run into thousands of dollars.

Additionally, the time frame to perform this task generally runs 180 days after the final rule is issued. Because this will affect every truss that is made for every manufacture, the normal 180 days is not enough time to get this review, retest and reapproval completed. This could cause manufacturers to cease manufacturing of certain types of homes when they can't get the correct truss

designed and approved in a timely fashion. This in turn may force the manufacture to go to a calculated truss that would be more expensive than the one that is tested.

There also doesn't seem to be much information given out as to what was in the NAHB report and if this report was done on trusses manufactured prior to the updated standards of 1994. Additionally, I don't see that HUD has addressed the question as to why this change is needed nor is there any information that shows that there are truss failures that are being discovered on an ongoing basis. We haven't had truss failures on homes in normal use. I also have received information from truss suppliers that they have had few complaints (in the range of 2 a year) concerning truss failures.

I believe the study referred to in the proposal was done by industry members and suppliers in response to the NHAB testing that was done in the 80s. These tests were flawed specifically with the criteria for selection. The process was to find the very worst trusses in an unbundled stack and test those. There was not concern that some of the trusses were likely to be culled prior to installation into the roof. I understand that the standard requires the worst trusses to be analyzed but to do a study on what could possibly happen is not correct.

The industry changed after this happened and the product improved. This being the case we are not looking at the same product that is being built now and what was built then. Because this isn't the same product we are comparing apples and oranges. The Department needs to revisit this study to see if I am not correct.

With this being the case, The Department should reject this separate proposal from the others and send it back to the MHCC for review and if need be, do research on the failure rate for trusses installed in homes that were produced after the 1994 code change. This would better reflect the real day situation and not penalize the industry for past research that is not current.

As to the comment that rule was passed through the NFPA consensus committee should not be given as much weight as what the Department would wish. I have been in meetings where some members on the NFPA Structural Technical Committee have repeatedly stated that the cost of the code requirements are either a minor consideration or are not to be considered at all when the code is being developed. This is entirely against what manufactured housing is about and why we are lower cost housing. This type of housing is based on performance and that should be looked at. I would submit that the

truss designs currently being used do perform without failure and the methods to test are adequate in their present form.

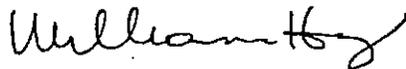
Lastly, the update to the electrical code is not a practical proposal. To adopt a code that is now 9 years behind the current one that is now being adopted by localities throughout the United States is ridiculous. The NEC 1996 ed. is no longer in print and to require manufactures to try to find this book so that they can determine what changes to the code affect them and what is the required standard they must meet is not logical and will be difficult.

As a remedy, I would suggest that this proposal be withdrawn from the entire proposal and sent back to the MHCC for review. It is imperative to the industry for our image and for practical reasons to let the MHCC update this to an edition of the NEC that is in print and readily accessible. There needs to be a review by the consensus committee of the current code since there were many changes in the current code. This review is necessary as some sections may conflict with the current 3280 and adjustments will probably be required to the 3280 to eliminate the conflicts.

Additionally, by requiring the manufactures to follow an obsolete code won't help with the perception that the manufactured housing industry builds inferior products when it comes to electrical design and will give reasons for our critics to discriminate against our industry.

I hope that these comments are helpful and will be taken into consideration as the Department determines the applicability of these proposals.

Sincerely,



William Hug
Director of Engineering

Typist: WH:mh



January 24, 2005

Regulations Division
Office of General Counsel
Room 10276
Department of Housing and Urban Development
451 Seventh Street, SW
Washington, DC 20410-0500

10

Re: Docket No. FR-4886-P-01
RIN Number 2502-A112
Manufactured Home Construction and Safety Standards

HUD RULES DOCKET

JAN 31 1 40 PM '05

REC'D

Introduction

The Manufactured Housing Institute (MHI) respectfully submits comments in response to the notice of proposed rulemaking (NPRM) noticed in the *Federal Register* of December 1, 2004, (69 FR 70015 - 70050).

MHI is a non-profit national trade association representing all segments of the manufactured housing industry, including: manufactured home producers; material and service suppliers; retailers; community developers, owners and managers; insurers; and, financial service providers. MHI manufacturer members produce over 83 percent of the HUD-Code manufactured homes built in the United States each year. MHI's community owner members manage land-lease communities, which house approximately 40 percent of the 22 million people who reside in over 10 million manufactured homes across the country. In addition, MHI's membership includes every State manufactured housing association across the nation. The State associations represent manufacturers, communities, retailers, installers and finance corporations.

General Comments

The Manufactured Housing Consensus Committee (MHCC) was the organization that provided the department with the list of 20 standards issues found in the NPRM. Under the Manufactured Housing Improvement Act of 2000 (the Act), the MHCC, as one of their underlying charges, is to provide the department with recommendations for updating the federal Manufactured Home Construction and Safety Standards (MHCSS, e.g., the HUD Code). This NPRM is the first set of MHCC recommended changes put forth through the federal rulemaking process for public comment.

Although MHI, and its MHCC representatives, did not articulate any objections to the revised roof truss test protocols noticed at pp. 70040 - 70043 during committee deliberations, new information has come to light from numerous sources citing the extremely high costs associated with its implementation and questioning the justification for making these changes at this time. Regarding the increased costs, most manufacturers anticipated a nominal expense but closer examination of the criteria has revealed that this is not the case. Therefore, MHI has come to the conclusion that the recommended revised truss test protocol needs further study and evaluation by the MHCC before implementation into the HUD Code.

Proposed Changes (NPRM – Item II)

There are four proposed issues that MHI would like to address. As a sidebar, these four issues were approved through the MHCC ballot process.

1. Formaldehyde Health Notice for HUD Code Homes (§3280.309)

HUD has rejected the MHCC recommendation to eliminate the formaldehyde health notice posting in HUD Code homes. This recommendation stemmed from a similar change that occurred during the development of NFPA 501 – *Standard for Manufactured Housing*, 2003 edition. The main reason cited in the NPRM was that “the MHCC did not provide or reference any data or studies in support of the recommendation to remove the health notice requirement and HUD, therefore, has no basis for taking such action” (pp. 70033). MHI undertook an investigation of formaldehyde concentration in manufactured homes since the health notice was required to be prominently displayed (temporarily) by HUD rulemaking (effective date February 1st, 1985). That study performed by the Manufactured Housing Research Alliance (MHRA) was completed in July 2004, entitled Formaldehyde Concentrations in Manufactured Homes: The Current Situation, copy attached.

This report provides a synopsis of how and why formaldehyde levels in today’s manufactured homes have changed in the 20 years since the department regulations were implemented. A review of the report depicts six reasons for the significant reduction of formaldehyde concentrations in homes.

- Changes in the types of materials used in manufactured homes. At the time when the formaldehyde provisions were approved, plywood wall materials were the predominant materials used for interior wall assemblies. In the last 20 years, gypsum wallboard has largely replaced the UF (urea formaldehyde) bonded plywood as the interior finish of choice. Studies have been performed to show that almost 95 percent of all new HUD Code homes use gypsum wallboard as the primary interior wall covering. The change of material selection was not only for wall assemblies, but also found its way to ceiling assemblies.
- Changes to the Formaldehyde Emissions of Plywood and Particleboard. The HUD Code currently requires maximum formaldehyde emissions for construction materials of 0.2 ppm for plywood and 0.3 ppm for particleboard. These are the same as the voluntary product standards emission rates that the board industry has been adhering to for many years. These new product standards have drastically reduced the formaldehyde emissions from UF bonded wood-based products.
- Health and Formaldehyde Levels. Health consequences of formaldehyde levels continue to be debated in various forums. During the August 2004 MHCC meeting in Alexandria, VA, HUD staff brought up the recent decision by the International Agency for Research on Cancer (IARC). The IARC had reclassified formaldehyde from a “probable” to a “known” carcinogen. The reclassification was based on studies in which individuals exposed to over 30 - 60 years ago to high doses of formaldehyde developed a rare cancer of the nasopharyngeal cavity (nasal). IARC concluded that these studies (assessment workplace exposure studies from the 1940s – 1970s) were not considered sufficient to establish a casual association with other forms of cancer. The IARC classification was a “hazard identification”, the first of several steps in the risk assessment process. This was not a finding of actual risk. Formaldehyde is extensively regulated by material and governmental regulations, such as OSHA. The HUD Code is the only model building code in this country that regulates formaldehyde emissions in building materials. By reductions that have occurred in formaldehyde levels over the last 20 years, workers in our plants are safe and homeowners are not likely to develop this rare form of nasal cancer.
- Increase in Home Ventilation Rates. The ventilation requirements of the HUD Code were revised in 1994. Under these new provisions, manufacturers must install a whole house ventilation

system capable of providing a minimum of 0.35 air changes per hour continuously or at an equivalent hourly average rate. This ventilation system increases the volume of indoor air exhausted from the home and outside air brought into the home, which can effectively dilute any indoor air pollutants such as formaldehyde.

- Home Size. One of the reasons for singling out HUD Code homes in 1985 was the small average size of homes compared to site-built homes. The average floor area for manufactured homes has increased approximately 25 percent since that timeframe. As floor area increases, the volume of air in the living space also increases and the dilution of any air borne contaminants can be reduced.
- Measured Formaldehyde Levels in Modern HUD Code homes. The MHRA report references studies of measured formaldehyde levels since 1985. Figure 1 of the MHRA report illustrates the trend in formaldehyde levels over time. This figure shows that the measured concentration of formaldehyde is below 0.1 ppm, with an average of below 0.05 ppm. A majority of all data gathered for this study was for homes built after 1985.

MHI supports the elimination of the formaldehyde health notice posting in HUD Code homes. Due to the MHRA study discussed above, it appears that formaldehyde concentrations are not as prevalent as they once were in HUD Code homes. Based on this new evidence, MHI suggests that HUD reconsider the MHCC recommendation to delete the formaldehyde health notice posting in HUD Code homes as stipulated by 3280.309(a). MHI supports retention of the formaldehyde emission criteria for wood-based products contained in 3280.308. With this change, materials are still required to be laboratory tested to meet formaldehyde emission limits, and the manufacturer would still be required to include the health notice in the consumer manual as required by 3280.309(d).

2. Roof Truss Testing Procedures (§3280.402)

The test protocol contained in the NPRM stems from the NFPA 501 – 2000 edition. The requirements found in NFPA 501 were the result of a proposed change submitted to the NFPA standard process in February 1999 by the Secretary of the MHCSS Consensus Committee, for which MHI functioned as secretariat from 1988 – 1996. It must be mentioned that during the NFPA standard process, the truss test protocol originally submitted by MHI as the MHCSS secretariat was revised in numerous areas by an NFPA task force to its current version contained in the NPRM (pp. 70040 – 70043).

The revised truss test protocol is wide-ranging from the manner in which truss suppliers and manufacturers currently qualify truss designs. While there has been many estimates on the cost to incorporate the revised truss test protocol, MHI member truss suppliers have indicated that the high end could be as much as a 25 percent cost increase for truss design and testing, depending on the style of roof design being considered. This test protocol could ultimately affect the design of the truss itself and the amount (size) of materials and fasteners necessary to qualify the truss design.

One drawback is that every, single truss design would need to be re-qualified under the revised test procedures. New information from truss suppliers and producers has indicated that the cost associated with re-qualification ranges from \$200 to \$500 per home. Even the low-end estimate far exceeds the estimated cost impact of \$77.28 per home as indicated on page 70035 under the heading *Impact on Small Entities*. MHI knows of some manufacturers who have actually been implementing certain criteria of the revised test procedures for years (use of the 2.5 overload factor), but not every single facet. Re-testing of all current truss designs would result if these revised test procedures are approved by final rulemaking, and there has not been mention in the NPRM where truss failures under the current qualification requirements are inadequate or have resulted in numerous truss system failures.

There are certain aspects of the revised truss test protocol that warrant comment.

- Requires measurement of deflection reading at each panel point, mid-span of the truss and mid-span between each panel point. While this would provide increased deflection checks along the truss span, is it really necessary? This appears to be excessive and the current checks at quarter points and mid-span should be more than sufficient.
- Requires a recovery deflection of $L/480$ within five minutes after live load removal. This recovery time appears to be ultra-conservative. MHI member manufacturers have permitted up to 4 hours of recovery time to qualify truss designs. Some truss designs might fail this acceptance criterion and not be permitted for HUD Code home construction.
- Test procedure for overload phase requirement increased to dead load plus 2.5 times the live load. MHI has learned that a couple of member manufacturers are currently using this requirement, and have been for a number of years. However, this is an increase up from the 1.75 overload factor under the current HUD Code. Combine this with the more stringent deflection acceptance criteria and some truss design may fail which would be otherwise acceptable under the existing provisions.
- Test procedure for overload phase requirements increased to 2.5 times the net uplift load for one minute. This is an increase up from the 1.75 overload factor of the current standard. Also, the test procedure has been revised to provide uplift to the top chord of the truss design and not the existing test set-up of inverting the truss and pushing down on the bottom chord. Couple the above with the uplift points of 6 inches on center and some truss designs may not be able to be tested due to their current design configuration. This does not provide flexibility in testing for the tension device placement as a 12-inch spacing might provide. MHI has also been informed that no testing facility, that currently qualifies HUD Code home roof trusses, would be capable to test trusses as described by the revised test protocol without a very lengthy process to change the test set-up.
- The non-destructive test procedure has been eliminated (1.75 proof-load test) and could impact industry for those manufacturers who qualify truss designs under this method. This test permits a recovery deflection to at least $L/180$ within a 12-hour timeframe. By the revised test protocol, destructive testing will result and could lead to limiting truss designs that would ultimately pass this non-destructive test. Some MHI truss supplier members have indicated that certain truss designs could be eliminated.

MHI would submit that it might be premature to completely revamp the truss test criteria at this time as further review is warranted to determine the overall affect on industry. The best avenue is to send this proposal back to the MHCC for further study. In this manner, the cost impact to the industry as a whole may become clearer. The biggest concern is that if these revised test protocols are implemented by final rulemaking, industry might have no alternative but to go to totally engineered truss designs, which will definitely be an expensive proposition for industry.

3. Waiver for Condensation Control (§3280.504(b)(4))

This particular waiver was a manner to attempt to control condensation that has been occurring in hot/humid climates of the Atlantic and Gulf Coasts. The current HUD Code permits the vapor retarder to be placed on the warm-in side of wall insulation. While this design requirement is acceptable for northern areas of the country, it has presented many problems in hot/humid climates. The waiver was an attempt to assist manufacturers in design of homes for these areas of the country as another option for condensation control, by placing the vapor retarder on the exterior side of wall insulation.

The department did not accept the full MHCC recommendation that permitted certain exceptions for the

minimum perm rating of the wall assembly. This is primarily why one sole manufacturer has not used the waiver. The waiver has one drawback in that it requires the interior finish and interior wall panel materials to have a combined permeance of not less than 5.0 perms. MHI suggests that HUD exempt four constructions from the interior finish and interior wall panel materials requirement to have a combined vapor permeance greater than 5.0.

Specifically, the following areas should be exempt from the minimum perm rating:

- Kitchen back-splash materials, less than 50 square feet in area installed around countertops, sinks and ranges
- Bathroom tub areas, and shower compartments
- Cabinetry and built-in furniture, in any location
- Hardwood wall paneling used under chair rails in dining room areas, less than 50 square feet in area.

The construction features listed above are commonly installed against exterior walls of manufactured homes. These areas do not represent a large exposed wall area where condensation due to the hot/humid climates would appear to be excessive. Regarding item 4 above, a September 2000 MHRA study, Measured Permeance Values for Selected Interior Wall Assemblies, (copy enclosed), revealed that hardwood paneling (luaun materials) is not detrimental to the established proposed waiver requirements of a minimum 5.0 perm rating.

Additional justification for these proposed four exemptions are highlighted below.

- Kitchen back-splash materials habitually are not tight-fitted to the interior walls; any moisture inside the exterior wall cavity will easily pass above and below the back-splash materials.
- Bathroom tubs and shower compartments are not tight-fitted all around their perimeters; any moisture inside the exterior wall will easily pass around the units.
- Cabinetry, in any location, does not block moisture migration through exterior walls. Any moisture that passes through the walls will easily migrate through and around the cabinets, because doors are not tight fitted.
- One design of hardwood paneling over gypsum wallboard (GWB) was tested and met the minimum 5.0-perm requirement. To avoid having manufacturers test other similar constructions with variable-thickness materials, an exemption is requested for hardwood wall paneling.

Dating back to the onset of the federal program, manufacturers' floor plans for both single-section and double-section manufactured homes almost universally contain the constructions listed above. MHI requests that HUD permit the cited exceptions so that manufacturers may implement the waiver that was finalized in April 2002.

4. Revisions to Standards Incorporated by Reference (pp. 70020 – 70032)

The update of the reference standard throughout the HUD Code is greatly needed. There are many reference standards that are over 20 years old. Many of these standards have been revised by their respective organizations since the HUD Code implemented them.

This is the first set of reference standards updates provided by the MHCC. At present, there are two additional sets of approved MHCC reference standards updates in the development process by HUD for proposed rulemaking. MHI would urge the department to review the two additional sets of MHCC standards changes and update any reference standard contained in this NPRM to the latest available edition receiving MHCC approval. In this manner, HUD would not have to update the same reference standard with possibly three different proposed rulemakings.

Two standards which this can be drawn to is AAMA 1701.2, *Primary Window and Sliding Glass Doors*:

Voluntary Standard for Utilization in Manufactured Homes, and AAMA 1704, *Voluntary Standard: Egress Window Systems for Utilization in Manufactured Homes* (pp. 70020). HUD intends to update AAMA 1701.2 to the 1997 edition, while MHCC ballots have approved of the 2002 edition. The same applies to AAMA 1704, where HUD has the 1985 edition and the MHCC has approved of the 2001 edition.

MHI window supplier members are certifying applicable fenestration products to both AAMA standards using the 1985 editions required by the HUD Code at §3280.403 and §3280.404. If the current NPRM becomes final, window suppliers would have to test and certify fenestration products under two different standard editions. While the HUD code would require the AAMA 1701.2-1997 and AAMA 1704-1985 editions, some manufacturers want fenestration products certified to the latest edition of each standard (2002 and 2001, respectively). This requires windows suppliers to test the same product to two different standards that would raise the cost of certifying the product. HUD should take advantage of the MHCC referenced standard update process by reviewing all ballots on file and suggesting the latest reference standard edition for proposed rulemaking. This would highly speed up the reference standard update process by the department and permit industry to use the latest standard for materials, components or assemblies, and not have to certify products to two different standards.

In addition, some general comments for the reference standards update are in order to clarify either new title changes to some standards, or where there are inconsistencies between standards cited on pp 70020 – 70032 and section V (pp.70036 – 70050) in the NPRM.

- Revise the title of ASTM 773 to read as follows: Standard Test Method for Accelerated Weathering of Sealed Insulating Glass Units.
- Revise the title of ASTM 774 to read as follows: Standard Specification for the Classification of the Durability of Sealed Insulating Glass Units.
- ASTM E84-91 is suggested to be deleted from the HUD Code (pp. 70026). However, §3280.203 (pp. 70037) still has both the ASTM E84 and the NFPA 255 test methods available to determine surface burning characteristics of building materials.
- IAS LC 1 is referenced as a new standard for the HUD Code but there is no title for the scope of its intended coverage or a standard edition indicated.

While not an actual reference standards change, there is another area of the proposed rule that indicates two different recommendations for one-piece metal roofing. On pp. 70034, a proposed footnote 9 is suggested for inclusion to the Table of Design Wind Pressures. However, pp. 70038 has this same footnote as a new §3280.305(c)(1)(ii)(C). From MHI's viewpoint, it might be best to have both contained in the HUD Code for testing requirements in addition to the HUD approval process.

Requested Comments from the General Public

Throughout the NPRM, HUD has asked for comments on a variety of subject matters contained in the proposed rule. MHI is providing responses to certain questions for HUD's consideration.

Final Approval of Alternate Test Methods

Comment is requested on whether the final approval of alternate test methods should be solely delegated to DAPIAs or if DAPIAs should only be permitted to provisionally approve test methods subject to HUD approval (pp. 70017). It is MHI's stance that the DAPIA should be able to approve any test method without subjecting this decision for HUD approval.

HUD Code §3280.303(g) has presented many problems in the past. For one, it sometimes takes an

extremely long period of time for HUD to finally approve a suggested new test method holding up the implementation of the material, component or system being proposed by a manufacturer. The DAPIA is responsible for approving the manufacturer's design package and should be able to approve a new test protocol for anything that might be contained in the design package. DAPIAs are the most likely group under the HUD regulations to make this informed decision since they are intimate with the particular manufacturer and its design process. DAPIAs are approved by HUD to function under the manufactured housing program and should be able to make these types of decisions without HUD "hanging over their shoulder". HUD will still have their same authority to challenge any design package if the MHCC recommendation to streamline the alternative test procedure is approved by final rulemaking.

Critical Connections in High Wind Regions

Comment is requested as to whether design for critical connections in high wind areas should be supported by suitable load tests (pp. 70017). MHI would refer back to the previous questions for the DAPIA approval possesses. If the DAPIA accepts these design changes to reduce the minimum thickness of steel strapping for Wind Zones II or III, then why would additional testing to verify changes of this nature be required? A reduction of steel strapping minimum gage would need to be supported by structural calculations or actual certification tests by the strap supplier to the manufacturer. Again, the manufacturer would need to supply its DAPIA with the calculations or supplier certifications tests for their approval of the design package, and the DAPIA always reserves the right to challenge any design modification that appears to be questionable. As long as the DAPIA is satisfied, there should be no reason to require further testing.

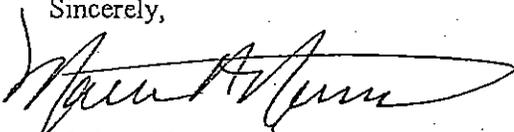
Metric Unit Notation

Comment is requested as to whether metric units should be provided in the HUD Code (pp. 70033). MHI would suggest that metric unit notation not be included in the HUD Code. The building community as a whole does not use metric on plans and specifications for any type of residential building. MHI believes the only time that metric units are necessary are for federally funded building projects. While this appears only to be a simple conversion from English to metric units, metric should not be implemented into HUD Code until the residential building community as a whole starts to use metric as the basic numerical notation for plans, details and specifications.

HUD should be applauded for publishing these changes for updating the HUD Code. MHI, and the industry at large, hopes that this is the first of many continual updates to the HUD Code, which are desperately needed. By the current MHCC approval process, two additional sets of standards changes will be forthcoming to HUD. With timely publishing through the rulemaking process, industry will be able to take advantage of the latest state-of-the-art knowledge for the design and construction of manufactured homes, in addition to updating the product approval process for materials, components or assemblies.

If there are any questions concerning the above comments, MHI will be happy to address them with the department staff.

Sincerely,



Mark A. Nunn
Vice President – Technical Activities



LIBERTY HOMES, INC.

Corporate Office

January 25, 2005

11

Regulations Division
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Room 10276
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451 Seventh Street, S.W.
Washington, D.C. 20410-0500

HUD RULES DOCKET

JAN 31 1 40 PM '05

REC'D

To Whom It May Concern:

Re: Docket No. FR-4886-P-01
RIN 2502-A112
Manufactured Home Construction and Safety Standards

As a participant in the MHCC consensus process, Nader Tomasbi is familiar with all the standards revisions, including those rejected by HUD. Our concerns with the proposals are: (I) the proposed Subpart E testing requirements for roof trusses and (II) HUD's rejection of the MHCC's proposed deletion of 24 C.F.R. 3280.309, which currently requires the "prominent" display of a Formaldehyde Health Notice in each manufactured home.

A. Comments Regarding Subpart E Roof Truss Testing Requirements

The HUD building standard is a performance based code. This feature allows for the manufacture of affordable homes which meet necessary performance criteria without over-building, which can result from prescriptive-type building codes. To our knowledge there have been no documented truss failures in HUD code homes built utilizing the existing truss testing system. Without such failures, the change promulgated by HUD is without justification.

The following are technical and cost concerns with HUD's proposed amendments to the Manufactured Home Construction and Safety Standards Section 3280.402, Test Procedure for Roof Trusses.

- 1) HUD is proposing to delete the 1.75 proof load test for roof trusses. Deleting the proof load test and requiring the destruct test for all tested trusses will increase truss member sizes, thereby increasing the cost of trusses by up to 25%. In some cases this will add up to \$600.00 actual cost per home from the truss manufacturer. This additional cost is unwarranted considering no truss

failures have been documented due to current truss testing procedures. Furthermore, deleting the 1.75 proof tests will limit existing designs and prevent new innovative designs by increasing the top and bottom chord sizes. This deletion will create a criteria that is more stringent and inconsistent with the other model building codes which require only a minimum test period of 10 seconds for test loads equal to 1.5 times the design wind load.

- 2) The existing standard requires deflection readings to be taken at mid-span and at 1/4 points. The proposed amendments, which call for taking readings at panel points and at mid-span between panel points, will increase the number of deflection readings from 3 to as many as 10. This change will significantly increase the time to perform truss testing and will increase the cost to perform the required truss testing for each truss design.
- 3) HUD's amendments propose a recovery deflection limit of $L/480$ for simply supported clear spans which is to be measured five minutes after the total live load has been removed. This recovery requirement is inconsistent with the model building codes, which require recovery of not less than 75 percent of the maximum deflection within 24 hours after removal of the load.
- 4) HUD's proposed rules change the method for uplift testing and require pulling up on the top chord as opposed to turning the truss upside down and applying the load to the bottom chord. Testing in accordance with existing uplift requirements (section 3280.402(2)) is simple and provides consistent results. Furthermore, there have been no documented truss failures due to the existing design criteria since the uplift testing procedures went into effect in 1994.

The HUD proposal for testing uplift requires 1" wide straps attached around the top chord at 6" o.c. In some cases, truss designs with closely spaced verticals and webs will be physically impossible to test to the 6" requirement. This requirement would limit truss design and innovation. Pulling up on straps at 12" o.c. provides the same uplift load and similar results as pulling on the uplift straps 6" o.c. Additionally, the proposed method requires cylinders spaced at 12" o.c., to apply 6" o.c. uplift strapping. This will require some truss manufacturers to redesign their current truss testing equipment which commonly has cylinders at 24" o.c. This retrofit will be costly and time consuming.

In conclusion as proposed, the new requirements will limit innovative design, eliminate existing designs, and significantly increase the cost of Manufactured Housing roof trusses. In view of the significant costs associated with the Subpart E amendment, its impact on roof trusses, home design innovation and the absence of any failures attributable to existing test procedures, **this proposal should be rejected by HUD and should be returned to the MHCC for further evaluation and further analysis of its cost impact.**

RE: Docket No. FR-4886-P-01
January 25, 2005
Page 3

B. Comments Regarding the Deletion of the Formaldehyde Health Notice

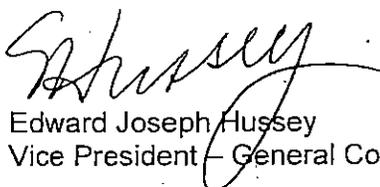
In recommending the deletion of the Formaldehyde Health Notice, the MHCC correctly observed that the materials used in manufactured homes are the same as those used in site-built homes and modular homes, neither of which requires such a health notice. There is no evidence that this health notice is instrumental in protecting the public or in preventing litigation. Since 1985, when the formaldehyde product standards for plywood and particle board became effective, there has been significant progress in lowering formaldehyde levels in manufactured homes. The Formaldehyde Health Notice serves only as a sales deterrent, while contributing to existing misunderstanding by the public regarding health related issues associated with formaldehyde emissions.

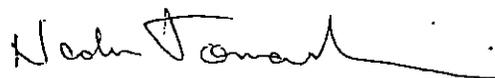
Considering the formaldehyde proposal went through two processes, one with CABO and the second with MHCC, we urge the department to reevaluate their decision on these matters and consider putting them up for public comment again.

Thank you for your consideration of these comments.

Sincerely,

LIBERTY HOMES, INC:


Edward Joseph Hussey
Vice President - General Counsel


Nader Tomasbi, P.E.
Vice President, Product Development
& Engineering Services.

seh

Manufactured Housing Consensus Committee

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January 28, 2005

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12

HUD RULES DOCKET

JAN 31 1 41 PM '05

REC'D

Re: Docket No. FR-4886-P-01
RIN 2502-AI12

Manufactured Housing Construction and Safety Standards

The following comments are submitted on behalf of the Manufactured Housing Consensus Committee (MHCC) and reflect the actions taken by the MHCC in the meeting on January 27, 2005 regarding these proposed rules.

The MHCC wants the public record to contain our appreciation of the Department of Housing and Urban Development (HUD)'s efforts to assist and work with the MHCC to develop this first set of changes to the Manufactured Housing Construction and Safety Standards (Standards) under the requirements of the Manufactured Housing Improvement Act of 2000 (2000 Act).

HUD's cooperation and efforts to expedite getting these proposed rules out for public comment in light of all the requirements on HUD in the 2000 Act deserves recognition.

The MHCC supports HUD's publishing these proposed changes to the Standards as final rules along with the few modifications / revisions / and additions recommended below.

- 3280.309 Formaldehyde Health Notice.

HUD is seeking comments on their rejection of the MHCC recommendation to not prominently display the Health Notice in each manufactured home. The reason for the rejection was "the MHCC did not provide or reference any data or studies supporting its recommendation to remove the requirement".

The MHCC discussed this issue with HUD at the MHCC meetings in June and August of 2004. This discussion included a review of the data in the proposed rule in 1983 and the final rule in 1984 that led to the adoption of the formaldehyde standards in 3280.308 and the Notice requirements in 3280.309. Further, the MHCC reviewed several documents including: current data from NFPA supporting the MHCC recommendation to amend the standards to not "prominently display the Health Notice"; a Study by the Manufactured Housing Research Alliance dated July 2004; and current Environmental Protection Agency documents concerning

Formaldehyde that are on their Environmental, Health and Safety Online system (See attached documentation). It is important to note that the MHCC is **not recommending any change to the current standards regarding the formaldehyde emission controls**; we are only talking about the notice.

All of this information was considered by the MHCC in its August 2004 meeting in developing a recommendation that rather than totally eliminating 3280.309 (Notice), the MHCC would be in favor of revising 3280.309 and require the Notice to be provided in the homeowner's packet instead of having the Notice prominently displayed in the home. The MHCC at its January 27, 2005 meeting approved adoption of MHCC modified recommendation to include the health notice in the home owner's packet only and consider the attached documentation as data sufficient to support adding this recommendation to the final rule.

- **3280.206 Fire blocking.**

HUD modified the MHCC recommendation for fire blocking by removing the alternatives that would permit the use of mineral wool, cellulose insulation and other loose fill materials as acceptable material for fire blocking. HUD stated the removal was due to: "These types of insulation have not been adequately evaluated for transportation effects that could cause settling or shifting when installed around pipes or vents in furnace and water heater compartments".

The MHCC reviewed HUD's concerns and believe the original MHCC recommendation addressed those concerns with the wording: "Where it has been specifically tested in the form and manner intended for use to demonstrate its ability to remain in place and to retard the spread of fire and hot gasses". The MHCC at its January 27, 2005 meeting reaffirmed its initial recommendation and recommends allowing the use of these alternatives when they can demonstrate they will remain in place in the final rule.

- **Testing Protocols 3280.303 (g).**

HUD is seeking comments on whether the final approval of alternate test methods should be solely delegated to DAPIAS. The MHCC unanimously approved delegating the approval to the DAPIAS in its recommendation to HUD and continues to believe this is appropriate.

HUD currently relies on the DAPIAS to review and accept or reject all drawings, calculations, tests, and other justifications supplied by the manufacturer for the design of the home. As far as testing is concerned 3282.203(b)(11) requires the home manufacturer to submit "reports of all tests that were run to validate the conformance of the design to the standards." 3282.361(b) (2) states that DAPIAS "...shall require the submission of all drawings, specifications, calculations, and test records...of each manufactured home design or variation." Further, 3280.203(c) provide the necessary regulation to carry out the quality assurance manual approvals that include a review and approval of the designs, work flow, testing, quality control systems and calculations used by manufacturers to build to the Standards.

The MHCC noted this delegation is in line with current DAPIA authority and that HUD has sufficient remedies under the regulations to deal with a DAPIAS poor performance in any area of responsibility. The MHCC again reviewed its recommendation at the January 27, 2005 meeting and continues to recommend that HUD adopt this change as proposed by the MHCC in the final rule.

- 3280.305(c) (1) (ii) (B) Footnote 9 on One -Piece Metal Roofing.

HUD has modified the note as proposed by the MHCC and in so doing destroyed the original intent of the MHCC recommendation. HUD states they are modifying the MHCC proposal to make it "consistent with the provisions of the Interpretative Bulletin I-2-98".

The intent of the MHCC proposal was to eliminate said IB by rendering it null and void, not to conform to it. (The record shows that IB I-2-98 when issued for public comment received 12 comments, all of which were negative, however, HUD ignored all 12 comments and issued the IB as proposed). HUD states they have modified the footnote "to indicate that test methods must be approved by HUD and comply with the requirements of 24 CFR 3280.303(c) and (g) and 3280.401 of the MHCSS".

The portion of HUD's argument dealing with 3280.303 and 3280.401 is confusing since ALL test methods are already required to comply with 3280.303(c) and (g) and 3280.401. Therefore, the addition of this language to the note serves no purpose.

Notwithstanding, the MHCC's main objection is that HUD is trying to re-impose the very pre-approval of test methods by HUD staff that have been eliminated in the 3280.303(g) proposal contained in these proposed rules. [See discussion above on 3280.303(g)] As discussed above, there is no valid reason for such pre-approval by HUD. It is noted that HUD's proposal lacks any justification as to why it believes pre-approval by its staff for this one product/design is necessary when they are agreeing to eliminate pre-approval for all other current/future products and designs by changing 3280.303(g). The one-piece metal roof catenary design is much stronger than the prescriptive roof sheathing option currently permitted by footnote 7 to the table for resisting uplift loads.

The MHCC at the January 27, 2005 meeting recommended that HUD adopt MHCC'S recommendation in the final rule by using the wording as proposed by the MHCC.

- Metric Units, page 70033

"HUD has requested comments on the use of metric units of measurement in the Construction and Safety Standards. Comment is specifically requested on whether English and metric units should be used concurrently or whether only one or the other should be used. HUD is interested in any information on whether there are circumstances in which the use of one of these measurement systems would be more appropriate than the use of the other."

HUD should definitely concentrate on a single system of units and that system should be English. Most aspects of the construction industry have been, and will continue to be, slow to convert to metric. So a dual system would only confuse and take up additional space. One only has to look at the current model building codes to see how little is gained by the constant use of metrics in parentheses and in footnotes to tables.

There may be some isolated cases where the reference to metric in addition to English could prove helpful. In the case of small pressures, where Pounds per Square Inch (psi) or inches of water or inches of mercury have traditionally been used, Pascals is becoming the unit of choice. Some dial gauges, in fact, may only have Pascal increments. Having Pascal alternate numbers in parenthesis in these isolated cases could prove helpful.

- **Additional Testing 3280 305 (e) (2):**

HUD is requesting comments on whether these changes for critical connections in high wind regions should be implemented unless also supported by suitable load tests.

The MHCC did not believe "suitable load testing" is necessary when engineering calculations and analysis supports use of these materials and connections in the proposed rules presented to HUD. HUD has always allowed calculations and analysis to be used instead of testing. Testing, while more specific than calculations, is generally less conservative.

In fact it is generally understood that HUD will not allow testing of simple assemblies which can be easily calculated. Some of the connections used in high wind regions would fall into this situation and need to be calculated anyway. This change is also consistent with the preference to use "performance requirements" set forth in 3280.1.

The MHCC again reviewed our recommendation at the January 27, 2005 meeting and continues to recommend that the final rule does not need to require "suitable load testing".

- **Ventilated Walls 3280.504 (b).**

HUD is requesting comments on whether the final rule should also include provisions to restrict exterior wall cavities from being ventilated to the outdoors as required by the Waiver. The rule as published already has such a restriction on exterior wall cavities being vented to the outside when the alternate specified in 3280.504 (b) (4) is used. Note that the vapor retarder location specified in 3280.504 (b) (4) is an alternate to that called out in 3280.504 (b) (1) and therefore could not be used with a vented wall cavity specified in 3280.504 (b) (3).

From a practical –useable standpoint, in order for the alternate vapor retarder location to be of any use at all, it is absolutely necessary to provide some minor exception to the requirement that the interior finish have a combined permeance of not less than 5.0 perms. The MHCC has already discussed with HUD the need to

include these exceptions which are part of further changes to the Standards approved by the MHCC but not yet in proposed rule form.

The MHCC at the January 27, 2005 meeting recommended that HUD include these exceptions in the final rule so the alternate vapor retarder location can be a useable option.

- Proposed changes to 3280.209 Roof Truss Testing.

The MHCC recommended accepting more stringent initial qualification testing of truss designs that have been talked about and supported by the industry, code development work groups and task forces over the last ten plus years.

Based on this history and the MHCC recommendation, HUD included these changes in these proposed rules. However, as part of the public review process concerns have been expressed by, and to members of the MHCC. These concerns include issues either not previously considered or not believed to have been a problem by the MHCC in developing its recommendations to HUD.

Several areas especially lacking in the MHCC consensus development process were adequate consideration of the true costs associated with the adoption of this proposal; the impact these changes may have on the testing procedures and the industry; and the proposal's impact on roof truss home design and future innovation.

Based on the MHCC consideration of these concerns at the January 27, 2005 meeting, the MHCC is asking that HUD extract this proposal from the proposed rules and return the proposal to the MHCC for further consideration and development.

The Manufactured Housing Consensus Committee asks that you consider these comments which reflect our actions at the January 27, 2005 meeting as the Department of Housing and Urban Development proceeds with final rule adoption.

Sincerely,



Robert E. Solomon, PE
Project Manager
Manufactured Housing Consensus Committee

C: MHCC Members

ENCL: Supporting Materials for 3280.309

ENCLOSURE

SUPPORTING DOCUMENT FOR 3280.309 FORMALDEHYDE
HEALTH NOTICE

duced or finished or where the plywood is finished. The quality control plan shall be designed to ensure that all panels comply with 4-8.1. The plan shall establish ongoing procedures to identify increases in the formaldehyde emission characteristics of the finished product resulting from the following changes in production:

- (1) In the case of plywood
 - a. The facility where the unfinished panels are produced is changed.
 - b. The thickness of the panels is changed so that the panels are thinner.
 - c. The grooving pattern on the panels is changed so that the grooves are deeper or closer together.
- (2) In the case of particleboard
 - a. The resin formulation is changed so that the formaldehyde-to-urea ratio is increased.
 - b. The amount of formaldehyde resin used is increased.
 - c. The press time is decreased.
- (3) In the case of plywood or particleboard
 - a. The finishing or top coat is changed and the new finishing or top coat has a greater formaldehyde content.
 - b. The amount of finishing or top coat used on the panels is increased, provided that such finishing or top coat contains formaldehyde.

4-8.2.4 The testing laboratory shall periodically visit the plant to monitor quality control procedures to ensure that all certified panels meet the standard.

4-8.2.5 To maintain its certification, plywood or particleboard shall be tested by the air chamber test specified in Section 5-6 whenever one of the following events occurs:

- (1) In the case of particleboard, the resin formulation is changed so that the formaldehyde-to-urea ratio is increased.
- (2) In the case of particleboard or plywood, the finishing or top coat is changed, and the new finishing or top coat contains formaldehyde.
- (3) In the case of particleboard or plywood, the testing laboratory determines that an air chamber test is necessary to ensure that panels comply with 4-8.1.

4-8.2.6 In the event that an air chamber test measures levels of formaldehyde from plywood or particleboard in excess of those permitted under 4-8.1, the tested product's certification shall immediately lapse as of the date of production of the tested panels. No panel produced on the same date as the tested panels, or on any day thereafter, shall be used or certified for use in manufactured homes, unless in accordance with 4-8.2.6.1 and 4-8.2.6.2.

4-8.2.6.1 A new product certification shall be permitted to be obtained by testing randomly selected panels that were produced on any day following the date of production of the tested panels. If such panels pass the air chamber test specified in Section 5-6, the plywood or particleboard produced on that day and subsequent days shall be permitted to be used and certified for use in manufactured homes.

4-8.2.6.2 Plywood or particleboard produced on the same day as the tested panels, and panels produced on subsequent days, if not certified pursuant to 4-8.2, shall be permitted to be used in manufactured homes only under the following circumstances:

- (1) Each panel is treated with a scavenger, sealant, or other means of reducing formaldehyde emissions that does not adversely affect the structural quality of the product.
- (2) Panels randomly selected from the treated panels are tested by and pass the air chamber test specified in Section 5-6.

4-8.3 Panel Identification. Each plywood and particleboard panel bonded or coated with a resin system containing formaldehyde, other than an exclusively phenol-formaldehyde resin system, that is installed in manufactured homes shall be stamped or labeled so as to identify the product manufacturer, date of production and/or lot number, and the testing laboratory certifying compliance with this section.

4-8.4 Treatment after Certification. If certified plywood or particleboard subsequently is treated with paint, varnish, or any other substance containing formaldehyde, the certification shall no longer be valid. In such a case, each stamp or label placed on the panels pursuant to 4-8.3 shall be obliterated. The treated panels shall be permitted to be recertified and reidentified in accordance with 4-8.2 and 4-8.3.

4-9 Health Notice on Formaldehyde Emissions.

4-9.1 Each manufactured home shall have a health notice on formaldehyde emissions prominently displayed in a temporary manner in the kitchen (e.g., countertop or exposed cabinet face). The notice shall read as shown in Figure 4-9.1.

4-9.2 The notice shall be legible and typed using letters at least $\frac{1}{4}$ in. (6 mm) in size. The title shall be typed using letters at least $\frac{3}{4}$ in. (19 mm) in size.

4-9.3 The notice shall not be removed by any party prior to delivery of the home to the first purchaser of the home for purposes other than resale.

4-9.4 A copy of the notice shall be included in the consumer manual required by Section 1-3.

Figure 4-9.1 Health notice on formaldehyde emissions.

Important Health Notice

Some of the building materials used in this home emit formaldehyde. Eye, nose, and throat irritation, headache, nausea, and a variety of asthma-like symptoms, including shortness of breath, have been reported as a result of formaldehyde exposure. Elderly persons and young children, as well as anyone with a history of asthma, allergies, or lung problems, may be at greater risk. Research is continuing on the possible long-term effects of exposure to formaldehyde.

Reduced ventilation resulting from energy efficiency standards may allow formaldehyde and other contaminants to accumulate in the indoor air. Additional ventilation to dilute the indoor air may be obtained from a passive or mechanical ventilation system offered by the manufacturer. Consult your dealer for information about the ventilation options offered with this home.

High indoor temperatures and humidity raise formaldehyde levels. When a home is to be located in areas subject to extreme summer temperatures, an air-conditioning system can be used to control indoor temperature levels. Check the comfort cooling certificate to determine if this home has been equipped or designed for the installation of an air-conditioning system.

If you have any questions regarding the health effects of formaldehyde, consult your doctor or local health department.

VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 13

(Log #108)
Committee: MAN-STR

(Log #50)
Committee: MAN-STR

501-71 - (4.9 [3280.309]): Accept
SUBMITTER: Frank Walter, Manufactured Housing Inst. (MHI)
RECOMMENDATION: Delete Section 4.9 in its entirety.

4.9 Health Notice on Formaldehyde Emissions:
4.9.1 Each manufactured home shall have a health notice on formaldehyde emissions prominently displayed in a temporary manner in the kitchen (e.g., countertop or exposed cabinet face). The notice shall read as follows:

IMPORTANT HEALTH NOTICE
Some of the building materials used in this home emit formaldehyde. Eyes, nose, and throat irritation, headache, nausea, and a variety of Asthma-like symptoms, including shortness of breath, have been reported as a result of formaldehyde exposure. Elderly persons and young children, as well as anyone with a history of asthma, allergies, or lung problems, may be at great risk. Research is continuing on the possible long-term effects of exposure to formaldehyde.

Reduced ventilation resulting from energy efficiency standards may allow formaldehyde and other contaminants to accumulate in the indoor air. Additional ventilation to dilute the indoor air may be obtained from a passive or mechanical ventilation system offered by the manufacturer. Consult your dealer for information about the ventilation options offered with this home.

High indoor temperatures and humidity raise formaldehyde levels. When a home is to be located in areas subject to extreme summer temperatures, an air conditioning system can be used to control indoor temperature levels. Check the comfort cooling certificate to determine if this home has been equipped or designed for the installation of an air conditioning system.

If you have any questions regarding the health effects of formaldehyde, consult your doctor or local health department.

4.9.2 The notice shall be legible and typed using letters at least 1/4 in. (6 mm) in size. The title shall be typed using letters at least 3/4 in. (19 mm) in size.

4.9.3 The notice shall not be removed by any party prior to delivery of the home to the first purchaser of the home for purposes other than resale.

4.9.4 A copy of the notice shall be included in the customer manual required by Section 1.3.

SUBSTANTIATION: This recommended change was originally submitted to HUD by the MHCSS Consensus Committee on 12-29-92, but no action has been taken. There is no difference in the materials used in manufactured homes versus site-built homes or modular homes, which require no health notices.

There is no evidence that this Health Notice is instrumental in protecting the public or in preventing litigation.

Since 1985 when the formaldehyde product standards for plywood and particleboard became effective, there has been a lot of progress in lowering formaldehyde levels in homes. Other high emitters, such as cigarette smoke, are not regulated by the Standard.

The Health Notice is only a sales deterrent and should be eliminated. It only complicates an issue that is already misunderstood by the public in general.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 12

NEGATIVE: 1

EXPLANATION OF NEGATIVE:

JONES: This warning was enacted due to prior public health concerns and litigation. The reason to remove the warning is not substantiated.

501-72 - (5-1.1 [3280.401(a)]): Accept in Principle
SUBMITTER: Michael L. Zieman, RADCO
RECOMMENDATION: Add the following text after the sentence in the middle of the paragraph which ends "...rupture, fracture, or excessive yielding."

(Note: Design live load deflection criteria does not apply when the structural assembly being evaluated does not include structural framing members. For example: exterior metal siding tests where the metal siding and its fastening are evaluated but the framing system, necessary to test the metal siding, is not being evaluated.)

SUBSTANTIATION: This is common sense but the clarification is needed to correct actual and potential misinterpretations. In the example above for exterior metal siding test the framing system used in the actual home would be separately substantiated by calculations or other tests which would include an evaluation for conformance to deflection criteria in 4-5.4 [3280-305(d)].

COMMITTEE ACTION: Accept in Principle.
Revise 5-1.1 and add a new appendix note to read as follows:

5-1.1* Proof Load Tests. Every structural assembly tested shall be capable of sustaining its dead load plus superimposed live loads equal to 1.75 times the required live loads for a period of 12 hours without failure. Tests shall be conducted with loads applied and deflections recorded in 1/4 design live load increments at 10-minute intervals until 1.25 times design live load plus dead load has been reached. Additional load shall then be applied continuously until 1.75 times design live load plus dead load has been reached. Assembly failure shall be considered as design live load deflection (or residual deflection measured 12 hours after live load removal) that is greater than the limits set in 4-5.4, rupture, fracture, or excessive yielding. Design live load deflection criteria shall not apply when the structural assembly being evaluated does not include structural framing members. An assembly to be tested shall be of the minimum quality of materials and workmanship of the production. Each test assembly, component, or subassembly shall be identified as to type and quality of grade of material. All assemblies, components, or subassemblies qualifying under this test shall be subject to a continuing qualification testing program acceptable to the regulatory agency.

A-5.1.1 Example for when design live load deflection criteria does not apply: exterior cladding tests where the cladding and its fastening are evaluated but the framing system, necessary to test the cladding, is not being evaluated.)

COMMITTEE STATEMENT: The proposal was revised to be in mandatory language. An appendix note was created to address the nonmandatory references of the examples as noted in the proposal. The term "metal siding" was changed to "cladding" for clarification and to identify that this is not just limited to metal siding.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 13

(Log #109)
Committee: MAN-STR

501-73 - (5-1.2 [3280.401(b)]): Accept in Principle
SUBMITTER: Michael L. Zieman, RADCO
RECOMMENDATION: Add the following text after the sentence in the middle of the paragraph which ends "...rupture, fracture, or excessive yielding."

(Note: Design live load deflection criteria does not apply when the structural assembly being evaluated does not include structural framing members. For example: exterior metal siding tests where the metal siding and its fastening are evaluated but the framing system, necessary to test the metal siding, is not being evaluated.)

SUBSTANTIATION: This is common sense but the clarification is needed to correct actual and potential misinterpretations. In the example above for exterior metal siding test the framing system used in the actual home would be separately substantiated by calculations or other tests which would include an evaluation for conformance to deflection criteria in 4-5.4 [3280-305(d)].

COMMITTEE ACTION: Accept in Principle.
Revise 5-1.2 and add a new appendix item to read as follows:

5-1.2 Ultimate Load Tests. Ultimate load tests shall be performed on a minimum of three assemblies or components to generally evaluate the structural design. Every structural assembly or component tested shall be capable of sustaining its total dead

(Log #65)

Committee: MAN-STR

COMMITTEE ACTION: Accept in Principle.
Add at the end of this section "...below the outer side walls."

This section now reads:
4-6.4 Requirements for Ties. Manufactured homes in Wind Zone I shall require only diagonal ties. These ties shall be placed along the main frame and below the outer walls. All manufactured homes designed to be located in Wind Zone II and Wind Zone III shall have both vertical and diagonal ties below the outer side walls.

COMMITTEE STATEMENT: This proposed revision establishes the clarification that both vertical and diagonal ties are to be used. This section does not mandate that each type of tie has to be installed with each other, just a combination in this location. In response to the Technical Correlating Committee's concern on the endwall application, an endwall is not considered an outer wall by the industry.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 16
VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 13
NEGATIVE: 1
NOT RETURNED: 2 Patel, Willis

EXPLANATION OF NEGATIVE:
MENDLEN: Revise Section 4-6.4 to read as follows:
4-6.4 All manufactured homes designed to be located in Wind Zone II and Wind Zone III shall have a vertical tie installed at each diagonal tie location below the outer side walls.

Substantiation: The above suggested revision would remove my negative comment and retain current requirements for vertical ties at each diagonal tie thereby not reducing present levels of resistance to overturning and uplift. As presently proposed, it would be possible to place fewer vertical ties at greater spacing which could significantly redistribute forces and cause premature failure of the vertical ties and/or higher loaded anchors.

(Log #58)

Committee: MAN-STR

501-61 - (4-6.4 [3280.306(d)]): Reject
SUBMITTER: Richard A. Mendlen, Dept. of Housing and Urban Development
COMMENT ON PROPOSAL NO: 501-65
RECOMMENDATION: Delete proposed revision to this section and retain existing language to read as follows:

4-6.4 All manufactured homes designed to be located in Wind Zone II and Wind Zone III shall have a vertical tie installed at each diagonal tie location, both vertical and diagonal ties.
SUBSTANTIATION: The current proposal without adequate engineering justification, significantly reduces the number of ties and weakens the anchoring system required by the present Standards. The entire subject of adequate anchoring and foundation systems to resist high wind forces requires additional field studies and investigation.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: This action was taken based on the Technical Committee's action on Comment 501-60 (Log #31) which revised this section for clarification.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 16
VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 13
NEGATIVE: 1
NOT RETURNED: 2 Patel, Willis

EXPLANATION OF NEGATIVE:
MENDLEN: Revise Section 4-6.4 to read as follows:
4-6.4 All manufactured homes designed to be located in Wind Zone II and Wind Zone III shall have a vertical tie installed at each diagonal tie location below the outer side walls.

Substantiation: The above suggested revision would remove my negative comment and retain current requirements for vertical ties at each diagonal tie thereby not reducing present levels of resistance to overturning and uplift. As presently proposed, it would be possible to place fewer vertical ties at greater spacing which could significantly redistribute forces and cause premature failure of the vertical ties and/or higher loaded anchors.

501-62 - (4-6.6 [3280.306(l)]): Reject
SUBMITTER: Mark A. Nunn, Manufactured Housing Inst.
COMMENT ON PROPOSAL NO: 501-66
RECOMMENDATION: Revise Section 4-6.6 to read as follows:
4-6. Anchoring equipment-load resistance. Anchoring equipment shall be tested in the low range of each soil classification, and be capable of resisting an allowable working load equal to or exceeding 3,150 lbs (1.43 x 10³ kg) and withstanding a 50 percent overload (4,725 lb total) (2.14 x 10³ kg) without failure of either the anchoring equipment or the attachment point on the manufactured home.
The minimum required test value for soil classifications are:
(a) Class 2 — 550 in.-lbs (6.35 m-kg)
(b) Class 3 — 360 in.-lbs (4.04 m-kg)
(c) Class 4a — 275 in.-lbs (3.18 m-kg)
(d) Class 4b — 175 in.-lbs (2.02 m-kg)

SUBSTANTIATION: This requirement would affect the manufacturing of anchor equipment. The current ground anchor certification criteria permits testing at the highest end of the soil classification. A Class 4a soil has a range from 275 to 350 inch-pounds. Anchors can be tested at the higher end of around 340 — 349 inch-pounds using a soil test probe kit torque wrench. The anchor tested in this high range would not be expected to develop the required working load at the lower end range of 275 inch-pounds. In this manner, ground anchors tested in the lower range of each soil classification would be expected to perform as intended for the entire soil classification.

This requirement would provide similar protection to the consumer as that provided by the wind zone standards, where the standard is geared toward a "worst case" scenario, rather than the opposite as currently exists with ground anchors.

Even though the committee recognized that there is some justification in establishing minimum criteria associated with soil classifications and overall application of the anchoring provisions, limits on the testing values to be used were suggested to be measurable and defined. This proposed comment seeks to clarify what is intended by the low range value for ground anchor testing.

Note: Supporting material available for review at NFPA Headquarters.

COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: The requirement for soil classification is not a requirement that is appropriately addressed within this document. These provisions should be addressed in the appropriate documents that pertain to site set and by the appropriate regulations established by the local and state authorities.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 16
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 14
NOT RETURNED: 2 Patel, Willis

(Log #57)

Committee: MAN-STR

501-63 - (4-9 [3280.309]): Reject
SUBMITTER: Richard A. Mendlen, Dept. of Housing and Urban Development
COMMENT ON PROPOSAL NO: 501-71
RECOMMENDATION: Delete the proposed revision to this section in its entirety and retain the existing language for the Health Notice in the current 501 Standard.
SUBSTANTIATION: No technical justification has been provided in support of the proposed action to eliminate the Health Notice on Formaldehyde Emissions. The statement offered in support of the action as substantiation that the Health Notice does not protect the public is not accurate. After reviewing the Notice, prospective purchasers can make informed decisions regarding symptoms and potential risks to themselves and family members due to exposure to formaldehyde. The Health Notice serves as a disclosure statement to those who are extremely sensitive and more at risk and advises concerned individuals to consult their doctor or local health department.
COMMITTEE ACTION: Reject.

COMMITTEE STATEMENT: The Technical Committee stands on recommendations of the original Proposal 501-71 (Log #50). There has been significant changes associated with this material since 1985 and this notice is not necessary now because of the levels now found within a home. It is noted there is nothing restricting the home manufacturer from providing this information to the purchaser in their general information package.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 16

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 13

NEGATIVE: 1

NOT RETURNED: 2 Patel, Wills

EXPLANATION OF NEGATIVE:

MENDLEN: No technical justification was provided at the TC meeting in support of the proposed action to eliminate the "Health Notice on Formaldehyde Emissions". Instead, the TC members indicated that the notice was no longer necessary because of fewer complaints and lower formaldehyde levels found in the home. Information was not provided that formaldehyde is no longer a health risk for certain individuals even at the lower formaldehyde levels. As stated in my early comment on this proposal, "the health notice serves as a disclosure statement to those who are extremely sensitive and more at risk and advises concerned individuals to consult their doctor or local health department."

5-2.3 Measuring and Loading Methods. Deflections in each truss shall be measured relative to a fixed reference datum.

Deflections shall be measured at the free end of an eave or cornice projection and at as many bottom chord panel points as necessary to obtain an accurate representation of the deflected truss(es) but shall be measured at least at the mid-span and at two quarter points. Deflections shall be read and recorded to the nearest 1/16 in. (1.6 mm). Dead loads shall be applied to the top and bottom chords and live load to the top chord through a suitable hydraulic, pneumatic, or mechanical system for weights to simulate loads. Load units for uniformly distributed loads shall be separated so that arch action does not occur, and shall be spaced no greater than 12 in. (305 mm) on center so as to simulate uniform loading. Bottom chord loading shall be spaced as uniformly as practical. Truss gravity loads shall be calculated based on the overall truss length (horizontal projection) including eave or cornice projections.

5-2.4 General Test Procedures. General test procedures include the following methods.

5-2.4.1 Dead Load. Measure and record initial elevation of the truss(es) in the test position at no load. When trusses are arranged according to Section 5-2.2.2(c), the no load to dead load measurement is not required. Apply dead loads to the top and bottom chord of the truss that are representative of the weights of the materials to be supported by the truss. The actual ceiling/roof assembly dead loads shall be used with a minimum of 5 psf on the top chord and 3 psf on the bottom chord. Greater dead loads shall be applied to the top and bottom chords if required, to represent the actual loads. Dead loads to be applied to the truss test assembly shall be permitted to include only the weights of materials supported by the truss and not the weight of the truss itself. However, readings from load cells (when used) on which the test truss rests shall reflect the sum of the applied load plus the weight of the truss. Apply dead loads and hold for five minutes. Measure and record the deflections.

5-2.4.2 Live Load. Maintaining the dead loads, apply live load to the top chord in approximate 1/4 live load increments until dead load plus 1.25 times the live load is reached. Measure and record the deflections at a minimum of five minutes after each live load increment has been applied. Apply incremental loads at a uniform rate such that approximately one-half hour is required to reach full design live load.

5-2.4.3 Overload Phase. Additional loading shall then be applied continuously until the dead load plus 2.5 times the design live load is reached. This overload condition shall be maintained for five minutes. After five minutes, remove the overload and design live load leaving the design dead load in place. Record the truss recovery within the next four hours.

5-2.4.4 Acceptance Criteria. The truss design shall be considered to have passed if all of the following conditions are met:

- (a) No load to dead load deflection shall be less than $L/480$ for simply supported clear spans and less than $Lo/240$ for eave and cornice projections, and
- (b) Dead load to design live load deflection shall be less than $L/240$ for simply supported clear spans and less than $Lo/120$ for eave or cornice projections, and
- (c) The truss shall maintain the overload condition for five minutes without failure, and
- (d) The truss shall recover to at least $L/240$ for simply supported clear spans and $Lo/120$ for eave and cornice projections within four hours after the overload condition and design live load have been removed.

5-2.5 Test Procedure for Bowstring Trusses Only. Bowstring truss(es) test procedures include the following methods.

5-2.5.1 Dead Load. Measure and record initial elevation of truss(es) in the test position at no load. When trusses are arranged per Section 5-2.2.2(c) the no load to dead load measurement is not required. The actual ceiling/roof assembly dead loads shall be used with a minimum of 3 psf on the top chord and 2 psf on the bottom chord. Greater dead loads shall be applied to the top and bottom chords, if required, to represent the actual loads. Dead loads to be applied to the truss test assembly shall be permitted to include only the weight of materials supported by the truss and not the weight of the truss itself. However, readings from load cells (when used) on which

(Log #66)
Committee: MAN-SFR

501-64 (5-2 [3280.402]): Accept in Principle
SUBMITTER: Mark A. Nunn, Manufactured Housing Inst.
COMMENT ON PROPOSAL NO: 501-74
RECOMMENDATION: Delete Section 5-2 and substitute the following: (Underlining omitted for clarity, except for revised Section 5-2.6.)

5-2 Test Procedure for Roof Trusses.

5-2.1 Roof Load Tests. The following is an acceptable procedure for roof truss testing. Where roof trusses act as support for other members, have eave or cornice projections or support concentrated loads, roof trusses shall be tested for those conditions.

5-2.2 General. Trusses shall be permitted to be tested in a truss test fixture, which replicates the design loads, and actual support points and does not restrain horizontal movement. When tested singly or in groups of two or more trusses, trusses shall be mounted on supports positioned to give the required clear span distance (L) and eave or cornice distance (Lo) if applicable as specified in the design. Truss tests shall be performed on a minimum of three trusses to evaluate the truss design.

5-2.2.1 When trusses are tested singly, trusses shall be positioned in a test fixture with supports properly located and have the roof loads evenly applied.

5-2.2.2 When tested in groups of two or more trusses, the top chord shall be permitted to be sheathed with 1/4 in. (6 mm) thick nominal 12 in. (305 mm) wide plywood strips. The plywood strips shall be at least long enough to cover the top chords of the trusses. Adjacent plywood strips shall be separated by at least 1/8 in. (3 mm). The plywood strip shall be nailed with 4d nails or equivalent staples not closer than 8 in. (203 mm) on center along the top chords. The bottom chords of the trusses shall be permitted to be either:

- (a) unbraced, or
- (b) laterally braced together (not cross braced) with 1 in. x 2 in. (25 mm x 51 mm) stripping not closer than 4 in. (610 mm) on center nailed with only one 6d nail at each truss.
- (c) as an alternate the top and bottom chords shall be permitted to be braced and covered with a material and with the connections or method of attachment as specified for the completed manufactured home.

Formaldehyde Concentrations in Manufactured Homes: The Current Situation

Prepared for:
The Manufactured Housing Institute
2101 Wilson Boulevard Suite 610
Arlington, VA 22201-3062

Prepared by:
Manufactured Housing Research Alliance
2109 Broadway, Suite 200
New York, NY 10023
(212) 496-0900

July 2004

The HUD formaldehyde rule went into effect on February 11, 1985 [49 Fed. Reg. 32847]. At the time HUD enacted the rule, the only existing residential ambient air formaldehyde standards in the US were in Wisconsin (0.4 ppm for manufactured housing) and Minnesota (0.5 ppm for manufactured housing) [48 Fed. Reg. 37137]. In publishing the rule, HUD concluded that "an indoor ambient formaldehyde level of 0.4 ppm provides reasonable protection to manufactured home occupants" [49 Fed. Reg. 31998]. After reviewing the available literature, HUD also concluded that "there is insufficient medical and scientific evidence to substantiate more than minimal health benefits when formaldehyde levels are reduced below 0.4 ppm."

In the ensuing years, a level of 0.1 ppm has been recommended by various organizations, such as:

- The California Air Resources Board (CARB) sets a level of 0.1 ppm as an "action level" above which it recommends taking action to reduce formaldehyde levels in the air, and a level of 0.05 ppm as a "target level" [CARB 1991].
- Health Canada similarly sets a level of 0.1 ppm as an "action level" and 0.05 ppm as a "target level" [Health Canada 1987].
- The US Consumer Products Safety Commission (CPSC) currently lists a level of 0.1 ppm as the symptom threshold for most people [CPSC 1997].
- The US Environmental Protection Agency has established 0.1 ppm as the level at which symptoms may occur [EPA 1995].

Unique factors exacerbated the formaldehyde problem in manufactured homes further encouraging HUD to establish standards. These factors included:

- Manufactured homes used more of the types of products containing formaldehyde than other types of residential structures. At the time the formaldehyde rule was enacted, a significant portion of the interior wall finish of manufactured homes was made of urea formaldehyde (UF)-bonded hardwood veneer plywood. The floor decking of manufactured homes was typically made of UF-bonded particleboard.
- Manufactured homes on average had a smaller volume of interior space than single family detached site-built homes. The smaller volume of typical manufactured homes (compared to site built homes) was assumed to exacerbate the formaldehyde concentrations in the indoor air.

2. The current situation

A review of the current situation with regard to formaldehyde concentrations in new homes suggests that the limits on material emissions in Section 3280.308 (see Appendix A) have had their intended effect. A confluence of factors, including the post-1985 changes in the manufacture, selection and application of materials, the trend toward larger homes and the requirement for whole house ventilation (Section 3280.103) have all contributed to significant reductions in ambient formaldehyde levels. The impact of these factors is described in the sections below.

Table 1 Summary of material formaldehyde emission requirements

Material	HUD requirement	Standard requirement for maximum formaldehyde emissions	Voluntary industry product standard
Particleboard	0.3ppm	0.2ppm (underlayment and decking) 0.3ppm for other grades	ANSI A208.1-1999
Plywood	0.2ppm	0.2ppm	ANSI/HPVA HP-1-2004

The new product standards dramatically reduced the formaldehyde emissions from UF-bonded bonded wood products (including plywood paneling and particleboard). From 1980 to 1985 average formaldehyde emissions from particleboard declined 85% [McCredie 1992]. On average, formaldehyde emissions from UF-bonded wood products declined between 75% and 90% from 1980 levels [McCredie 1992].

It is important to note, however, that actual concentrations of ambient formaldehyde in a home will vary depending on an array of factors including: the amount of UF-containing material present in the home, the temperature and humidity, and the amount of fresh air ventilation provided to the home. In addition, the rate of formaldehyde emission from a source material will decline as the material ages [CPSC 1997].

2.3. Health and formaldehyde levels

The health consequences of various formaldehyde levels continue to be a topic of debate among researchers. Particularly at very low concentration (below 0.1 ppm) there is no consensus on safe levels or durations of environmental formaldehyde exposure. The Organization for Economic Cooperation and Development in its Screening Information Data Set describes the following symptom levels (Table 2)[OECD 2004]:

Table 2 Summary of symptoms due to air borne formaldehyde exposure [OECD 2004]

Symptoms	Level (ppm)
Eye irritation threshold for most people	0.3 to 0.5
Odor threshold	0.5 to 1.0
Significant eye irritation	1.0
Moderate to severe eye, nose and throat irritation	2.0 to 3.0

A phenomenon known as chemical hypersensitivity affecting a small portion of the population causes a few individuals to be extremely sensitive to many industrially-produced chemicals, including some used in the manufacture of building materials and other products used in the home. While formaldehyde may be among the chemicals that, at even extremely low levels, can affect these people, many other chemicals commonly found in household items, such as cleaning products, perfumes, pesticides, personal care products, and paints may elicit symptoms in some individuals.

2.4. Increase in home ventilation rates

One of the provisions of the 1985 HUD formaldehyde rule is a requirement that manufacturers offer an optional ventilation system in new manufactured homes. This was replaced by HUD in 1994 with the adoption of Section 3280.103 (b) into the HUD standards establishing whole house ventilation requirements. Under the provision, manufacturers must

median formaldehyde concentration was found to be 0.037 ppm, and all concentrations were lower than the most restrictive guideline in the US at that time of 0.050 ppm (the CARB guidelines).

- **Pilot Study Formaldehyde Levels in Manufactured Homes from Occupant Placed and Activated Passive Monitors [Angleton 1988].** This study was conducted in 1988 for HUD by the NAHB Research Foundation and the Hardwood Plywood Manufacturers Association. Researchers measured formaldehyde concentrations in eight occupied and furnished manufactured homes and found long-term (7-day) average measured formaldehyde concentrations ranging from 0.01 ppm to 0.05 ppm with an average of all homes of 0.03 ppm.
- **Formaldehyde Measurements in Five New, Unoccupied Energy Efficient Manufactured Homes [Parker 1986].** In this study, conducted in 1986 by the Pacific Northwest National Laboratory, researchers measured the formaldehyde concentrations in five new energy efficient unoccupied manufactured homes built to the specifications of the Model Conservation Standards (MCS) established by the Northwest Power Planning Council. As MCS homes, they incorporated measures that resulted in an extremely tight building envelope. To compensate for the low level of natural air infiltration, homes built under the program were required to be equipped with air-to-air heat exchangers (AAHX). The average measured formaldehyde concentration for the five homes with the AAHX on (operating mode) was 0.078 ppm. Average levels for each of the homes ranged from 0.065 ppm to 0.097 ppm.

A search of the literature has not revealed any scientific studies of formaldehyde in manufactured homes, constructed since the implementation of the HUD rule that measured average operational levels of airborne formaldehyde above the EPA and CPSC threshold of 0.1 ppm.

A number of engineering firms that offer building performance and diagnostic testing services for the manufactured housing industry have had experience testing for formaldehyde in manufactured homes in the past. MHRA conducted a survey of these firms in June 2004 requesting data on measured formaldehyde levels in manufactured homes constructed since 1995. Of the five firms responding, three had had no formaldehyde-related complaints and therefore no data. Two firms provided data from the homes they had tested. Since 1995, each firm had tested a single home (see Appendix B for letters with test results from the two firms that have conducted recent testing). One of the tests indicated a level of 0.06 ppm and the other test was negative for the presence of airborne formaldehyde.

The historic data is shown on Figure 1 and illustrates the trend in levels of formaldehyde concentrations over time. Also shown on the graph are the CPSC symptom level (0.1 ppm), the CARB action and target levels (0.1 ppm and 0.05 ppm respectively), and HUD's target level (0.4 ppm). All homes in the data set constructed since 1990 are below the 0.1 ppm threshold.

3. Conclusions and recommendations

As noted above, the conditions that led HUD to promulgate formaldehyde regulations in the early 1980s have largely dissipated. Compared with homes constructed 20 years ago, the evidence suggests that new homes have dramatically lowered levels of air borne formaldehyde. Among the major factors accounting for the reduction are the following:

- The building materials regulated by HUD contain 75 to 90% less formaldehyde than they did prior to the HUD rule.
- Hardwood plywood paneling, the most used urea formaldehyde-containing material in pre-1985 manufactured homes, is rarely used today. It has been supplanted by non-formaldehyde containing gypsum board in over 95% of all new homes.
- Manufactured homes today are larger, and have a mandated fresh air whole house ventilation system, diluting the concentration of any remaining formaldehyde in the indoor air.

Recent measurements of formaldehyde levels in manufactured homes, albeit limited in number, provide hard evidence of the impact of these changes, and attest to the success of the HUD rule in eliminating formaldehyde contamination of indoor air as a problem in modern manufactured homes. The small number of studies on homes constructed since the passage of the HUD formaldehyde rule is likely the result of few homeowner complaints and the general attitude within the building science community that formaldehyde in manufactured homes is no longer a potential health hazard. Neither HUD, the US Environmental Protection Agency, the manufactured housing industry, nor any state or regional organization that actively studied this issue in the 1980s has seen the need to conduct tests of formaldehyde levels in manufactured homes in recent years.

Consumer complaint data relating to formaldehyde for the 12 states that HUD monitors has been requested and will be incorporated into this paper as an addendum when it becomes available. While anecdotal, a survey was conducted of the design approval primary inspection agencies (DAPIAs), organizations that would typically be involved in responding to consumer complaints. Most of the DAPIAs indicated that they had received no complaints over the past 10 years or so. Data collected by one DAPIA (RADCO) is included in this Appendix B to this report and involved a total of nine homes over a six year period, the most recent being 1996.

With regard to the HUD standards for formaldehyde, the following are recommended actions:

- The HUD rule establishing maximum formaldehyde emissions for plywood and particleboard (Section 3280.308) used in manufactured homes should remain in place as it has been instrumental in limiting ambient levels of formaldehyde in manufactured housing.
- There appears to be no justification for maintaining the Health Notice (Section 3280.309) and this provision should be repealed. The health notice required by the HUD formaldehyde rule is misleading and its implication that the air in manufactured homes contains dangerously high levels of formaldehyde is outdated and contradicted by the literature, contemporary data and experience. The levels of formaldehyde present in modern manufactured homes are lower than that recommended by authoritative sources.

Posting of a health notice suggests that under certain conditions, that are not uncommon in new homes, people will suffer ill effects. For current construction, this has not been demonstrated and no evidence has been found to substantiate such a claim. To justify a health warning, convincing scientific evidence must be provided.

University International Particleboard/Composite Materials Symposium, April 7, 8, 9, 1992. Pullman, WA.

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Appendix B—Letters from independent engineers



June 30, 2004

Jordan Dentz
Manufactured Housing Research Alliance
2109 Broadway, Suite 200
New York, NY 10023

Re: Testing for Formaldehyde in Manufactured Housing

Dear Jordan:

In May 2000, I visited a 2-month old home (sited 2 months) in Clayton NC to follow up reports of formaldehyde and symptoms consistent with indoor air problems. In the end, no significant elevation of formaldehyde levels was discovered. Excerpts from my report follow:

IAQ Complaint

The occupants reported that the air in the home had a chemical odor that caused burning of the eyes. They had experienced a variety of symptoms that included: eye burning, nausea, headaches, and respiratory difficulties that coincided with the period of time living in the home. The retailer had also observed the eye burning and odor phenomenon. The problem began 3-4 days after occupancy and seemed to be more intense after a rainstorm and periodically after that – sometimes being much stronger than others.

Initial (flawed) formaldehyde test

An independent environmental testing laboratory tested the air in five rooms on May-16-2000 for formaldehyde. Their analysis of the results indicated an elevated level of formaldehyde from 0.5 to 2.5 parts per million (ppm) at which point the occupants were told to leave the house. Upon reviewing the testing protocol, these tests were found to have been conducted incorrectly. The initial formaldehyde testing was conducted with a pump not certified for the particular test procedure - use of non-certified pumps for the particular formaldehyde tests are known to result in considerable measurement errors

Final formaldehyde analysis

I visited the house a second time on May 26, 2000. At this time the environmental testing lab conducted a second formaldehyde test of the same rooms, and building cavities under my supervision using the proper protocol under conditions designed to maximize formaldehyde levels. Since the analysis involved a subjective interpretation of an indicator color in a glass tube for which no one present had specific experience; I had duplicate sample tubes sent to the manufacturer of the testing apparatus for interpretation. Their written analysis stated:



U.S. Environmental Protection Agency

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IAQ in Large Buildings

"An Update on Formaldehyde - 1997 Revision"

U.S. Consumer Product Safety Commission (CPSC)
Washington, DC 20207
CPSC Document #725
(reprinted by the U.S. EPA)

What is Formaldehyde?

Formaldehyde is an important industrial chemical used to make other chemicals, building materials, and household products. It is one of the large family of chemical compounds called volatile organic compounds or 'VOCs'. The term volatile means that the compounds vaporize, that is, become a gas, at normal room temperatures. Formaldehyde serves many purposes in products. It is used as a part of:

- the glue or adhesive in pressed wood products (particleboard, hardwood plywood, and medium density fiberboard (MDF));
- preservatives in some paints, coatings, and cosmetics;
- the coating that provides permanent press quality to fabrics and draperies;
- the finish used to coat paper products; and
- certain insulation materials (urea-formaldehyde foam and fiberglass insulation).

Formaldehyde is released into the air by burning wood, kerosene or natural gas, by automobiles, and by cigarettes. Formaldehyde can off-gas from materials made with it. It is also a naturally occurring substance.

The U.S. Consumer Safety Commission has produced this booklet to tell you about formaldehyde found in the indoor air. This booklet tells you where you may come in contact with formaldehyde, how it may affect your health, and how you might reduce your exposure to it.

Why Should You Be Concerned?

Formaldehyde is a colorless, strong-smelling gas. When present in the air at levels above 0.1 ppm (parts in a million parts of air), it can cause watery eyes, burning sensations in the eyes, nose and throat, nausea, coughing, chest tightness, wheezing, skin rashes, and allergic reactions. It has also been observed to cause cancer in scientific studies using laboratory animals and may cause cancer in humans. Typical exposures to humans are much lower; thus any risk of causing cancer is believed to be small at the level at which humans are exposed.

Formaldehyde can affect people differently. Some people are very sensitive to formaldehyde while others may not have any noticeable reaction to the same level.

Persons have developed allergic reactions (allergic skin disease and hives) to formaldehyde through skin contact with solutions of formaldehyde or durable-press clothing containing formaldehyde. Others have developed asthmatic reactions and

skin rashes from exposure to formaldehyde.

Formaldehyde is just one of several gases present indoors that may cause illnesses. Many of these gases, as well as colds and flu, cause similar symptoms.

What Levels of Formaldehyde Are Normal?

Formaldehyde is normally present at low levels, usually less than 0.03 ppm, in both outdoor and indoor air. The outdoor air in rural areas has lower concentrations while urban areas have higher concentrations. Residences or offices that contain products that release formaldehyde to the air can have formaldehyde levels of greater than 0.03 ppm. Products that may add formaldehyde to the air include particleboard used as flooring underlayment, shelving, furniture and cabinets; MDF in cabinets and furniture; hardwood plywood wall panels, and urea-formaldehyde foam used as insulation. As formaldehyde levels increase, illness or discomfort is more likely to occur and may be more serious.

Efforts have been made by both the government and industry to reduce exposure to formaldehyde. CPSC voted to ban urea-formaldehyde foam insulation in 1992. That ban was over-turned in the courts, but this action greatly reduced the residential use of the insulation product. CPSC, the Department of Housing and Urban Development (HUD) and other federal agencies have historically worked with the pressed wood industry to further reduce the release of the chemical from their products. A 1985 HUD regulation covering the use of pressed wood products in manufactured housing was designed to ensure that indoor levels are below 0.4 ppm. However, it would be unrealistic to expect to completely remove formaldehyde from the air. Some persons who are extremely sensitive to formaldehyde may need to reduce or stop using these products.

What Affects Formaldehyde Levels?

Formaldehyde levels in the indoor air depend mainly on what is releasing the formaldehyde (the source), the temperature, the humidity, and the air exchange rate (the amount of outdoor air entering or leaving the indoor area). Increasing the flow of outdoor air to the inside decreases the formaldehyde levels. Decreasing this flow of outdoor air by sealing the residence or office increases the formaldehyde level in the indoor air.

As the temperature rises, more formaldehyde is emitted from the product. The reverse is also true; less formaldehyde is emitted at lower temperature. Humidity also affects the release of formaldehyde from the product. As humidity rises more formaldehyde is released.

The formaldehyde levels in a residence change with the season and from day-to-day and day-to-night. Levels may be high on a hot and humid day and low on a cool, dry day. Understanding these factors is important when you consider measuring the levels of formaldehyde.

Some sources – such as pressed wood products containing urea-formaldehyde glues, urea-formaldehyde foam insulation, durable press fabrics, and draperies – release more formaldehyde when new. As they age, the formaldehyde release decreases.

What are the Major Sources?

1. **Urea-formaldehyde foam insulation:** During the 1970s, many home owners installed this insulation to save energy. Many of these homes had high levels of formaldehyde soon

afterwards. Sale of urea-formaldehyde foam insulation has largely stopped. Formaldehyde released from this product decreases rapidly after the first few months and reaches background levels in a few years. Therefore, urea-formaldehyde foam insulation installed 5 to 10 years ago is unlikely to still release formaldehyde.

2. **Durable-press fabrics, draperies, and coated paper products:** In the early 1960s, there were several reports of allergic reactions to formaldehyde from durable-press fabrics and coated paper products. Such reports have declined in recent years as industry has taken steps to reduce formaldehyde levels. Draperies made of formaldehyde-treated durable press fabrics may add slightly to indoor formaldehyde levels.
3. **Cosmetics, paints, coatings, and some wet-strength paper products:** The amount of formaldehyde present in these products is small and is of slight concern. However, persons sensitive to formaldehyde may have allergic reactions.
4. **Pressed Wood Products:** Pressed wood products, especially those containing urea-formaldehyde glues, are a source of formaldehyde. These products include particleboard used in flooring underlayment, shelves, cabinets, and furniture; plywood wall panels, and medium density fiberboard used in drawers, cabinets and furniture. When the surfaces and edges of these products are unlaminated or uncoated they have the potential to release more formaldehyde. Manufacturers have reduced formaldehyde emissions from pressed wood products by 80-90% from the levels of the early 1980's.
5. **Combustion Sources:** Burning materials such as wood, kerosene, cigarettes and natural gas, and operating internal combustion engines (e.g. automobiles), produce small quantities of formaldehyde. Combustion sources add small amounts of formaldehyde to indoor air.
6. Products such as carpets or gypsum board do not contain significant amounts of formaldehyde when new. They may trap formaldehyde emitted from other sources and later release the formaldehyde into the indoor air when the temperature and humidity change.

Do You Have Formaldehyde-Related Symptoms?

There are several formaldehyde-related symptoms, such as watery eyes, runny nose, burning sensation in eyes, nose, and throat, headaches, and fatigue. These symptoms may also occur because of the common cold, the flu or other pollutants that may be present in the indoor air. If these symptoms lessen when you are away from home or office but reappear upon your return, they may be caused by indoor pollutants, including formaldehyde. Examine your environment. Have you recently moved into a new or different home or office? Have you recently remodeled or installed new cabinets or furniture? Symptoms may be due to formaldehyde exposure. You should contact your physician and/or state or local health department for help. Your physician can help to determine if the cause of your symptoms is formaldehyde or other pollutants.

Should You Measure Formaldehyde?

Only trained professionals should measure formaldehyde because they know how to interpret the results. If you become ill, and the illness persists following the purchase of furniture or remodeling with pressed wood products, you might not need to measure formaldehyde. Since these are likely sources, you can take action. You may become ill after painting, sealing, making repairs, and/or applying pest control treatment in your home or office. In such cases, indoor air pollutants other than formaldehyde may be the cause. If the source is not obvious, you should consult a physician to determine whether or not your symptoms might relate to indoor air quality problems. If your physician believes that you may be sensitive to formaldehyde, you may want to make some measurements. As discussed earlier, many factors can affect the level of formaldehyde on a given day in an office or residence. This is why a professional is best suited to make an accurate measurement of the levels.

Do-it-yourself formaldehyde measuring devices are available, however these devices can only provide a "ball park" figure for the formaldehyde level in the area. If you use such a device, you must carefully follow the instructions.

How Do You Reduce Formaldehyde Exposure?

Every day you probably use many products that contain formaldehyde. You may not be able to avoid coming in contact with some formaldehyde in your normal daily routine. If you are sensitive to formaldehyde, you will need to avoid many everyday items to reduce symptoms. For most people, a low-level exposure to formaldehyde (up to 0.1 ppm) does not produce symptoms. People who suspect they are sensitive to formaldehyde should work closely with a knowledgeable physician to make sure that formaldehyde is causing their symptoms.

You can avoid exposure to higher levels by:

- Purchasing pressed wood products such as particleboard, MDF, or hardwood plywood for construction or remodeling of homes, or for do-it-yourself projects that are labeled or stamped to be in conformance with American National Standards Institute (ANSI) criteria. Particleboard should be in conformance with ANSI A208.1-1993. For particleboard flooring, look for ANSI grades "PBU", "D2", or "D3" actually stamped on the panel. MDF should be in conformance with ANSI A208.2-1994; and hardwood plywood with ANSI/HPVA HP-1-1994. These standards all specify lower formaldehyde emission levels.
- Purchasing furniture or cabinets that contain a high percentage of panel surfaces and edges that are laminated or coated. Unlaminated or uncoated (raw) panels of pressed wood products will generally emit more formaldehyde than those that are laminated or coated.
- Using alternative products such as wood panel products not made with urea-formaldehyde glues, lumber or metal.
- Avoiding the use of foamed-in-place insulation containing formaldehyde, especially urea-formaldehyde foam insulation.
- Washing durable-press fabrics before use.

How Do You Reduce Existing Formaldehyde Levels?

The choice of methods to reduce formaldehyde is unique to your situation. People who can help you select appropriate methods are your state or local health department, physician, or professional expert in indoor air problems. Here are some of the methods to reduce indoor levels of formaldehyde.

1. Bring large amounts of fresh air into the home. Increase ventilation by opening doors and windows and installing an exhaust fan(s).
2. Seal the surfaces of the formaldehyde-containing products that are not already laminated or coated. You may use a vapor barrier such as some paints, varnishes, or a layer of vinyl or polyurethane-like materials. Be sure to seal completely, with a material that does not itself contain formaldehyde. Many paints and coatings will emit other VOCs when curing, so be sure to ventilate the area well during and after treatment.
3. Remove from your home the product that is releasing formaldehyde in the indoor air. When other materials in the area such as carpets, gypsum boards, etc., have absorbed formaldehyde, these products may also start releasing it into the air. Overall levels of formaldehyde can be lower if you increase the ventilation over an extended period.

One method NOT recommended by CPSC is a chemical treatment with strong ammonia (28-29% ammonia in water) which results in a *temporary* decrease in

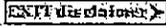
formaldehyde levels. We strongly discourage such treatment since ammonia in this strength is extremely dangerous to handle. Ammonia may damage the brass fittings of a natural gas system, adding a fire and explosion danger.

For more information:

For a copy of "[The Inside Story: A Guide to Indoor Air Quality](#)," contact The U.S. Environmental Protection Agency's Indoor Air Quality Clearinghouse [IAQINFO] at:

P.O. Box 37133
Washington, DC 20013-7133
1-800-438-4318
(703) 356-4020
(fax) (703) 356-5386
iaqinfo@aol.com

For more information about biological pollutants, asbestos, and indoor air quality in your home, write to:

[U.S. Consumer Product Safety Commission](#) 
Washington, D.C. 20207
CPSC's toll-free hotline: 800-638-2772

[American Lung Association](#) 
1740 Broadway
New York, N.Y. 10019-4374
(local ALA offices also have information)

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Organic chemicals are widely used as ingredients in household products. Paints, varnishes, and wax all contain organic solvents, as do many cleaning, disinfecting, cosmetic, degreasing, and hobby products. Fuels are made up of organic chemicals. All of these products can release organic compounds while you are using them, and, to some degree, when they are stored.

EPA's Total Exposure Assessment Methodology (TEAM) studies found levels of about a dozen common organic pollutants to be 2 to 5 times higher inside homes than outside, regardless of whether the homes were located in rural or highly industrial areas. Additional TEAM studies indicate that while people are using products containing organic chemicals, they can expose themselves and others to very high pollutant levels, and elevated concentrations can persist in the air long after the activity is completed.

Sources

Household products including: paints, paint strippers, and other solvents; wood preservatives; aerosol sprays; cleansers and disinfectants; moth repellents and air fresheners; stored fuels and automotive products; hobby supplies; dry-cleaned clothing.

Health Effects

Eye, nose, and throat irritation; headaches, loss of coordination, nausea; damage to liver, kidney, and central nervous system. Some organics can cause cancer in animals; some are suspected or known to cause cancer in humans.

The ability of organic chemicals to cause health effects varies greatly from those that are highly toxic, to those with no known health effect. As with other pollutants, the extent and nature of the health effect will depend on many factors including level of exposure and length of time exposed. Eye and respiratory tract irritation, headaches, dizziness, visual disorders, and memory impairment are among the immediate symptoms that some people have experienced soon after exposure to some organics. At present, not much is known about what health effects occur from the levels of organics usually found in homes. Many organic compounds are known to cause cancer in animals; some are suspected of causing, or are known to cause, cancer in humans.

Sources of Indoor Air Pollution

- [Asbestos](#)
- [Biological Pollutants](#)
- [Carbon Monoxide](#)
- [Formaldehyde/Pressed
Wood Products](#)
- [Household Cleaning
and Maintenance,
Personal Care, or
Hobbies](#)
- [Lead](#)
- [EPA Mercury website](#)
- [Nitrogen Dioxide](#)
- [Pesticides](#)
- [Radon](#)
- [Respirable Particles](#)
- [Secondhand
Smoke/Environmental
Tobacco Smoke](#)
- [Stoves, Heaters,
Fireplaces, and
Chimneys](#)

Read "[The Inside Story: A Guide to Indoor Air Quality](#)" [EPA 402-K-93-007, April 1995]

Levels in Homes

Studies have found that levels of several organics average 2 to 5 times higher indoors than outdoors. During and for several hours immediately after certain activities, such as paint stripping, levels may be 1,000 times background outdoor levels.

Steps to Reduce Exposure

- Use household products according to manufacturer's directions.
- Make sure you provide plenty of fresh air when using these products.
- Throw away unused or little-used containers safely; buy in quantities that you will use soon.
- Keep out of reach of children and pets.
- Never mix household care products unless directed on the label.

Follow label instructions carefully.

Potentially hazardous products often have warnings aimed at reducing exposure of the user. For example, if a label says to use the product in a well-ventilated area, go outdoors or in areas equipped with an exhaust fan to use it. Otherwise, open up windows to provide the maximum amount of outdoor air possible.

Throw away partially full containers of old or unneeded chemicals safely.

Because gases can leak even from closed containers, this single step could help lower concentrations of organic chemicals in your home. (Be sure that materials you decide to keep are stored not only in a well-ventilated area but are also safely out of reach of children.) Do not simply toss these unwanted products in the garbage can. Find out if your local government or any organization in your community sponsors special days for the collection of toxic household wastes. If such days are available, use them to dispose of the unwanted containers safely. If no such collection days are available, think about organizing one.

Buy limited quantities.

If you use products only occasionally or seasonally, such as paints, paint strippers, and kerosene for space heaters or gasoline for lawn mowers, buy only as much as you will use right away.

Keep exposure to emissions from products containing methylene chloride to a minimum.

Consumer products that contain methylene chloride include paint strippers, adhesive removers, and aerosol spray paints. Methylene chloride is known to cause cancer in animals. Also, methylene chloride is converted to carbon monoxide in the body and can cause symptoms associated with exposure to carbon monoxide. Carefully read the labels containing health hazard information and cautions on the proper use of these products. Use products that contain methylene chloride outdoors when possible; use indoors only if the area is well ventilated.

Keep exposure to benzene to a minimum.

Benzene is a known human carcinogen. The main indoor sources of this chemical are environmental tobacco smoke, stored fuels and paint supplies, and automobile emissions in attached garages. Actions that will reduce benzene exposure include eliminating smoking within the home, providing for maximum ventilation during painting, and discarding paint supplies and special fuels that will not be used immediately.

Keep exposure to perchloroethylene emissions from newly dry-cleaned materials to a minimum.

Perchloroethylene is the chemical most widely used in dry cleaning. In laboratory studies, it has been shown to cause cancer in animals. Recent studies indicate that people breathe low levels of this chemical both in homes where dry-cleaned goods are stored and as they wear dry-cleaned clothing. Dry cleaners recapture the perchloroethylene during the dry-cleaning process so they can save money by re-using it, and they remove more of the chemical during the pressing and finishing processes. Some dry cleaners, however, do not remove as much perchloroethylene as possible all of the time. Taking steps to minimize your exposure to this chemical is prudent. If dry-cleaned goods have a strong chemical odor when you pick them up, do not accept them until they have been properly dried. If goods with a chemical odor are returned to you on subsequent visits, try a different dry-cleaner.

From the IAQ Tools for Schools kit - IAQ Coordinator's Guide - www.epa.gov/iaq/schools/tfs/guidee.html

Description	Sources	Standards or Guidelines
<p>Volatile organic chemicals (VOCs) are emitted as gases from certain solids or liquids. VOCs include a variety of chemicals, some of which may have short- and long-term adverse health effects. Concentrations of many VOCs are consistently higher indoors (up to ten times higher) than outdoors.</p>	<p>VOCs are emitted by a wide array of products numbering in the thousands. Examples include: paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials and furnishings, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions.</p>	<p>No standards have been set for VOCs in non industrial settings. OSHA regulates formaldehyde, a specific VOC, as a carcinogen. OSHA has adopted a Permissible Exposure Level (PEL) of .75 ppm, and an action level of 0.5 ppm. HUD has established a level of .4 ppm for mobile homes. Based upon current information, it is advisable to mitigate formaldehyde that is present at levels higher than 0.1 ppm.</p>
Health Effects	Control Measures	
<p>Key signs or symptoms associated with exposure to VOCs include conjunctival irritation, nose and throat discomfort, headache, allergic skin reaction, dyspnea, declines in serum cholinesterase levels, nausea, emesis, epistaxis, fatigue, dizziness.</p>	<p>Increase ventilation when using products that emit VOCs. Meet or exceed any label precautions. Do not store opened containers of unused paints and similar materials within the school. Formaldehyde, one of the best known VOCs, is one of the few indoor air pollutants that can be readily measured. Identify, and if possible, remove the source. If not possible to remove, reduce exposure by using a sealant on all exposed surfaces of paneling and other furnishings. Use integrated pest management techniques to reduce the need for pesticides.</p>	

Additional Resources

Indoor Air Fact Sheet No. 4 (revised) - Sick Building Syndrome

Explains the term "sick building syndrome" (SBS) and "building related illness" (BRI). Discusses causes of sick building syndrome, describes building investigation procedures, and provides general solutions for resolving the syndrome. [EPA 402-F-94-004, April 1991]

Indoor Air Pollution: An Introduction for Health Professionals

Assists health professionals (especially the primary care physician) in diagnosis of patient symptoms that could be related to an indoor air pollution problem. Addresses the health problems that may be caused by contaminants encountered daily in the home and office. Organized according to pollutant or pollutant groups such as environmental tobacco smoke, VOCs, biological pollutants, and sick building syndrome, this booklet lists key signs and symptoms from exposure to these pollutants, provides a diagnostic checklist and quick reference summary, and includes suggestions for remedial action. Also includes references for information contained in each section. This booklet was coauthored with the American Lung Association, the American Medical Association, and the U.S. Consumer Product Safety Commission. [EPA 402-R-94-007, 1994]

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Last updated on Thursday, November 18th, 2004
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Microprocessor-Controlled Vaporizer for Decontamination Procedures

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Formaldehyde in the Home

[Back to the main indoor air quality page](#)

Formaldehyde

Formaldehyde is an important chemical used widely by industry to manufacture building materials and numerous household products. It is also a by-product of combustion and certain other natural processes. Thus, it may be present in substantial concentrations both indoors and outdoors.

Sources of formaldehyde in the home include building materials, smoking, household products, and the use of unvented, fuel-burning appliances, like gas stoves or kerosene space heaters. Formaldehyde, by itself or in combination with other chemicals, serves a number of purposes in manufactured products. For example, it is used to add permanent-press qualities to clothing and draperies, as a component of glues and adhesives, and as a preservative in some paints and coating products.

In homes, the most significant sources of formaldehyde are likely to be pressed wood products made using adhesives that contain urea-formaldehyde (UF) resins. Pressed wood products made for indoor use include: particleboard (used as subflooring and shelving and in cabinetry and furniture); hardwood plywood paneling (used for decorative wall covering and used in cabinets and furniture); and medium density fiberboard (used for drawer fronts, cabinets, and furniture tops). Medium density fiberboard contains a higher resin-to-wood ratio than any other UF pressed wood product and is generally recognized as being the highest formaldehyde-emitting pressed wood product.

Other pressed wood products, such as softwood plywood and flake or oriented strandboard, are produced for exterior construction use and contain the dark, or red/black-colored phenol-formaldehyde (PF) resin. Although formaldehyde is present in both types of resins, pressed woods that contain PF resin generally emit formaldehyde at considerably lower rates than those containing UF resin.

Since 1985, the Department of Housing and Urban Development (HUD) has permitted only the use of plywood and particleboard that conform to specified formaldehyde emission limits in the construction of

prefabricated and mobile homes. In the past, some of these homes had elevated levels of formaldehyde because of the large amount of high-emitting pressed wood products used in their construction and because of their relatively small interior space.

The rate at which products like pressed wood or textiles release formaldehyde can change. Formaldehyde emissions will generally decrease as products age. When the products are new, high indoor temperatures or humidity can cause increased release of formaldehyde from these products.

During the 1970s, many homeowners had urea-formaldehyde foam insulation (UFFI) installed in the wall cavities of their homes as an energy conservation measure. However, many of these homes were found to have relatively high indoor concentrations of formaldehyde soon after the UFFI installation. Few homes are now being insulated with this product. Studies show that formaldehyde emissions from UFFI decline with time; therefore, homes in which UFFI was installed many years ago are unlikely to have high levels of formaldehyde now.

Health Effects of Formaldehyde

Formaldehyde, a colorless, pungent-smelling gas, can cause watery eyes, burning sensations in the eyes and throat, nausea, and difficulty in breathing in some humans exposed at elevated levels (above 0.1 parts per million). High concentrations may trigger attacks in people with asthma. There is evidence that some people can develop a sensitivity to formaldehyde. It has also been shown to cause cancer in animals and may cause cancer in humans.

Reducing Exposure to Formaldehyde in Homes

Ask about the formaldehyde content of pressed wood products, including building materials, cabinetry, and furniture before you purchase them.

If you experience adverse reactions to formaldehyde, you may want to avoid the use of pressed wood products and other formaldehyde-emitting goods. Even if you do not experience such reactions, you may wish to reduce your exposure as much as possible by purchasing exterior-grade products, which emit less formaldehyde. For further information on formaldehyde and consumer products, call the EPA Toxic Substance Control Act (TSCA) assistance line (202-554-1404).

Some studies suggest that coating pressed wood products with polyurethane may reduce formaldehyde emissions for some period of time. To be effective, any such coating must cover all surfaces and edges and remain intact. Increase the ventilation and carefully follow the manufacturer instructions while applying these coatings. (If you are sensitive to formaldehyde, check the label contents before purchasing coating products to avoid buying products that contain formaldehyde, as they will emit the chemical for a short time after application.)

Maintain moderate temperature and humidity levels and provide adequate ventilation.

The rate at which formaldehyde is released is accelerated by heat and may also depend somewhat on the humidity level. Therefore, the use of dehumidifiers and air conditioning to control humidity and to maintain a moderate temperature can help reduce formaldehyde emissions. (Drain and clean dehumidifier collection trays frequently so that they do not become a breeding ground for microorganisms.)

Increasing the rate of ventilation in your home will also help in reducing formaldehyde levels.

Sources: Pressed wood products (hardwood plywood wall paneling, particleboard, fiberboard) and furniture made with these pressed wood products. Urea-formaldehyde foam insulation (UFFI). Combustion sources and environmental tobacco smoke. Durable press drapes, other textiles, and glues.

Health Effects: Eye, nose, and throat irritation; wheezing and coughing; fatigue; skin rash; severe allergic reactions. May cause cancer. May also cause other effects listed under "organic gases."

Levels in Homes: Average concentrations in older homes without UFFI are generally well below 0.1 (ppm). In homes with significant amounts of new pressed wood products, levels can be greater than 0.3 ppm.

Steps to Reduce Exposure:

- Use "exterior-grade" pressed wood products (lower-emitting because they contain phenol resins, not urea resins).
- Use air conditioning and dehumidifiers to maintain moderate temperature and reduce humidity levels.
- Increase ventilation, particularly after bringing new sources of formaldehyde into the home.

Subject-Specific Publications

An Update on Formaldehyde - U.S. Consumer Product Safety Commission

The U.S. Consumer Safety Commission has produced this booklet to tell you about formaldehyde found in the indoor air. This booklet tells you where you may come in contact with formaldehyde, how it may affect your health, and how you might reduce your exposure to formaldehyde.

Additional References Include:

American Lung Association

1740 Broadway
New York, NY 10019-4374
(local ALA offices also have information)

The Formaldehyde Institute, Inc.

1330 Connecticut Ave., N.W.
Washington, DC 20036

This page was updated on January 21, 2005

Contact information:

Environmental Health & Safety Online

EHSO, Inc., 8400-O Roswell Rd., Atlanta, GA 30350

770-263-8700 (please EMAIL rather than call - our advice is staffed by UNPAID volunteer employees)

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January 27, 2005

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Regulations Division
Office of General Counsel
Room 10276
Department of Housing and Urban Development
451 Seventh Street, S.W.
Washington, DC 20410-0500

REC'D
FEB 1 10 35 AM '05
HUD RULES DOCKET

Subject: HUD Proposed Rule to Amend the Federal Manufactured Home Construction and Safety Standard

The American Gas Association (AGA) is pleased to submit its comments on the HUD Proposed Rule to amend the Federal Manufactured Home Construction and Safety Standard published in the December 1, 2004 Federal Register.

AGA represents 191 local energy utility companies that deliver natural gas to more than 53 million homes, businesses and industries throughout the United States. Natural gas meets one-fourth of the United States' energy needs.

The following are general and specific comments on the Proposed Rule:

Update of ANSI Gas Appliance and Component Reference Standards.

A review of the recommendations made to HUD by the Manufactured Housing Consensus Committee (MHCC) indicates a need to update a number of the reference standards to more current versions of those standards and codes than proposed in the Federal Register Notice. AGA recommends that the updated reference standards listed below be incorporated in the final rule. They are:

ANSI Z21.1	2000	Household Cooking Gas Appliances	3280.703
ANSI Z21.5.1	2002	Gas Clothes Dryers Volume 1	3280.703
ANSI Z21.10.1	2004	Gas Water Heaters-Volume 1, Storage Water Heaters with Input Ratings of 75,000 BTU per hour or Less	3280.703

ANSI Z21.15 (R2003)	1997	Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves	3280.703
ANSI Z21.20	2000	Automatic Gas Ignition Systems And Components	3280.703
ANSI Z21.21	2000	Automatic Valves for Gas Appliances	3280.703
ANSIZ21.22 (R2003)	1999	Relief Valves	3280.703
ANSI Z21.23	2000	Gas Appliance Thermostats	3280.703
ANSI Z21.24	2001	Connectors for Gas Appliances	3280.703
ANSI Z21.40.1(R2002)	1996	Gas Fired Heat Activated, Air Conditioning and Heat Pump	3280.703 3280.714 (a) (2)
ANSI Z21.47	2003	Gas Fired Central Furnaces (Note – Incorporates provisions of Z21.64 now discontinued, that are Related to direct vent)	3280.703
ANSI Z21.75	2001	Connectors for Outdoor Gas Appliances And Manufactured Homes	3280.703
ANSI/LC 1	1997	Gas Piping Systems Using Corrugated Stainless Steel Tubing	3280.703
ANSI Z223.1/NFPA 54	2002	National Fuel Gas Code	3280.703

Proposed Changes to Section 3280.705 Gas Piping Systems

Add a new section (5) Corrugated Stainless Steel Tubing (CSST) Systems. CSST interior gas piping systems shall be design certified to the ANS LC-1, *Gas Piping Systems Using Corrugated Stainless Steel Tubing*, and shall be installed in accordance with this code, the Z223.1/NFPA 54 *National Fuel Gas Code* and the manufacturer's installation instructions.

Rationale: Since the HUD proposal is including a reference to the ANSI/LC-1 CSST standard; the proposed additional provision is needed in the interior gas piping section of the standard

Delete New Proposed Section 3280.709 Installation of Appliances

Rationale: We believe that this proposal has not been developed in compliance with the HUD Final Information Quality Guidelines published in the November 18, 2002 Federal Register Notice. Specifically, the HUD Guidelines require in Section VI. Policy that "the information it disseminates to the public is objective (accurate, clear, complete, and unbiased), useful, and has integrity." HUD has not presented any information to justify this requirement including any economic or technical justification that cost justifies the addition of the new section that would require a corrosion resistant water drip collection and drain pan installed under each water heater. In addition, such a requirement will result in problems of installation, cost, drainage, and for fossil fuel type water heater can result in the blockage of combustion air openings for water heaters that obtain combustion air from the bottom of the unit, a very typical manufactured home application. . For these reasons, HUD should not adopt the new section.

Source of Reference Standards

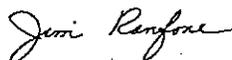
Add the American Gas Association (AGA) as source of the ANSI/Z223.1/NFPA 54 National Fuel Gas Code. AGA is a cosponsor of this reference code. Contact information is as follows: AGA- American Gas Association, 400 North Capitol St., NW, Washington, DC 20001, 202 824-7312 fax 202-824-9122, <http://www.aga.org>

Additional Comments

While not included in this HUD proposal, AGA would request that HUD consider making changes to the MHCSS to update the requirements that are seriously out of date. Specifically, Section 3280.707 (d) contains minimum efficiency requirements for central heating and water heating appliances that need to be updated to the Department of Energy minimum efficiency requirements. In addition, Section 3280.702 Definitions still has a definition for water heaters that has the term "other than space heating". There are many types of combination water heater space heaters that are used in manufactured homes and this verbiage needs to be deleted.

Please don't hesitate to call me if you have any questions on the AGA comments.

Sincerely,



Jim Ranfone
Managing Director
Building Codes & Standards
Ph: 202/824-7310
Email: jranfone@aga.org



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January 25, 2005

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14

Re: Docket No. FR-4886-P-01, RIN 2502-AI12, Manufactured Home Construction and Safety Standards

Dear Sir or Madam:

The following comments are submitted on behalf of RADCO. RADCO is an independent consulting engineering, inspection agency and testing laboratory with 34 years experience in manufactured (mobile) home design, evaluation, inspection and testing. Our testing laboratory and inspection services are internationally recognized through approvals granted by International Approval Services (IAS).

Testing Protocols 3280.303(g) – “HUD is seeking comments on whether the final approval of alternate test methods should be solely delegated to DAPIAs as would be permitted by this proposal or if DAPIAs should only be allowed to provisionally approve the test method subject to HUD’s approval, if the proposal should include provisions for rejection of alternate tests by HUD upon subsequent review of the approval by the DAPIA, and whether this practice could have an adverse effect on the enforcing the Construction and Safety Standards.”

In a word the system was working fine before HUD added this preapproval criteria to 303(g) about 10 years ago and it will work fine when this item is eliminated.

HUD should accept the MHCC recommendation, which was unanimously approved by that consensus body. All approved third-party DAPIAs are required to review and accept or reject all drawings, calculations, tests, and other justifications supplied by the manufacturer for the design of the home. As far as testing is concerned 3282.203(b)(11) requires the home manufacturer to submit “reports of all tests that were run to validate the conformance of the design to the standards.” 3282.361(b)(2) states that DAPIAs shall require the submission of all drawings, specifications, calculations, and test records....of each manufactured home design or variation.” Since DAPIAs are already performing this approval process for the testing itself they are also competent enough to approve a test method.

HUD has very limited resources and does not need the additional work of reviewing and approving test protocols and has a proven record of being unable to do so in a timely manner. HUD does not need to exercise this kind of “Micro Management” and is always



free to review designs after they have been approved. Also, HUD contract agent is constantly reviewing designs and test methods used.

Lastly HUD should consider the changes in the law contained in the MHLA of 2000. Specifically 604(b)(3) calls for MHCC review of "interpretative bulletins". Requiring HUD staff to pre-approve these test procedures could be considered equivalent to the issuance of interpretative bulletins.

Additional Testing 3280.305(e)(2) – "HUD is requesting comments on whether these changes for critical connections in high wind regions should be implemented unless also supported by suitable load tests."

HUD has always allowed calculations and analysis to be used instead of testing. Testing, while more specific than calculations, generally is less conservative. In fact it is generally understood that HUD will not allow testing of simple assemblies which can be easily calculated. Some of the connections used in high wind regions would fall into this situation and need to be calculated anyway. This change is also consistent with the preference to use "performance requirements" set forth in 3280.1.

Ventilated Walls 3280.504(b) – "HUD is requesting comments on whether the final rule should also include provisions to restrict exterior wall cavities from being ventilated to the outdoors as required by the Waiver."

The final rule as published already has such a restriction on exterior wall cavities being vented to the outside when the alternate specified in 504(b)(4) is used. Note that the vapor retarder location specified in 504(b)(4) is an alternate to that called out in 504(b)(1) and therefore could not be used with a vented wall cavity specified in 504(b)(3)

From a practical-useability stand point in order for the alternate vapor retarder location to be of any use at all some minor exception is absolutely necessary to the requirement that the interior finish have a combined permeance of not less than 5.0 perms. Said exceptions have already been approved by the MHCC and are embodied in NFPA-501 2003 edition at section 8.4.2.1.6. **HUD MUST include these exceptions in order for the alternate vapor retarder location to be useable.**

MHCC's Recommendations, page 70033 – "HUD is specifically soliciting comments and feedback from the public on both the MHCC's recommendations as submitted to HUD, and HUD's proposed rejections and modifications of these recommendations."

Regarding the MHCC proposals which HUD has declared their intent to reject (3280.209 Health Notice) or modified [3280.206 Fireblocking and 3280.305(c)(1)(ii)(B) Footnote 9]:

HUD should accept both the MHCC proposals without modifications. See additional

comments below.

3280.209 Formaldehyde Health Notice – At its August, 2004 meeting the MHCC discussed this entire matter and unanimously reaffirmed its position that the “Health Notice on Formaldehyde” contained in 3280.209 should be eliminated.

HUD has stated: “The MHCC did not provide or reference any data or studies in support of the recommendation to remove the Health Notice ...” A study entitled Formaldehyde Concentrations in Manufactured Homes: The Current Situation prepared by the MHRA and containing such data was given to HUD at the August, 2004 MHCC meeting. It is “common knowledge” that Formaldehyde emissions in manufactured homes have been dramatically reduced since the requirement for the Notice was first imposed. Therefore, the science and data that was used by HUD to justify the original Notice requirement is no longer valid as a result of product standards regulating emissions from building materials and other changes as enumerated in the above referenced MHRA report. At the time the Notice was originally required there were no such product standards in effect.

HUD has implied that only manufactured homes are permitted to use construction materials containing urea-formaldehyde resins. This assertion is untrue as we are not aware of such a restriction for modular or site built homes.

At the August, 2004 MHCC meeting one HUD engineer raised questions regarding the veracity of the data in the MHRA report on this issue. As one of the engineers who conduct a number of the tests reported on my MHRA I strongly object to the questions raised by HUD’s engineer. First, all tests which I (RADCO) conducted used a test method which on two separate occasions was field correlated with the NIOSE method and found to give identical result. All results which we reported were accurate to within plus or minus 0.01 ppm and accurate down to the zero point level. (HUD’s engineer falsely claimed that the test methods used were not accurate at low levels. This was a rather amazing claim since the actual test methods used largely were not even identified my MHRA in their report!)

3280.206 Fireblocking – HUD has modified the MHCC recommendation by totally rejecting the inclusion of Loose-fill insulation as fireblocking material not only in roofs, where they site alleged problems, but in walls and floors as well. The MHCC recommendation is consistent with what is allowed in other model codes (such as the IBC at section 717.2.1). The material would only be allowed “where it has been specifically tested in the form and manner intended for use to demonstrate its ability to remain in place and to retard the spread of fire and hot gasses”. [See MHCC proposed 3280.206(b)(3).] This requirement addresses and alleviates HUD’s expressed concerns about the material staying in place during transportation, etc. as they would have to pass tests which include these concerns before they could be used.

3280.305(c)(1)(ii)(B) Footnote 9 on One-Piece Metal Roofing – HUD has modified the note as proposed by the MHCC and in so doing destroyed the original intent of the MHCC. HUD states they are modifying the MHCC proposal to make it “consistent with the provisions of

the Interpretative Bulletin I-2-98". The intent the MHCC proposal was to eliminate said IB by rendering it null and void, not to conform to it! **IB I-2-98 was without doubt the worst IB ever issued by HUD.** (The record shows that IB I-2-98 when issued for public comment received 12 comments [see attached], all of which were strongly negative, however, HUD ignored all 12 comments and issued the IB as proposed. This kind of arrogance on the part of HUD's needs to stop!)

HUD states they have modified the footnote "to indicate that test methods must be approved by HUD and comply with the requirements of 24 CFR 3280.303(c) and (g) and 3280.401 of the MHCSS". The portion of the HUD's argument dealing with 303 and 401 is a pretense since ALL test methods are already required to comply with 3280.303(c) and (g) and 3280.401, therefore, the addition of this language to the note serves no purpose.

By modify the MHCC proposal HUD is trying to reimpose the very pre-approval of test methods by HUD staff that have been eliminated in 3280.303(g). [See discussion above on 3280.303(g)] As discussed above there is no valid reason for such pre-approval by HUD.

HUD's proposal lacks any justification as to why it believes pre-approval by its staff for this one product/design is necessary when they are agreeing to eliminate pre-approval for all other current/future products/designs by changing 3280.303(g). Since no justification was given for wanting to retain pre-approval in this single instance one can only presume that HUD's staff wants to use this authority to continue to block this innovative design approach.

When resisting uplift loads the one-piece metal roof catenary design is much stronger than the prescriptive roof sheathing option currently permitted by footnote 7 to the table. HUD has blocked this innovation for over ten years and it is time that this stop!

3280.402 Test Procedure for Roof Trusses. Numerous concerns have recently been expressed about this proposal. HUD needs to make the following modifications to this proposal.

A. 3280.402(c) & 3280.402(e)(1)(ii). Deflection Measurement Points. Remove the new proposal to measure deflections "...at each panel point, and at mid-span between each panel point" and retain the current requirement to measure deflection at 1/4 points and mid-span. Justifications: The trusses that are utilized in manufactured homes are short spans and have panel points quite close together. If we were testing a sixty foot long truss with panel points far apart maybe the deflection measurements in the Standard would be justified. With the shorter manufactured home trusses, mid-span and quarter points allow for an accurate representation of the deflection. The current proposal would needlessly add to the cost of testing by requiring numerous unnecessary deflection readings.

B. 3280.402(d)(1) & (d)(5)(i). No Load to Dead Load Deflection. Remove the requirements to measure no load to dead load deflection and the limit for same. Justification: This is a meaningless requirement. The deflection from no load to dead load is normally compensated

for by building camber into the truss. This added step will add needless cost to the test procedure.

C. 3280.402(c) & (d)(1) Dead Load Application. Revise the new proposed requirement to add dead load to both the top and bottom chord of the truss so that this is only required if the actual bottom chord dead load exceeds 5 psf. Otherwise allow the entire dead load to be applied to the top chord as is currently allowed. Justification: For small bottom chord dead loads (up to and including 5 psf) this added step is not necessary and needlessly adds to the cost of testing.

D. 3280.402(d)(3) & (d)(5)(iii). Recovery Deflection. Revise the new proposal so that it will allow up to four (4) hours for recovery deflection to reach L/480 or better. Justification: Five minutes may not be adequate time to allow recovery to occur and could eliminate otherwise acceptable designs thus adding cost. Some of the proprietary criteria in use today by some home manufactures specify four (4) hours and is working fine without problems.

E. 3280.402(e)(1)(ii) Uplift Load Spacing. Change 6 inches on center to an "average of not greater than 12 inches on center". Justification: 1) 12 inches on center is more than adequate and, if anything, will give more conservative results than closer spacing. And closer spacing is still allowed as an option. 2) Many of the test fixtures in use today cannot test at 6 inch on center and would have to be scraped and replaced with totally new fixtures. 3) An average rather than an absolute spacing number is needed because some chord points will interfere with placement of tension attachment devices. Therefore some flexibility in the placement of individual attachment devices is needed.

Sincerely,
RADCO



Michael L. Zieman, P.E.
President

DESC PUBLIC COMMENT LOG RECORDS

COMMENT NO.	FR_NO	SEQ. NO.	COMENTER NAME	CITY	ST	LETTER DATE	RECEIVED DATE
1	FR00427102		MANUFACTURED HOUSING INSTITUTE	ARLINGTON	VA	06/26/98	06/30/98
2	FR00427102		BUCCANEER HOMES	HAMILTON	AL	07/07/98	07/10/98
3	FR00427102		ELIXIR INDUSTRIES	ELKHART	IN	07/09/98	07/13/98
4	FR00427102		FLEETWOOD HOMES	RIVERSIDE	CA	07/10/98	07/13/98
5	FR00427102		PFS CORPORATION	MADISON	WI	07/10/98	07/13/98
6	FR00427102		OAKWOOD HOMES CORPORATION	GREENSBORO	NC	07/10/98	07/13/98
7	FR00427102		RADCO (RESOURCES APPLICATIONS DESIGNS & CONTROLS)	LONG BEACH	CA	07/10/98	07/13/98
8	FR00427102		SCHULT HOMES CORPORATION	MIDDLEBURY	IN	07/07/98	07/14/98
9	FR00427102		R-ANELL CUSTOM HOMES INC.	DENVER	NC	07/10/98	07/14/98
10	FR00427102		MANUFACTURED HOUS. ASSOC. FOR REGULATORY REFORM	WASHINGTON	DC	07/10/98	07/14/98
11	FR00427102		CHAMPION ENTERPRISES, INC.	AUBURN HILLS	MI	07/07/98	07/16/98
12	FR00427102		FABWEL, INC.	ELKHART	IN	07/10/98	07/23/98

Records printed: 12



Manufactured Housing Institute

REC'D

JUN 23 2 42 PM '98

June 26, 1998

HUD DOCKET DOCKET

Mr. David R. Williamson, Director
Office of Consumer and Regulatory Affairs
U.S. Department of Housing and Urban Development
451 Seventh Street, S.W.
Room 9156
Washington, DC 20410

1

RE: HUD Docket No. FR-4271-A-02, May 12, 1998 (63 FR 26392)

Dear David:

This letter provides both you and the HUD Docket with MHI's interim response to the May 12, 1998 Advance Notice of Proposed Rulemaking (ANPRM) concerning the Table at 24 CFR 3280.305(c)(1)(ii)(B), on requirements for designing manufactured homes to be sited in high wind areas.

The issuance of the final Interpretative Bulletin on metal roofing culminates a 21-month effort by MHI to cooperate with the Department in settling the metal roof issue for Wind Zones II and III homes. It is unfortunate that the Department chose not to offer the interpretative bulletin for public comment, in accordance with 24 CFR 3282.113. We note that, concurrent with issuance of the IB, the Department also issued an ANPRM with a comment due date of July 13, 1998. The notice offered the opportunity for the public to make recommendations regarding any changes to the Table of Design Wind Pressures, at 24 CFR 3280.305(c)(1)(ii)(B).

As we discussed with you in our meeting on April 28, 1997 and our letter to Assistant Secretary Nicolas Retsinas dated May 27, 1997, MHI on behalf of its members does not read the subject Table in the standard to require metal roofed homes built in Wind Zones II and III to be constructed with structural sheathing underlayment. (See enclosed letter dated May 27, 1997). It is a table which sets forth performance criteria that specify certain wind loads which must be met for various wind-resisting parts of the home—not a prescription of the roof materials required. Therefore, we do not believe that any changes to the subject Table are required. However, if HUD proceeds to interpret the subject Table to prohibit metal roofs without sheathing in Wind Zones II and III, then HUD has prescribed new standards without complying with its rulemaking procedures and should not be asking for the public to submit proposed changes to the Table but should be requesting comments on its proposed changes to the wind design standards.

Several of our manufacturers are in the process of preparing designs, with appropriate testing procedures and preliminary test results, and will seek DAPLA approval to site metal-roof homes in Wind Zone II without underlying roof sheathing. Therefore, MHI requests that the Department extend the comment due date for the ANPRM by 180 days, with a new due date of January 13, 1999.

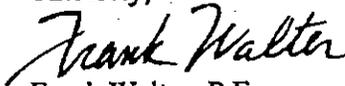
Several manufacturers are now working with metal roof suppliers to prepare appropriate metal roof designs. This procedure will take several weeks. Their designs are expected to show, in accordance with the IB, that the "alternative roof material...performs like sheathing," in accordance with the IB, at 63 FR 26388, in resisting the wind pressures specified in the Table of Design Wind Pressures. Their designs,

testing procedures, and test results will show that "the roofing system will transfer the higher wind loads to which the Table is formulated to structural support members and components without compromising the integrity of those members and components..." Their design packages will also show "that the metal roof would be fastened to the support members (trusses, edge members, etc.)," in accordance with footnote 2 on page 26388.

If one or more DAPIAs challenge the design packages and accompanying testing procedures and tests reports, the manufacturer(s) plan to jointly seek from the Secretary an opportunity to present views provided for in the Act and under the enforcement regulations at 24 CFR 3282.151(b)(2). Manufacturers have advised us that if this predicament occurs, they will request an informal presentation of views, under 24 CFR 3282.152(f). The objective of their request would be to appear before a presiding officer who would not have to recuse himself/herself, because of prejudicial knowledge on this issue. The main purposes of their presentation would be to explain their test procedures, to demonstrate that they are appropriately structured in accordance with 24 CFR 3280.401(b), and to seek approval for the procedures from the Department under 24 CFR 3280.303 (g).

Manufacturers are quite concerned about the possible future impacts on their engineering design initiatives for metal-roof homes placed both in Wind Zones I and II. We urge you to grant a 180-day extension of the comment due date for the ANPRM, so that manufacturers may accomplish the actions we outlined in this letter including, if necessary, an informal presentation of views. The July 13 comment due date does not afford sufficient time to accomplish all these actions. The time extension will also permit industry to prepare a final response to the ANPRM.

Sincerely,



Frank Walter, P.E.
Vice President
Technical Activities

Enclosure

cc: Marion Connell
Peter Race

HUD Docket - Regulations Division
Room 10276
Office of General Counsel



Manufactured Housing Institute

May 27, 1997

The Honorable Nicholas P. Retsinas
Assistant Secretary for Housing-FHA Commissioner
451 Seventh Street, S.W., Room 9100
Washington, DC 20410

Dear Assistant Secretary Retsinas:

MHI and its members engaged in the manufacture of metal roofs appreciated the opportunity to meet with David Williamson and his staff on Monday, April 28, 1997, regarding the use of metal roofs on manufactured homes in Wind Zone II. In follow-up to our meeting, we believe that it is important to express to you our concerns with how the Department has and is addressing this matter. We believe this situation presents an opportunity for the industry and the Department to continue to work together to arrive at a solution which will preserve an affordable housing option without compromising the safety of residents.

Background

This issue first arose when the Department issued a letter dated July 18, 1996, informing the industry that it could no longer use metal roofs without underlying structural sheathing in Wind Zones II and III.

Over the course of the last six to eight months, HUD and the industry pursued certain actions to ensure an open dialogue between engineering experts to determine if the testing performed by the metal roof suppliers was acceptable to the Department. As requested by Mr. Williamson, each of the metal roof suppliers submitted their testing reports to the Department for review. The Manufactured Housing Program staff was asked to provide the suppliers, through MHI, with any concerns or questions that it had with the tests prior to meeting with MHI and the suppliers.

However, a week prior to our April 28 meeting, we were informed that the Department had made a decision concerning the use of metal roofs in Wind Zone II and that it would not discuss the test reports supplied by each of the suppliers. At our meeting, we were informed that the Department had decided to issue an interpretative bulletin (IB) on this issue and, because it was engaged in rulemaking, could not discuss the test reports until after the IB is issued.

Advice to Metal Roof Suppliers on their Tests

We believe the Department has a responsibility to inform each of the metal roof suppliers of its decision to accept or reject their testing procedures pursuant to the Federal standards, Section 3280.303(g). Such a notification is not prohibited pending issuance of an interpretative

bulletin; if it was, it would be impracticable for HUD to administer its ongoing enforcement program.

Since the advent of new wind standards in 1994, metal roof suppliers have spent considerable time and research funds to perform testing pursuant to a procedure, earlier accepted by the Program staff, to demonstrate that their products meet the new Federal wind standards. Nowhere does the wind standard specifying design loads for high wind areas require "the use of roof structural sheathing," as specified in the Department's July 18 letter. The HUD standard is a performance standard that specifies certain wind loads which must be met for various wind-resisting parts of the home—not a prescription of the roof materials required.

We believe that industry tests prove that metal roofs can meet the design loads required by the standards and that metal roofs have withstood high winds in Wind Zone II. In fact, metal roof suppliers have expressed concerns that wood sheathing may not hold on trusses at the 51 psf design uplift pressure. For the Department to prohibit the use of metal roofs in Wind Zone II runs counter to the increasing use of steel across the country in both residential and commercial buildings.

Continued Dialogue is Necessary

The Program staff suggested that the manufacturers, in lieu of using the table referenced in the standard, could use Section 3280.305(c)(1)(ii)(A) and design the home using ASCE 7-88. However, the Program staff has said that manufacturers may not use part of the table and part of ASCE 7-88. Our suppliers believe that using ASCE 7-88 is not an option because manufacturers would have to redesign the entire structural package for each model home, which is too costly. In addition, ASCE 7-88 is a site specific standard which is not workable for regionwide manufacturers' shipments. With ASCE 7-88, each home location requires design or testing, which greatly increases the cost of the home.

The Department, throughout its programs over the last five years, has been an advocate for increasing the affordability of housing by reducing barriers and reexamining standards that add cost without benefit. The suppliers informed the Program staff that to require structural sheathing under metal roofs will add about \$3,000 to the cost of the manufactured home. This additional up-front cost literally prices many first-time homebuyers out of home ownership.

MHI and the suppliers believe that this issue presents a strong case for the technical experts of the Department and the industry to continue to work together in an open dialogue to develop a middle ground on design criteria for the use of metal roofs in Wind Zone II. Such a working arrangement would be efficient and provide for the continued use of a safe and affordable housing design option.

However, if the Department proceeds with the issuance of an interpretative bulletin under Section 3282.113(a) to require structural sheathing under metal roofs in Wind Zone II, MHI believes the Department must treat such issuance "as rulemaking" and obtain public comment. In this case, it is not in the public interest to proceed without public comment. Such an exception to rulemaking is not justified because HUD's letter to DAPIAs on July 18, 1996, has already

temporarily halted approval of designs using metal roofs without structural sheathing in Wind Zones II and III. Therefore, there is no pending emergency need to stop the practice. Because of diverse engineering views on this issue, public comment is clearly needed for the Department to arrive at a reasoned decision.

Summary

MHI urges the Department to reconsider its recently expressed planned course of action regarding the use of metal roofs in Wind Zone II. First, the Department should honor its commitment to provide each metal roof supplier with comments on its test reports. Then, members of the Manufactured Housing Program staff should commit to openly discussing their concerns with a working group of suppliers and manufacturers engineers. We are hopeful that this dialogue could lead to the development of design criteria which would ensure the continued option for use of metal roofs in Wind Zone II. Finally, if the Department believes that it cannot proceed with the suggested working group, it should issue its proposed interpretative bulletin for public comment in accordance with the Department's rulemaking procedures.

We will be pleased to supply you with additional information regarding this matter. We appreciate your continued interest and support for the role of manufactured housing in providing unsubsidized homeownership for an increasing number of our citizens.

Sincerely,



Jerry C. Connors
President

cf: Emelda Johnson
David Williamson
Marion Connell
Rick Mendlen



Industrial Park
P.O. Box 1418
Hamilton, Alabama 35570
(205) 921-3135

2

July 7, 1998

HUD DOCKET

JUL 10 2 06 PM '98

REC'D

HUD Docket No. 4271-A-02
Room 10276
Office of General Counsel
Department of Housing and Urban Development
451 Seventh Street, S. W.
Washington, DC 20410-0500

RE: *Manufactured Home Construction and Safety Standards;
Metal Roofing; Advance Notice of Proposed Rulemaking (ANPRM)*

Buccaneer Homes herewith respectfully submits comments regarding the advance notice of proposed rulemaking concerning the Table in 24 CFR 3280.30(c)(1)(ii)(B).

We object to the HUD interpretative bulletin (IB I-2-98) as based on inaccurate statements and analysis. In response to the ANPRM, there is no need to revise the performance standard set forth in the subject Table. If HUD proceeds to interpret the subject Table to prohibit metal roofs without sheathing in Wind Zones II and III, then HUD has prescribed new standards without complying with its rulemaking procedures and should not be asking for the public to submit proposed changes to the Table, but should be requesting comments on its proposed changes to the wind design standards.

Buccaneer Homes objects to the interpretative bulletin for the following reasons:

- Our company has developed tests to demonstrate that our manufactured homes comply with the HUD Code at Section 3280.303(c) and 3280.401 (b), for models that include metal roofs for Wind Zone II.
- Our designs of metal roofs show that the high-wind loads are transferred by the metal roof, performing like sheathing, to structural support members, as clarified in the interpretative bulletin of May 12, 1998 (I-2-98)(63 FR 26836 to 26389).
- Metal roof damage in Hurricane Andrew or other past high wind events has no bearing on how new products might perform under new testing under the loads of the January 1994 rule. (63 FR 26386)
- Metal roofing is *not* part of the January 1994 rule, its preamble nor any of its previous interpretations. There are no restrictions on its use to be found anywhere in the published documents.
- Metal roofing design is *not* limited by the Table of Design Wind Pressures or its footnotes. Footnote 7 only exempts prescriptively installed 3/8" rated sheathing; it does not prescribe how it will be used for every design condition.
- The interpretative bulletin appears to be rulemaking. It is a "change in policy or interpretation" by the Department. It does not merely "clarify requirements". If it is so obvious in the Standards that metal roofing must be restricted in Wind Zones II and III, why did so many DAPIAs approve tests and designs contrary to this interpretation? (63 FR 26386)

- Having a "rigid box" is not a requirement of the standards. Section 3280.301(a) is only a general statement and a metal roof easily meets the only stated requirement for "structural strength and rigidity". (63 FR 26387)
- If it was the intention of the Department at the publication of the January 1994 rule for the metal roof to be installed over structural sheathing as was done for shingle roofs, why was no fastening dictated as it was for shingles in the Table of Design Wind Pressures? (63 FR 26386)
- Section 3280.305 is not a "prescriptive standard" as the Department contends. There are a few limited items which are prescriptive for Wind Zones II and III (strap thickness, truss spacing, shingle fastening, etc.), but the Table of Design Wind Pressures dictates the loads to be accommodated by a *performance* standard. (63 FR 26386)
- Testing according to the Standards is not a *lower* standard than engineering analysis, as implied by the IB. Nowhere in the Standards is testing relegated as inferior to calculations. In fact a thorough testing program, as was done in the case of metal roofing with many different construction methods and assemblies tested, should give a more complete picture of actual failure modes than typical structural analysis calculations. (63 FR 26388)
- It seems strange for the Department to appeal to the "industry trade association" economic analysis for the January 1994 rule to show that the industry understood that sheathing was required for the new wind zones. None of the testing that has since been submitted to the Department had been performed at that time, so there was no way for a designer to know that metal roofing could meet the Wind Zone II loads without sheathing. (63 FR 26387)
- Why does the Department reference damage to "corrugated metal siding and roofed building", in earlier disasters, as having any bearing on the current research and technology and proposed metal roofing on manufactured housing? Is not this really an "apples and oranges" comparison? (63 FR 26387)

Buccaneer Homes objects to the critique of test reports submitted to HUD in March and April, 1997 by metal roof suppliers for the following reasons:

- Were there any specific reasons given in writing to either the manufacturers or suppliers for rejecting the previous tests? (63 Fr 26387)
- The testing submitted to the Department did "replicate the actual loads...not just approximate those loads and conditions". The testing did replicate the exact loads in the Table including the effects in the 3-foot end zones. (63 FR 26388)
- There is no reason for the Department to question the workmanship of the samples tested and whether or not a factory can comply. First of all the Standards, at 24 CFR 3280.401, are clear about how the test samples are to represent "minimum quality of materials and workmanship" (as in the case of Proof Load Tests) or "average quality of materials and workmanship" (Ultimate Load Tests). Secondly, the production inspectors can observe and note if there are problems associated with the assembly of the metal roof system. (63 FR 26387)

- There is no reason to include "fastener slip" as a failure mode for these tests. Assembly failure is clearly defined in 3280.401 as "deflection greater than the limits" or "rupture, fracture, or excessive yielding". (63 FR 26387)

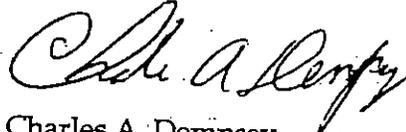
For all the above reasons, we urge the Department to withdraw the interpretative bulletin (I-2-98) because it fails to provide any useful clarification of the Standards. Furthermore, the IB was inappropriately issued, contrary to the requirements for comment-rulemaking. (24 CFR 3282.113)

In response to the ANPRM, at this time, we have no recommended revisions to Section 3280.305(c)(1)(ii)(B). The Table clearly sets forth the requirements that must be met. However, we are advised that several manufacturers are preparing revised designs for metal roof homes in Wind Zone II. Therefore, we request that the comment due date of July 13, 1998 be extended by 180 days. Our company continues to evaluate the IB and the Table, and we would like to have the opportunity to possibly submit additional comments by January 13, 1999.

Thank you for the opportunity to submit preliminary comments in response to the ANPRM.

Sincerely,

Buccaneer Homes



Charles A. Dempsey
President

CD/th



ELIXIR INDUSTRIES

REGIONAL OFFICES • 640 COLLINS ROAD • ELKHART, IN 46516 • 219/294-5685 • FAX 219/293-1049

July 9, 1998
Page one of two

3

HUD DOCKET NUMBER

JUL 13 9 45 AM '98

REC'D

HUD Docket No. 4271-A-02
Room 10276
Office of General Counsel
Department of Housing and Urban Development
451- Seventh Street SW
Washington, DC 20410-0500

**Re: Manufactured Home Construction and Safety Standard;
Metal Roofing, Advance Notice of Proposed Rulemaking (ANPRM)**

Elixir Industries respectfully submits this letter regarding the advanced notice of proposed rulemaking concerning the Table in 24 CFR 3280.305 (c) (1) (ii) (b):

Elixir Industries urges the Department to withdraw the Interpretive Bulletin because it is in direct conflict with our previous agreement for testing metal roofing and attempts to put new prescriptive requirements in the standard for the use of sheathing without the appropriate comment-rulemaking process. (24 CFR 3282.113)

Please let it be known that in August of 1994 Elixir Industries pursued permission from the Department to qualify metal roofing without sheathing for Wind Zone II and the Department granted permission and an approved test protocol under 3280.401b.

On July 31, 1996, I wrote to David Williamson to provide this background information for his initial meeting with MHI on Zone II metal roofing issues. I included with my letter, two letters from Radco. One dated August 1, 1994 requesting guidance and an approval for testing metal roofing and one dated September 1, 1994, documenting an agreement for testing metal roofing. In this letter and attachments, I detailed Elixir's efforts to insure our metal roof testing was in compliance with the standards. I have attached a copy of my letter for your reference (Enclosures 1 and 2).

On January 24, 1997, Elixir submitted to Rick Mendlen, test reports #RAD 1722 and #RAD 1795 for the Departments evaluation. Included as Appendix B of this test report, is Radco's September 1, 1994 letter documenting an agreement specifically to test metal roofing referenced above (Enclosure 3).

July 9, 1998
Page two of two

I have repeatedly made attempts to discuss this agreement with the Department. The Department has refused to comment. In the IB the Department now makes statements totally contrary to the referenced agreement to test metal roofing. Since the issue of the Interpretive Bulletin, I have requested a response to the comments made in the Interpretive Bulletin regarding subsequent tests reports submitted by Elixir to Rick Mendlen (Enclosure 4). The Department has yet to respond.

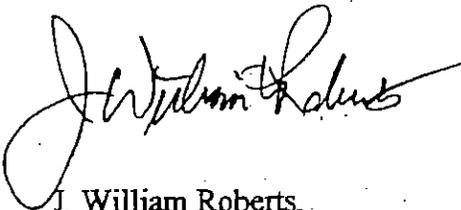
On this day July 9, 1998, I have also forwarded a letter to David Williamson requesting an explanation for the above mentioned items (Enclosure 5). The Department owes not only Elixir, but the entire industry an explanation, prior to trying to close this matter.

Until the Department responds to Elixir's inquiries, we request that the comment date be extended to allow the Department and Elixir's legal counsel the opportunity to have evaluate HUD's response to the enclosed inquiries. Only then can Elixir make an appropriate response to the ANPRM.

At this time, Elixir Industries has no recommendations for revising Section 3280.305 (c) (1) (ii) (b). The Table clearly sets forth the requirements that must be met. Elixir Industries and Radco requested, guidance and testing approval from the Department to use the Table, and it was granted. If the Department now decides it doesn't like the results of testing, it should pursue changing the standards through the appropriate comment- rulemaking process.

Thank you for the opportunity to submit preliminary comments in response to the ANPRM.

Sincerely,



J. William Roberts,
National Marketing Manager

JWR/br

Enclosures

C: Dave Whitt Tim Suttles Pam Danner Peter Race



ELIXIR INDUSTRIES

NATIONAL SALES • 17925 SO. BROADWAY • P.O. BOX 470 • GARDENA, CA 90247 • (213) 321-1191

July 31, 1996

Mr. David Williamson,
Director of HUD Office of Consumer and Regulatory Affairs
451-7th Street S.W. Mail Room B-133
Washington, DC 20410

Dear Mr. Williamson,

I'm writing to you to provide some background for your upcoming meeting with MHI regarding your letter, dated July 18, 1996, to Richard M. Reinhard, in response to the June 17th DTAG letter requesting guidance regarding positions taken on Wind Zone II Metal Roof issues.

Your letter to the DTAG II committee would appear to have been written without any knowledge of what your predecessors had already agreed to regarding testing metal roofing for Zone II. But before I present all of my information on our previous agreement with HUD, let me first tell you a little about Elixir Industries.

Elixir Industries was founded in 1948 and has twenty operating divisions throughout the United States. We are one of the nation's largest independent suppliers of metal roofing and siding, entrance and utility doors, frame parts, putty tape, sealants and aluminum extrusions to the Manufactured Housing Industry.

Our company has a long history of manufacturing component products for the Manufactured Housing Industry to help provide America with the most affordable manufactured homes.

When HUD revised the code to express more restrictive requirements for Hurricane Wind Areas and established specific standards for Zone II and Zone III, Elixir Industries realized the more restrictive building code would require metal roof testing to continue to allow the industry to provide America with an all metal affordable Manufactured Home.

In behalf of Elixir, Radco, a nationally recognized testing laboratory, helped us to run initial tests to determine the feasibility for metal roofing to meet the new standard.

ENCLOSURE 1

Upon determining that indeed metal roofing could meet or exceed the standard, we realized the tremendous expense that would be required to qualify galvanized metal roofing for Zone II and requested Radco contact HUD to establish: Test procedures for the new standard; Testing protocol; And address any and all of HUD's concerns that would effect our ability to performance test to the new standard.

On July 21, 1994 Mike Ziemen of Radco made contact with Philip W. Schulte of your office and requested a dialogue and guidance from HUD for Elixir to begin qualifying Zone II tests. See Attached Exhibit A (Radco letter, dated 8/1/94, to Philip Schulte)

The August 1st letter outlines: The proposed test protocol; Issues regarding the number of fasteners potentially splitting rim members; Required design loads; And the assurance that metal roofing could indeed be tested as a component or cladding under the table in 3280.305c, not to ASCE-7.

The last week of August of 1994, several conference calls between Mike Ziemen of Radco and your office took place to review the proposed acceptance and approval for Radco to performance test metal roofing. On August 31, 1994 Rick Mendlin gave his approval for all of the above mentioned performance testing issues. See attached Exhibit B (Radco letter, dated 9/1/96 to Philip Schulte.

Based on these agreed upon conditions for testing, which coincidentally also addressed each issue mentioned in your July 18, 1996 letter to the DTAG II Committee, Elixir began performance testing Zone II metal roof packages for the industry. Since this agreement, Elixir has conducted more than fifty Zone II tests and qualified four separate Zone II roof packages to the standard and our agreement. These packages have been built by five separate manufacturers since the referenced August 31, 1994 agreement.

We tested and these manufacturers built and sold homes in Zone II all based on the original agreement with HUD.

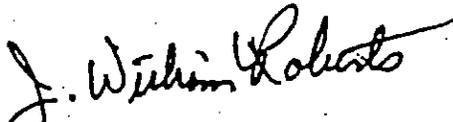
At this juncture my company has invested a substantial amount of money in both preliminary and performance testing all based on the original agreement with HUD. We consider it the responsibility of HUD to live up to their original agreement. The standard does not specify wood sheathing, as a requirement, anywhere, that anyone can find, as the standard is currently written. HUD's agreement for performance testing to 3280.401b using the design loads as shown in the table in 3280.305c is already established.

Your letter to the DTAG II committee is both confusing and contradictory considering HUD's original referenced agreement.

It is our hope that your meeting with MHI will simply be a formality and this presumed confusion will be immediately reversed and the DAPIA position paper accepted. The Industry Technical Exchange Committee voted unanimously to accept the DAPIA position paper at the May 1996 COASSA Meeting and is waiting to see if HUD stands behind their agreements.

Should you have any questions about any of the information contained in this letter or wish additional information, please don't hesitate to contact me at 219-294-5685 or contact any of the other parties referenced in the attachments.

Sincerely,


J. William Roberts,
National Sales , East

JWR/br

c: Marion Connell Tom Martin Mike Ziemen MHI

EXHIBIT A

ATTACHMENT

RADCO LETTER DATED 8-1-94



RESOURCES
APPLICATIONS
DESIGNS &
CONTROLS, INC.

2220 E. 58TH STREET
LONG BEACH, CA 90805
TELEPHONE: (310) 272-7221
TELECOPIER: (310) 529-7313

August 1, 1994

Mr. Philip W. Schulte
Chief, Compliance Branch
U.S. Department of Housing & Urban Development
Manufactured Housing and Construction and Standards Divn.
451 Seventh Street, S.W.
Washington, DC 20410

Re: Metal Roof Catenary Membrane Testing

Dear Mr. Schulte:

This is written as a follow-up to my July 21, 1994 conference call with you and members of your staff and NCSBCS on the above referenced matter.

First, I would like to clarify that RADCO is acting as a nationally recognized testing laboratory (NER-TL476) in this matter. Our client, Eibir Industries, manufactures and distributes the product. The ability to use this product in high-wind zones is critical to the manufactured housing industries ability to provide low-cost housing in these areas. We trust the product will be evaluated solely on its' ability to meet the performance requirements outlined in Section 3280.305 "Table of Design Wind Pressures".

We believe the following responds to the main issues discussed in our conference call.

- I. Splitting of Roof Rim Members - As discussed, the six (6) rim members in the three (3) tested specimens reported in RAD-1470 never cracked or split, not even after application of design live load with a safety factor of 2.5. Also, additional 2x4 specimens were tested with the specified fastener pattern without splitting. Home manufacturers should be able to maintain the specified fastener pattern using templates or other means. Also, to the best of our knowledge the specified pattern does not violate any recognized design standard. We believe that this issue, like other workmanship issues, is one which can easily be addressed by the manufacturer's Q.C. and IPFA inspectors.
- II. Test Protocol: The tests were, and will continue to be, conducted in general accordance with 3280.401(b). The exception being that if "structural framing members" are not loaded or being tested then deflections will not be monitored [See 3280.305(d)].

Mr. Philip W. Schulte
Dept. of HUD

August 1, 1984
Page -2-

- III. Dynamic Loading: As noted above we feel this (and all) products should be evaluated against the requirements of the standards. If and when dynamic loading requirements are added to the standards compliance will then be necessary for all roof products.
- IV. Truss Negative Load Design Requirements: Although it appears to be an unnecessary duplication of load resistant elements, if HUD so rules, we will agree that both the metal catenary membrane and the roof trusses be designed to resist the same negative loads as specified in the Table. If HUD so decides we would appreciate a technical explanation of the basis for such duplication.
- V. Required Design Loads: We will continue to use the design wind pressure loads from the Table as opposed to using ASCE-7.

We continue to believe that it is appropriate to classify the metal roof catenary membrane as a "main wind force resisting system" as opposed to an "exterior roof covering" under "components and cladding". Our belief is founded on the large tributary area covered by the metal roof catenary membrane. Typical "exterior roof coverings" cover only small tributary areas; examples include roof shingles (about 11" x 36") and 4x8' plywood sheathing. The metal roof catenary membrane covers the entire single wide roof, typically over 800 square feet.

We believe further support for our position is found in the ASCE-7 document itself from which the HUD Table was derived. One of the notes to Table 4 of said document reads as follows:

"Major structural components supporting tributary areas greater than 700 square feet in extent may be designed using the provisions for main wind-force resisting systems" (instead of the components and cladding loads).

Upon further review should HUD agree with our position the design loads would be -39psf and -47psf for wind zones II and III respectively. However, if HUD insists on the use of "exterior roof covering" loads we propose two separate series of tests to qualify the design as follows:

1. Gable End Areas: The test specimens will be 6' long by the width of the home (i.e., 16' wide). This will simulate the two 3' long gable ends butted together. The metal roof will be attached to the roof rim members as before and along the edge of the gable ends. The design load will be -73psf and -59psf for wind zones II and III respectively.
2. Remainder of Roof Area: The load will be calculated as illustrated in Attachment I. In essence, the 3' sidewall zones and the remainder of the roof area will be averaged using a weighted average as shown. The appropriate table loads will be used for wind zone II or III. Both the calculation of load and tests will be performed on a 16' wide. As illustrated the results could be

Mr. Philip W. Schulte
Dept. of HUD

August 1, 1994
Page -3-

extended to lesser widths (i.e., 14' & 12' widths).

RADCO will be testing two different systems for Elbir. One system will be a one piece roof as previously tested. The second system will be a two piece roof with a continuous longitudinal seam connection to a wooden backer adjacent to the roof's peak.

For reference we are including a clean copy of our initial test report #RAD-1470.

We anxiously await HUD's determination so that this project can be moved ahead for the benefit of those who depend on this form of low cost housing. Please feel free to contact the undersigned should any questions arise during review.

We thank you for your swift attention given this matter.

Sincerely,

RADCO



Michael L. Zisman, P.E.
Senior Vice President

MLZ:jjb

cc: Thomas A. Martin - Elbir
Rick Mendlen - HUD
Don Fairman - HUD

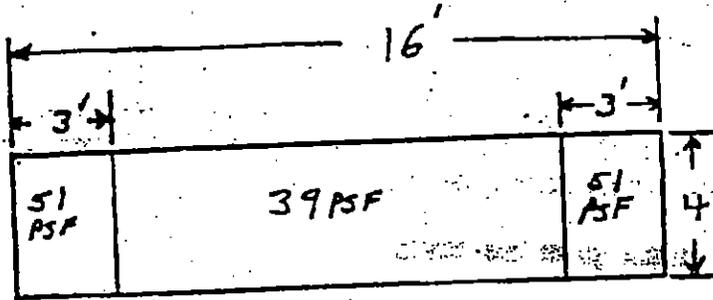
Encl.

Jenmizhud3

RADCO

ATTACHMENT I

Weighted Average Example for Zone II:



$$\text{Uniform Test Pressure} = \frac{(6 \times 51) + (10 \times 39)}{16} = 43.5 \text{ psf}$$

Example of extension of 16' results to qualify 14' wide design:

$$\text{Uniform Test Pressure} = \frac{(6 \times 51) + (8 \times 39)}{14} = 44.1 \text{ psf}$$

$$44.1 \text{ psf} \leq \frac{16 \times 43.5}{14} = 49.7 \text{ psf}$$

Therefore extension to 14' wide is okay

EXHIBIT B

ATTACHMENT

RADCO LETTER DATED 9-1-94



RESOURCES
APPLICATIONS
DESIGNS &
CONTROLS, INC.

3220 E 59TH STREET
LONG BEACH, CA 90803
TELEPHONE (310) 272-7231
TELECOPIER (310) 329-7513

September 1, 1994

Mr. Philip W. Schulte
Chief, Compliance Branch
Manufactured Housing and Construction Standards Division
Department of Housing & Urban Development
451 7th Street S.W., Rm 9156
Washington, DC 20410

Re: Metal Roof Catenary Membrane Testing.

Dear Mr. Schulte:

In the way of background on August 1, 1994 we wrote the Department on the above referenced matter in response to our July 21, 1994 conference call. Last week and Tuesday and Wednesday of this week we held telephone conversation with messrs Tang and Mendlin of your staff.

Yesterday August 31, 1994, Mr. Mendlin verbally gave us the final conditions under which we could proceed with testing this product. Rather than outline those conditions to us in writing he requested that we outline them back to you; thus the purpose for this letter.

1. Splitting of Roof Rim Membrane: This is a factory QC concern that does not affect testing unless splitting were to occur on test samples.
2. Test Protocol: Test will be in accordance with 3280.401(b). The roof truss framing system will not be monitored for deflection (i.e. framing is not part of the system being tested). We will most likely use trusses listed for the zone being tested.
3. Dynamic Loading: No requirement.
4. Truss Negative Load Design Requirements: Reference to truss load requirements will not be made in the test report.
5. Required Design Loads: Design pressure loads will come from the Table in 3280.305(c) not the ASCE-7 standard. Table loads for "Components and cladding: Exterior roof coverings...." will be used. (We note that the Department did not explain why "Main wind force resisting system" loads could not be used.)

"Gable end Areas" will be tested as outlined in our August 1, 1994 letter. "Remainder of roof area" loads and testing will also be as outlined in our August 1, 1994 letter. (It is permissible to average the 3' side wall zone loads with the center area zones and use the resultant average load for test purposes as shown in our August 1, 1994 Attachment I.)

It will be permissible to extend results for longer spans (i.e. 16' wides) to lesser spans (i.e. 14' or 12' wides) following the approach presented in our August 1, 1994 Attachment I or a similar approach of Mr. Mendlin's.

6. Miscellaneous: We will assure that the 4" channel does not add resistance to the assemble or restrict the 12" x 28 gauge continuous steel band. Said band satisfies the strap requirements of 3280.305(e)(2). Sheathing under the metal catenary roof membrane is not required. Two roof systems will be tested as noted on page 3 of our August 1, 1994 letter.

RADCO TEST REPORT
Test Report No. RAD-1470
Project No. C-5475

**UPLIFT WIND PRESSURE LOAD TEST ON A STRUCTURAL
METAL ROOF CATENARY MEMBRANE, MAIN WIND FORCE RESISTING ELEMENT**

Prepared for

ELIXIR INDUSTRIES
P.O. Box 470
Gardena, CA 90247

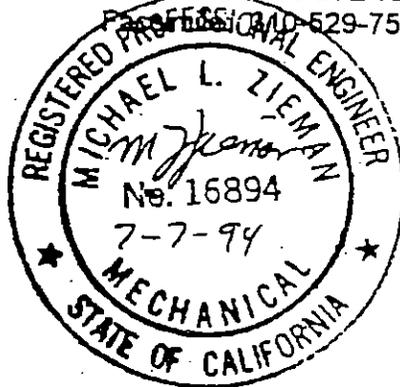
by

RADCO
Resources, Applications, Designs and Controls, Inc.
Listing and Testing Division
3220 E. 59th Street
Long Beach, CA 90805
Telephone: 310-272-7231
Facsimile: 310-529-7513

Prepared by:



Sanjay "Jay" Mishra, Manager
Code Coordination Services



Submitted by:



Michael L. Ziemann, P.E.
Sr. Vice President

Issued: July 1994

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PHOTOGRAPHS

1.0 INTRODUCTION

At the request of Elixir Industries, RADCO conducted uplift wind pressure load tests on its 0.0125" (minimum finish thickness) galvanized metal roof catenary membrane covered under RADCO listing #1050. The tests were conducted to determine compliance with the Manufactured Home Construction and Safety Standards 3280.305 for design wind pressure for Wind Zones II and III which will become effective July 13, 1994. The "Main Wind Force Resisting System" design live loads of -39 psf and -47 psf for zones II and III respectively were selected. This selection was based on the continuous uniform properties of the metal catenary membrane and the large tributary area (i.e. the entire roof surface) covered by the structural catenary membrane. The tests were conducted to evaluate the ability of the metal catenary membrane and its fasteners to withstand the required loads. The testing was not conducted to evaluate the framing system other than the rim members which receive the fasteners connecting the continuous membrane. Roof framing system design is the responsibility of the home manufacturer. The users of this report are referred to Section 5.0 CONDITION OF USE for further guidance.

2.0 TEST SPECIMEN DESCRIPTION

The metal catenary membrane was laid on simulated roof framing 188" long x 49-1/2" wide with 3.25/12 pitch peak trusses @ 16" o.c. as shown in Figure 1. A 9-1/2" high, 16" o.c. simulated 2"x4" stud wall section was built such that it rested above the 2x4 rim member. A 1/2" thick x 3-1/2" wide sheet of gypsum wallboard was placed between the top plate of the simulated stud wall and the rim member. The simulated stud wall was fastened to the trusses and then braced. (No negative wind pressure load was applied to the truss assembly.)

A 12" x 48" x 26 gauge continuous metal band was fastened to the stud walls with four (4) 1" crown x 1" long x 16 gauge staples at the two end studs and with eight (8) identical staples at the two interior wall studs. (Tributary roof length was 8" for each end stud and 16" for the two interior studs.)

Three strips of 1" wide x 1/16" thick Elixir Industries #101 Mobile-Lastic black rubber sealing tape were applied to the metal band. The 6 mil plastic sheet was then placed to provide the vacuum loading chamber. Three more strips of the sealing tape were applied on the plastic sheet above the original 3 strips. The metal catenary membrane was then laid such that there was a 3-1/2" side lap at each end.

The metal catenary membrane was fastened on each edge to a 2"x4" spruce-pine-fir rim member with a total of 36 #8 x 1-1/2" long hex washer head sheet metal screws arranged in 3 horizontal rows at 4" o.c. Each row was staggered 1-1/2" apart and 1" below the other. Each screw penetrated roof metal, sealing tapes and plastic, the 26 gauge steel band and then the 2x4 rim member. Minimum edge distance for the bottom row of sheet metal screw fasteners was 1/2".

The metal catenary membrane, sealing tape and steel band were submitted by Elixir Industries for testing. The test specimens were fabricated by RADCO personnel. All testing was conducted at RADCO's testing facility in Long Beach, California.

3.0 TEST SET-UP AND PROCEDURE

One 4" deep metal C-channel section was bolted to the 26 gauge steel band and wall studs with one 3/8" diameter bolt at each stud to hold the test specimen in the test fixture. Elongated holes were placed in the steel band so that the bolts would not bear on the band.

The test fixture consisted of a 4ft. high x 16ft. long x 4ft-8 inches wide reinforced open top box in which the test specimen was placed in an inverted position. The plastic sheet was draped over the walls of the fixture and sealed to the floor thus creating an air tight enclosure for the negative loading.

The uplift wind pressure load tests were generally conducted in accordance with the ultimate load tests procedures in Section 3280.401(b) of the Federal Manufactured Home Construction and Safety Standards. Because qualification of the framing system was not the consideration (see 3280.305d) deflection readings were not taken.

The load was applied using the vacuum method of loading by evacuating the air below the test specimen. The applied load was measured with a water manometer capable of reading in 0.2 inch increments of water column.

The load was applied gradually at an approximate rate of 5 psf per minute until failure occurred. The load in inches of water was converted to psf using 1" w.c. = 5.20 psf.

4.0 TEST RESULTS & CONCLUSION

A total of three (3) specimens were tested. The ultimate loads and type of failures observed are described below:

SPECIMEN NUMBER	ULTIMATE LOAD (psf)
1	124.80
2	117.52
3	134.68
Average	125.67

Design Load = $125.67 + 2.5 = 50.3$ psf

In all three tests, failure occurred when the metal catenary membrane tore through the sheet metal screws at one or both edges. All screws remained in place in all three tests. There was no damage to the metal screws or the continuous steel band. All screw holes in the band remained circular without any elongation. The 2"x4" rim member also remained undamaged. The metal roof catenary membrane exceeds the design live load wind pressures of -39 psf and -47 psf for zones II and III respectively.

5.0 CONDITIONS OF USE

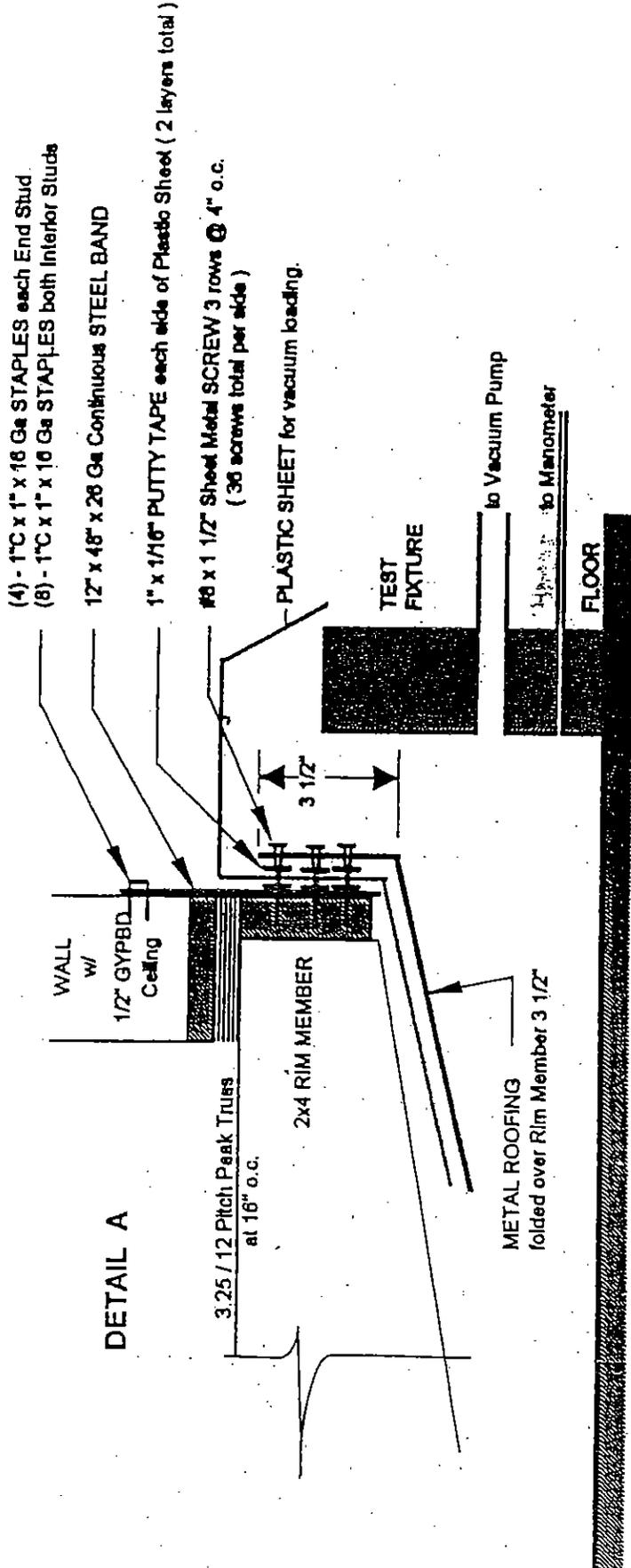
1. The metal catenary membrane roof system can only be used on single wide homes with a maximum width of 188". Lesser widths are acceptable.
2. Minimum roof slope is 3.25/12.
3. Fasteners must be installed and as specified in Section 2.0 above. Also see detail A.
4. Roof rim members must be a minimum 2"x4" with a minimum specific gravity (G) of 0.42. Refer to table 12A in the 1991 NDS.

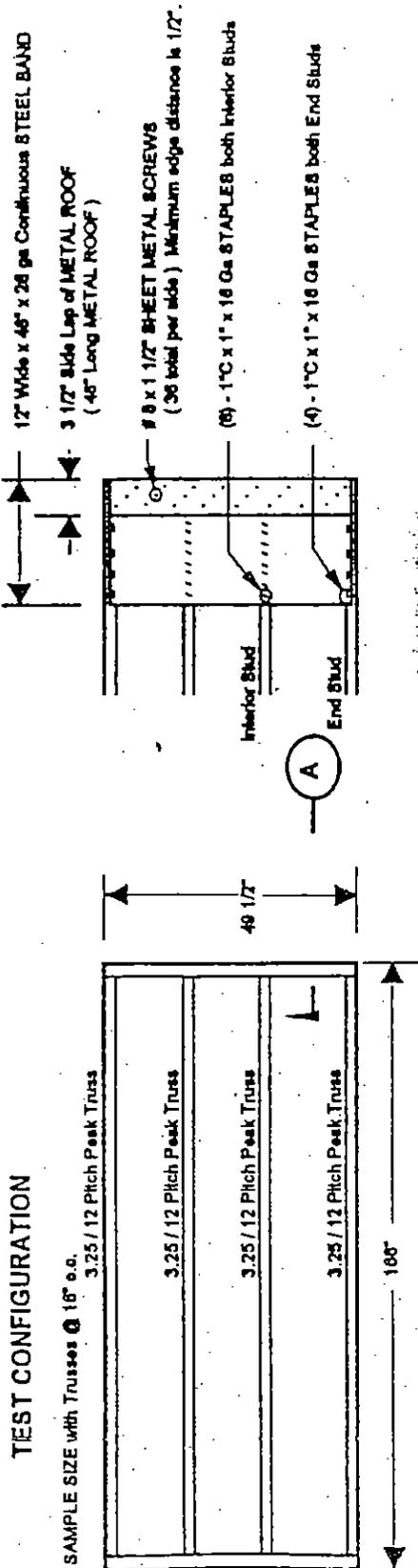
5. The metal catenary membrane must lap over the minimum 2"x4" rim member a minimum of 3½".
6. Minimum edge distance for the bottom row of sheet metal screw fasteners is ½".
7. The 12" wide by 26 gauge continuous sheet metal band must be installed as shown in detail A and fastened to each stud (16" o.c.) as specified in Section 2.0. NOTE: This continuous band satisfies the prescriptive requirements of 3280.305(e)(2) for a steel strap or bracket 16" or 24" on center from the roof to the wall. Also, note that the structural metal catenary membrane carries the entire uplift (negative) load to the side wall. Thus the trusses/rafters under the metal catenary membrane are not subjected to the uplift (negative) load and need only be designed for the downward (positive) design loads of the standards.

APPENDIX

FIGURE 1: TEST SPECIMEN DETAILS
PHOTOGRAPHS

DETAIL A





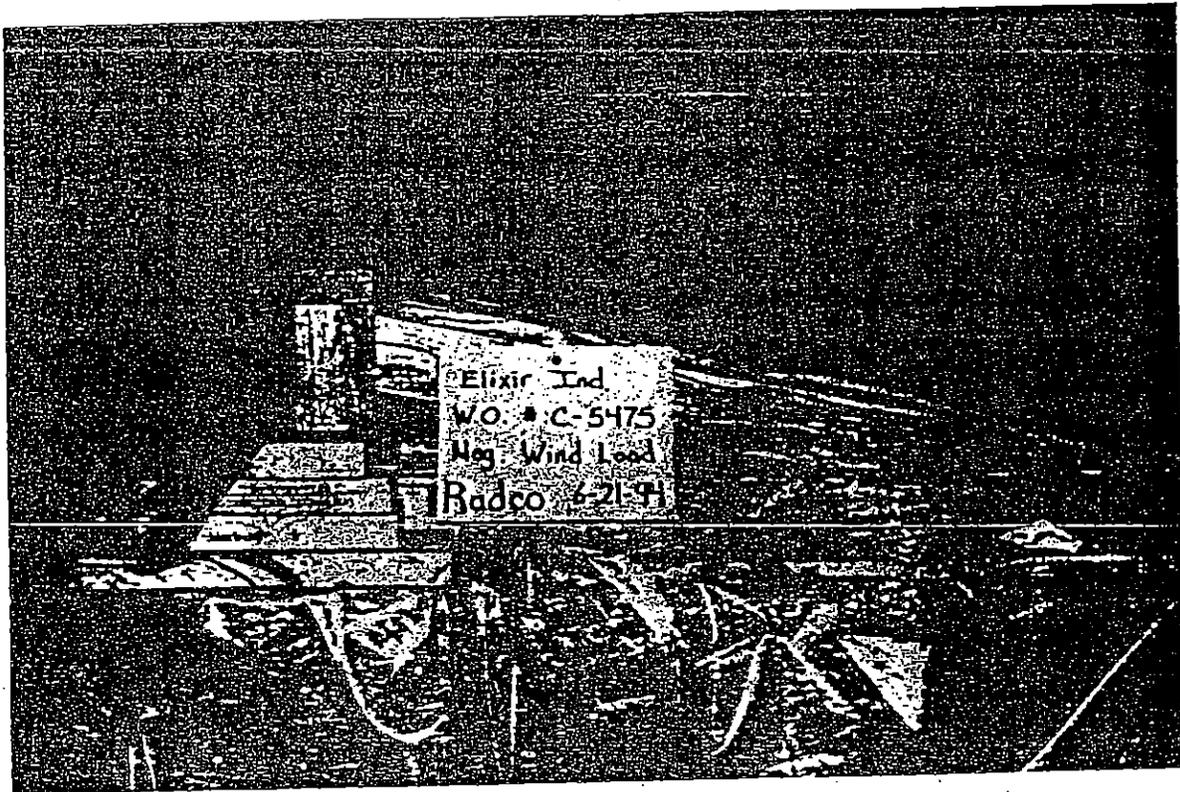
DETAIL B

DETAIL C

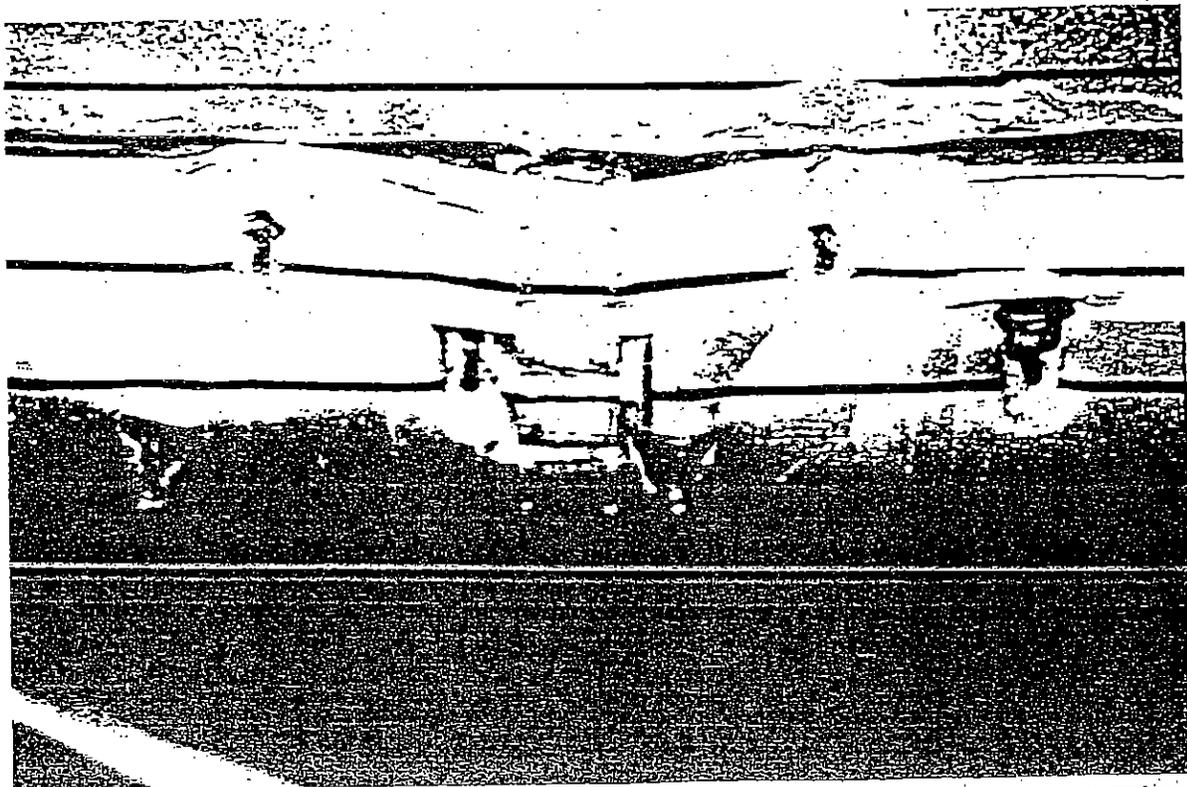
TYPICAL NEGATIVE LOAD TEST SETUP



SIDE VIEW OF SPECIMEN AND METHOD OF SUPPORT



CLOSE UP OF TYPICAL FAILURE - METAL TORE AT THE SCREW LOCATIONS





ELIXIR INDUSTRIES

REGIONAL OFFICES • 640 COLLINS ROAD • ELKHART, IN 46516 • 219/294-5685 • FAX 219/293-1049

January 24, 1997

Mr. Rick Mendlen
HUD Office of Consumer and Regulatory Affairs
Room 9156, 451-7th Street S. W.
Washington, DC 20410

Dear Rick,

Thanks for the opportunity to discuss some of the issues relating to Metal Roofs in Wind Zone II.

Per your request, I have enclosed the successful tests run in 1996.

Again, I want to emphasize that data we have referenced in our conference call of 1/15/97, isn't represented in the test reports you've requested. When testing Galvanized Metal Roofing for Zone II, the test report describes how the simulated structure to be tested was built, how the test was run and to what load limits the roof was tested to.

When we discuss data that we felt would be of vital importance to HUD's review of this situation, we are referencing the data that we have accumulated from the trial and error tests we had to run to be able to successfully complete the roof tests you've requested.

The photographs and analysis of failed test samples shows many of the actual structural problems with subjecting a test specimen to an up-lift wind load for Zone II. As I verbally related to you, we have extensively investigated strengthening the test specimen in various ways to meet this up-lift wind loading.

As you review the test reports I have enclosed, bear in mind that you are only seeing the report of how the galvanized roofing performed. To fully understand all aspects of what is really necessary to strengthen a Zone II home without requiring wood sheathing, we need to review all data I've mentioned.

ENCLOSURE 3

January 24, 1997
Page 2 of 2

Elixir Industries feels that since we have extensively tested Galvanized Metal Roofing for Zone II and to the best of our knowledge HUD hasn't tested any specimens for Metal Roofing or Wood Sheathing for Zone II, a comparison and review of our data is necessary for HUD to address this issue.

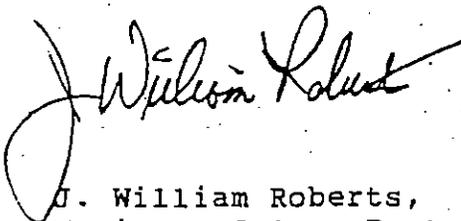
Again I want to emphasize that requiring wood sheathing does not serve to make a safer home for Zone II, but instead prevents the manufacturers from being able to build an affordable entry level home.

Please find enclosed test report numbers RAD-1722 and RAD-1795 for your review. Prior to these tests we were testing specimens which utilized a 2x6 rim member. We moved to a 1x6 rim member to verify it's strength at these same Zone II loadings. One of our goals was to determine if a 1x6 rim member was able to sustain the minimal fastening pattern at the Zone II loadings without splitting.

Once you have had an opportunity to review these tests and formulate your questions and areas of interest, give me a call.

I look forward to your questions and comments.

Sincerely,



J. William Roberts,
National Sales, East

JWR/br

c: David Williamson
Marion Connell
Tom Martin
Radco



ELIXIR INDUSTRIES

REGIONAL OFFICES • 640 COLLINS ROAD • ELKHART, IN 46516 • 219/294-5685 • FAX 219/293-1049

June 11, 1998
Page one of two

Mr. David R. Williamson,
Director, Office of Consumer and Regulatory Affairs, Room 9156,
Department of Housing and Urban Development
451-7th Street S.W.
Washington, DC 20410

Dear Mr. Williamson,

When we met at your office in April, 1997. Your staff was not willing discuss any of the specific questions we asked about the test reports submitted for evaluation. When asked if you would answer questions after you issued your Interpretive Bulletin (IB), you indicated you would.

Under the IB I-2-98 heading, "Subsequent Testing of Metal Roofs", several concerns were stated that I would like you or your staff to elaborate on specific to Elixir's test report #RAD 1722.

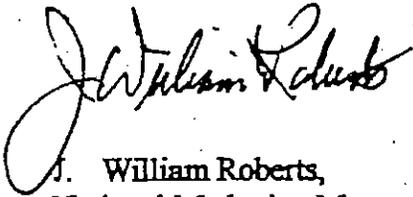
1. How did our test method provide additional "resistance not available under actual conditions of application?" Please be specific.
2. What "horizontal load" do you want to be incorporated and how do you want to incorporate it into a test?
3. When the truss is required to be separately tested and qualified for Wind Zone II or III, why would a truss (roof framing members) now need to have "deflection readings" taken. Our test report indicates when there was a failure of the truss. Why the need for deflection readings.
4. Under "other specific questions about tests include:" We don't believe any of these items apply to Elixir's test report. If you feel they do, we would like to hear your reasons.

ENCLOSURE 4

June 9, 1998
Page two of two

If you or your staff wishes to discuss this report, I welcome the opportunity. When can we expect a response or have an opportunity to meet?

Sincerely,



J. William Roberts,
National Marketing Manager

JWR/br

C: Tim Suttles · Frank Walter



ELIXIR INDUSTRIES

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July 9, 1998

Page one of two

Mr. David Williamson,
Director of HUD Office of Consumer and Regulatory Affairs
Room 9156, 451-7th Street SW
Washington, DC 20410

Dear Mr. Williamson,

I am writing to you in response to your Interpretive Bulletin I-2-98. In the Interpretive Bulletin, you made statements contrary to information I provided you almost two years ago.

On July 31, 1996, I wrote to you to provide background information for your initial meeting with MHI on Zone II metal roofing issues. I included with my letter two letters from Radco. One dated August 1, 1994 requesting guidance and an approval for testing metal roofing and one dated September 1, 1994, documenting an agreement for testing metal roofing. In this letter and attachments, I detailed Elixir's efforts to insure our metal roof testing was in compliance with the standards. I have attached a copy of my letter for your reference.

On January 24, 1997, Elixir submitted to Rick Mendlen, test report #RAD 1722 for the Departments evaluation. Included as Appendix B of this test report, is Radco's September 1, 1994 letter documenting an agreement to test metal roofing referenced above.

Elixir Industries has been repeatedly asked about this agreement. On February 10th of 1997, I presented the chronological order of events on metal roof testing at the MHI Technical Activities Committee meeting. Copies of the letters referenced above were provided to all members.

I have repeatedly made attempts to discuss this agreement with the Department. The response was always that you would not make comment until you had issued the Interpretive Bulletin. In the IB you make statements totally contrary to the referenced agreement to test metal roofing.

ENCLOSURE 5

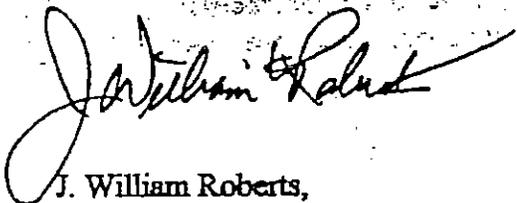
July 9, 1998
Page two of two

At the Technical Activities Committee meeting on June 16, 1998, we discussed the Radco August 1st and September 1st, 1994 letters and your references contrary to the agreement for testing metal roofing.

Now that you have issued the IB, Elixir is due an explanation. I am formally requesting your written explanation for this breach of agreement.

I respectfully request that this document and your response be entered into the HUD Docket- No. 4271-A-02 for potential future action.

Sincerely,



J. William Roberts,
National Marketing Manager

JWR/br

C: Dave Whitt
Tim Suttles
Frank Walters
Pam Danner
Peter Race
Office of General Counsel
HUD Docket- Regulations Division Room 10276



Regulations Division
Room 10276
Office of General Counsel
Department of Housing and Urban Development
451 Seventh Street, S.W.
Washington, DC 20410-0500

July 10, 1998

BF8-117

4/

Subject: Docket No. FR-4271-A-02
24 CFR Part 3280
Manufactured Home Construction and Safety Standards
Metal Roofing, Advance Notice of Proposed Rulemaking
(Interpretative Bulletin I-2-98)

REC'D
JUL 13 9 49 AM '98
HUMAN RESOURCES

Dear Sir or Madam:

There are so many reasons why I wish to object to the declarations contained in the Advanced Notice of Proposed Rule-making (ANPRM) that was published in the May 12, 1998 Federal Register that it is difficult to know where to start. I will try to list as many of my objections as I can in this letter in the hope that they will be carefully considered before any other official action is taken by the Department.

1) This is clearly changing the Federal Manufactured Housing Construction and Safety Standards ("the Standards") without following the requirements for such changes that have been clearly established. Metal roofing was not addressed in the January 1994 revision to the Standards. There are clearly no restrictions on the use of metal roofs in higher wind zones in the Standards as they are now written. Contrary to the Department's contention, this IS a "change in policy or interpretation."

2) Why does the text of this ANPRM make so much mention of the Preamble to the January 1994 Rule? What is important now is the wording of the Standards as written. Surely the industry is not being asked to treat the Preamble as a supplement to the Standards?

3) Hurricane Andrew should not be used as data to analyze how any part of the homes will perform when designed to the new loads that are presently in the Standards. That disaster prompted the changes that have been made but only future hurricanes will tell how product designed and constructed to the new wind requirements will perform. The testing presented to the Department of which I am aware met the "post-Andrew" wind loads.

4) It makes no sense to appeal to the footnotes in the Table of Wind Design Pressures ("the Table") to say that metal roofing is limited by the existing Standards. The very clear and obvious reading of footnote 7 does only one thing: it allows 3/8" rated sheathing to be used as a roofing material without further justification when fastened as prescribed. This "exemption" has nothing whatsoever in its reading to do with metal roofing. If it was the Department's intention to prohibit metal roofing in footnote 7 only a mind reader could determine that now.

5) By the Department's own admission many manufacturers and third party agencies interpreted the Table to allow metal roofing in the higher wind zones if those products could meet

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Riverside, CA 92513-7638
909-351-3500

the performance criteria of the explicit wind loads. If it was so obvious that metal roofing was excluded from Wind Zone II by the revision of the Standards in '94 why did so many professionals and technical types miss it? Why did the monitoring agent not object to any of the many approved designs?

6) It is curious that the Department should insinuate that testing in accordance to the performance loads in the Standards is some how a lower standard than "engineering analysis". Most of the calculation methods and allowable stresses published today in handbooks are derived from earlier testing. It has been my experience that one learns a great deal more about the performance of a structural assembly through destructive testing in the laboratory than through hand calculations performed at one's desk.

7) The references to "corrugated metal siding and roofed buildings" and their performance in earlier disasters seemed curious. What bearing do these materials have on the single-piece metal roofing used in manufactured housing? What relationship does the performance of these materials have on the performance of metal roofing tested to the new wind Standards? This appears to be a "straw man" built to prove a very weak point.

8) It is a great misuse of terms to refer to section 3280.305 of the Standards as "prescriptive." Every one in the industry refers to this section as a "performance" standard. It is true that there are a few prescriptive items for Wind Zone II and III (such as strap thickness, siding fastening, and truss location) but most of the items are performance in nature, especially the Table. How can one comply with a "Table of Wind Design Pressures" without designing components to perform to this criteria? Referring to this section as prescriptive is very misleading.

9) The Department's contentions that it was always their intent to exclude metal roofing from Wind Zones I and II unless it was applied over roof sheathing seems inconsistent. One curious example concerns the prescriptive requirements for roofing that *are* included. The footnotes detail the fastening for shingles over roof sheathing, but fail to mention any fastening for metal roofing when applied over this same sheathing. Why was not this also addressed?

10) Why did the Department introduce the "rigid box" method of analysis? This is clearly not part of the Standards (or any of the Department's correspondence that I have ever seen.) A rigid box may be a nice thing to have and may be one of many ways to meet the performance standards but it is by no means a part of the Standards. Many existing, approved designs for Wind Zone II and III are not rigid boxes even with a shingled roof and sheathing as dictated in the Standards. Why is the Department confusing the discussion by introducing this terminology?

11) It is quite misleading to mention that the industry understood the Standards in 1994 required a "rigid box" based on their economic forecasts for several reasons:

- a) The design of a "rigid box" was not a part of that work. The presence of roof sheathing does not insure a "rigid box" nor does it indicate that the designer even intended for there to be a "rigid box". (see above)
- b) That economic analysis contained roof sheathing under metal roofs because it was not clear that any testing program could show that metal roofing (which was only calculated up until that time) could meet the higher loads.
- c) If it was so clear to the industry that a "rigid box" was required why did they embark on a testing program to find a way to make metal roofing meet the design loads?

12) What information or test data does the Department have that proves that metal roofing will perform adequately in high winds just because there is structural sheathing underneath? It appears as if the Department thinks the metal roofing will blow off but the sheathing will remain thereby offering some protection to the residence and its contents. If this is so a) why not clearly state this in the IB and b) how does this prevent the metal roof from becoming "airborne debris" "dangerous flying missiles"? It would seem to me to be a much better solution to install a metal roof in accordance with the details that have been substantiated by a testing program so that the roof has a good chance to remain attached to the home during a storm.

I am very familiar with much of the testing that was done in an attempt to make metal roofing comply with the wind loads of the '94 Standards. In fact it was my company that first alerted the Department to some of the early testing that seemed to overlook several critical assumptions to make a thorough and accurate test. I participated in a conference call with the Department, a supplier and a testing agency where these issues were clarified and new protocols given verbal approval by all parties. (Unfortunately there appears to be no written confirmation of those discussions in existence.) I witnessed several tests and assisted both the supplier and the testing agency in performing many unsuccessful tests. Each of those tests gave us more information as to failure modes and critical fasteners or assemblies. After much work many successful tests were completed. After that even more tests were performed to verify other assumptions. It was a very enlightening albeit expensive and lengthy process. Fleetwood was pleased with the final details which were approved by our third party and never questioned by the monitoring agent.

I find it strange that the Department has found it necessary to now reverse the guidance given to at least a segment of the industry and disallow any of the testing that was done during that period. I have seen a wealth of data gathered by several suppliers developed with several manufactures that appears quite good. Not all of it was of the same caliber but the amount and variety leads me to an entirely different conclusion than the Department. In reading the comments by the Department concerning that array of data I wonder if the Department has ever really analyzed them thoroughly or did it always intend to rule out metal roofing in the higher wind zones regardless of any data submitted.

Concerning the criticism of testing that was published in the ANPRM I offer the following:

13) The testing of which I am aware did, in fact, "replicate the actual loads.....not just approximate those loads and conditions." Numerous tests were done using the full uplift loads in the Table for both in middle and 3-foot end zones.

14) Why does the Department imply that lateral wind loads must be imposed simultaneously during an uplift test of the metal roof. The Standards are clear that there are no lateral loads on the roof if the slope is less than 20 degrees which certainly is the case with a metal roof. Did the Department mean that the lateral wind loads on the sidewall would somehow affect the uplift straps for the roof rim plate? I fail to see how any such interaction exists or would affect the outcome of the testing I witnessed.

15) Did the Department ever notify any of the manufactures in writing the reasons why their Wind Zone II metal roof designs were unacceptable? Did the Department notify any supplier in writing as to the reasons their testing was unacceptable? I know neither my supplier, my third-party, nor I knew of any reasons our research was unacceptable.

16) Why did the Department mention "workmanship" as a criteria for rejecting the existing tests? The standards are very clear in regard to workmanship. Section 3280.401 says the tested assemblies are to represent "minimum quality materials and workmanship" (for proof load tests) or "average quality materials and workmanship" (for ultimate load tests).

17) Why is the question of whether the factory can comply with the tested assemblies a reason for rejecting the testing itself? Is not this the reason we have in-plant inspectors? They are certainly empowered to insure that the "quality control system" is capable of preventing "production problems" associated with "large number of fasteners" and "small edge distances." This may be a valid concern in the factory but it is not a reason to reject the testing itself.

18) The mention of "fastener slip" is totally out of place in any discussion of failure modes in testing. Section 3280.401 clearly defines assembly failure as "deflection greater than the limits" and "rupture, fracture, or excessive yielding" (emphasis added). Fastener slip, especially under destructive load testing, is completely irrelevant.

19) I fail to see how any of the testing I observed and used in my design package failed to meet the criteria listed in "Summary of Requirements, Using Table" in the IB. Specifically great care was taken to conform to item 3 - "The metal roof itself has been tested, using procedures that either meet all of the requirements of 3280.303(c) and 3280.401." I would challenge the Department to specify in writing were those or any other tests failed to meet this criteria. I know our third party certainly thought we had met all of the requirements of the Standards and so did the several professional engineers I have on my staff.

I have taken a great deal of time to record as many objections as I can to this ANPRM because I feel very strongly that a segment of the public has already been restricted access to affordable housing by these rules. Many consumers shopping for a Wind Zone II home may only be able to afford a "metal-metal" home. These regulations dictate full shingle roof (because metal-over-sheathing is more expensive). A full shingle roof means the exterior must be vinyl lap siding instead of metal due to design and other detailing considerations. The end result is that the potential buyer is denied the dream of home ownership. If asked by that customer why he has been forced out of the market I would tell him it is because "the regulators ignored the innovative designs that would have made it possible."

Let manufacturers, third parties and suppliers work with the Department to provide reasonable solutions to the wind load performance criteria that will enable the marginal customer to realize his or her dreams.

Sincerely,

FLEETWOOD ENTERPRISES, INC.



Bill Farish, P.E.
Director of Product Engineering
Housing Group



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Midwest Region
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July 10, 1998

5

Regulations Division, Room 10276
Office of General Counsel
Dept. of Housing & Urban Development
451 Seventh Street, S.W.
Washington, DC 20410-0500

RE: Docket No. FR-4271-A-02
Manufactured Home Construction and
Safety Standards: Metal Roofing

REC'D
JUL 14 9 50 AM '98
HUD REG DOCKET

To Whom It May Concern:

The following comments and recommendations are being offered on the subject in response to the Advanced Notice of Proposed Rulemaking, Federal Register, May 12, 1998.

The first comment is that it seems somewhat manipulative or inappropriate at the very least to issue a rule, calling it an Interpretative Bulletin and then six pages later in the same Federal Register, ask for comments on that rule.

The IB itself contains many vague intentions and assumptions such as "it is clear from the history of the (January 1994) rule . . . that HUD was intending . . .," or ". . . there is ample evidence of HUD's objectives . . ." or "The January 1994 rule clearly reflects HUD's intent . . .," etc. There appears to be nothing wrong with the Standard in this area as long as one reads it without the supposed intentions and assumptions which are not clear, offer no evidence (certainly none that would be considered substantial or concrete in the legal sense) and do not "clearly reflect" anything.

It appears that a footnote in the table is the basis for the reasoning behind the whole IB. That is a highly unusual and confusing way to introduce a major design restriction into a Standard. If HUD feels that metal roofing subjected to Wind Zone II or III loading as defined in the table in the Standard [3282.305(c)(1)(ii)(B)] is to be prescriptively prohibited, say so directly and be prepared to defend that decision with sound engineering reasoning.

The assumptions and intentions cited by the IB to justify its present position are clear and evident only to a few people at HUD and the HUD lawyers.

I believe that industry engineers can devise designs to withstand higher wind loads than current Zone I conditions dictate without artificial restrictions and these people should be allowed to do so and the DAPIA's should be allowed to evaluate those designs and their back-up calculations and/or tests using sound engineering principles without the pall of political reaction.

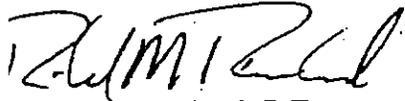


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regulations Division, Room 10276
page 2
July 10, 1998

Because manufactured housing is supposed to provide the home-buying public with a low-cost option (and to some, cost is extremely critical), there should be no stone left unturned to try to develop and design the most cost-effective homes possible including the use of metal roofing which has proven to be a viable alternate to other conventional roofing materials for years. If it can be done, it should be given the chance.

Yours very truly,



Richard M. Reinhard, P.E.
APIA Administrator

10G-pb



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Friday, July 10, 1998

HUD Docket No. 4271-A-02
Room 10276
Office of General Counsel
Department of Housing and Urban Development
451 Seventh Street, S. W.
Washington, DC 20410-0500

RE: Manufactured Home Construction and Safety Standards:
Metal Roofing: Advance Notice of Proposed Rulemaking (ANPRM)

Oakwood Homes Cooperation respectfully submits comments regarding the advance notice of proposed rulemaking concerning the Table in 24 CFR 3280.305 (c) (1) (ii) (B).

We object to the HUD interpretative bulletin (IB I-2-98) as based on inaccurate statements and analysis. In response to the ANPRM, there is no need to revise the performance standards set forth in the Table. If HUD proceeds to interpret the subject Table to prohibit metal roofs without sheathing in Wind Zones II and III, then HUD has prescribed new standards without complying with its rulemaking procedures and should not be asking for the public to submit proposed changes to the Table, but should be requesting comments on its proposed changes to the wind design standards.

- Oakwood Homes metal roof designs show that the high-wind loads are transferred by the metal roof to the structural members and components without compromising their integrity, performing like sheathing, as clarified in the IB I-2-98. According to the language of the IB it does not state that sheathing is required, but only that an alternate roof material that "performs like sheathing" per the test data is acceptable.
- Oakwood Homes has developed engineering analysis to demonstrate that our manufactured homes do comply with the HUD Code (Federal Standards) 3280.303 (c) and /or 3280.401 (b), for homes which include metal roof construction for Wind Zone II.
- Testing according to the Standards is not a lower standard than engineering analysis, as implied by the IB I-2-98. No where in the standards is testing relegated as inferior to calculations. In fact a thorough testing program, as was done in the case of metal roofing with many different construction methods and assemblies tested, should give a more complete picture of actual failure modes than a typical structural analysis calculations. (63 FR 26388)

HUD RPT DOCKET

JUL 13 10 30 AM '98

REC'D

For all the above reasons, we urge the Department to withdraw the interpretative bulletin (I-2-98) because it fails to provide any useful clarification of the Standards. Furthermore, the IB was inappropriately issued, contrary to the requirements for comment-rulemaking. (24 CFR 3282.113)

In response to the ANPRN, at this time, we have no recommended revisions to Section 3280.305 (c) (1) (ii) (B). The Table clearly sets forth the requirements that must be met. However, we are advised that several manufacturers are preparing revised designs for metal roof homes in Wind Zone II. Therefore, we request that the comment due date of July 13, 1998, must be extended by 180 days. Our company continues to evaluate the IB and the Table, and we would like to have the opportunity to possibly submit additional comments by January 13, 1999.

Thank you for the opportunity to submit preliminary comments in response to the ANPRM.

Sincerely yours,



Rodney E. Baylous
Oakwood Homes Corporation
Engineering Compliance Analyst



RESOURCES
APPLICATIONS
DESIGNS &
CONTRLS, INC.

July 10, 1998

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Department of Housing and Urban Development
Regulations Division, Room 10276
Office of General Counsel
451 Seventh Street, SW
Washington, DC 20410-0500

7

REC'D
JUL 13 1 03 PM '98

Re: Docket No. FR-4271-A-02
Manufactured Home Construction and Safety
Standards: Metal Roofing; Advance Notice of
Proposed Rulemaking.

RADCO is responding to this ANPR in its capacity as a nationally recognized testing laboratory (NER-TL476 and NVLAP 100264). The ANPR advises commenters to review IB I-2-98 published May 12, 1998. Thus, prior to making specific recommendations regarding any changes in the table... and in the way of background for such recommendations presented below, comments on IB I-2-98 are in order.

COMMENTS ON IB I-2-98

Comments by section of the IB are presented below:

Supplementary Information

The IB states "This IB does not denote any change in policy or interpretation formulated by HUD, but clarifies requirements that were adopted as part of an extensive notice-and-comment rulemaking process." This simply is not true. In exhibit one attached are two letters from RADCO to HUD dated September 1, 1994 and August 1, 1994. The September 1, 1994 letter confirmed the results of extensive discussions with HUD on the metal roof in high wind area issue as of that point in time. Note that contrary to the IB, sheathing was not required at that time. Therefore, sometime between September 1, 1994 and the issuance of the IB there was a change in policy.

Background

1. The IB states ".... that HUD was intending to create prescriptive standards the manufacturers could elect to comply with....." By-in-large the table is not a "prescriptive standard" though a few of the footnotes to the table are prescriptive. Section 3280.1 sets forth the intention for the standards to be "Performance" not prescriptive in nature. To foster innovations in design, new materials, economy, value, safety and durability HUD should do everything possible to not introduce prescriptive criteria.
2. The Background comments go to great length to show that HUD's "intent" was to require roof sheathing. Without addressing the veracity of these arguments suffice it to say that objective readers of the Standards have not found such a requirement. HUD should write the Standards so they clearly communicate their intent.

The January 1994 Rule

Several times the IB mentions a "rigid box" in connection with "roof sheathing" and "diaphragm material." It is not clear where in the Standards the "rigid box" requirement is found. Also, such a vague and ambiguous term as "rigid box" is a poor way to define structural requirements.

Never-the-less HUD should be fully aware that roof sheathing (i.e., a roof diaphragm) is not necessary to have a "rigid box." Since the very beginning of the HUD standards in 1976, ceiling diaphragms have been the prominent method used to maintain structural integrity ("rigid box") in the top section of the home not roof diaphragms (i.e., roof sheathing). Also, since the advent of the new wind rules in 1994 to this very day HUD has permitted ceiling diaphragms in wind zones II & III. Is HUD now pretending that ceiling diaphragms cease functioning simply because one chooses to apply a metal roof?

Subsequent Testing of Metal Roofs

1. The IB states that HUD found in reviewing tests performed "....that none of the tests satisfied all the requirements of the standards...." We strongly disagree with that assertion. RADCO has conducted numerous metal roof tests and we specifically make reference to our test reports RAD-1722 and RAD-1795 attached hereto as exhibits II & III respectively. Specifically we would point out the following regarding these tests as they relate to HUD's assertions.
 - A. The test method used by RADCO did not ".... introduced additional resistance for the test assemblies that would not be available under actual conditions of application or construction...." We would ask HUD to specifically identify what additional resistance they feel was added.
 - B. The "fasteners and components" which made up the metal roof test assemblies were not subject to "horizontal wind forces" under actual conditions. We would ask HUD to specifically identify which fasteners and components and which "horizontal wind forces" they are referring to.
 - C. The "....compression load added as a result of the sole use of metal roofing without sheathing...." was taken by standard and minimal roof trusses without the added benefit afforded by ceiling diaphragm sheathing. In other words, though we could have used ceiling diaphragm sheathing since it exists "under actual conditions", we choose not to in order to demonstrate the superior attributes of the metal roof system which is capable of withstanding two and one-half (2.5) times the uplift load required for wind Zone II in the Table.
 - D. The IB demonstrates a lack of understanding of the "deflection" requirements contained in 3280.401 and 3280.305(a) and (h) and/or a lack of understanding of how the metal roof system functions. Both 3280.401(a) & (b) set forth that design load (live load) deflection cannot exceed the limits set for in 3280.305(d). 3280.305(d) sets deflection limits for "structural framing members." Specifically for "vertical loads" the following elements are identified: "Floor, Roof & Ceiling, Headers, Beams and Girders." The limits are defined in terms of "L" where "L" is the "clear span between supports." With a standard sheathed roof the vertical uplift load is

transferred directly to truss top chords. In this case 3280.305(d) is applicable since the trusses are loaded vertically which causes vertical deflections. However, the metal roof structural design transfers the vertical uplift loads directly to sidewall studs. There is no vertical load on the trusses. Hence even a layman should be able to see that since the trusses are not loaded vertically there will be no vertical deflection. This is why our tests did not report deflections

2. The IB sets forth under "other specific questions about the tests" four (4) specific comments. Below we repeat and respond to each comment as they relate to our tests.

A. *"Concerns about whether the laboratory tests simulated factory conditions for replicating the workmanship associated with the small edge distance and installation of the large number of fasteners required."*

This concern is spurious. In this regard RADCO's metal roof tests were no different from hundreds of other structural load tests conducted by RADCO and others. For example, where floor decking is butt jointed and fastened to floor joist the "small edge distance" is typically less than the distances used for the rim rail member in our metal roof tests. Again using the floor decking as an example there is a "larger number of fasteners" there than used to secure the metal roof.

B. *"The ability of the quality control system to prevent production problems that would be caused because of the large number of fasteners required and the small edge distance for the outermost row of fasteners at the metal-to-rim rail connection of the roof, which is likely to cause damage to wood rim members or tearing of the metal during production or when design wind loads are applied";*

Regarding the "large number of fasteners" and "small edge distances" see our comment immediately above. Our tests showed that there was no "....damage to (the) wood rim members" not only at design wind loads but at two and one-half (2.5) times design wind load! The comment that these fasteners are "....likely to cause damage...." is simply spurious. If it did not happen in all of our testing at two and one-half (2.5) times design wind load how can HUD claim it is "likely" to happen. Also, there are other structural connections in the home, such a metal anchorage brackets screwed to floor rim joist where the concentration of fasteners per unit area is higher!

C. *"Failure of the tests to include all of the fasteners required in actual production, which would have further damaged the rim rail and weakened the tested assemblies";*

RADCO's tests included all fasteners which penetrate the rim rail.

D. *"Lack of information about deformation criteria for the connectors (fastener slip) or other conditions that would constitute failure of the test assembly, such as rim rail rotation."*

RADCO's test reports document all failures as required by 3280.401. If our report did not mention an item it is because there was no failure. For example, we did not experience "....rim rail rotation...." so it was not mentioned in our report. Again this is a spurious question; at least as it relates to RADCO's test reports.

Testing Protocols

The IB makes the following statement in the first paragraph of this section:

"Manufacturers have chosen to test metal roofs intended for wind zones II and III using the design wind pressures in the Table, apparently because the metal roofs may not have been able to qualify under the higher standards through engineering analysis."

HUD should know that this statement is not true. In the first place "engineering analysis" is not a "higher standard." Oftentimes testing results in a lower allowable value than could be achieved through engineering (analytical) analysis. Secondly, and more importantly, testing is sometimes the only accurate way to assess the structural capacity of a given system.

Complicated structural systems often cannot be accurately evaluated using analytical analysis. Analytical analysis always requires assumptions. For example: How are loads transferred between components? What effect does the rigidity differences between components make? What are the true load paths and how exactly are these loads shared between various components? The wonderful thing about structural load testing is that the uncertainty of these and many other assumptions implicit in any analytical analysis are eliminated. Testing reveals the true capacity of a structural assembly. Metal roofs were not tested because they "....may not have been able to qualify under the higher standards through engineering analysis." They were tested in order to obtain their true structural capacity and because the complicated nature of the assembly made it impossible to obtain an accurate evaluation using standard analytical analysis.

RECOMMENDATIONS FOR CHANGE TO THE TABLE

The following are specific changes which should be made to the table.

1. Revise the table to specifically state that roof and wall sheathing is not required when a roof (such as a metal roof) or metal wall assembly are qualified by testing. Extensive testing and analysis have conclusively shown that metal roofs without sheathing are stronger (more tornado & hurricane resistant) than standard sheathed roofs. (See exhibit IV attached). HUD should embrace this innovation rather than create road blocks against it. Not only is the metal roof without sheathing a stronger alternative it also is a lower cost alternative. By blocking its use HUD is denying home ownership to those who cannot afford the more expensive alternatives.
2. Revise the table and/or 3280.401 to clarify that deflection measurements are not needed under the following conditions:
 - A. When a test is not evaluating a framing member. For example, metal siding tests evaluate the metal siding and its fastening not the framing which is separately evaluated. For this and similar testing there is no need to measure deflection.
 - B. When a framing member is not loaded perpendicular to its length. (Common sense, no load no deflection).
3. The current table is based on exposure C loading. As defined in ASCE 7-88, most homes (probably over 90%) are sited in an exposure B or A locations. Thus consumers are forced to purchase exposure C homes (more costly) when in most cases exposure B would be

adequate. HUD should add a second table or expand the existing table to add exposure B loading. The home's data plate could be revised to identify the exposure and the data plate and/or installation manual could be revised to include a definition of the two exposures.

4. Currently there is an issue with soffit material in wind zones II & III. The table should be revised to exempt soffits. Soffits are only 4 to 8 inches wide. If soffit material should come loose in a high wind event, it does not compromise the structure. The best solution would be to exempt soffit material. To the best of our knowledge the model codes ignore soffits as well.
5. Revise note 8 to the table to clarify that the first "6 inches o.c." means in one direction (vertical or horizontal) not both directions simultaneously.

Thank you for your consideration of these comments and suggested revisions to the Table.

Sincerely,

R A D C O



Michael L. Zieman, P.E.
Executive Vice President

MLZ/mdc

FRONT/MIKE/ANPR



EXHIBIT I

RESOURCES
APPLICATIONS
DESIGNS &
CONTROLS, INC.

September 1, 1994

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Mr. Philip W. Schulte
Chief, Compliance Branch
Manufactured Housing and Construction Standards Division
Department of Housing & Urban Development
451 7th Street S.W., Rm 9156
Washington, DC 20410

Re: Metal Roof Catenary Membrane Testing.

Dear Mr. Schulte:

In the way of background on August 1, 1994 we wrote the Department on the above referenced matter in response to our July 21, 1994 conference call. Last week and Tuesday and Wednesday of this week we held telephone conversation with messrs Tang and Mendlin of your staff.

Yesterday August 31, 1994, Mr. Mendlin verbally gave us the final conditions under which we could proceed with testing this product. Rather than outline those conditions to us in writing he requested that we outline them back to you; thus the purpose for this letter.

1. Splitting of Roof Rim Membrane: This is a factory QC concern that does not affect testing unless splitting were to occur on test samples.
2. Test Protocol: Test will be in accordance with 3280.401(b). The roof truss framing system will not be monitored for deflection (i.e. framing is not part of the system being tested). We will most likely use trusses listed for the zone being tested.
3. Dynamic Loading: No requirement.
4. Truss Negative Load Design Requirements: Reference to truss load requirements will not be made in the test report.
5. Required Design Loads: Design pressure loads will come from the Table in 3280.305(c) not the ASCE-7 standard. Table loads for "Components and cladding: Exterior roof coverings...." will be used. (We note that the Department did not explain why "Main wind force resisting system" loads could not be used.)

"Gable end Areas" will be tested as outlined in our August 1, 1994 letter. "Remainder of roof area" loads and testing will also be as outlined in our August 1, 1994 letter. (It is permissible to average the 3' side wall zone loads with the center area zones and use the resultant average load for test purposes as shown in our August 1, 1994 Attachment I.)

It will be permissible to extend results for longer spans (i.e. 16' wides) to lesser spans (i.e. 14' or 12' wides) following the approach presented in our August 1, 1994 Attachment I or a similar approach of Mr. Mendlin's.

6. Miscellaneous: We will assure that the 4" channel does not add resistance to the assemble or restrict the 12" x 26 gauge continuous steel band. Said band satisfies the strap requirements of 3280.305(e)(2). Sheathing under the metal catenary roof membrane is not required. Two roof systems will be tested as noted on page 3 of our August 1, 1994 letter.

Based on the above understanding from the Department RADCO is now proceeding to test and attempt to qualify a metal roof catenary membrane system.

We thank the Department for it's review of our August 1, 1994 letter and the time expended on this matter.

Sincerely,

RADCO

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Michael L. Zieman, P.E.

Sr. Vice President

MLZ/mdc

cc: Thomas A. Martin - Elbir

FRONTSCHULTIG



RESOURCES
APPLICATIONS
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August 1, 1994

Mr. Philip W. Schulte
Chief, Compliance Branch
U.S. Department of Housing & Urban Development
Manufactured Housing and Construction and Standards Divn.
451 Seventh Street, S.W.
Washington, DC 20410

Re: Metal Roof Catenary Membrane Testing

Dear Mr. Schulte:

This is written as a follow-up to my July 21, 1994 conference call with you and members of your staff and NCSBCS on the above referenced matter.

First, I would like to clarify that RADCO is acting as a nationally recognized testing laboratory (NER-TL476) in this matter. Our client, Elixir Industries, manufactures and distributes the product. The ability to use this product in high-wind zones is critical to the manufactured housing industries ability to provide low-cost housing in these areas. We trust the product will be evaluated solely on its' ability to meet the performance requirements outlined in Section 3280.305 "Table of Design Wind Pressures".

We believe the following responds to the main issues discussed in our conference call.

- I. Splitting of Roof Rim Members - As discussed, the six (6) rim members in the three (3) tested specimens reported in RAD-1470 never cracked or split, not even after application of design live load with a safety factor of 2.5. Also, additional 2x4 specimens were tested with the specified fastener pattern without splitting. Home manufacturers should be able to maintain the specified fastener pattern using templates or other means. Also, to the best of our knowledge the specified pattern does not violate any recognized design standard. We believe that this issue, like other workmanship issues, is one which can easily be addressed by the manufacturer's Q.C. and IPIA inspectors.
- II. Test Protocol: The tests were, and will continue to be, conducted in general accordance with 3280.401(b). The exception being that if "structural framing members" are not loaded or being tested then deflections will not be monitored [See 3280.305(d)].

- III. Dynamic Loading: As noted above we feel this (and all) products should be evaluated against the requirements of the standards. If and when dynamic loading requirements are added to the standards compliance will then be necessary for all roof products.
- IV. Truss Negative Load Design Requirements: Although it appears to be an unnecessary duplication of load resistant elements, if HUD so rules, we will agree that both the metal catenary membrane and the roof trusses be designed to resist the same negative loads as specified in the Table. If HUD so decides we would appreciate a technical explanation of the basis for such duplication.
- V. Required Design Loads: We will continue to use the design wind pressure loads from the Table as opposed to using ASCE-7.

We continue to believe that it is appropriate to classify the metal roof catenary membrane as a "main wind force resisting system" as opposed to an "exterior roof covering" under "components and cladding". Our belief is founded on the large tributary area covered by the metal roof catenary membrane. Typical "exterior roof coverings" cover only small tributary areas; examples include roof shingles (about 11" x 36") and 4'x8' plywood sheathing. The metal roof catenary membrane covers the entire single wide roof, typically over 800 square feet.

We believe further support for our position is found in the ASCE-7 document itself from which the HUD Table was derived. One of the notes to Table 4 of said document reads as follows:

"Major structural components supporting tributary areas greater than 700 square feet in extent may be designed using the provisions for main wind force resisting systems" (Instead of the components and cladding loads).

Upon further review should HUD agree with our position the design loads would be -39psf and -47psf for wind zones II and III respectively. However, if HUD insists on the use of "exterior roof covering" loads we propose two separate series of tests to qualify the design as follows:

1. Gable End Areas: The test specimens will be 6' long by the width of the home (i.e., 16' wide). This will simulate the two 3' long gable ends butted together. The metal roof will be attached to the roof rim members as before and along the edge of the gable ends. The design load will be -73psf and -89psf for wind zones II and III respectively.
2. Remainder of Roof Area: The load will be calculated as illustrated in Attachment I. In essence, the 3' sidewall zones and the remainder of the roof area will be averaged using a weighted average as shown. The appropriate table loads will be used for wind zone II or III. Both the calculation of load and tests will be performed on a 16' wide. As illustrated the results could be

Mr. Philip W. Schulte
Dept. of HUD

August 1, 1994
Page -3-

extended to lesser widths (i.e., 14' & 12' wides).

RADCO will be testing two different systems for Elixir. One system will be a one piece roof as previously tested. The second system will be a two piece roof with a continuous longitudinal seam connection to a wooden backer adjacent to the roofs' peak.

For reference we are including a clean copy of our initial test report #RAD-1470.

We anxiously await HUD's determination so that this project can be moved ahead for the benefit of those who depend on this form of low cost housing. Please feel free to contact the undersigned should any questions arise during review.

We thank you for your swift attention given this matter.

Sincerely,

RADCO



Michael L. Zieman, P.E.
Senior Vice President

MLZ:jjb

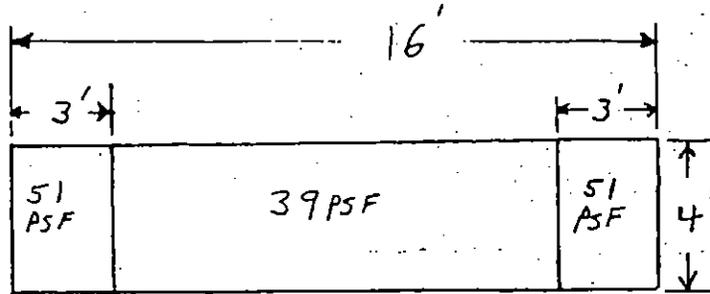
cc: Thomas A. Martin - Elixir
Rick Mendlen - HUD
Don Fairman - HUD

End.

jrm/mz/hud3

ATTACHMENT I

Weighted Average Example for Zone II:



$$\text{Uniform Test Pressure} = \frac{(6 \times 51) + (10 \times 39)}{16} = 43.5\text{psf}$$

Example of extension of 16' results to qualify 14' wide design:

$$\text{Uniform Test Pressure} = \frac{(6 \times 51) + (8 \times 39)}{14} = 44.1\text{psf}$$

$$44.1\text{psf} \leq \frac{16 \times 43.5}{14} = 49.7\text{psf}$$

Therefore extension to 14' wide is okay



RADCO TEST REPORT
Test Report No. RAD-1722
Project No. C-6002

**UPLIFT WIND PRESSURE LOAD TEST ON A STRUCTURAL
METAL ROOF CATENARY MEMBRANE
TEST FOR CONFORMANCE TO HUD WIND ZONE II**

Prepared for

ELIXIR INDUSTRIES
P.O. Box 470
Gardena, CA 90247.

by

RADCO
Resources, Applications, Designs and Controls, Inc.
Listing and Testing Division
3220 E. 59th Street
Long Beach, CA 90805
Telephone: 310-272-7231
Facsimile: 310-529-7513

Prepared by:

Sanjay "Jay" Mishra, Manager
Testing Laboratories & Code Interface Services



Submitted by:

Michael L. Ziemann, P.E.
Sr. Vice President

Issued: June 1996

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1.0 INTRODUCTION

At the request of Elixir Industries, RADCO conducted uplift wind pressure load tests on its 0.0125" (minimum finish thickness) galvanized metal roof catenary membrana covered under RADCO listing #1050. The tests were conducted to determine compliance with the Manufactured Home Construction and Safety Standards 3280.305 for design wind pressures for Wind Zone II which became effective July 13, 1994.

2.0 TEST APPROACH

The following outlines the test approach used. All elements of this approach were presented to HUD and accepted by Messrs Richard Mendlen and Phillip Schulte on behalf of HUD. See the Appendix D of this report for a copy of the September 1, 1994 letter outlining acceptance.

Design pressure loads were selected using the classification for "Components and cladding: Exterior Roof Coverings" shown in the Table in 3280.305(c).

For the purpose of determining the required design loads and testing the roof is considered as two separate areas. These areas are identified as "Gable End Areas" and "Remainder of Roof Area". This report covers the testing done to qualify both areas.

1. Gable End Areas: The test specimens will be a minimum of 6' long by the width of the home (i.e., 18' wide). This will simulate the two 3' long gable ends butted together. (As noted below the actual test width was 83" which presents a worse case than 6'.) Along the sides the metal roof will be attached to the roof rim members and at the gable ends to the truss top chords. The design load will be -73 psf for wind zone II.
2. Remainder of Roof Area: The test load was calculated as illustrated in Appendix B and below. The 3' sidewall zones and the remaining center roof area are averaged using a weighted average as shown. The appropriate table loads were used for wind zone II. Using this HUD approved method the test load calculation is illustrated below.

Example: Wind Zone II, 16 ft. (186") wide home

The uniform test pressure required is:

$$= \frac{(3 \text{ ft.} \times 51 \text{ psf}) + (3 \text{ ft.} \times 51 \text{ psf}) + 9.5 \text{ ft.} \times 39 \text{ psf}}{15.5 \text{ ft.}}$$

$$= 43.65 \text{ psf}$$

Load on fastener system resulting from applied test pressure = $43.65 \times 7.75 \text{ ft.} = 338 \text{ lbs./linear ft. of roof.}$

Similarly, for a 14 ft. (168") wide design, the uniform test pressure required would be:

$$= \frac{(3 \text{ ft.} \times 51 \text{ psf}) + (3 \text{ ft.} \times 51 \text{ psf}) + (8 \text{ ft.} \times 39 \text{ psf})}{14 \text{ ft.}}$$

$$= 44.1 \text{ psf}$$

Load on fastener system resulting from applied test pressure = $44.1 \times 7 \text{ ft.} = 308.7 \text{ lbs./linear ft. of roof.}$

The load on the fastener system is therefore reduced from 338 lbs./linear ft. for a 16 ft. wide home to 308.7 lbs./linear ft. for a 14 ft. wide home.

All tests were conducted to evaluate the ability of the metal catenary membrane and its fasteners to withstand the required loads. The testing was not conducted to evaluate the framing system. Roof framing system design is the responsibility of the home manufacturer. The users of this report are referred to Section 6.0 CONDITION OF USE for further guidance.

3.0 TEST SPECIMEN DESCRIPTION

3.1 Remainder of Roof Area:

The metal catenary membrane was laid on simulated roof framing 186" long x 65½" wide with 2.96/12 pitch peak trusses @ 16" o.c. as shown in Figure 2. A 24" high, 16" o.c. simulated 2x4 stud wall section was built such that it rested above the 1x6 rim member. The wall was fabricated using stud grade SPF with (1) 2 - 9/16" x ¼" dado placed 6" from the end. A 1x3 SPF belt rail was attached to the 2x4 studs with (2) 2"x7/16" C x 15ga staples at each dado intersection. One additional 2x4 SPF stud was attached with (10) 2 - ¼" x 15 ga. staples to each 16" o.c. stud; a oversized 3" x ¼" deep dado was placed in this added stud so as not to provide any support to the 1x3 belt rail. A ½" thick x 3-1/2" wide sheet of gypsum wallboard was placed between the top plate of the simulated stud wall and the rim member. The top plate of the simulated stud wall was not directly fastened to the trusses. Also, the roof rim member was not directly fastened to the top plate of the simulated stud wall.

24" high x .010" nominal thickness Elixir steel siding was placed on each side of the test assembly and fastened onto the 1x3 belt rails with (1) #10 x 1" hex head sheet metal screws at 4" o/c. This siding extended past the top plate and onto the nominal 1x6 roof rim member.

One strip of 3" wide x 1/16" thick Elixir Industries #101 Mobile-Lastic black sealing tape was applied to the metal siding. The 6 mil plastic sheet was then placed to provide the vacuum loading chamber. One more strip of the sealing tape was applied on the plastic sheet above the original strip. The metal catenary membrane was then laid such that there was a 3" side lap at each side of the specimen.

The steel roof membrane was fastened at the roof rim member with one row of #10 x 1" hex head sheet metal screws spaced at 3" o/c and two (2) rows of 1"x1"x16ga staples at 2" o.c. into the 1x6 roof rim member. See Details A & C of Figure 1 for details of row spacing and orientation. The fasteners penetrated the steel roof membrane, the sealing tape, the 6 mil plastic, the sealing tape, the sidewall metal and then into the 1x6 rim member. All exposed steel edges were taped to prevent tearing the 6 mil plastic.

A 1x4 strongback was placed near the peak and fastened to each truss top chord with one 2"x7/16"Cx16ga. staple. Also, 2 longitudinal 1x4 braces and 2 diagonal 1x4 braces were attached at or near the truss bottom chords to simulate the attachment of the ceiling diaphragm. This bracing provided considerably less stiffness to the trusses than is provided in an actual home by the ceiling diaphragms.

The metal catenary membrane, sealing tape and steel metal siding were submitted by Elixir Industries for testing. The test specimens were fabricated by RADCO personnel. All testing was conducted at RADCO's testing facility in Long Beach, California.

3.2 Gable End Area:

The gable end area specimens were similar to the remainder of the roof area specimens. See Figures 1 and 2 for details. The gable end area specimens included the following features:

1. The overall width was 83" instead of 65½".
2. Trusses were doubled. The end trusses were fasten together with #8 x 2½" wood screws @ 12" o.c. at the top and bottom chords. See Figure 1 Detail B.
3. (2) 1" x 4" x 35" flat braces were add at each end of the specimen to the truss top chords. See Figure 1 for details.
4. At the metal siding to belt rail connection an additional #10 x 1" hex head sheet metal screw was added 8" o.c. and staggered ¼".
5. At the two ends of the specimen one strip of 1" wide Elbdr #101 mobile-elastic sealing tape was applied to the side face of the truss top chord receiving the fasteners, then the plastic sheet was laid and a second strip of tape was applied on the plastic sheet directly above the original strip. The metal roof was then folded over the end truss top chords such that there was a 2" end lap, and fastened with #8 x 1½" long hex head sheet metal screws at 4" o.c.

4.0 TEST SET-UP AND PROCEDURE

One 6" deep metal C-channel section was bolted to the end of the wall studs of each wall with one ¾" diameter bolt at each stud to hold the test specimen in the test fixture. The metal siding stopped short of the C-channel. See Figure 1, Detail A.

The test fixture consisted of a 4ft. high x 16ft. long x specimen width plus 3" reinforced open top box in which the test specimen was placed in an inverted position. The plastic sheet was draped over the walls of the fixture and sealed to the floor thus creating an air tight enclosure for the negative loading.

The uplift wind pressure load tests were generally conducted in accordance with the ultimate load tests procedures in Section 3280.401(b) of the Federal Manufactured Home Construction and Safety Standards. Because qualification of the framing system was not the consideration [(see 3280.305(d)) deflection readings were not taken.

The load was applied using the vacuum method of loading by evacuating the air below the test specimen. The applied load was measured with a digital manometer capable of reading in 0.1 inch increments of water column.

The load was applied gradually at an approximate rate of one to two inches of water column per minute until failure occurred. The load in inches of water column was converted to psf using 1" w.c. = 5.20 psf.

5.0 TEST RESULTS & CONCLUSION

A total of three (3) specimens were tested for both the Remainder of Roof Area and the Gable End Area. The ultimate loads and type of failures observed are described below:

5.1 Remainder of Roof Area

SPECIMEN NUMBER	ULTIMATE LOAD (psf)
1	112.84
2	109.72
3	122.20
Average	114.92

Design Load = $114.92 \div 2.5 = 46.0$ psf

(NOTE: Each specimen exceeded 43.65psf design pressure)

In all three tests, failure occurred at the metal roof catenary membrane connection to the roof rim member. The metal roof tore through the shank of the hex head sheet metal screws which remained in the roof rim member. The staples pulled out of the rim member. The 1x6 rim member remained undamaged.

For the Remainder of Roof Area for 16' wide (186") and narrower homes the metal roof catenary membrane exceeds the design live load wind pressures of -43.65 psf, for Wind Zone II.

5.2 Gable End Area

SPECIMEN NUMBER	ULTIMATE LOAD (psf)
1	183.04
2	186.68
3	186.16
Average	185.29

Design Load = $186.16 \div 2.5 = 74.12$ psf

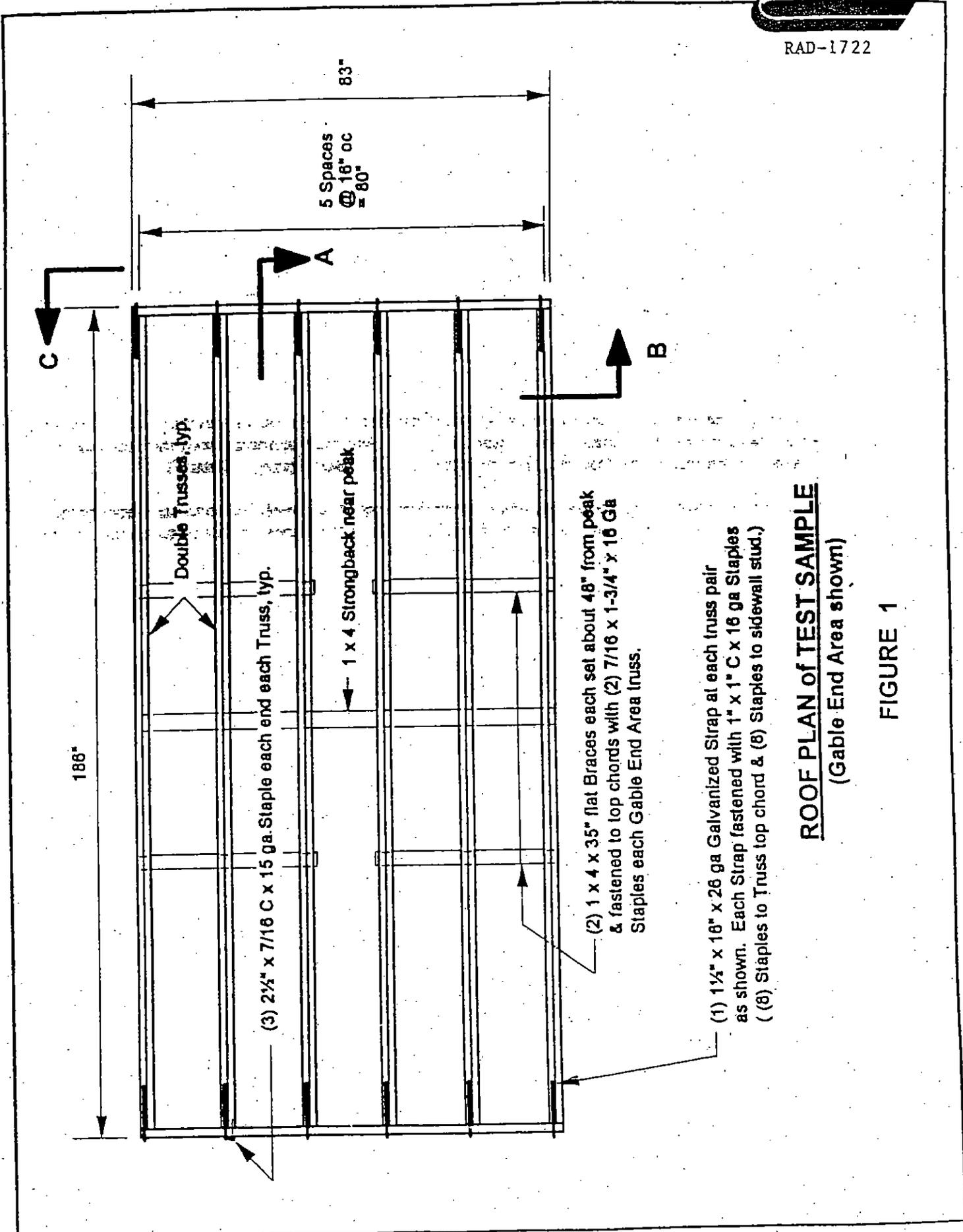
(NOTE: Each specimen exceeded 73psf design pressure)

Specimen #1 failed when the Elixir steel siding tore through the sheet metal fasteners at the belt rail. Specimen #2 failed when the 1x3 belt rail cracked. Specimen #3 failed when the bottom chords of one set of end double trusses both broke near the heel block (at one corner of the specimen). There was no failure of any kind on the two ends of the specimens where the metal roof connected to the end truss top chords.

For the Gable End Areas the metal roof catenary membrane exceeds the design live load wind pressure of -73psf for wind zone II.

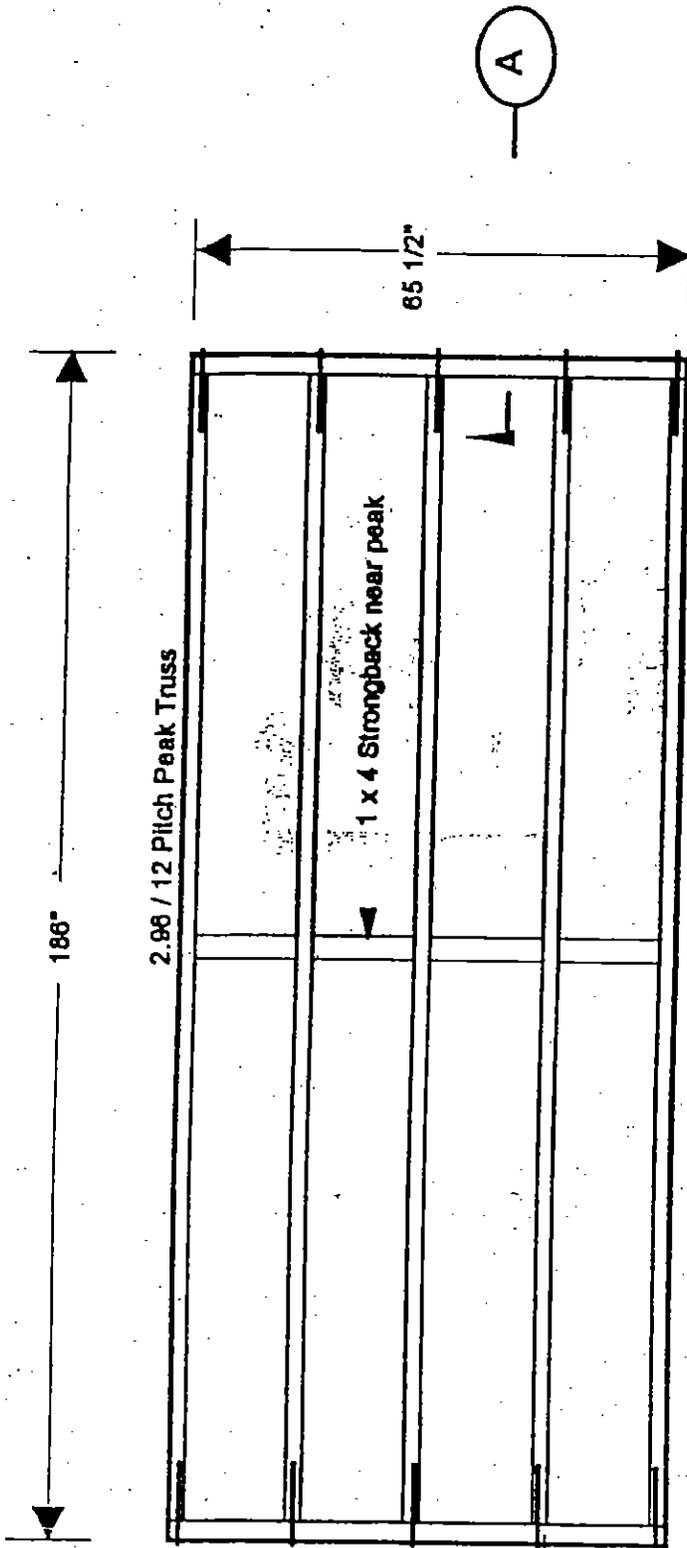
6.0 CONDITIONS OF USE

1. The metal catenary membrane roof system can only be used on single wide homes with a maximum width of 186". Lesser widths are acceptable.
2. Minimum roof slope is 2.96/12.
3. Fasteners at the metal roof to the 1x6 roof rim member and the steel siding to the 1x3 (minimum) belt rail must be installed as specified in Section 3.0 above. Also, see Figures 1 & 2 and related details.
4. Roof rim members must be a minimum of nominal 1x6 with a minimum specific gravity (G) of 0.42. (Refer to table 12A in the 1991 NDS).
5. The metal catenary membrane must lap over the roof rim member a minimum of 3". Minimum edge distance for the bottom row of staples is 1/4". Minimum distance from the top row of staples to the top of the 1x6 roof rim member is 1 1/4". See Figure 1, Detail C.
6. In Gable End Areas the metal catenary membrane must lap over the end truss top chords a minimum of 2". Double trusses at the extreme ends of the home must be fastened together as specified. See Detail B.
7. Strongback (entire length of home) and flat braces (Gable End Areas only) are required as specified in Figure 1.
8. One layer of 3" wide by 1/16" thick Elixir Industries #101 Mobil-Lastic block sealing tape must be used between the steel siding and the metal roof. Also, one layer of 1" wide by 1/16" of the same product must be used at the two ends of the home between the top chord of the end trusses and the metal roof.



ROOF PLAN OF TEST SAMPLE
(Gable End Area shown)

FIGURE 1

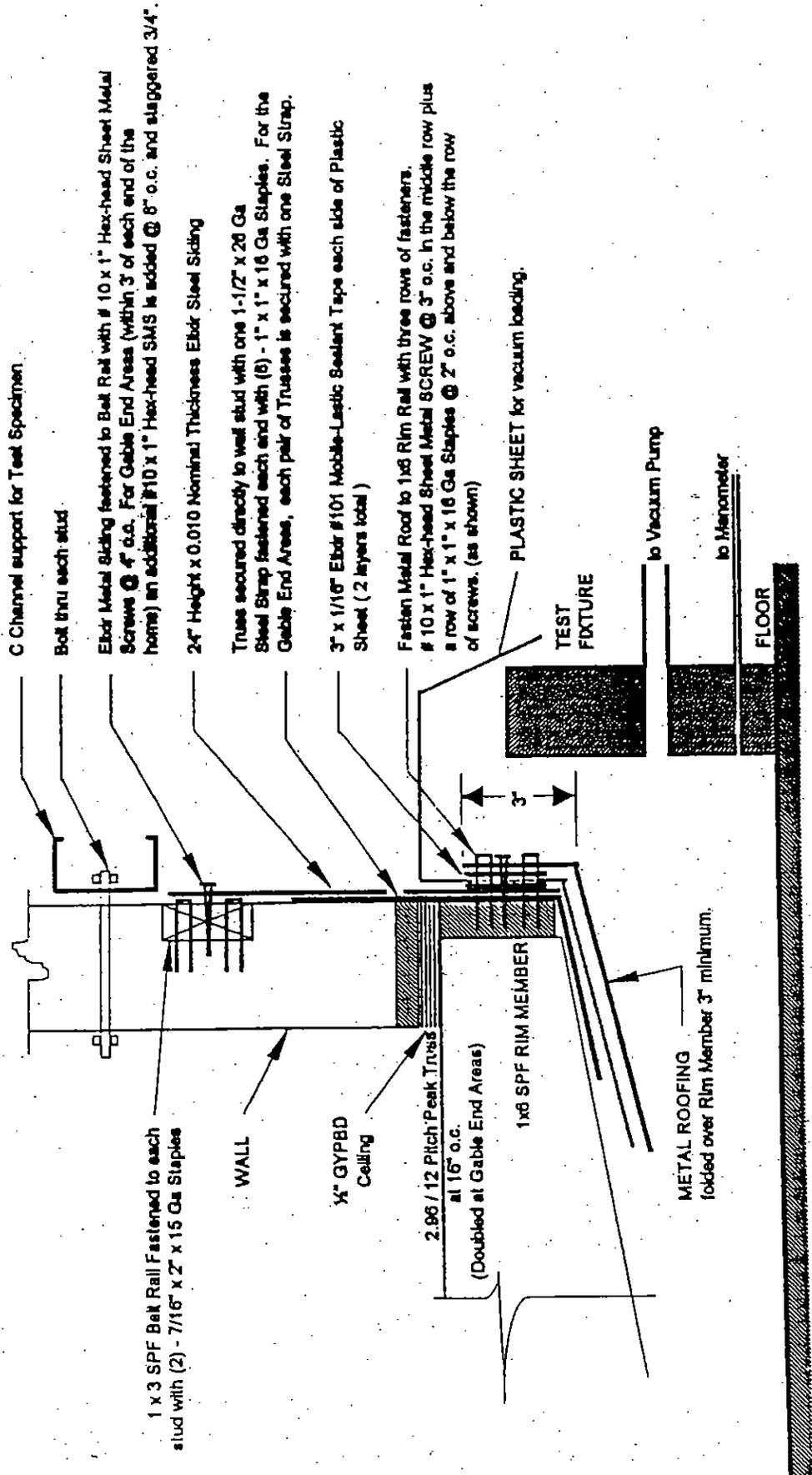


(3) 2 1/2" x 7/16 C x 15 ga Staple each end each Truss, typ.

(1) 1 1/2" x 16" x 26 ga Galvanized Strap at each truss as shown. Each Strap fastened with 1" x 1" C x 16 ga Staples (6) Staples to Truss top chord & (6) Staples to sidewall stud.)

ROOF PLAN of TEST SAMPLE
(Remainder of Roof Area)

FIGURE 2



C Channel support for Test Specimen

Bolt thru each stud

Elbor Metal Sliding fastened to Belt Rail with #10 x 1" Hex-head Sheet Metal Screws @ 4" o.c. For Gable End Areas (within 3" of each end of the home) an additional #10 x 1" Hex-head SMS is added @ 8" o.c. and staggered 3/4".

2-4" Height x 0.010 Nominal Thickness Elbor Steel Sliding

Trusses secured directly to wall stud with one 1-1/2" x 20 Ga Steel Strip fastened each end with (6) - 1" x 1" x 16 Ga Staples. For the Gable End Areas, each pair of Trusses is secured with one Steel Strip.

3" x 1/16" Elbor #101 Mobile-Lastic Sealant Tape each side of Plastic Sheet (2 layers total)

Fasten Metal Roof to 1x8 Rim Rail with three rows of fasteners. #10 x 1" Hex-head Sheet Metal SCREW @ 3" o.c. in the middle row plus a row of 1" x 1" x 16 Ga Staples @ 2" o.c. above and below the row of screws. (as shown)

PLASTIC SHEET for vacuum loading.

TEST FUTURE

to Vacuum Pump

to Manometer

FLOOR

1 x 3 SPF Belt Rail Fastened to each stud with (2) - 7/16" x 2" x 15 Ga Staples

WALL

1/4" GYPBD Ceiling

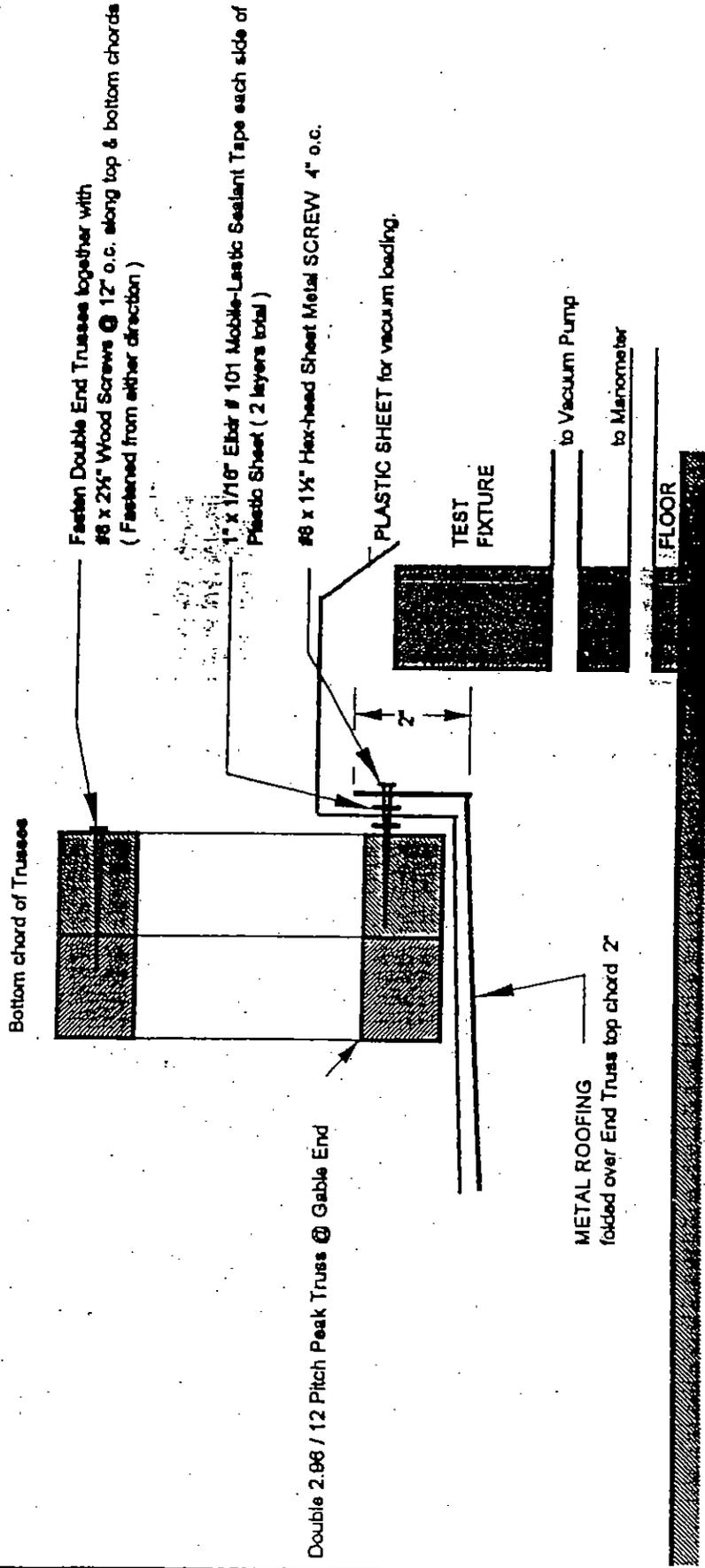
2.96 / 12 Pitch Peak Truss at 16" o.c. (Doubled at Gable End Areas)

1x8 SPF RIM MEMBER

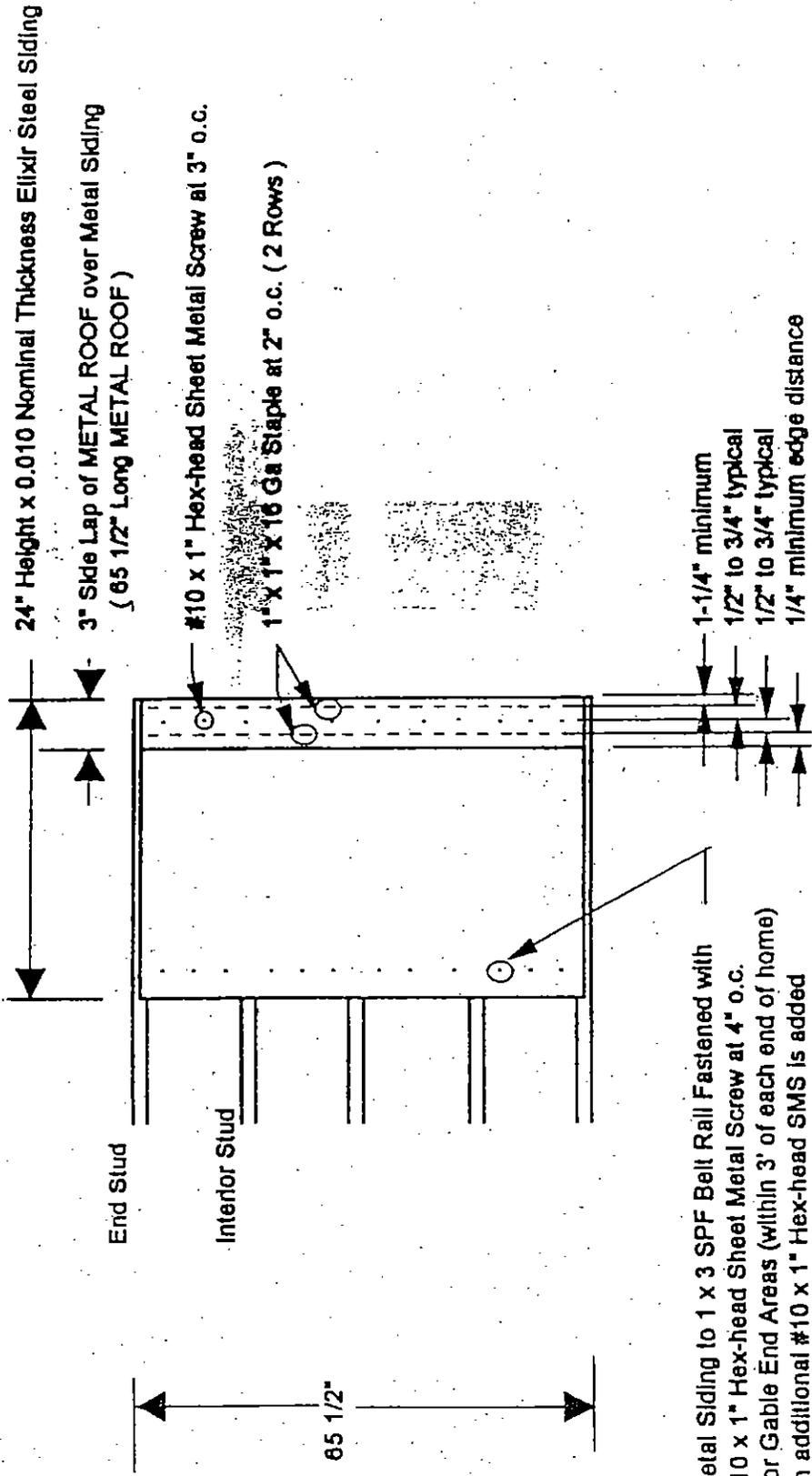
METAL ROOFING folded over Rim Member 3" minimum.

DETAIL A

CROSS SECTION OF SIDE CONNECTION



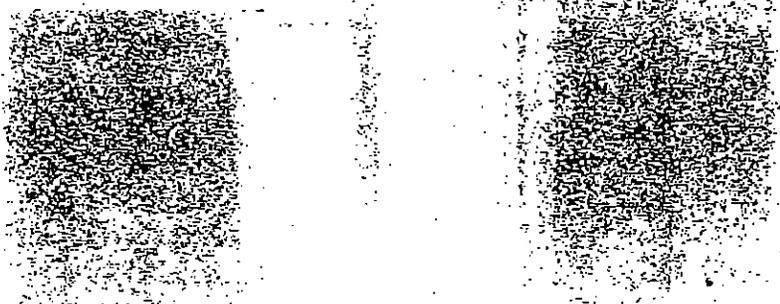
DETAIL B
 CROSS SECTION OF END CONNECTION FOR GABLE END AREA

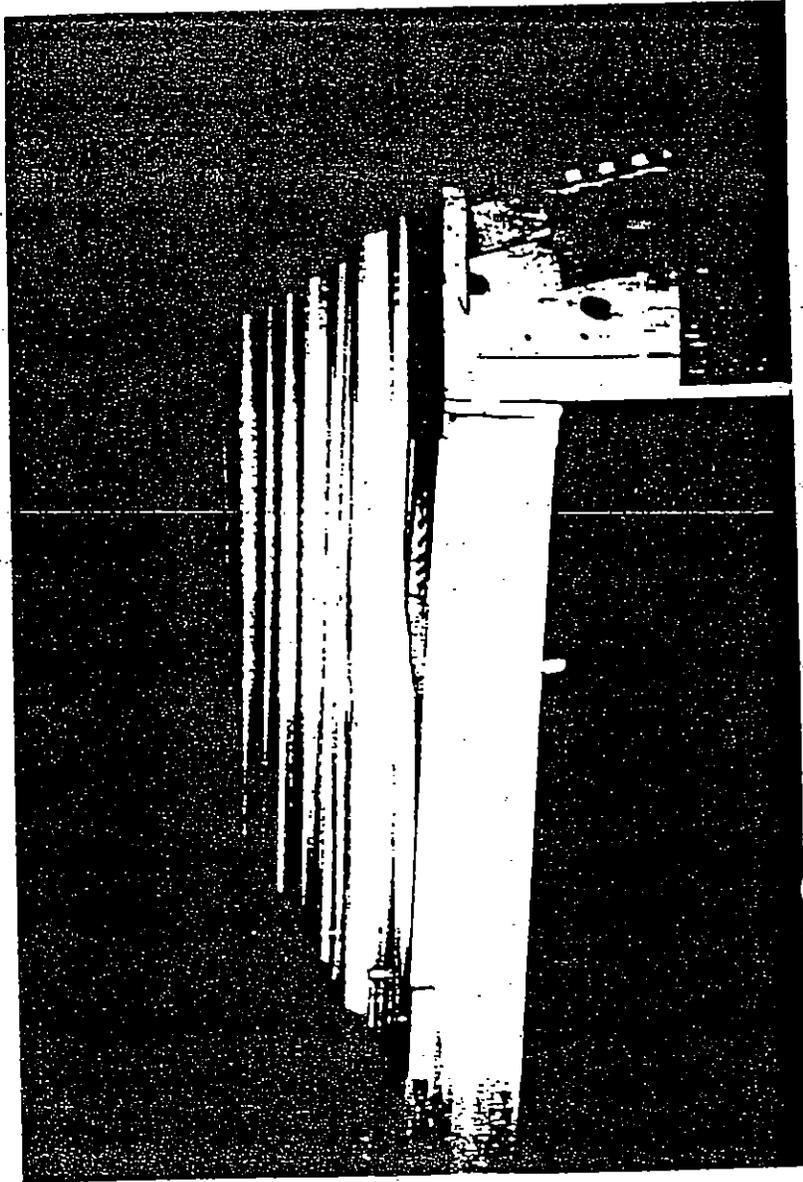


Metal Siding to 1 x 3 SPF Belt Rail Fastened with #10 x 1" Hex-head Sheet Metal Screw at 4" o.c. For Gable End Areas (within 3' of each end of home) an additional #10 x 1" Hex-head SMS is added @ 8" o.c. and staggered 3/4".

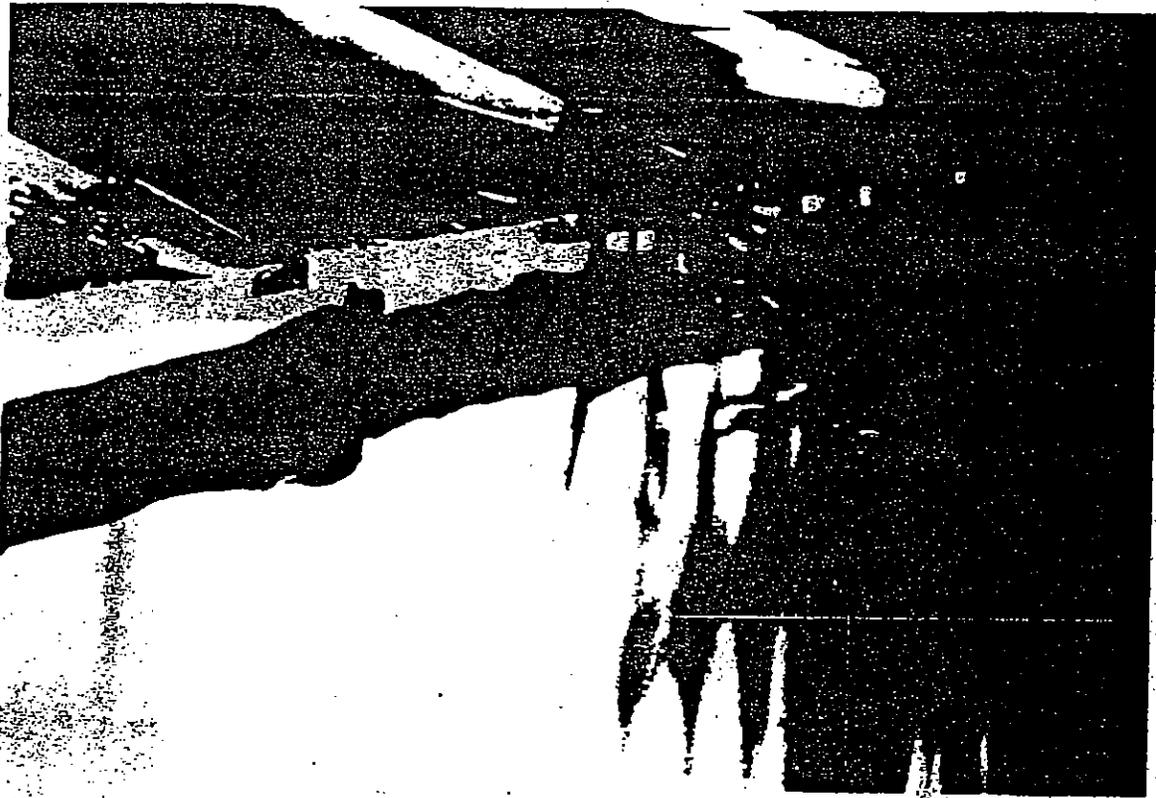
DETAIL C

APPENDIX A
PHOTOGRAPHS

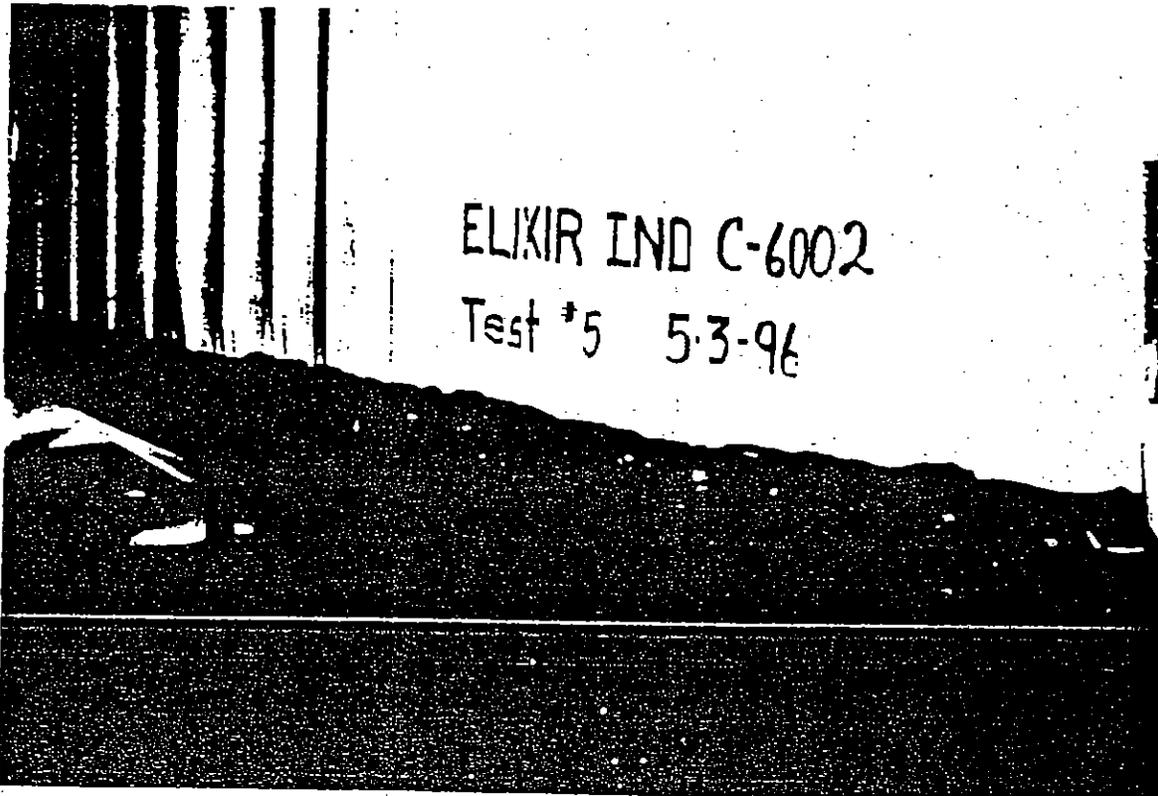




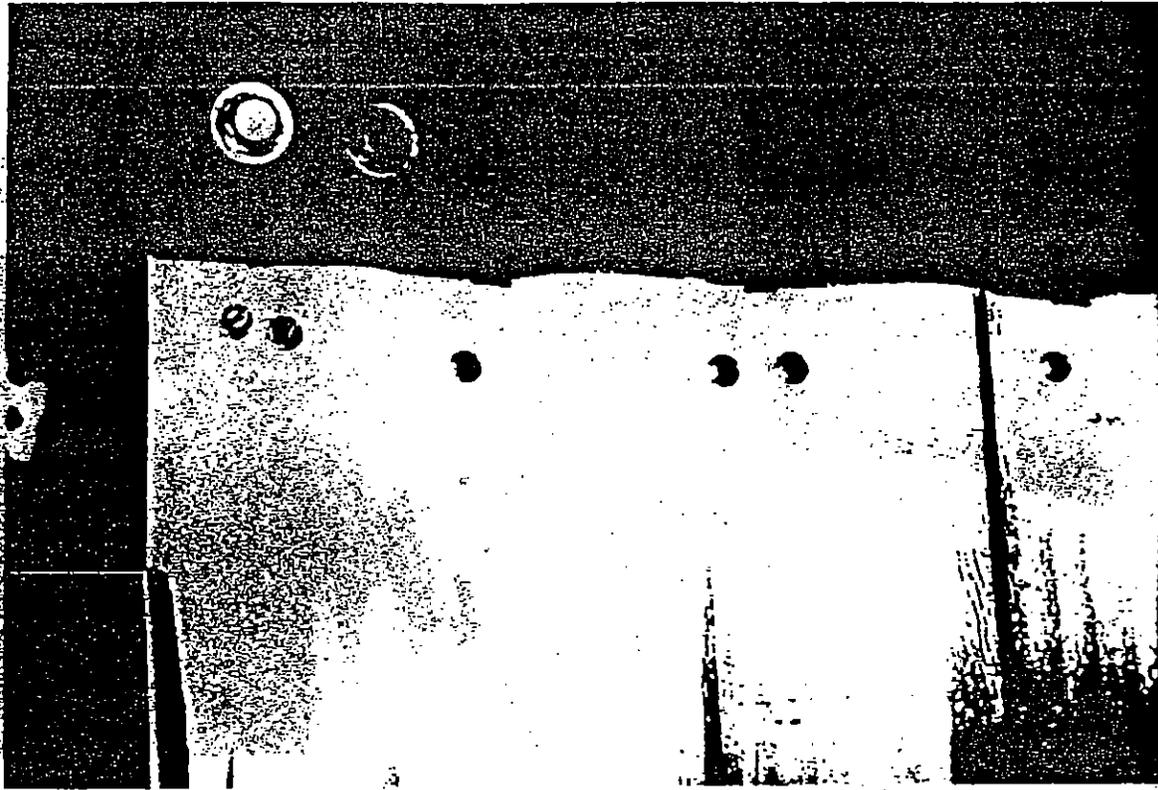
Test specimen (remainder of roof area) during fabrication



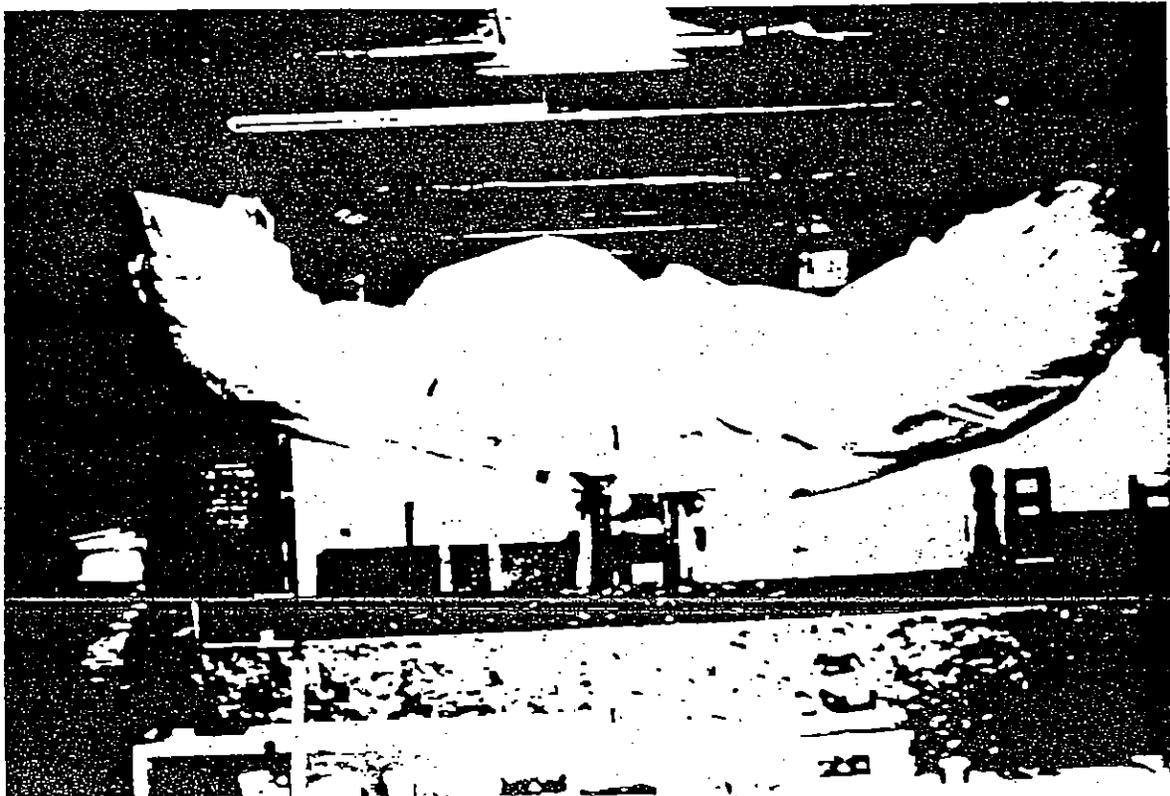
Test specimen (remainder of roof area) during fabrication



Metal roof to roof rim member fastening



Elixir steel siding to 1x3 belt rail fastening (Gable End area specimen shown)



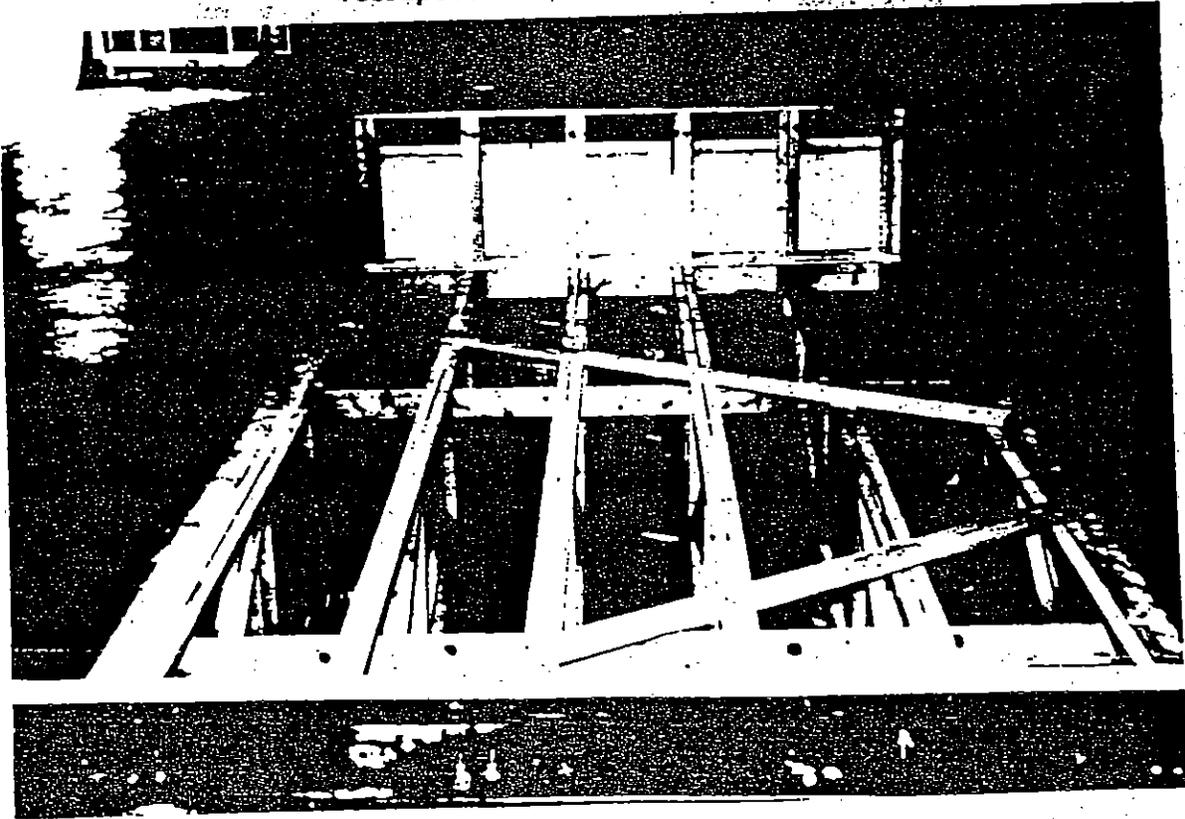
Test specimen being placed in fixture



Test specimen in test fixture - view of one side

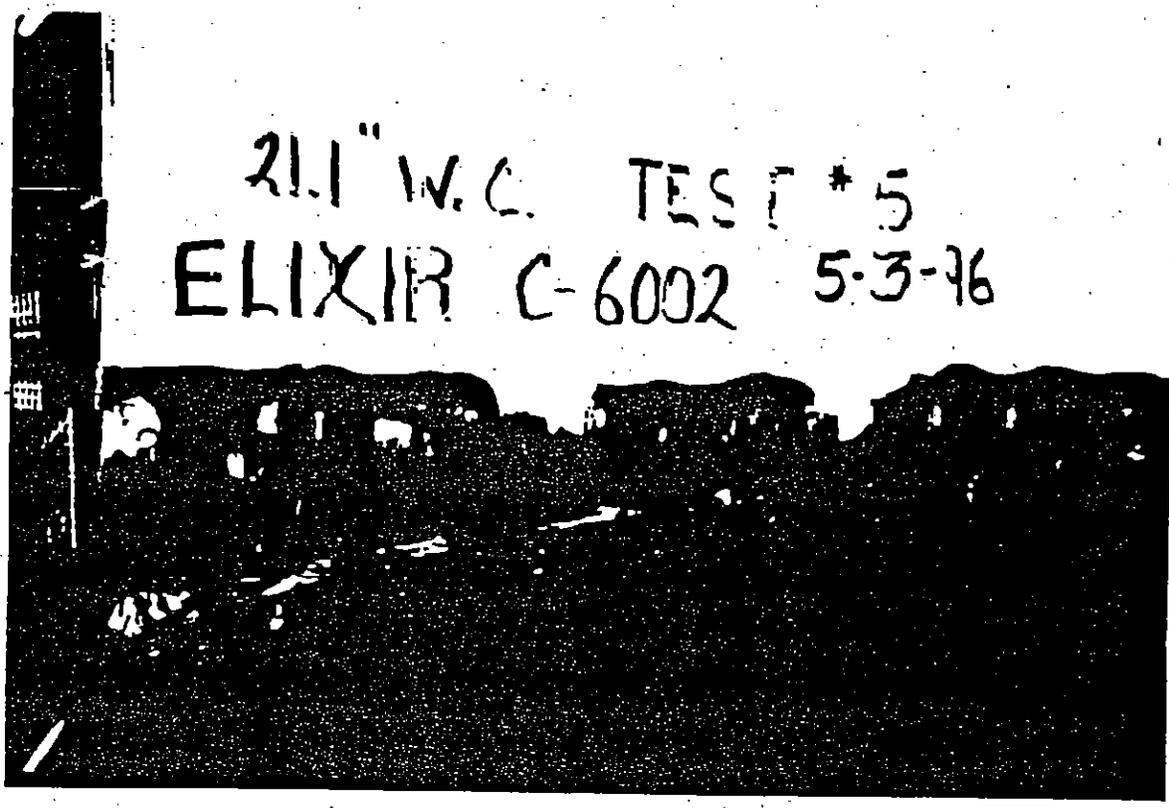


Test specimen - inside view of one side



Overhead view of test specimen in test fixture

21.1" W.C. TEST # 5
ELIXIR C-6002 5-3-76



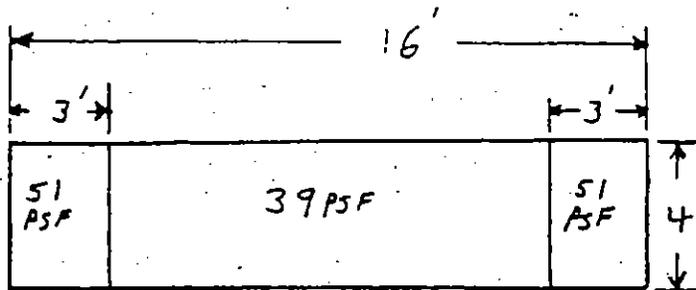
Typical failure at metal roof to roof rim member connection

APPENDIX B

REMAINDER OF ROOF AREA TEST LOAD CALCULATION

REMAINDER OF ROOF AREA TEST LOAD CALCULATION

Weighted Average Example for Zone II:



$$\text{Uniform Test Pressure} = \frac{(6 \times 51) + (10 \times 39)}{16} = 43.5 \text{ psf}$$

Example of extension of 16' results to qualify 14' wide design:

$$\text{Uniform Test Pressure} = \frac{(6 \times 51) + (3 \times 39)}{14} = 44.1 \text{ psf}$$

$$44.1 \text{ psf} \leq \frac{16 \times 43.5}{14} = 49.7 \text{ psf}$$

Therefore extension to 14' wide is okay

APPENDIX C

ROOF TRUSS

APPENDIX D

HUD LETTER



RESOURCES
APPLICATIONS
DESIGNS &
CONTROLS, INC.

September 1, 1994

3220 E 59TH STREET
LONG BEACH, CA 90805
TELEPHONE 310 272-7231
TELESCOPE 310 439-7513

Mr. Philip W. Schulte
Chief, Compliance Branch
Manufactured Housing and Construction Standards Division
Department of Housing & Urban Development
451 7th Street S.W., Rm 9156
Washington, DC 20410

Re: Metal Roof Catenary Membrane Testing.

Dear Mr. Schulte:

In the way of background on August 1, 1994 we wrote the Department on the above referenced matter in response to our July 21, 1994 conference call. Last week and Tuesday and Wednesday of this week we held telephone conversation with messrs Tang and Mendlen of your staff.

Yesterday August 31, 1994, Mr. Mendlin verbally gave us the final conditions under which we could proceed with testing this product. Rather than outline those conditions to us in writing he requested that we outline them back to you; thus the purpose for this letter.

1. Splitting of Roof Rim Membrane: This is a factory QC concern that does not affect testing unless splitting were to occur on test samples.
2. Test Protocol: Test will be in accordance with 3280.401(b). The roof truss framing system will not be monitored for deflection (i.e. framing is not part of the system being tested). We will most likely use trusses listed for the zone being tested.
3. Dynamic Loading: No requirement.
4. Truss Negative Load Design Requirements: Reference to truss load requirements will not be made in the test report.
5. Required Design Loads: Design pressure loads will come from the Table in 3280.305(c) not the ASCE-7 standard. Table loads for "Components and cladding: Exterior roof coverings..." will be used. (We note that the Department did not explain why "Main wind force resisting system" loads could not be used.)

"Gable end Areas" will be tested as outlined in our August 1, 1994 letter. "Remainder of roof area" loads and testing will also be as outlined in our August 1, 1994 letter. (It is permissible to average the 3' side wall zone loads with the center area zones and use the resultant average load for test purposes as shown in our August 1, 1994 Attachment 1.)

It will be permissible to extend results for longer spans (i.e. 16' wides) to lesser spans (i.e. 14' or 12' wides) following the approach presented in our August 1, 1994 Attachment 1 or a similar approach of Mr. Mendlens'.

6. Miscellaneous: We will assure that the 4" channel does not add resistance to the assemble or restrict the 12" x 26 gauge continuous steel band. Said band satisfies the strap requirements of 3280.305(e)(2). Sheathing under the metal catenary roof membrane is not required. Two roof systems will be tested as noted on page 3 of our August 1, 1994 letter

Based on the above understanding from the Department RADCO is now proceeding to test and attempt to qualify a metal roof catenary membrane system.

We thank the Department for it's review of our August 1, 1994 letter and the time expended on this matter.

Sincerely,

RADCO

151
Michael L. Zieman, P.E.
Sr. Vice President

MLZ/mdc

cc: Thomas A. Martin - Elodr

FRONT/SCHULTIS



RADCO TEST REPORT
Test Report No. RAD-1795
Project No. C-6131

**UPLIFT WIND PRESSURE LOAD TEST ON A STRUCTURAL
TWO PIECE METAL ROOF CATENARY MEMBRANE
TEST FOR CONFORMANCE TO HUD WIND ZONE II**

Prepared for

ELIXIR INDUSTRIES
P.O. Box 470
Gardena, CA 90247

by

RADCO

Resources, Applications, Designs and Controls, Inc.
Listing and Testing Division
3220 E. 59th Street
Long Beach, CA 90805
Telephone: 310-272-7231
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Prepared by:

Sanjay "Jay" Mishra, Director
Testing Laboratories & Code Interface Services



Submitted by:

Michael L. Ziemann, P.E.
Sr. Vice President

Issued: November 1996

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TEST SPECIMEN FIGURES 1 & 2 AND
DETAIL A THROUGH D

APPENDIX B
REMAINDER OF ROOF AREA TEST LOAD CALCULATION

APPENDIX C
ROOF TRUSS

APPENDIX D
HUD LETTER

1.0 INTRODUCTION

At the request of Elixir Industries, RADCO conducted uplift wind pressure load tests on its 0.0125" (minimum finish thickness) galvanized metal roof catenary membrane (2 piece design) covered under RADCO listing #1050. The tests were conducted to determine compliance with the Manufactured Home Construction and Safety Standards 3280.305 for design wind pressures for Wind Zone II which became effective July 13, 1994.

2.0 TEST APPROACH

The following outlines the test approach used. All elements of this approach were presented to HUD and accepted by Messrs Richard Mendlen and Phillip Schulte on behalf of HUD. See the Appendix D of this report for a copy of the September 1, 1994 letter outlining acceptance.

Design pressure loads were selected using the classification for "Components and cladding: Exterior Roof Coverings" shown in the Table in 3280.305(c).

For the purpose of determining the required design loads and testing the roof is considered as two separate areas. These areas are identified as "Gable End Areas" and "Remainder of Roof Area". This report covers the testing done to qualify both areas.

1. Gable End Areas: The test specimens will be a minimum of 6' long by the width of the home (i.e., 16' wide). This will simulate the two 3' long gable ends butted together. (As noted below the actual test width was 83" which presents a worse case than 6'.) Along the sides the metal roof will be attached to the roof rim members and at the gable ends to the truss top chords. The design load will be -73 psf for wind zone II.
2. Remainder of Roof Area: The test load was calculated as illustrated in Appendix B and below. The 3' sidewall zones and the remaining center roof area are averaged using a weighted average as shown. The appropriate table loads were used for wind zone II. Using this HUD approved method the test load calculation is illustrated below.

Example: Wind Zone II, 16 ft. (186") wide home

The uniform test pressure required is:

$$= \frac{(3 \text{ ft.} \times 51 \text{ psf}) + (3 \text{ ft.} \times 51 \text{ psf}) + 9.5 \text{ ft.} \times 39 \text{ psf}}{15.5 \text{ ft.}}$$

$$= 43.65 \text{ psf}$$

Load on fastener system resulting from applied test pressure = $43.65 \times 7.75 \text{ ft.} = 338 \text{ lbs./linear ft. of roof.}$

Similarly, for a 14 ft. (168") wide design, the uniform test pressure required would be:

$$= \frac{(3 \text{ ft.} \times 51 \text{ psf}) + (3 \text{ ft.} \times 51 \text{ psf}) + (8 \text{ ft.} \times 39 \text{ psf})}{14 \text{ ft.}}$$

$$= 44.1 \text{ psf}$$

Load on fastener system resulting from applied test pressure = $44.1 \times 7 \text{ ft.} = 308.7 \text{ lbs./linear ft.}$ of roof.

The load on the fastener system is therefore reduced from 338 lbs./linear ft. for a 16 ft. wide home to 308.7 lbs./linear ft. for a 14 ft. wide home.

All tests were conducted to evaluate the ability of the metal catenary membrane and its fasteners to withstand the required loads. The testing was not conducted to evaluate the framing system. Roof framing system design is the responsibility of the home manufacturer. The users of this report are referred to Section 6.0 CONDITION OF USE for further guidance.

3.0 TEST SPECIMEN DESCRIPTION

3.1 Remainder of Roof Area:

The metal catenary membrane was laid on simulated roof framing 186" long x 65½" wide with 2.96/12 pitch peak trusses @ 16" o.c. as shown in Figure 2. A 24" high, 16" o.c. simulated 2x4 stud wall section was built such that it rested above the 1x6 rim member. The wall was fabricated using stud grade SPF with (1) 2 - 9/16" x ¾" dado placed 6" from the end. A 1x3 SPF belt rail was attached to the 2x4 studs with (2) 2"x7/16" C x 15ga staples at each dado intersection. One additional 2x4 SPF stud was attached with (10) 2 - ½" x 15 ga. staples to each 16" o.c. stud; an oversized 3" x ¾" deep dado was placed in this added stud so as not to provide any support to the 1x3 belt rail. A ½" thick x 3-1/2" wide sheet of gypsum wallboard was placed between the top plate of the simulated stud wall and the rim member. The top plate of the simulated stud wall was not directly fastened to the trusses. Also, the roof rim member was not directly fastened to the top plate of the simulated stud wall.

24" high x 0.010" nominal thickness Elixir steel siding was placed on each side of the test assembly and fastened to the 1x3 belt rails with (1) #10 x 1" hex head sheet metal screws at 4" o/c. This siding extended past the top plate and onto the nominal 1x6 roof rim member.

One strip of 3" wide x 1/16" thick Elixir Industries #101 Mobile-Lastic black sealing tape was applied to the metal siding. The 6 mil plastic sheet was then placed to provide the vacuum loading chamber. One more strip of the sealing tape was applied on the plastic sheet above the original strip. The metal catenary membrane was then laid such that there was a 3" side lap at each side of the specimen.

The steel roof membrane was fastened at the roof rim member with one row of #10 x 1" hex head sheet metal screws spaced at 3" o/c and two (2) rows of 1"x1"x16ga staples at 2" o.c. into the 1x6 roof rim member. See Details A & C of Figure 1 for details of row spacing and orientation. The fasteners penetrated the steel roof membrane, the sealing tape, the 6 mil plastic, the sealing tape, the sidewall metal and then into the 1x6 rim member. All exposed steel edges were taped to prevent tearing the 6 mil plastic.

The metal catenary roof membrane was supplied as one piece and cut into two by RADCO. An overlap joint was created which was 5½" wide. The two separate roof sections were fastened together using a floating 1x6 SPF member which was not fastened to any truss. A single layer of ¼" thick Elixir Industries #101 Mobile-Lastic sealing tape was sandwiched between the two overlapping roof sections, prior to fastening with #10 x 1" hex head sheet metal screws. The overlap joint was offset such that the edge of the 1x6 nearest the peak was 6" from the peak.

A 1x4 strongback was placed near the peak on the opposite side of the floating 1x6 connecting member and fastened to each truss top chord with one 2"x7/16"Cx16ga. staple. Also, 2 longitudinal 1x4 braces and 2 diagonal 1x4 braces were attached at or near the truss bottom chords to simulate the attachment of the ceiling diaphragm. These are not required in actual installations. This bracing provided considerably less stiffness to the trusses than is provided in an actual home by the ceiling diaphragms.

The metal catenary membrane, sealing tape and steel metal siding were submitted by Elixir Industries for testing. The test specimens were fabricated by RADCO personnel. All testing was conducted at RADCO's testing facility in Long Beach, California.

3.2 Gable End Area:

The gable end area specimens were similar to the remainder of the roof area specimens. See Figures 1 and 2 for details. The gable end area specimens included the following features:

1. The overall width was 83" instead of 65½".
2. Trusses were doubled. The end trusses were fastened together with 7/16 C x 2½" x 15 gauge staples @ 6" o.c. at the top and bottom chords. See Figure 1 Detail B.
3. (2) 1" x 4" x 35" flat braces were add at each end of the specimen to the truss top chords. See Figure 1 for details.
4. At the metal siding to belt rail connection an additional #10 x 1" hex head sheet metal screw was added 8" o.c. and staggered ¾".
5. At the two ends of the specimen one strip of 1" wide Elixir #101 mobile-lastic sealing tape was applied to the side face of the truss top chord receiving the fasteners, then the plastic sheet was laid and a second strip of tape was applied on the plastic sheet directly above the original strip. The metal roof was then folded over the end truss top chords such that there was a 2" end lap, and fastened with #8 x 1½" long hex head sheet metal screws at 4" o.c.

4.0 TEST SET-UP AND PROCEDURE

One 6" deep metal C-channel section was bolted to the end of the wall studs of each wall with one $\frac{3}{8}$ " diameter bolt at each stud to hold the test specimen in the test fixture. The metal siding stopped short of the C-channel. See Figure 1, Detail A.

The test fixture consisted of a 4ft. high x 16ft. long x specimen width plus 3" reinforced open top box in which the test specimen was placed in an inverted position. The plastic sheet was draped over the walls of the fixture and sealed to the floor thus creating an air tight enclosure for the negative loading.

The uplift wind pressure load tests were generally conducted in accordance with the ultimate load tests procedures in Section 3280.401(b) of the Federal Manufactured Home Construction and Safety Standards. Because qualification of the framing system was not the consideration [(see 3280.305(d)) deflection readings were not taken.

The load was applied using the vacuum method of loading by evacuating the air below the test specimen. The applied load was measured with a digital manometer capable of reading in 0.1 inch increments of water column.

The load was applied gradually at an approximate rate of one to two inches of water column per minute until failure occurred. The load in inches of water column was converted to psf using 1" w.c. = 5.20 psf.

5.0 TEST RESULTS & CONCLUSION

A total of three (3) specimens were tested for both the Remainder of Roof Area and the Gable End Area. The ultimate loads and type of failures observed are described below:

5.1 Remainder of Roof Area

SPECIMEN NUMBER	ULTIMATE LOAD (psf)
1	124.80
2	127.92
3	130.00
Average	127.58

Design Load = $127.57 + 2.5 = 51.03$ psf

(NOTE: Each specimen exceeded 43.65psf design pressure)

Mode of Failure

In all three tests, the roof rim member cracked and the metal roof tore through the shank of the hex head sheet metal screws, which remained in the rim member. The staples pulled out of the rim member. Very little tearing was observed at the 1x6 floating connecting member where the two roof sections were attached.

For the Remainder of Roof Area for 16' wide (186") and narrower homes the metal roof catenary membrane exceeds the design live load wind pressures of -43.65 psf, for Wind Zone II.

5.2 Gable End Area

SPECIMEN NUMBER	ULTIMATE LOAD (psf)
1	191.36
2	188.76
3	192.92
Average	191.01

Design Load = $191.01 + 2.5 = 76.40$ psf

(NOTE: Each specimen exceeded 73psf design pressure)

In test #1 and #2, the 1x6 floating connecting member split and the two roof sections came apart. Additionally, in test #2 the top chord of one of the end trusses also broke near its peak. In test #3, failure occurred when one belt rail and rim member broke simultaneously.

For the Gable End Areas the metal roof catenary membrane exceeds the design live load wind pressure of -73psf for wind zone II.

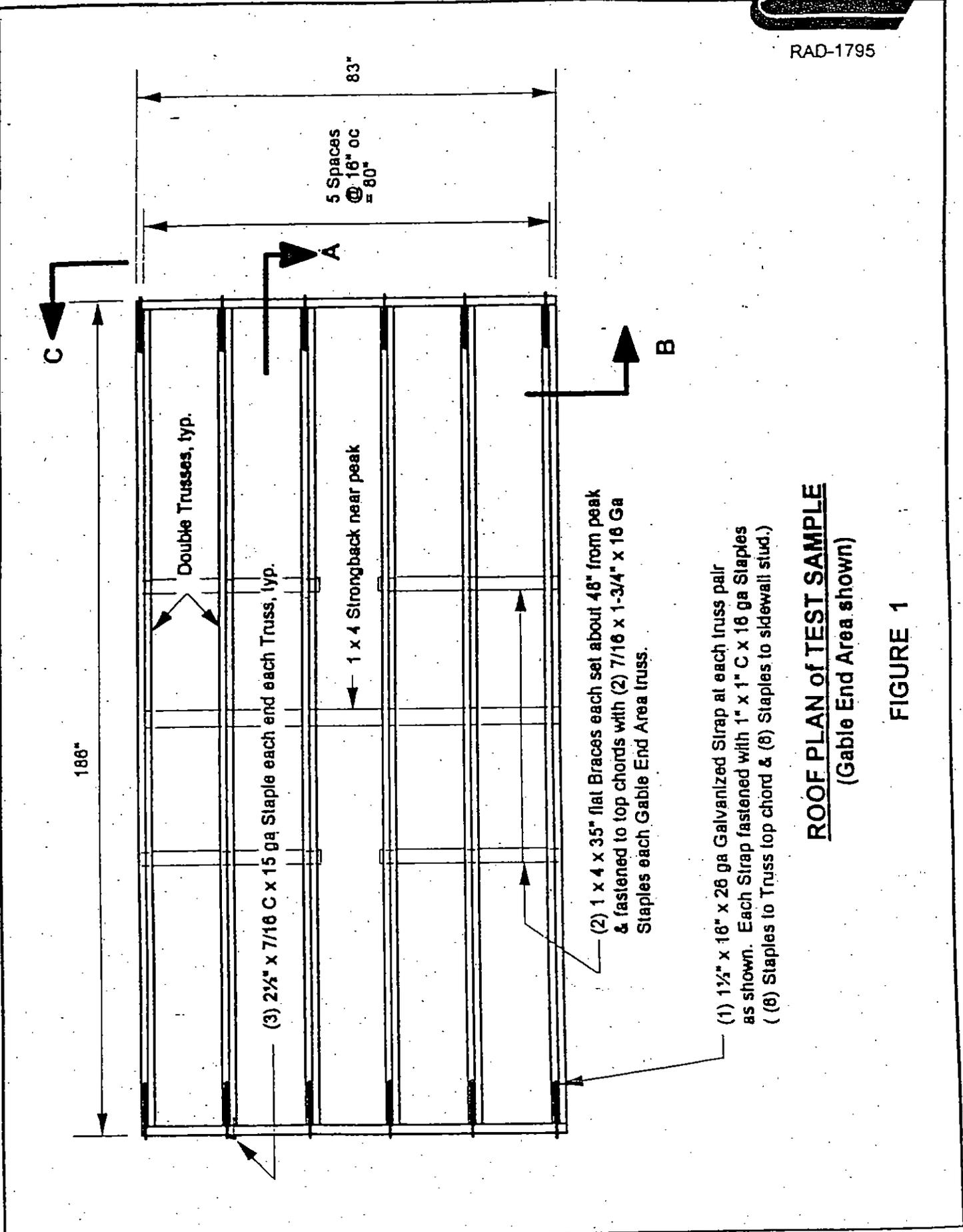
6.0 CONDITIONS OF USE

1. The metal catenary membrane roof system can only be used on single wide homes with a maximum width of 186" with a 1x rim member or 187½" with a 2x rim member. Lesser widths are acceptable.
2. Minimum roof slope is 2.96/12.
3. Fasteners at the metal roof to the 1x6 roof rim member and the steel siding to the 1x3 (minimum) belt rail must be installed as specified in Section 3.0 above. Also, see Figures 1 & 2 and related details.
4. Roof rim members and the floating connecting member must be a minimum of nominal 1x6 with a minimum specific gravity (G) of 0.42. (Refer to table 12A in the 1991 NDS).

5. The metal catenary membrane must lap over the roof rim member a minimum of 3". Minimum edge distance for the bottom row of staples is $\frac{1}{4}$ ". Minimum distance from the top row of staples to the top of the 1x6 roof rim member is $1\frac{1}{4}$ ". See Figure 1, Detail C.
6. In Gable End Areas the metal catenary membrane must lap over the end truss top chords a minimum of 2". Double trusses at the extreme ends of the home must be fastened together as specified. See Detail B.
7. Strong back (entire length of home) and flat braces (Gable End Areas only) are required as specified in Figure 1.
8. One layer of 3" wide by $\frac{1}{8}$ " thick Elixir Industries #101 Mobil-Lastic block sealing tape must be used between the steel siding and the metal roof. Also, one layer of 1" wide by $\frac{1}{8}$ " of the same product must be used at the two ends of the home between the top chord of the end trusses and the metal roof.
9. The location and fastening pattern of the 1x6 floating connection member shall be as specified in Detail D. The $\frac{1}{8}$ " thick sealing tape shall be used between the two overlapping roof sections prior to fastening.

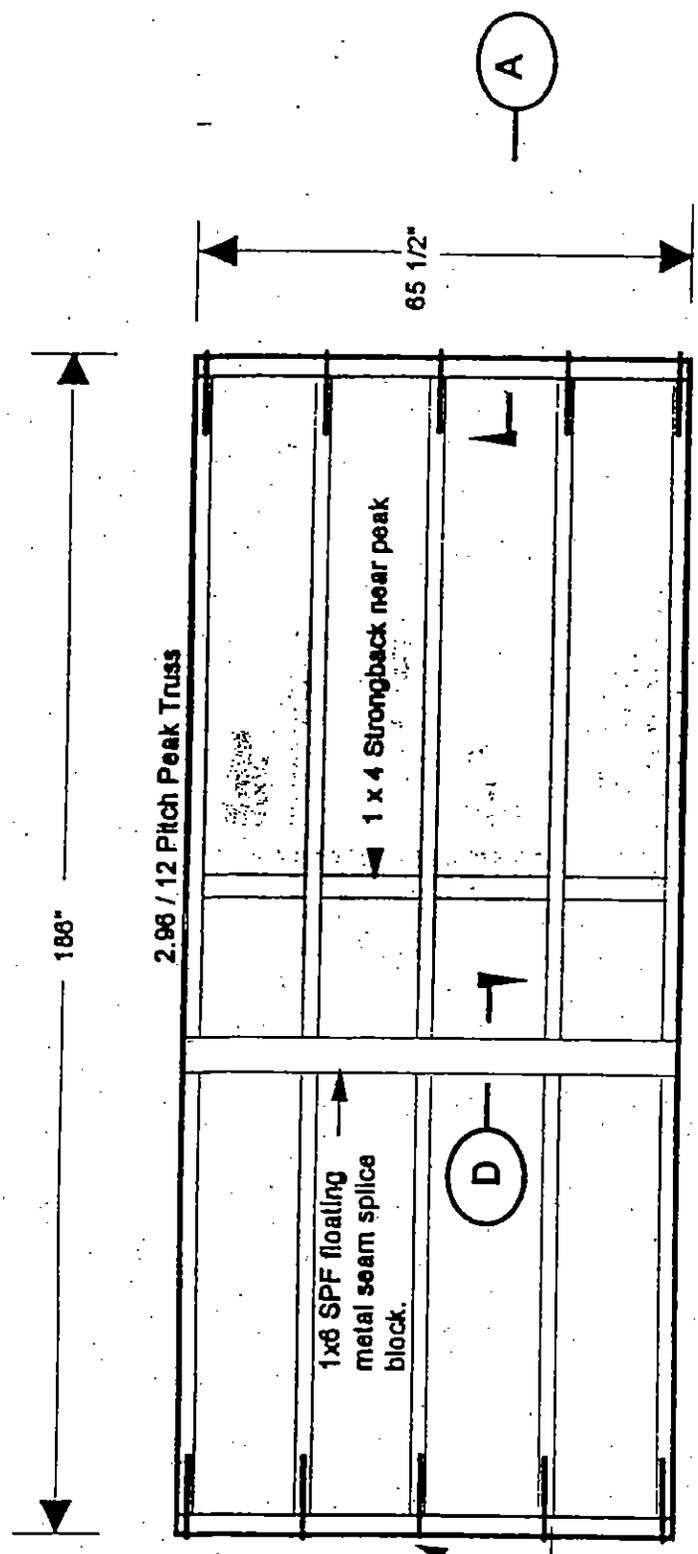
APPENDIX A

TEST SPECIMEN FIGURES 1 & 2 AND
DETAIL A THROUGH D



ROOF PLAN of TEST SAMPLE
(Gable End Area shown)

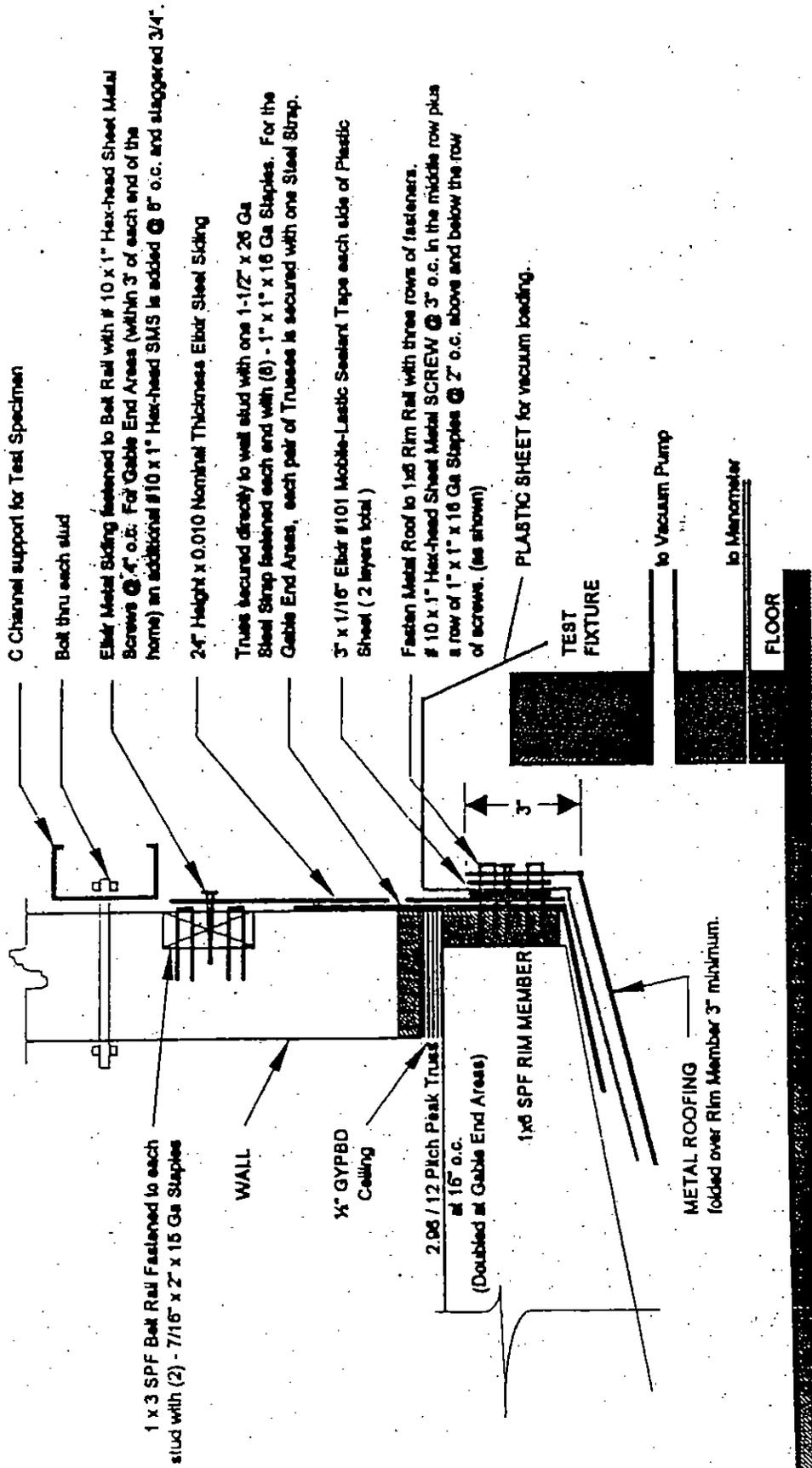
FIGURE 1



- (3) 2 1/2" x 7/16 C x 15 ga Staple each end each Truss, typ.
- (1) 1 1/2" x 16" x 26 ga Galvanized Strap at each Truss as shown. Each Strap fastened with 1" x 1" C x 16 ga Staples
- (8) Staples to Truss top chord & (8) Staples to sidewall stud.)

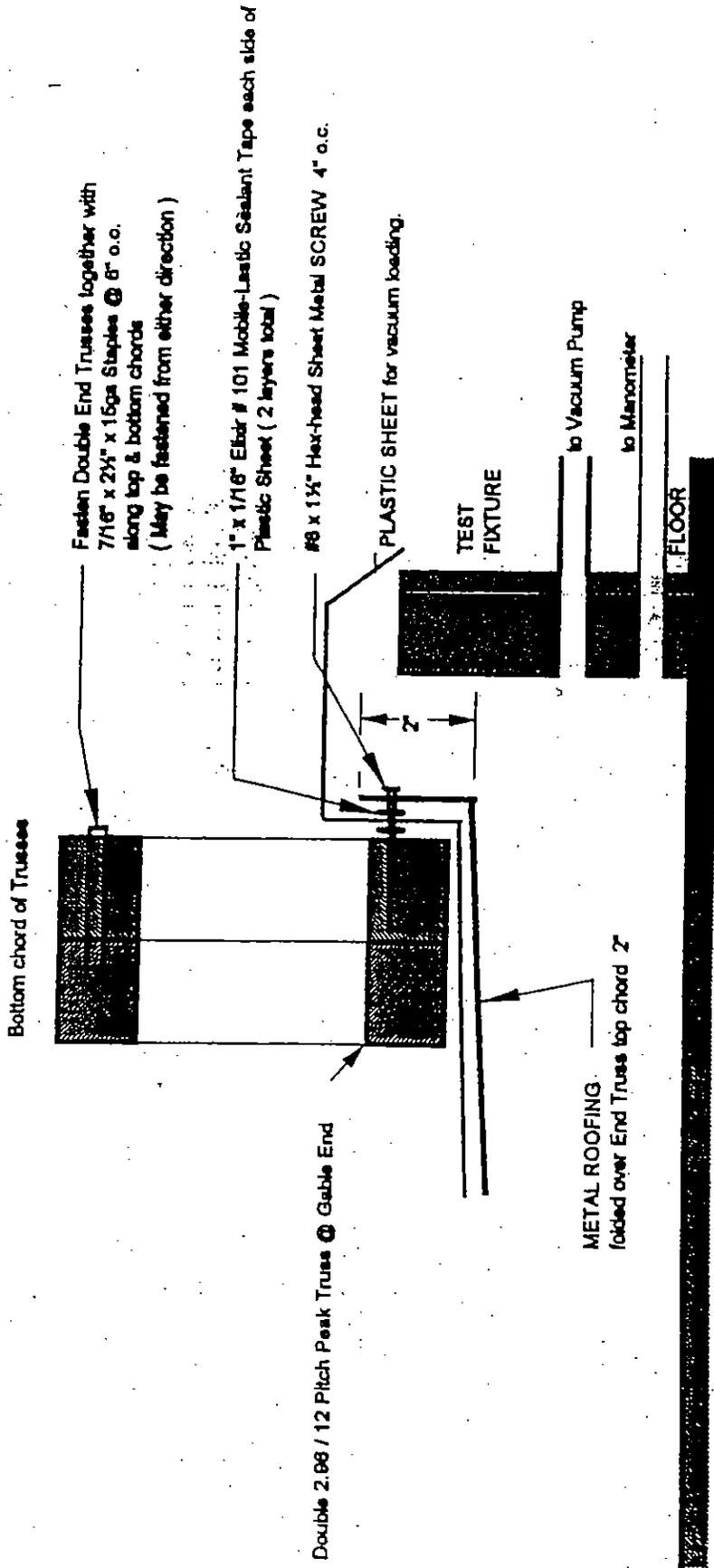
ROOF PLAN OF TEST SAMPLE
(Remainder of Roof Area)

FIGURE 2

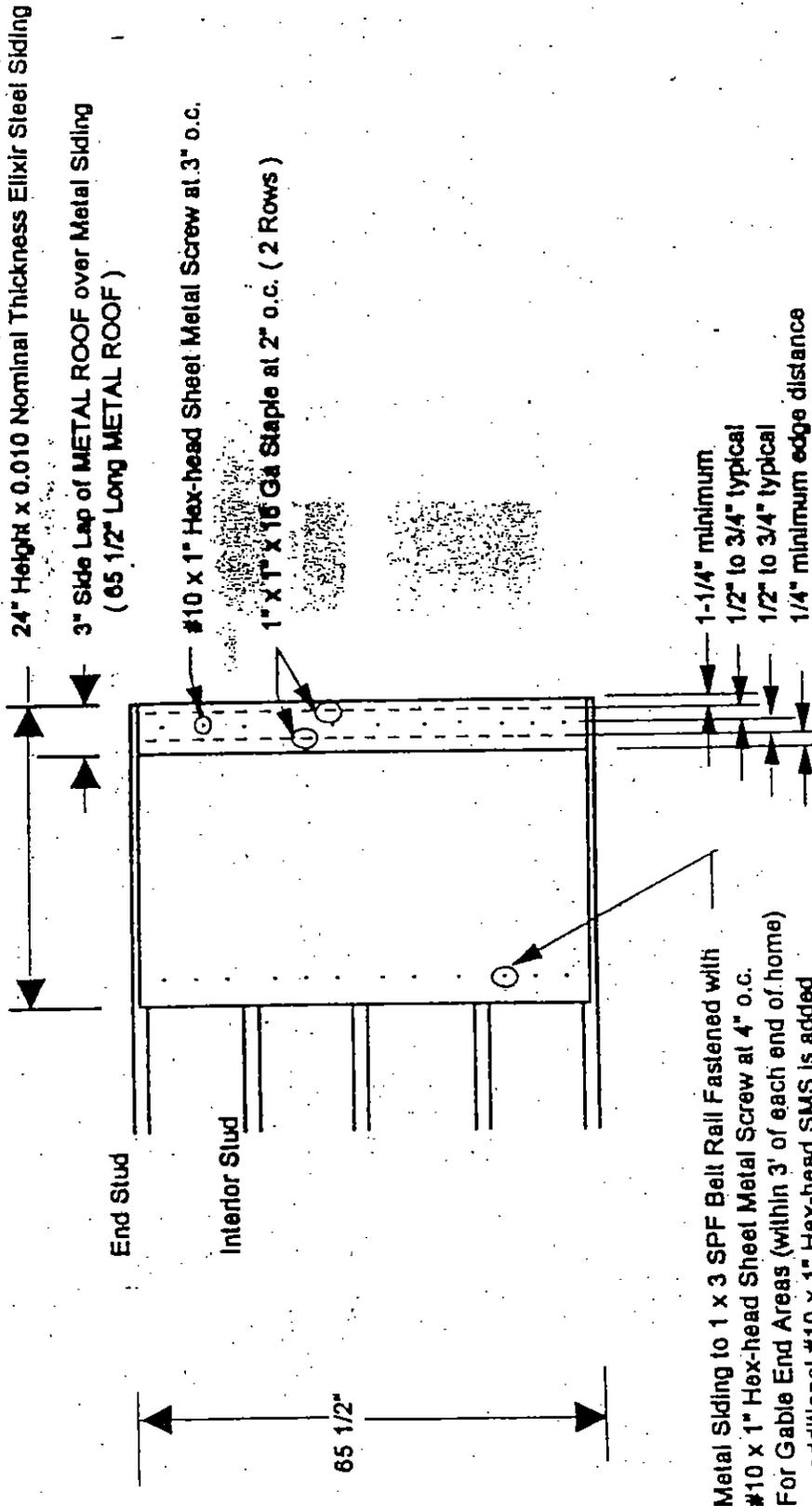


DETAIL A

CROSS SECTION OF SIDE CONNECTION



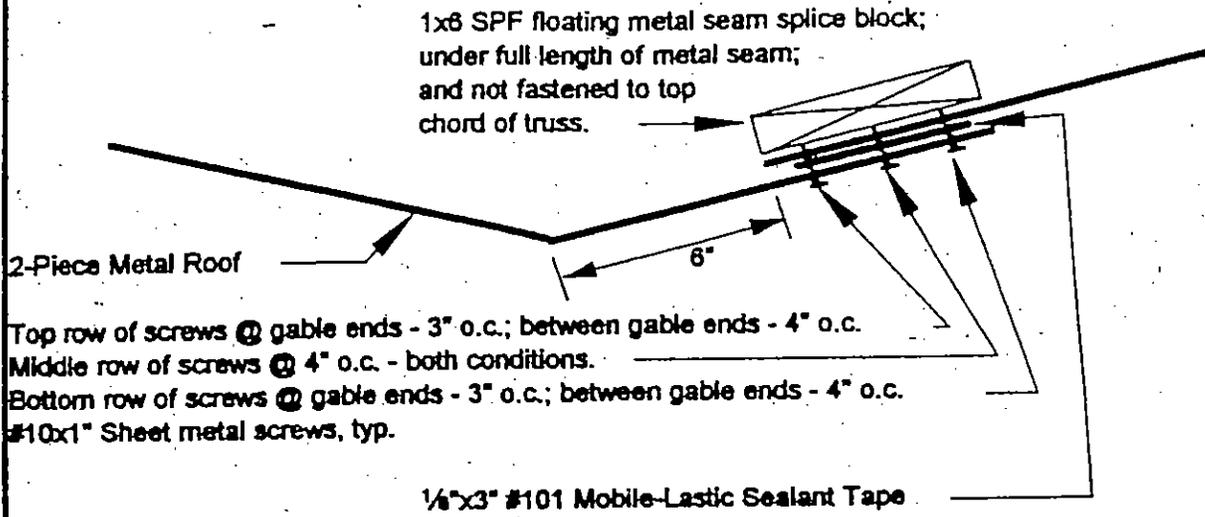
DETAIL B
CROSS SECTION OF END CONNECTION FOR GABLE END AREA



DETAIL C

APPENDIX B

REMAINDER OF ROOF AREA TEST LOAD CALCULATION



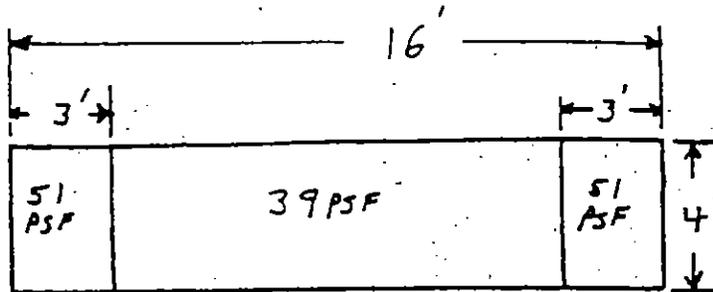
DETAIL D

APPENDIX C

ROOF TRUSS

REMAINDER OF ROOF AREA TEST LOAD CALCULATION

Weighted Average Example for Zone II:



$$\text{Uniform Test Pressure} = \frac{(6 \times 51) + (10 \times 39)}{16} = 43.5 \text{psf}$$

Example of extension of 16' results to qualify 14' wide design:

$$\text{Uniform Test Pressure} = \frac{(6 \times 51) + (3 \times 39)}{14} = 44.1 \text{psf}$$

$$44.1 \text{psf} \leq \frac{16}{14} \times 43.5 = 49.7 \text{psf}$$

Therefore extension to 14' wide is okay

NOTES:

- 1) ALL PULPIN SPACERS - FT. M.A.
- 2) MANUFACTURER'S TOLERANCES
- 3) ALL DI-RECT CONNECTIONS MUST BE MADE A MINIMUM OF 4" FROM ENDS
- 4) ALL CONNECTOR PLATES ARE TO BE INSTALLED ON BOTH SIDES UNLESS OTHERWISE INDICATED
- 5) BEAMS MUST BE SPACED 1-1/2" UNLESS OTHERWISE SPECIFIED
- 6) BOTTOM CHORD MEMBER IS 7" PFS NO. 85-003
- 7) CHORDS USUALLY CARRIED
- 8) BASED ON POSSIBLCI FOR GRAVITY LOAD REQUIREMENTS.

MARK	PT (LEFT/RIGHT)	CAMBER
1/4		3/16
1/2		3/8
3/4		1/2
1		5/8
1 1/4		3/4
1 1/2		7/8
1 3/4		1
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APPENDIX D

HUD LETTER



RESOURCES
APPLICATIONS
DESIGNS &
CONTROLS, INC.

3220 E 39TH STREET
LONG BEACH, CA 90805
TELEPHONE (310) 272-7211
TELECOPIER (310) 529-7313

September 1, 1994

Mr. Philip W. Schulte
Chief, Compliance Branch
Manufactured Housing and Construction Standards Division
Department of Housing & Urban Development
451 7th Street S.W., Rm 9158
Washington, DC 20410

Re: Metal Roof Catenary Membrane Testing.

Dear Mr. Schulte:

In the way of background on August 1, 1994 we wrote the Department on the above referenced matter in response to our July 21, 1994 conference call. Last week and Tuesday and Wednesday of this week we held telephone conversation with messrs Tang and Mendlin of your staff.

Yesterday August 31, 1994, Mr. Mendlin verbally gave us the final conditions under which we could proceed with testing this product. Rather than outline those conditions to us in writing he requested that we outline them back to you; thus the purpose for this letter.

1. Splitting of Roof Rim Membrane: This is a factory QC concern that does not affect testing unless splitting were to occur on test samples.
2. Test Protocol: Test will be in accordance with 3280.401(b). The roof truss framing system will not be monitored for deflection (i.e. framing is not part of the system being tested). We will most likely use trusses listed for the zone being tested.
3. Dynamic Loading: No requirement.
4. Truss Negative Load Design Requirements: Reference to truss load requirements will not be made in the test report.
5. Required Design Loads: Design pressure loads will come from the Table in 3280.305(c) not the ASCE-7 standard. Table loads for "Components and cladding: Exterior roof coverings...." will be used. (We note that the Department did not explain why "Main wind force resisting system" loads could not be used.)

"Gable end Areas" will be tested as outlined in our August 1, 1994 letter. "Remainder of roof area" loads and testing will also be as outlined in our August 1, 1994 letter. (It is permissible to average the 3' side wall zone loads with the center area zones and use the resultant average load for test purposes as shown in our August 1, 1994 Attachment I.)

It will be permissible to extend results for longer spans (i.e. 16' wides) to lesser spans (i.e. 14' or 12' wides) following the approach presented in our August 1, 1994 Attachment I or a similar approach of Mr. Mendlin's.

6. Miscellaneous: We will assure that the 4" channel does not add resistance to the assemble or restrict the 12" x 26 gauge continuous steel band. Said band satisfies the strap requirements of 3280.305(e)(2). Sheathing under the metal catenary roof membrane is not required. Two roof systems will be tested as noted on page 3 of our August 1, 1994 letter

Based on the above understanding from the Department RADCO is now proceeding to test and attempt to qualify a metal roof catenary membrane system.

We thank the Department for it's review of our August 1, 1994 letter and the time expended on this matter.

Sincerely,

RADCO

15!

Michael L. Zieman, P.E.
Sr. Vice President

MLZ/mdc

cc: Thomas A. Martin - Elbar

FRONTIERULTIO



EXHIBIT IV

RESOURCES APPLICATIONS DESIGNS & CONTROLS, INC.

3220 E. 59TH STREET LONG BEACH, CA 90805 TELEPHONE: (310) 272-7231 TELECOPIER: (310) 528-7513

December 11, 1996

Mr. William Roberts, National Sales East Elixir Industries 640 Collins Road Elkhart, IN 46516

Re: HUD Code 3/8" Roof Sheathing verses Metal Roof for Wind Zone II.

Dear Mr. Roberts:

At your request we have tested 3/8" plywood roof sheathing for Wind Zone II of the HUD Code for Manufactured Homes.

Note 7 of the Table of Design Wind Pressures contained in Section 3280.305(c) of the HUD Manufactured Home Construction and Safety Standards is an exception to the roof design pressures contain in said table. In summary the Note stipulates that if 3/8" sheathing is fastened at 4" on-center within 3' of each gable end or end wall and 6" on-center in all other areas it "need not be evaluated for these design wind pressures" of the Table.

Our test showed that 3/8" sheathing fastened at 6" on-centers can only withstand a design load pressure of 23.0 PSF. Extrapolating this result to fastened at 4" on-center gives a gable end design load pressure of only 34.5 PSF. As shown in the table below both of these loads are significantly lower than required by the Table in Section 3280.305(c) for Wind Zone II and III.

Table with 4 columns: Roof Area, 3/8" sheathing PSF, Required design pressure PSF (Zone II), Required design pressure PSF (Zone III). Rows include 3' from gable end or end wall, 3' from eave or side wall if no eave, and All other roof areas.

In contrast to the above your metal roof system, as reported in RADCO Test Report Numbers RAD-1722 and RAD-1795, exceeds the required design pressures for Wind Zone II.

If you have any questions on this matter please feel free to contact the undersigned.

Sincerely,

RADCO

Handwritten signature of Michael L. Zieman

Michael L. Zieman, P.E. Sr. Vice President

MLZ/mdc

cc: Tom Martin - Elixir

HUD Docket No. 4271-A-02
Room 10276
Office of General Counsel
Department of Housing and Urban Development
451 Seventh Street, S.W.
Washington, DC 20410-0500

REC'D

JUL 14 10 11 AM '98

HUD DOCKET



July 7, 1998

RE: Manufactured Home Construction and Safety Standards;
Metal Roofing; Advance Notice of Proposed Rulemaking (ANPRM)

Schult Homes Corporation respectfully submits comments regarding the Advance Notice of Proposed Rulemaking concerning the Table in 24CFR 3280.305 (c)(1)(ii)(B).

We object to the HUD Interpretive Bulletin (I-2-98) as based on inaccurate statements and analysis. In response to the ANPRM, there is no need to revise the performance standard set forth in the subject Table. If HUD proceeds to interpret the subject Table to prohibit metal roofs without sheathing in Wind Zones II and III, then we believe HUD has prescribed new standards without complying with its rulemaking procedures and should not be asking for the public to submit proposed changes to the Table, but should be requesting comments on its proposed changes to the existing wind design standards.

A number of manufacturers and suppliers have performed tests that demonstrate that metal roofs can be installed without sheathing and still meet the loads specified in the Table for Wind Zones II and III.

The industry has clearly shown through testing that an unsheathed metal roof will adequately perform under high wind loads. We are not aware of any evidence the Department has that indicates that a sheathed metal roof will perform any better?

Metal roofing is not part of the January 1994 rule, its preamble nor any of its previous interpretations. There are no restrictions on its use to be found anywhere in the published documents. Metal roofing design is not limited by the Table of Design Wind Pressures or its footnotes. Footnote 7 only exempts prescriptively installed 3/8" rated sheathing, it does not prescribe how it is to be used in every design condition. We do not understand why is HUD now restricting its use after allowing it for the last 3 1/2 years based on DAPIA accepted tests?

The Interpretive Bulletin appears to be rulemaking. It appears to be a change in policy or interpretation by the Department. It does not merely clarify requirements. If the current standard was unclear concerning the use of metal roofs in Wind Zones II and III, the many DAPIA's would not have approved tests and designs contrary to this interpretation.

We do not believe that section 3280.305 is a *prescriptive* standard as the Department contends. The Table of Design Wind Pressures dictates the loads to be accommodated by a *performance* standard which follows the format of the remainder of the HUD code.

We do not believe that testing according to the Standards is a lower standard than engineering analysis, as applied by the Interpretive Bulletin. Nowhere in the Standards is testing relegated as inferior to calculations. On the contrary, a thorough testing program as was done in the case of metal roofing with different construction methods and assemblies tested, gives a more realistic picture of actual performance than typical structural analysis calculations.

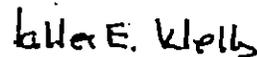
We are not aware of any specific reasons given in writing to either manufacturers or suppliers for rejecting the tests that have been run to date.

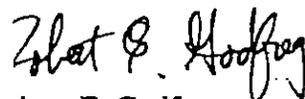
For the above reasons, we urge the Department to withdraw the Interpretive Bulletin (I-2-98) because it fails to provide any useful clarifications of the Standards. Furthermore, we believe the IB was inappropriately issued, contrary to the requirements for comment-rulemaking (24CFR 3282.113).

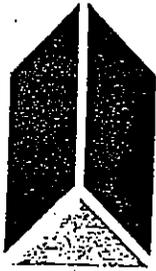
In response to the ANPRM, at this time, we have no recommended revisions to section 3280.305 (c) (1) (ii) of the Standards. The table clearly sets forth the requirements that must be met. However, we are advised that several manufacturers are preparing revised designs for metal roof homes in Wind Zone II. Therefore we request that the comment due date of July 13, 1998, be extended by 180 days. We would like to have the opportunity to possibly submit additional comments by January 13, 1999.

Thank you for the opportunity to submit preliminary comments in response to the ANPRM.

Sincerely,


Walter E. Wells
President, Chief Executive Officer
Shult Homes Corporation


Robert E. Godfrey
Senior Director of Engineering
Shult Homes Corporation



R-ANELL CUSTOM HOMES INC.

P.O. Box 428
Denver, N.C. 28037
704/483-5511
Fax 704/483-5674

July 10, 1998

HUD Docket No. 4271-A-02
Room 10276
Office of General Counsel
Department of Housing and Urban Development
451 Seventh Street, S.W.
Washington, DC 20410-0500

9

RECEIVED
JUL 11 10 11 AM '98
DOCKET

RE: Manufactured Home Construction and Safety Standards;
Metal Roofing; Advance Notice of Proposed Rule Making (ANPRM)

R-Anell Custom Homes, Inc. respectfully submits comments regarding the advance notice of proposed rulemaking concerning the Table in 24 CFR 3280.305(c)(1)(ii)(B).

We object to the HUD interpretative bulletin (IB I-2-98) as based on inaccurate statements and analysis. In response to the ANPRM, there is no need to revise the performance standard set forth in the subject Table. If HUD proceeds to interpret the subject Table to prohibit metal roofs without sheathing in Wind Zones II and III, then HUD has prescribed new standards without complying with its rulemaking procedures and should not be asking for the public to submit proposed changes to the Table, but should be requesting comments on its proposed changes to the wind design standards.

The following short list of objections should be considered.

- What evidence does the Department have that metal roofing with sheathing underneath will perform properly?
- Metal roof damage in Hurricane Andrew or other past high wind events has no bearing on how new products might perform under new testing under the loads of the January 1994 rule. (63 FR 26386)
- Metal roofing is not part of the January 1994 rule, its preamble nor any of its previous interpretations. There is no restrictions on its use to be found anywhere in the published documents.
- The interpretive bulletin appears to be rulemaking. It is a "change in policy or interpretation" by the Department. It does not merely "clarify requirements." If it is so obvious in the standards that metal roofing must be restricted in Wind Zones II and III, why do so many DAPIAs approve tests and designs contrary to this interpretation?

We urge the Department to withdraw the interpretative bulletin (I-2-98) because it fails to provide any useful clarification of the standards. Furthermore, the IB was inappropriately issued, contrary to the requirements for comment-rulemaking. (24 CFR 3282.113)

Thank you for the opportunity to submit comments.

Sincerely,

Harold Woodside
Director of Engineering



Manufactured Housing Association for Regulatory Reform

1331 Pennsylvania Avenue, NW • Suite 508 • Washington, DC 20004 • 202-783-4087 • Fax 202-783-4075

HUD Docket No. FR.4271-A-02
Regulations Division
Room 10276
Office of General Counsel
Department of Housing and Urban Development
451 Seventh Street, S.W.
Washington, D.C. 20410-0500

July 10, 1998

10

DOCKET

JUL 14 10 11 AM '98

REC'D

Re: Manufactured Housing--Approval of Metal Roofs
In Wind Zones II and III

These comments are submitted on behalf of the Manufactured Housing Association for Regulatory Reform ("MHARR,"), a trade organization representing the rights and interests of producers of manufactured housing subject to federal regulation pursuant to the National Manufactured Housing Construction and Safety Standards Act of 1974, 42 U.S.C. 5401, et seq., ("Act"). MHARR, formerly known as the Association for Regulatory Reform ("ARR"), was founded in 1985. MHARR currently represents the manufacturers of more than 40 percent of all manufactured homes produced in the United States. MHARR respectfully submits these comments regarding the advance notice of proposed rulemaking ("ANPRM") concerning the Table in 24 CFR 3280.305(c) (1) (ii) (B).

We oppose HUD's interpretative bulletin (IB I-2-98) because it is not a clarification or reiteration of the Department's past policy but a substantial and unwarranted shift in how metal roofs are approved in manufactured houses. This change is neither necessary nor cost-effective and was forced on the industry and its consumers by a back door process that circumvented the required channels of rulemaking and public comment.

BACKGROUND

On January 14, 1994, HUD published a revised wind resistance rule for manufactured housing. This rule, codified at 24 C.F.R. section 3280.305, became effective on July 13, 1994. Among other things, its provisions established certain "design wind pressures" for manufactured home structural elements, including "exterior roof coverings." These design pressures apply only to homes sited in "high wind areas", designated by HUD as Zone II (100 M.P.H design wind speed) and Zone III (110 M.P.H design wind speed).

For at least two years after this rule went into effect, HUD's acceptance of metal roofs without sheathing was never in doubt. Indeed, the Department, in a July 1, 1994, Interpretative Bulletin expressly stated that metal roofs without sheathing were perfectly acceptable "provided that the exterior covering and its fastenings are capable of resisting the full positive and negative design pressures specified in the Table." HUD confirmed its acceptance of no sheathing in an August 31, 1994 memorandum that followed a conference call between one of its chief engineers and its own DAPIA Technical Advisory Group.

In a July 18, 1996 letter, however, HUD turned 180 degrees and began expressing concerns and reservations over "the acceptance of metal roofs without structural sheathing." This pronouncement was followed by HUD's Interpretative Bulletin of May 12, 1998, that stated unequivocally that the Department interprets Section 3280.305 (c) (1) (ii) (B) "to require every design for manufactured housing for high wind areas to include roof sheathing (emphasis added) or alternative roof material that performs like sheathing in resisting the wind pressures specified in the Table of Design Wind Pressures." As an alternative, HUD declared that manufactures also have the option of designing their homes using the design wind loads laid out in ANSI/ASCE 7-88 and the applicable design wind speed.

SPECIFIC OBJECTIONS

1. HUD's claim that its May 12 Interpretative Bulletin does not denote any change in current policy or interpretation is false. As the above history indicates, this is a huge shift in the Department's policy and indicates a fundamental sea change on an issue the industry thought was long settled. Seismic shifts in policy such as this-- the prescription of a totally new standard--requires HUD to follow the strict rulemaking procedures laid out by Congress. Instead, HUD asserts that its January 1994 amendment made it clear that it required sheathing in metal roofs--as an alternative to ANSI/ASCE 7-88--if a manufacturer chose to rely on the requirements for resisting the wind pressures laid out in the Table.

In reality, the preamble to this amendment says nothing about sheathing and certainly does not impose any restrictions on the use of metal roofing in manufactured homes. And nowhere in the wind standard specifying design loads for high wind areas is there anything about requiring the use of structural sheathing in roofs. In truth, HUD's pre-May 12, 1998, standard is merely a performance standard that specifies certain wind loads which must be met for various wind resisting parts of a home, not

a fiat on what roofing materials are required to achieve this standard.

2. HUD originally based this reversal in policy on the claim that structural sheathing would prevent or limit the type of water damage which occurred when roofs were lost during such severe hurricanes as Andrew. Later, it claimed that sheathing was required because it would make manufactured houses safer. Leading industry experts and engineers dispute this and have found that wood sheathing may not hold on trusses at the 51 PSF design uplift pressure HUD requires and that this use actually flies in the face of the growing commercial and residential practice of relying on steel as the primary structural safeguard in a building or a home. In addition, several manufactures are hard at work with metal roof suppliers in designing alternative roof material that will be far superior to any wood sheathing. To require wood sheathing now is both wrong and premature.

3. ANSI/ASCE 7-88 is not an acceptable alternative to requiring sheathing because it would force manufactures to re-design their entire structural package. The cost of this would be prohibitive and price many people particularly first time home buyers, out of the market. Similarly, ANSI/ASCE 7-88 is site specific, a quality that simply is not workable for regional shipments. This peculiar characteristic requires that each manufactured home built under this standard must undergo its own design and testing--factors which greatly increase their costs to the consumers.

4. According to industry estimates, the requirement that metal roofs must have sheathing will add an estimated \$1,000-\$1,500 to the cost of each unit. This unjustifiable cost will have to be passed on to the consumer, the very person HUD claims to help by passing such regulations. The metal-only roofing systems that HUD would now prohibit are highly affordable and are used on some of the industry's most cost-effective housing. If the roofs on these homes have been tested to comply with the wind pressure criteria of section 3280.305--criteria that exceed any requirements currently in place for site-built housing--without the use of any sheathing, what purpose is served by this new requirement? The only effect will be to place any type of homeownership beyond the reach of Americans who could only afford to buy the least costly models.

5. Industry tests clearly show that existing metal roofs fully comply with HUD's Code Section 3280.305 and that high wind loads are transferred properly to structural support members as the May 12 Interpretative Bulletin mandates. In addition, industry engineers have found that there is no solid evidence

that a metal roof with wood sheathing will resist a hurricane force wind any better than a metal roof without wood sheathing.

6. HUD cavalierly dismisses as unreliable the tests and analyses performed by the industry's experts and engineers. In reality, the industry has developed conclusive proof that several of its models with metal roofs exceed the Department's structural requirements for high wind areas. Moreover, the industry resents any claim that its tests were not accurate and did not "replicate the exact loads in the Table." In fact, these tests were performed under rigorous and precise conditions, and the industry stands by their findings. These tests were performed with many different construction methods and probably provide a more realistic and accurate portrait of actual failure modes than the more prosaic structural calculations HUD seems to want and require.

In addition, the industry takes keen exception to HUD's refusal to provide in writing its specific reasons for rejecting past industry tests and analyses. This lack of forthrightness retards the process and does nothing to advance a fair and frank exchange of views. Likewise, the industry objects to HUD's questioning the integrity and workmanship of its testing samples. 24 CFR 3280.401 provides more than enough in the way of safeguards to insure that these samples are what they are supposed to be.

7. The industry contends that it is specious to ask it to comment about the design wind loads enunciated in the Table. There is nothing wrong with these standards; indeed, they have been accepted for years and need neither clarification nor elaboration. What HUD wants is meaningless comments on an issue that has already been decided without public comment. Although HUD undoubtedly will argue that the Interpretative Bulletin and the ANPRM address two different issues, the truth is somewhat different--the ANPRM is mere window dressing for the compliance decision contained in the May 12 bulletin. What this reinforces is a clear pattern by HUD of bypassing congressionally required rulemaking on substantive issues and trying to deflect this violation by soliciting worthless comments on minor issues.

8. Finally, the interpretative bulletin's main objective is to entirely eliminate metal roofs regardless of installing wood sheathing under them. This is evident by addition of 3280.401 which limits movement (deflection) of metal roof and disregards the overall performance under ultimate loading.

For all the above reasons, we respectfully request that HUD withdraw its May 12 Interpretative Bulletin because it was issued without the Department's adherence to proper rulemaking procedures and safeguards and because it adds nothing to clarifying what standards do exist. Thank you for the opportunity to submit our comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Danny D. Ghorbani", with a long horizontal line extending to the right.

Danny D. Ghorbani
President

CC: MANUFACTURERS



CHAMPION
ENTERPRISES, INC.

Corporate Headquarters
Suite 300
2701 University Drive
Auburn Hills, Michigan 48326
(248) 340-0880
FAX: (248) 340-0888

July 7, 1998

JUL 15 10 04 AM '98
 RECD
 HUD HUD DOCKET

HUD Docket No. 4271-A-02
Room 10276
Office of General Counsel
Department of Housing and Urban Development
451 Seventh Street, SW
Washington, DC 20410-0500

Re: Manufactured Home Construction and Safety Standards;
Metal Roofing; Advance Notice of Proposed Rulemaking (ANPRM)

Champion Enterprises, Inc. respectfully submits comments regarding the advance notice of proposed rulemaking concerning the Table in 24 CFR 3280.305(c)(1)(ii)(B).

We object to the HUD interpretative bulletin (IB I-2-98) as based on inaccurate statements and analysis. In response to the ANPRM, there is no need to revise the performance standard set forth in the subject Table. If HUD proceeds to interpret the subject Table to prohibit metal roofs without sheathing in Wind Zones II and III, then HUD has prescribed new standards without complying with its rulemaking procedures and should not be asking for the public to submit proposed changes to the Table, but should be requesting comments on its proposed changes to the wind design standards.

- Our company has developed engineering analysis to demonstrate that manufactured homes can comply with the HUD Code at Section 3280.303(c) and/or 3280.401(b), for models that include metal roofs for Wind Zone II.
- Our designs for metal roofs show that the wind loads are transferred by the metal roof, performing like sheathing, to structural support members, as clarified in the interpretative bulletin of May 12, 1998 (I-2-98)(63 FR 26836 to 26389).
- Metal roofing is not part of the January 1994 rule, its preamble or any of its previous interpretations. There are no restrictions on its use to be found anywhere in the published documents.
- Metal roofing design is not limited by the Table of Design Wind Pressures or its footnotes. Footnote 7 only exempts prescriptively installed 3/8" rated sheathing; it does not prescribe how it will be used for every design condition.
- The interpretative bulletin appears to be rulemaking. It is a "change in policy or interpretation" by the Department. It does not merely "clarify requirements." It is not obvious in the Standards that metal roofing must be restricted in Wind Zones II and III, as evidenced by many DAPIAs who have approved tests and designs contrary to HUD's interpretation. (63 FR 26387)
- Having a "rigid box" is not a requirement of the standards. Section 3280.301(a) is only a general statement and a metal roof easily meets the only stated requirement for "structural strength and rigidity." (63 FR 26387)
- If it was the intention of the Department at the publication of the January 1994 rule for the metal roof to be installed over structural sheathing as was done for shingle roofs, fastening would have been dictated as it was for shingle roofs in the Table of Design Wind Pressures. (63 FR 26386)

- Section 3280.305 is not a "prescriptive standard" as the Department contends. There are a few limited items which are prescriptive for Wind Zones II and III (strap thickness, truss spacing, shingle fastening, etc.), but the Table of Design Wind Pressures dictates the loads to be accommodated by a *performance* standard. (63 FR 26386)
- Testing according to the Standards is not a *lower* standard than engineering analysis, as implied by the IB. No where in the Standards is testing relegated as inferior to calculations. In fact a thorough testing program, as was done in the case of metal roofing with many different construction methods and assemblies tested, should give a more complete picture of actual failure modes than typical structural analysis calculations. (63 FR 26388)
- It is inappropriate for the Department to appeal to the "industry trade association" economic analysis for the January 1994 rule, to show that the industry understood that sheathing was required for the new wind zones. None of the testing that has since been submitted the Department had been performed at that time, so there was no way for a designer to know that metal roofing could meet the Wind Zone II loads without sheathing. (63 FR 26387)
- The Department's reference to damage to "corrugated metal siding and roofed building", in earlier disasters, has no bearing on the current research and technology and proposed metal roofing on manufactured housing.

For all the above reasons, we urge the Department to withdraw the interpretative bulletin (I-2-98) because it fails to provide any useful clarification of the Standards. Furthermore, the IB was inappropriately issued contrary to the requirements for comment-rulemaking. (24 CFR 3282.113)

In response to the ANPRM, at this time, we have no recommended revisions to Section 3280.305(c)(1)(ii)(B). The Table clearly sets forth the requirements that must be met. However, we are advised that several manufacturers are preparing revised designs for metal roof homes in Wind Zone II. Therefore, we request that the comment due date of July 13, 1998, be extended by 180 days. Our company continues to evaluate the IB and the Table, and we would like to have the opportunity to possibly submit additional comments by January 13, 1999.

Thank you for the opportunity to submit preliminary comments in response to the ANPRM.

Sincerely yours,



C. Edgar Bryant, PE
Vice President Engineering

FABWEL, Inc.

3030 Windsor Court • Post Office Box 1366
Elkhart, Indiana 46514

July 10, 1998

12

HUD Docket No. 4271-A-02
Room 10276
Office of General Counsel
Department of General Counsel
451 Seventh Street, S.W.
Washington, DC 20410-0500

HUD DOCKET

JUL 21 2 35 PM '98

REC'D

Reference: **Manufactured Home Construction and Safety Standards:
Metal Roofing; Advance Notice of Proposed Rulemaking (ANPRM)**

Fabwel, Inc. respectfully submits comments regarding the advance notice of proposed rulemaking concerning the Table in 24 CFR 3280.305(c)(1)(ii)(B).

We object to the HUD interpretative bulletin (IB I-2-98) as based on inaccurate statements and analysis. In response to the ANPRM, there is no need to revise the performance standard set forth in the subject Table. If HUD proceeds to interpret the subject Table to prohibit metal roofs without sheathing in Wind Zones II and III, then HUD has prescribed new standards without complying with its rulemaking procedures and should not be asking for the public to submit proposed changes to the Table, but should be requesting comments on its proposed changes to the wind design standards.

Fabwel objects to the interpretive bulletin (IB I-2-98) based upon the following reasons and respectively requests that HUD address these issues:

1. Fabwel has developed and conducted tests that demonstrate that our roof systems comply with the HUD Code at Section 3280.303(c) and 3280.401(b). Further, Fabwel at the request of HUD has submitted said test reports for review and comment and as of this date has not received any specific comments that would address how they are not in compliance with these sections of the code.
2. Our designs and testing have shown that the metal roofs transfer the high wind loads to the structural support elements, performing like sheathing, as clarified in the interpretive bulletin of May 12, 1998 (I-2-98)(63 FR 26836 to 26389).
3. The department has not offered any evidence that metal roofs with sheathing will perform properly. Nor has the department shown that a metal roof is removed (blown off) during a storm.

4. Metal roofing is not part of the January 1994 rule, its preamble nor any of its previous interpretations. There are no restrictions on its use to be found anywhere in the published documents.
5. The design of metal roofs are not limited by the Table of Design Wind Pressures or its footnotes. Footnote 7 only exempts prescriptively installed 3/8" rated sheathing, it does not prescribe how all roof products are to be designed and used for every design condition.
6. If it was the intention of the Department at the publication of the January 1994 rule for the metal roof to be installed over structural sheathing (as stated by the Department's Engineers at recent public meetings), *why was no fastening method and installation procedure dictated? The Department took the effort to prescribe a fastening method and installation requirements for asphalt shingles.*
7. The interpretive bulletin appears to be an attempt by HUD to be rulemaking and not the clarification as stated in the bulletin. If it is obvious that the standard requires the use of roof sheathing under metal roofs in Wind Zones II and III, why have all the DAPIAs approved our test reports and designs contrary to the interpretation? *Would the Department be implying that a large body of Professional Engineers is incapable of reviewing the HUD Standard and properly interpreting the design requirement?*
8. Section 3280.305 is not a "prescriptive standard" as the Department contends. The number of items that are prescribed for Wind Zones II and III are limited (strap thickness, truss spacing limits, shingle fastening), but the Table of Design Wind Pressures dictates the loads to be accommodated by a performance standard. (63 FR 26386)
9. Testing in accordance with the Standards is not a lower standard than engineering analysis, as implied by the IB. The interaction of the various components that comprise a roof system cannot be accurately modeled through calculations and require that full scale testing be completed in order to insure proper roof performance. The test reports Fabwel submitted to the Department *exceeded the design loads in excess of 2.5 times in accordance with the provisions of 3280.401(b).* Therefore, the testing program not only insured that all components interacted properly, but that they did it at load conditions that greatly exceeded what the Department stated through rulemaking could be expected during a storm in Zone II or III areas.
10. The Department has no evidence to support questioning the workmanship of the samples tested and whether a factory can comply. The Standards clearly state within 24

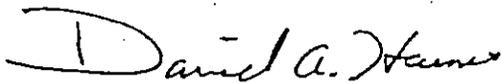
CFR 3280.401 that the test samples are representative of an "average quality of materials and workmanship" which Fabwel represented within our test report and which is clearly specified within report. The reports have been reviewed and approved by the DAPIA, and included within Manufacturer's Design Packages. Finally, the production inspectors, armed with this information, can observe and note if there are any problems associated with the assembly of the roof system. In the past four (4) years, Fabwel, nor any DAPIA or IPIA have received any written or oral notification of our roof system being difficult to assemble in a production setting.

For all the reasons above, we urge the Department to withdraw the interpretive bulletin (I-2-98) because it fails to provide any useful clarification of the Standards. Furthermore, the IB was inappropriately issued contrary to the requirements for comment-rulemaking. (24 CFR 3282.113)

In response to the ANPRM, we have no recommended revisions to Section 3280.305(c)(1)(ii)(B) at this time. The Table clearly sets forth the requirements that must be met. However, we are advised that several manufacturers are preparing revised designs for metal roof homes in Wind Zone II. Therefore, we request that the comment due date of July 13, 1998 be extended by 180 days. Our company continues to evaluate the IB and the Table, and we would like to have the opportunity to possibly submit additional comment by January 13, 1999.

Thank you for the opportunity to submit preliminary comments in response to the ANPRM.

Sincerely,



David A. Haines P.E.
Vice President - Engineering



National PROPANE GAS Association

1150 17th St NW, Suite 310
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Tel: 202.466.7200
Fax: 202.466.7205

January 27, 2005

15

Regulations Division,
Office of General Counsel,
Room 10276
Department of Housing and Urban Development
451 Seventh Street SW
Washington, D.C. 20410-0500

**Re: Department of Housing and Urban Development: Docket No. FR-4886-P-01
(Proposed Rule - Manufactured Home Construction and Safety Standards)**

The purpose of this letter is to submit comments of the National Propane Gas Association (NPGA) in response to the Department of Housing and Urban Development (HUD) Proposed Rule published December 1, 2004. The proposed rule would amend the Federal Manufactured Housing Construction and Safety Standards.

As a matter of background, NPGA is the national trade association of the propane industry with a membership of about 3,800 companies, including 39 affiliated state and regional associations representing members in all 50 states. Although the single largest group of NPGA members is retail marketers of propane gas, the membership also includes propane producers, transporters and wholesalers. Propane gas is used in a variety of applications including residential installations, and more specifically, it is used as a fuel gas for space heating and water heating in manufactured homes. Based on this application, NPGA submits the following comments.

Section 3280.703 (Minimum Standards)

The agency proposes to modify this section by, among other things, updating existing referenced standards to more recent editions.

- With respect to the propane industry, the accepted standard for installations of LP-gas systems is NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gases*. The current edition referenced in Part 3280 is the 1992 edition, while this proposal seeks to update the reference to the 1995 edition.

NPGA recommends that the agency refer to the 2001 edition of NFPA 58. In doing so, it would maintain consistency with other federal agencies to whose regulations our members must comply, such as the Department of Transportation.

- The referenced standard for gas piping systems using corrugated stainless steel tubing, LC 1-1997 should be moved from the *Appliances* category under 3280.703 to *Ferrous Pipe and Fittings*, which is a more appropriate category. In addition, this referenced standard should also include its addenda, i.e. LC 1a-1999, for completeness.

Section 3280.704 (Fuel Supply Systems)

Paragraph (b) (5) of this section addresses LP-gas safety devices and is revised to reflect the 1995 edition of NFPA 58. It also refers to subsection 221 of the 1995 edition for compliance with relief valve requirements.

The reference to subsection 221 of the 1995 edition is incorrect. The proper reference to relief valves in 1995 edition is to subsection 2-3.2. As a minimum, the agency should revise this reference. However, as previously noted, NPGA believes that HUD should refer to the 2001 edition of this standard. To assist the agency with the proper reference to relief valves, the 2001 edition of NFPA 58 addresses this subject in subsection 2.3.2.

Section 3280.705 (Gas Piping Systems)

To be consistent with the addition of standard LC 1-1997 in § 3280.703, HUD should add to paragraph (b) *Materials* of this section, a new subparagraph (5) to refer to the acceptability of using corrugated stainless steel tubing material for gas piping. Likewise, this reference should include the 1999 addenda to this standard.

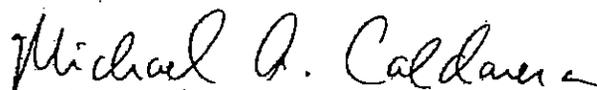
Section 3280.709 (Installation of Appliances)

Paragraph (h) of this section proposes the addition of a corrosion resistant water drip collection and drain pan to be installed under each gas water heater.

NPGA opposes this proposal. Gas water heaters in manufactured housing typically obtain combustion air from the area beneath the water heater. To install a drain pan under the water heater would restrict the ability of the water heater to receive the proper amount of combustion air. Moreover, it would require modifications to the design and construction that could significantly increase the costs without any economic justification.

NPGA appreciates your consideration of our comments. Please feel free to contact us if you have any questions.

Sincerely,



Michael A. Calderera
Director, Regulatory and Technical Services



PFS Corporation

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An Employee-Owned Company

Quality Control Dept.

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January 26, 2005

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Regulations Division
Office of General Counsel – Room 10276
Department of Housing and Urban Development (HUD)
451 Seventh Street, SW
Washington, DC 20410-0500

Subject: Docket No. FR-4886-P-01
RIN Number 2502-A112
Manufactured Home Construction and Safety Standards
Proposed Rule (Dec 1, 2004 Federal Register)

The following are PFS Corporation comments on the subject proposed changes to the FMHCSS recently published for public comment.

PFS has commented on four (4) specific proposed code change issues and the three (3) issues where HUD asked for general comments.

3280.309 Formaldehyde Notice

As a testing lab that derives part of its income from the testing of products for formaldehyde, PFS should remain silent on this issue hoping that it remains in the code so that the company can continue in that part of the business. To be honest, however, it would seem that for the past 20 years the formaldehyde levels in manufactured housing have continued to decline to the point where they are no higher than any other residential structure whether that structure is modular, panelized or site-built. None of these products are required to carry such a notice. We believe the manufactured home product and materials used to construct it have progressed to the point where the need for a large prominently displayed "warning" of this type is arcane and only contributes to the public's notion that manufactured homes are somehow "inferior" to other types of housing.

At the very least, if such a "warning" is still deemed necessary for some reason, it would seem appropriate to include it in the Homeowner's Manual with an explanation that ALL homes, in fact, contain certain amounts of formaldehyde.

3280.402 Procedures for Truss Testing

This seems to be the largest cost impact issue in the entire code change proposal. PFS as a Listing Agency for several truss manufacturers has heard a number of dire predictions by truss makers about the increased cost. If even a fraction of their concerns and cost estimates are valid, it would appear to be prudent to separate this issue from the rest of the proposals and re-evaluate its cost impact.



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for the specific scope of
accreditation under
Lab Code 100421-0

As an editorial comment, PFS would observe that those HUD-code manufacturers who are, in ever-increasing numbers, embracing modular homes will be less effected by this issue than those who build only HUD homes because the multi-product builders tend to use the same trusses (ie: "Engineered" vs. "Listed") on both product lines.

3280.504(b) Homes in "Humid" or "Fringe" Climates

It would appear that allowing a vapor barrier on the exterior side of the wall insulation in those climate areas designated as "Humid" or "Fringe" should go a long way to greatly reduce or eliminate the excess moisture, mildew and mold problems that seem to be more prevalent in this part of the country, but the wording of the code is fatally flawed. Requiring ALL wall surfaces to have a combined permeance of not less than 5.0 is all but mathematically impossible. Consider the very common layout where a tub/shower surround [watertight per 3280.607(b)(3)] is on an exterior wall: If the surround (say, P_1) has a permeance of 0.5, in order for that part of the wall to have a combined permeance of not less than 5.0, using the formula from 3280.405(b)(2): $P_{total} = 1/[(1/P_1) + (1/P_2)]$, P_2 would be a material that doesn't exist!

This same "impossible" situation occurs at kitchen countertop back-splashes and wherever built-in cabinetry is on an exterior wall. This is the reason why not one PFS client has even attempted to use the waiver in "Humid" or "Fringe" areas. As is, this waiver is unusable; it needs to recognize the common situations in floor plan layout described above and allow an "exemption" for those areas.

3280.801 Electrical – Scope

PFS is very much in favor of upgrading the HUD code in all aspects, especially when it comes to electrical systems. As mentioned above often manufactured housing is viewed by the general public as being "inferior" to other housing and when anyone in authority or supposedly possessing "knowledge" about the residential housing industry points out that HUD-code homes are *three or four* revisions of the National Electrical Code behind the rest of the country, it reinforces this perception.

As a small side comment, PFS presumes that HUD is well aware of the fact that the main source of the Electrical Code publications, NFPA, no longer publishes the 1996 edition, NFPA No. 70-1996. The hundreds or even possibly thousands of copies that will be sought after when (if) the code update goes into effect will have to come from "other" sources unless an arrangement can be made with NFPA to resume publication of the 1996 NEC.

While PFS applauds upgrading to a more recent edition of the National Electric Code, we believe any such upgrade will require most, if not all, electrical drawings to be revised. With this in mind, we strongly encourage HUD to adopt the same "phase-in" program it used when changing to the new smoke alarm requirements. It's fair and provides plenty of time to make the changes that will be required.

Request for General Comments:

- Should the approval of alternate test methods be left up to the DAPIA exclusively or should the DAPIA be only allowed to provisionally approve such tests with HUD concurrence.

PFS is a NVLAP-accredited testing laboratory and as such, is often asked by clients to devise or advise on test protocols for materials and designs outside those currently covered by any recognized standards and outside the HUD program. We feel perfectly capable of doing this

same thing for HUD-code manufacturers, and we feel we can do it in a more timely manner than HUD has demonstrated in the past. Also, the technical wording of 3280.303(g) has been interpreted by HUD in the past to mean that only manufacturers could request such testing work be done, not suppliers. That has necessitated suppliers having to "recruit" cooperative manufacturers to "sponsor" the test requests for the benefit of the industry. This has caused even more unnecessary delay that could be eliminated by a DAPIA simply working with the technical staff of a supplier to develop a "universally acceptable" test protocol.

- Critical Connections in High Wind Regions

One of the most forward-thinking aspects of the HUD Code is its emphasis on "performance" instead of being simply a "prescriptive" code. As a DAPIA, PFS scrutinizes the actual holding power of whatever thickness of steel strapping is used, the capacity of the brackets to which the strapping is attached, and the fastening used to secure those brackets. A "good" engineering design would match all 3 elements as closely as possible to realize the maximum capacity and cost effectiveness of the design. A manufacturer should be allowed to choose to utilize larger brackets, more fasteners and stronger strapping to allow for greater spacing of the anchors, or vice-versa and not be penalized by prescriptive requirements. This "engineering options" approach is often used in all kinds of design conditions in the HUD Code and this issue should be no different.

- Metric Units

It would appear that as of now, the construction industry, especially the manufactured home single family dwelling segment is not buying any components that are described or specified in metric terms, so to include these numbers in the FMHCSS would seem to be superfluous and unnecessary and would serve only to "clutter" the code book with unused information. When and if materials used by the industry begin to appear with metric dimensions, or foreign markets demand information in metric measurements, then those specific requirements can be calculated from standard conversion factors and the inclusion of the metrics overall in the code can be considered at that time.

Sincerely,



Richard M. Reinhard, P.E.
Manager of Manufactured
Housing Operations

RMR:cjp

FR-4886-P-01

Agency : HOUSING AND URBAN DEVELOPMENT DEPARTMENT
Title : Manufactured Home Construction and Safety Standards
Subject Category : Manufactured home construction and safety standards: Manufac
turing Housing Consensus Committee recommendations
Docket ID :
CFR Citation : 24 CFR 3280
Published : December 01, 2004
Comments Due : January 31, 2005
Phase : PROPOSED RULES

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Your comment has been sent. To verify that this agency has received your comment
, please contact the agency directly. If you wish to retain a copy of your comme
nt, print out a copy of this document for your files.

Please note your REGULATIONS.GOV number.
Regulations.gov #: EREG - 1 Submitted Jan 20, 2005

Author : Mr. William Hug
Organization : Cavco Industries, Inc
Mailing Address : 1001 N. Central Ave Suite 800
Phoenix, AZ 85004
US

Attached Files : 04-26381-31406-ATT-1.doc

Comment : To Whom It May Concern:
Attached are my comments on the proposed rule to 24CFT 3280 docket No. FR-4886-P
-1
William Hug
Director of Engineering
Cavco Industries

January 18, 2005

Regulations Division,
Office of the General Council
Room 10276
Department of Housing Urban
Development
451 Seventh Street, SW.
Washington, DC 20410-0500

RE: Proposed Rule to 24 CFR 3280 Docket No. FR-4886-P-01

To Whom It May Concern:

I am disappointed that HUD is not issuing for public comment the proposal to eliminate the requirement for the formaldehyde notice to be placed in our homes. This label is not required in any other home that is constructed in this nation even though they use the same exact materials that we are using. This requirement stigmatizes our homes and additionally adds costs that are wasteful albeit small.

The Department's argument is that there were no studies sent to The Department to show this proposal is valid is on the face arbitrary and restrictive. By their own words The Department states that "The law requires a federal agency to follow similar procedures for the rescission of rules as it does for their promulgation." If this is true, then everything that is in this proposal should have been rejected on the same basis. Using this same reasoning, all the proposals that are here for public comment didn't have full back up information to substantiate the change, especially when you look at all the proposed "Standards Revisions". The Department is accepting these on face value because they are now the standard that is in use by the industry that supplies materials. The Department is, by issuing this proposal, accepting that another third party review committee has accepted the evidence to make this the new standard. I am sure that The Department and the MHCC didn't research the changes to see if they were accepted with valid backup. The reason that the MHCC didn't provide this research is because the standard went through another consensus process. The MHCC wasn't privy to the process or documentation presented nor was there enough time to review it even if they wanted to do so.

Well the formaldehyde proposal went through two processes one with CABO and the second with MHCC. In the case of the CABO review, I was on that committee as well as representatives from The Department and there was

evidence given that showed that the requirement was not needed any longer. The reason is because of the changes of the manufacturing processes of these products to eliminate major out-gassing of formaldehyde.

I would ask The Department to reevaluate their decision on this matter and entertain putting it up for public comment again. The Department needs to be consistent with the entire program and ask for the same level of proof for all changes either rescissions or proposals. It would seem to me that The Department is being selective as to what level of backup is needed when a proposal is presented for consideration. The Department needs to be consistent on the requirements because, without consistency, how will the MHCC know what will be accepted or what will not be accepted by the Department.

I also have comments on the change to 3280.402.

Eliminating the option of 1.75 x overload ends one cost effective way of building the homes at the lower end of the manufactured housing market. This will place additional cost on a section of the market that can least afford it.

The change to the testing procedure as outlined in 3280.402 alone will cost much more than the \$77.28 that has been advanced by the Department for the entire proposal now before us. Estimates of the price increase per truss for Zone I wind that I have received from my truss supplier is in the 15 to 25 percent range. This would increase the material cost of a 24 x 60 to somewhere around \$75 per half or \$150 for the entire house. The eventual cost to the consumer would be about \$325. This is far greater than the \$77 that is proposed by the Department.

This will also create a huge backlog in truss retesting and redesign. Every truss will need to be retested or be calculated to meet this new standard. In my case we have over 400 truss designs that are being used at the plants. Each of these will need to be reviewed, retested or possibly be changed into a calculated design. If the design is calculated then the truss will need to be resubmitted to the Dapia for approval. This is an additional cost that has not been taken into consideration of my figure of \$325. The added cost even though only a one time expenditure could run into thousands of dollars.

Additionally, the time frame to perform this task generally runs 180 days after the final rule is issued. Because this will affect every truss that is made for every manufacture, the normal 180 days is not enough time to get this review, retest and reapproval completed. This could cause manufacturers to cease manufacturing of certain types of homes when they can't get the correct truss designed and approved in a timely fashion. This in turn may force the

manufacture to go to a calculated truss that would be more expensive than the one that is tested.

There also doesn't seem to be much information given out as to what was in the NAHB report and if this report was done on trusses manufactured prior to the updated standards of 1994. Additionally, I don't see that HUD has addressed the question as to why this change is needed nor is there any information that shows that there are truss failures that are being discovered on an ongoing basis. We haven't had truss failures on homes in normal use. I also have received information from truss suppliers that they have had few complaints (in the range of 2 a year) concerning truss failures.

I believe the study referred to in the proposal was done by industry members and suppliers in response to the NHAB testing that was done in the 80s. These tests were flawed specifically with the criteria for selection. The process was to find the very worst trusses in an unbundled stack and test those. There was not concern that some of the trusses were likely to be culled prior to installation into the roof. I understand that the standard requires the worst trusses to be analyzed but to do a study on what could possibly happen is not correct.

The industry changed after this happened and the product improved. This being the case we are not looking at the same product that is being built now and what was built then. Because this isn't the same product we are comparing apples and oranges. The Department needs to revisit this study to see if I am not correct.

With this being the case, The Department should reject this separate proposal from the others and send it back to the MHCC for review and if need be, do research on the failure rate for trusses installed in homes that were produced after the 1994 code change. This would better reflect the real day situation and not penalize the industry for past research that is not current.

As to the comment that rule was passed through the NFPA consensus committee should not be given as much weight as what the Department would wish. I have been in meetings where some members on the NFPA Structural Technical Committee have repeatedly stated that the cost of the code requirements are either a minor consideration or are not to be considered at all when the code is being developed. This is entirely against what manufactured housing is about and why we are lower cost housing. This type of housing is based on performance and that should be looked at. I would submit that the truss designs currently being used do perform without failure and the methods to test are adequate in their present form.

Lastly, the update to the electrical code is not a practical proposal. To adopt a code that is now 9 years behind the current one that is now being adopted by localities throughout the United States is ridiculous. The NEC 1996 ed. is no longer in print and to require manufactures to try to find this book so that they can determine what changes to the code affect them and what is the required standard they must meet is not logical and will be difficult.

As a remedy, I would suggest that this proposal be withdrawn from the entire proposal and sent back to the MHCC for review. It is imperative to the industry for our image and for practical reasons to let the MHCC update this to an edition of the NEC that is in print and readily accessible. There needs to be a review by the consensus committee of the current code since there were many changes in the current code. This review is necessary as some sections may conflict with the current 3280 and adjustments will probably be required to the 3280 to eliminate the conflicts.

Additionally, by requiring the manufactures to follow an obsolete code won't help with the perception that the manufactured housing industry builds inferior products when it comes to electrical design and will give reasons for our critics to discriminate against our industry.

I hope that these comments are helpful and will be taken into consideration as the Department determines the applicability of these proposals.

Sincerely,

William Hug
Director of Engineering

Typist: WH:mh

January 24, 2005

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John Weldy, Managing Director of DAPIA Services
NTA Inc.
Email: jweldy@ntainc.com

The following are comments regarding the December 1, 2004 Federal Register
Manufactured Home Construction and Safety Standards proposed rule.

I. The Department should reconsider rejection of the use of mineral wool or loose fill insulation to be considered an acceptable fireblocking material in section 3280.206. The technical data is available that document that such material when properly installed to a specified R value is effective as when used as fireblocking. The latest building codes recognize this material as acceptable as fireblocking.

II. Subpart E Testing

1. The proposed rule has deleted the 1.75 proof load tests for roof trusses, which will significantly impact the industry.

- a. This deletion is not justified since there are no documented roof truss failures and a minimum number of consumer complaints related specifically to truss designs since the inception of the HUD standard in 1976.
- b. Deleting the proof load test and requiring the destruct test for all tested trusses will increase truss member sizes, thereby increasing the cost of trusses by up to 25%. In some cases, this will add substantial cost per home from the truss manufacturer to the home manufacturer. This additional cost is unwarranted considering no truss failures have been documented due to current truss testing procedures.
- c. Deleting the 1.75 proof tests will limit existing designs and prevent new innovative designs by increasing the top and bottom chord sizes. Designs such as low-sloped cathedrals, which are common in the industry, will be virtually eliminated.
- d. Deleting the 1.75 proof test for uplift (wind loads) will result in criteria that is more stringent and inconsistent with the other model building codes which require only a minimum test period of 10 seconds for test loads equal to 1.5 times the design wind load. Furthermore, there have been no

documented truss failures due to existing design criteria since the uplift testing procedures went into effect in 1994.

2. The proposed rules change the method for uplift testing and require pulling up on the top chord as opposed to turning the truss upside down and applying the load to the bottom chord.

In 1994 HUD and NAHB ran proficiency tests comparing tests that pulled on the top chord to test in the inverted position. It was determined from these tests that pulling on the top chord was difficult, impractical, dangerous, and yield inconsistent results. It was determined that testing the truss in the inverted position provides adequate results.

Testing in accordance with existing uplift requirements (section 3280.402(2)) is simple and provides consistent results. Furthermore, there have been no documented truss failures due to the existing design criteria since the uplift testing procedures went into effect in 1994.

Testing uplift in accordance with the new HUD proposal will have a significant cost impact on the truss approval process. The set-up procedure for the proposed test will take 3 to 4 times longer, which will increase the cost for testing a new design substantially. It does not appear that economic impact studies have been provided with this proposal and all modifications to truss testing should be delayed until such studies can be prepared for review.

III. Updates to reference standards:

1. AFPA 1997 Manual for Engineered Wood Construction is already an obsolete standard reference and should be updated to the latest version (2001). By updating to latest 2001 version, manufacturers could better take advantage of utilizing and sharing designs with Modular packages.
2. AFPA 1993 Design Values for Joists and Rafters- This standard for Design values for joist and rafters is based on AFPA 1993 Manual for Engineered Wood

Construction standard which may conflict with proposed referenced standard, AFPA 1997 Manual for Engineered Wood Construction. NTA believes the industry would be better served by updating both AFPA reference standards to the 2001 version.

3. The ANSI/TPI 1 1990 has been removed from the list of reference standards and has not been replaced with alternative design standard. All other model-building codes reference the ANSI/TPI as standard to use when designing metal plate connected roof trusses. Accordingly, the ANSI/TPI 1-2002 reference standard should be incorporated into the amendments to insure all designs are calculated to the same criteria.
4. The proposed rule updates the electrical standard from 1993 NEC to the 1996 NEC. It appears that this standard should be updated to the latest version (2005) of the NEC. Due to the nature of the industry which stock piles thousands of approved floor plans which will need to be updated to the proposed NEC; it would be unwarranted to update to the obsolete 1996 version. It appears that the requirement for arc-fault circuit-interrupter protection which has been adopted in more recent versions of the NEC maybe the reason for adopting the 1996 version. I would agree with the committees reluctance to adopt the requirements for arc-fault due to a lack of available product and technology in the market at this time; and would suggest that in adopting the 2005 NEC that an exception to the arc-fault requirement be written.



January 17, 2005

BF5-002

Regulations Division
Office of General Counsel – Room 10276
Department of Housing and Urban Development (HUD)
451 Seventh Street, SW
Washington, DC 20410-0500

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Subject: Docket No. FR-4886-P-01
Manufactured Home Construction and Safety Standards (MHCSS)
Proposed Rule (Dec. 1, 2004 *Federal Register*)

Dear Sir or Madam:

This is to transmit my comments on the subject proposed changes to the MHCSS recently published for public comment. I want to commend HUD and the Manufactured Housing Consensus Committee (MHCC) for finally proposing changes to the MHCSS. While this is only a first attempt at updating this document, and much more needs to be done, to finally see a specific set of changes go through the consensus process and then presented to the public is almost a dream come true. It is my hope that this will be the first of many much needed revisions to both the MHCSS and the Manufactured Home Procedural and Enforcement Regulations.

Fleetwood's comments on the proposed rule are on the attached pages. They are arranged into three categories: Comments on Major Changes, Minor Changes, and Requested Comments. If you have any other questions about these opinions please do not hesitate to contact me.

Sincerely,

FLEETWOOD ENTERPRISES, INC.

Bill Farish, P.E.
Director of Product Engineering
Housing Group
(e-mail: bill.farish@fleetwood.com)

cc – Roger Howsmon, Ron Brewer, Wes Chancey, Charles Stapleton, Jimmy Phillips,
Buddy Wrye, Kent Johnson, Irv Hill, Bobby Sanders, Steve Smith, Ron St. Onge,
Brent Pendleton, Jim Schwartz, Jon Tinsley, Ted Gugliotta, Charles Kepford,
Ornella Atwell, Robert Garcia, Mark Handian, Manuel Santana, Marisella Rivera,
John Walters, Frank Gradillas, Dave Braun, Jack Woolard, Sergio Tejada,
Gary Pritchard, Todd Uhlick
Dick Reinhard – PFS, Mike Zieman - RADCO
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3051 Myers Street
Riverside, CA 92513-7638
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Comments on Major Changes

Fleetwood Homes

Docket No. FR-4886-P-01

Formaldehyde Notice – On page 70033 of the *Federal Register* HUD gave its reasons for rejecting the MHCC proposal to eliminate the Health Notice that is presently prominently displayed in the homes in accordance with 3280.309. It is hoped HUD will reconsider their rejection based on the following reasons:

- Manufactured Housing Research Alliance (MHRA) has produced the most recent and up-to-date study on the health risks of formaldehyde in manufactured homes. Formaldehyde Concentrations in Manufactured Homes: The Current Situation (July 2004) investigates this issue from several different aspects and shows that formaldehyde should no longer pose any greater concern than conventional housing. Even though it is only one paper it is a summation of many other studies that are more current than the ones used by HUD almost 20 years ago when the notice became part of the Standards.
- The notice itself is outdated. The compulsory language of the notice references the Ventilation Option, which was deleted in 1994. This Ventilation Option, formerly 710(g) was replaced by the Additional Ventilation in 103(b).
- There is no reason to display this notice so prominently. Why should it be the first thing a prospective buyer sees when they enter a new manufactured home when the warning only applies to a very small fraction of the total population?
- If HUD really thinks this warning should remain for the sake of the few consumers with greater sensitivity to formaldehyde, then leave an amended, updated version of the notice in the consumer manual.

Vapor Barrier – The changes to 504(b) are greatly appreciated and way over due. To be able to put the vapor barrier on the exterior side (warm side) of the wall in hot, humid climates is very necessary to properly handle potential moisture problems as stated in HUD's discussion of the proposed rule. The requirement to have the interior finish have a combined permeance of not less than 5.0 perms makes good sense also, but a set of exceptions is necessary. It is impractical to build a home with all interior surfaces at 5 perms or more. Surfaces that need exceptions are:

- 1) Back-splashes in the kitchen
- 2) Cabinetry in the kitchen or bath
- 3) Tubs and showers

The reasons for these exceptions are many:

- Without these exceptions no manufacturer will be able to place the vapor barrier on the outside in the appropriate zones. HUD has had similar wording in their April '02 waiver but without these necessary exceptions. As a result virtually no manufacturer has been able to use the waiver.
- The only reason to restrict the permanence of the interior surfaces is to make sure any moisture that gets past the exterior barrier is able to exit the wall to the interior. These few exceptions will not trap moisture in the wall. In fact these three items are usually not tight-fitted against the framing so moisture should easily escape the cavity.
- The other building codes have no interior wall restrictions at all associated with vapor barriers. For instance:
 - 2003 IBC – article 1403.3 – no mention of interior perm ratings
 - 2003 IRC – article R318.1 – no mention of interior perm ratings
 - 2003 IECC – article 502.1 – no mention of interior perm ratings

- The NFPA 501 standard already contains these exceptions in its corresponding section on vapor barriers. The NFPA list of exceptions is even longer than the three being requested above. That group of technical experts following their consensus processes found that some exceptions to the interior permeance were necessary.
- HUD should allow these exceptions so the industry can catch up to present building science. Without these exceptions the vapor barrier will remain on the inside in the hot, humid climate and moisture will be trapped in the home.

Truss Testing – The revisions to the testing procedures in section 402 are quite extensive. These will greatly change the way trusses are tested, constructed and possibly installed. There are several factors to consider:

- **Cost** - These revisions will impact the cost of the trusses, both in the initial testing and the actual construction. The biggest impact will be the omission of the Nondestructive (1.75) test and the addition of the recovery concept (both in the testing, at 1.25 LL, and after 2.50 LL). At the present time Fleetwood does not use the nondestructive test at all and has a similar recovery criteria at the end of the test. The impact of these two items has been minimal for Fleetwood but it is also not clear what the benefit has been.
- **Rationale** - Since the nondestructive test uses a much longer duration of 12 hours versus the destructive method it is not clear which test method would consistently be more conservative. Fleetwood is unaware of any data that shows the nondestructive test to allow trusses that are unsafe. In general Fleetwood is unclear on the benefits of these changes for the industry.
- **Recovery Time** – The five-minute recovery time appears too conservative. Fleetwood has been using 4 hours for its recovery. HUD should consider allowing at least one hour for recovery.
- **Deflection Measurements** – It is not clear that there is any advantage in measuring deflections at all of the panel points and between panel points. The existing method of mid-span and quarter points appears to give enough data to identify the critical deflection for a roof truss under uniform loading.
- **Uplift** - Fleetwood is very much in favor of the changes in 402(e) to finally convert the uplift test to a more reasonable approximation of the actual loading the rafter will experience. Pushing down on the bottom chord of an inverted truss never seemed like an appropriate uplift test. The spacing of the uplift points, however, appears to be too conservative. Instead of every 6" it seems that every 12" would be sufficient and be easier to convert existing testing equipment with hydraulic cylinders at 24".
- **Phase-in** – It is very clear that all industry trusses will need to be re-certified according to the new test procedures. Even considering the trusses used by Fleetwood which have been tested with methods that closely approximate the new procedures there are enough changes (such as the 1.25LL recovery, deflection points, etc.) which Fleetwood does not presently use that retesting will be necessary. It is imperative that HUD allows a lengthy, reasonable time period for phase-in of the new rafters similar to what has been done in the past. (Example – the new wind load testing of windows was 6 months after the wind load were enacted.) In this case, due to the scope, it is hoped that HUD will allow 12 months for all testing to be completed.

One Piece Metal Roof – The new section .305(c)(1)(ii)(C) which would allow metal roofing in all wind zones is greatly appreciated. The previous restriction to Wind Zone I unless sheathing was utilized made little sense if testing could show the assembly was capable of withstanding the suction loads. What is unclear is the motivation for adding the words “.....testing procedures that

have been approved by HUD..." to the requirements. Why is HUD again inserting itself into this process? (See New Test Protocols under Requests for Comments below for arguments against the requirement for HUD to approved new test methods.) The third-party approval process is more than adequate for approving test procedures. In fact the third-party is probably better able to review a test method for a certain supplier or home manufacturer than HUD is able to do due to their familiarity with the details.

Minor ChangesFleetwood Homes
Docket No. FR-4886-P-01

- .103(b)(4)(i) – “Maximum ~~zone~~ zone rating of 1.0; and”
- .305(c)(3)(i)(B) – For the Middle Roof Zone arrange the states alphabetically and the counties within the state alphabetically, as was done for the Wind Zone II and III.
- .305(c)(3)(i)(C) – “The states and counties that are not listed for the ~~Middle North~~ Middle North Roof Load Zone in paragraph (c)(3)(i)(A) of this section, or the ~~North Middle~~ North Middle Roof Load Zone in paragraph (c)(3)(i)(B) of this section are deemed to be within the South Roof Load Zone.”
- .305(e)(2) – (second sentence) – “....or by a combination of ~~with~~ 0.016 inch base metal.....”
- .604(b)(2) – (third from last item) – “Performance requirements for Pipe Applied Atmospheric Type Vacuum Breakers – ASSE 1001 ~~ASSE/ASNI~~ ANSI – 1990”
- .715(e) – Change the spelling of “grills” back to “grilles”. It remains “grilles” in (e)(2), and it remains “grilles” in .208(b)(3).
- One Piece Metal Roof - There is some confusion about this change in regards to the *Federal Register*. On page 70034 in HUD’s comments this change is listed as new footnote 9 to the Table of Design Wind Pressures, yet on page 70038 where the actual text is shown it is a new subsection (C) to .305(c)(1)(ii). It appears that the new subsection (C) is a more reasonable location than in a footnote for this information.

Requested Comments
Fleetwood Homes
Docket No. FR-4886-P-01

In several locations throughout the *Federal Register* HUD asked for additional public comments. These are Fleetwood's responses to some of those requests.

New Test Protocols – On page 70017 of the *Federal Register* comments were requested concerning whether DAPIAs should be allowed to approve alternate test methods or should they be approved first by HUD. The DAPIAs should retain this responsibility for the following reasons:

- The approval process under the old 303(g) was problematic as far as timing. HUD has a very poor record for timely responses to proposed test methods.
- There is virtually no advantage to having HUD approve a test method instead of the DAPIA. The third-party is already tasked by the Regulations with approving all calcs and tests for the home manufacturer. Why does HUD doubt their suitability in this case?
- The DAPIA need only review the test protocol in relation to the home manufacturer's package of details. It can make a more informed review of the actual application in this case than HUD.
- Under the previous 303(g) procedures HUD had to review a new protocol in relation to the entire industry. This is very time consuming and is probably not necessary in most cases.
- HUD needs to apply its limited resources on other more pressing matters.
- HUD will still be able to review and challenge any new testing protocol just as it is empowered to do presently for any details, calculation, or test that are already approved by the DAPIA.

Strapping/Fastening in Wind Zone II & Wind Zone III (WZII/III) – Also on page 70017 of the *Federal Register* comments were requested whether or not testing should be required for "critical connections in high wind regions." It is not clear why these connections cannot be justified by calculations or tests acceptable to the DAPIA. In fact it is generally accepted that calculations are more conservative than tests. It may also be confusing as to which connections are "critical". It seems that most connections are critical for all wind zones. The MHCSS already requires PE stamps on all WZII/III calculations, tests and details. There is no need to impose some additional testing criteria for "critical connections."

MHCC Rejections – On page 70033 of the *Federal Register* comments are requested concerning HUD's handling of the MHCC recommendations, especially HUD's rejection of one (formaldehyde notice) and heavy modification of another (fireblocking). It does not seem unusual for HUD to slightly modify an MHCC proposal. There could always be some small technical detail or slight conflict with other portions of the HUD standard that needs to be addressed. But it seems very unusual for HUD to reject entirely any item that has gone through both HUD's designated NFPA consensus process and then the MHCC process, especially since HUD staff participates in both processes. It would seem that HUD would make better use of their resources to raise their objections during these processes while adjustments could be made rather than reject a proposal after it has been formally transmitted to HUD.

Metric – Also on page 70033 of the *Federal Register* comment is sought on the use of metric units of measure. Under no circumstances should HUD consider adding the alternate metric

equivalents to the MHCC. One only has to look at NFPA 501 and its parallel use of metric equivalents to see how cumbersome and error-prone such a practice is. There appears to be no one in the construction industry who is using metric dimensions.



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Document Detail: HUD-2004-0012-0003

Agency Docket Number:

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Document ID: HUD-2004-0012-0003

Docket ID: HUD-2004-0012

Title: Comment focusing on changing reference standards to meet design specification and keeping the code more current submitted by Lynne Walshaw, Ritz-Craft Corporation

Description: This comment is included entirely within this index record. There is no PDF.

Type: Public Comment

Phase: Proposed Rule

Company/Group/Association Name: Ritz-Craft Corporation

Author Date (mm/dd/yyyy): 12-07-2004

Effective Date:

Comment: Change the reference to APA 51 "Plywood Design Specification" to APA D510 "Panel Design Specification" APA D510 incorporates the use of ALL Structural Use Panels, not just Plywood. Use 2001 Edition of NDS along with appropriate supplements. This will keep the HUD code more current, as the 2001 edition will be adopted by most code writing bodies within the next year or so.

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Document Detail: HUD-2004-0012-0024

Agency Docket Number:

Agency Document Number:

Document ID: HUD-2004-0012-0024

Docket ID: HUD-2004-0012

Title: Comment submitted by Michael Lubliner, Northwest Energy Efficiency Alliance

Description:

Type: Public Comment

Phase: Proposed Rule

Company/Group/Association Name: Northwest Energy Efficiency Alliance

Author Date (mm/dd/yyyy): 01-31-2005

Effective Date:

The proposed rule will improve indoor air-quality, reduce energy consumption associated with mechanical ventilation systems, and provide crucial consumer education. Proper consumer use of quiet, reliable whole house exhaust fans will reduce mold problems associated with internally generated moisture, and indoor air pollutant concentrations. The proposed whole house ventilation strategy has been successfully employed in over 100,000 HUD-code homes built in the Pacific Northwest, since 1990.

Comment:

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Document Detail: HUD-2004-0012-0027

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Document ID: HUD-2004-0012-0027

Docket ID: HUD-2004-0012

Title: Comment submitted by Michael Lubliner, Northwest Energy Efficiency Alliance

Description:

Type: Public Comment

Phase: Proposed Rule

Company/Group/Association Name: Northwest Energy Efficiency Alliance

Author Date (mm/dd/yyyy): 01-31-2005

Effective Date:

The proposed rule to permit window manufacturers the alternative to use NFRC 100 to rate window energy performance is a step in the right direction. The rule should also eliminate reference to AAMA 1500, because: 1) The majority of manufacturers have moved to NFRC. 2) NFRC supported by USDOE and EPA Energy Star. 3) HUD is the only federal agency still relying on AAMA 1500 thermal performance 4) NFRC-100 labels provide consumers, plant, and IPIA data on the window, while AAMA does not.

Comment:

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Title: Comment submitted by Michael Lubliner, Northwest Energy Efficiency Alliance

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Phase: Proposed Rule

Company/Group/Association Name: Northwest Energy Efficiency Alliance

Author Date (mm/dd/yyyy): 01-31-2005

Effective Date:

HUD should reconsider its rejection. The removal of the Health Notice would likely be supported by the

Comment: findings in NIST IAQ manufactured housing research for HUD's Healthy House program. Did HUD consult with NIST before rejecting the MHCC proposal?

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Docket ID: HUD-2004-0012

Title: Comment submitted by Michael Lubliner, Northwest Energy Efficiency Alliance

Description:

Type: Public Comment

Phase: Proposed Rule

Company/Group/Association Name: Northwest Energy Efficiency Alliance

Author Date (mm/dd/yyyy): 01-31-2005

Effective Date:

The proposed rule to amend 3280.715(c) to help ensure ductwork is "substantially air tight" will save large amounts of energy for individual consumers and the roughly 200,000 HUD code homes built each year in the US. These improvements have been shown to be very cost-effective in the USDOE Building America and USEPA Energy Star programs, when combined with HUD/IPIA and/or factory QA duct leakage testing.

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Agency : HOUSING AND URBAN DEVELOPMENT DEPARTMENT
Title : Manufactured Home Construction and Safety Standards
Subject Category : Manufactured home construction and safety standards: Manufacturing Housing Consensus Committee recommendations
Docket ID :
CFR Citation : 24 CFR 3280
Published : December 01, 2004
Comments Due : January 31, 2005
Phase : PROPOSED RULES

Your comment has been sent. To verify that this agency has received your comment, please contact the agency directly. If you wish to retain a copy of your comment, print out a copy of this document for your files.

Please note your REGULATIONS.GOV number.
Regulations.gov #: EREG - 6 Submitted Jan 28, 2005

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Author : Mr. Nelson Steiner
Organization : Florida Manufactured Housing Association
Mailing Address : 2958 Wellington Circle N., Suite 100
Tallahassee, FL 32309
US

Attached Files :

Comment : January 28, 2005

Regulations Division
Office of General Counsel
Room 10276
Department of Housing and Urban Development
451 Seventh Street SW
Washington, DC 20410-0500

RE: Docket Number FR-4886-P-01
RIN Number 2502-AI12
Manufactured Home Construction and Safety Standards

COMMENTS OF THE FLORIDA MANUFACTURED
HOUSING ASSOCIATION

Introduction

The Florida Manufactured Housing Association (FMHA) respectfully submits comments in response to the proposed rulemaking that was noticed in the Federal Register on December 1, 2004 (69 FR 70015-70050).

FMHA represents all segments of the manufactured housing industry, including home manufacturers, retailers, community operators and developers, service and supplier firms, and those providing financing and insurance. Through November of 2004, Florida was taking delivery of 8.5% of the homes produced in the U.S. (14,113 out of 121,351 Source: National Conference of States on Building Codes and Standards). As such a major consumer of these homes, Florida is heavily impacted by the outdated, 20-year-old formaldehyde health notice requirement that is addressed in this rulemaking.

General Comments

The FMHA subscribes completely to the comments being filed by the Manufactured Housing Institute (MHI) in response to this Notice of Proposed Rulemaking. FMHA i

s an active member of MHI, and very strongly supported creation of the Manufactured Housing Consensus Committee (MHCC) which has included removal of the formaldehyde notice among its 20 recent recommendations for updating the Manufactured Housing Construction and Safety Standards (HUD Code). FMHA is confident that when the Department is provided with the data and studies used by the MHCC as the basis for its recommendation, the Department will agree that posting of the formaldehyde health notice should no longer be required, and the best interests of the public would be served by continuing to include the contents of the notice in the consumer manual as required by 3280.309 (d).

Page Two

Specifically, FMHA urges the Department to carefully consider the following factors (which are expanded upon in the comments submitted by MHI):

- , The HUD Code is the only model building code in the country that regulates formaldehyde emissions in building materials.
- , Changes over the past 20 years of the materials used in manufactured homes; very little urea formaldehyde bonded plywood of the kind being extensively used in 1985 is still being used.
- , Increase in home ventilation rates pursuant to the HUD Code revisions of 1994, which effectively dilute any indoor pollutants.
- , Home size, which has increased since 1985, when HUD Code homes were small in comparison to site-built dwellings. The larger the living space, the more any possible pollutants are diluted.
- , In cases where they are still used, urea formaldehyde bonded wood-based products have had their emission rates dramatically reduced through HUD's own emission limitations.

FMHA suggests that close attention be paid to the most recent study done on formaldehyde levels in our industry's current homes, done by the Manufactured Housing Research Alliance, and entitled Formaldehyde Concentrations in Manufactured Homes: The Current Situation.

The FMHA stands ready to assist the Department, in any feasible way to justify withdrawal of a requirement that has outlived its usefulness over the past two decades.

Respectfully submitted,

Nelson Steiner, President
Florida Manufactured Housing Association

Clayton

January 30, 2005

Regulations Division
Office of General Counsel
Room 10276
Department of Housing and Urban Development
451 Seventh Street, SW
Washington, DC 20410-0500

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Re: **Docket No. FR-4886-P-01**
RIN Number 2502-A112
Manufactured Home Construction and Safety Standards

Clayton Homes respectfully submits comments in response to the notice of proposed rulemaking, as provided in the Federal Register of December 1, 2004, (69 FR 70015 - 70050).

Simply stated, Clayton Homes is in full support and agreement with the comments and responses made by Mr. Mark Nunn, Vice President of Technical Activities for MHI, in his letter to the Regulations Division dated 1/24/05.

We wish to elaborate further on three items in particular that we feel the most strongly about, the first of which is HUD's proposal to reject the MHCC recommendation to eliminate the formaldehyde health notice posting in HUD Code homes. By all indications, as proven by the study performed by the Manufactured Housing Research Alliance (MHRA) completed in July 2004, the notice is no longer applicable or relevant to our product. The combined affect of new materials, increased ventilation rates, larger homes, improvements to the formaldehyde emissions of plywood and particleboard, and lower concentration levels of formaldehyde in HUD code homes (as recently tested), all support the MHCC recommendation to remove the requirement for displaying the formaldehyde health notice posting.

Secondly, we oppose the proposed roof truss testing procedures on the grounds that such changes do not increase the value or safety of our homes to the consumer. We have no evidence to indicate that increasing safety factors on trusses will provide a better quality truss. In the rare instance that we experience roof or ceiling problems in our homes, associated with trusses, the general fabrication quality of the truss is most often the culprit. However, increasing the safety factor and applying more stringent testing guidelines to trusses does not ensure better quality of materials or fabrication. While the cost of the proposed change is debatable, it is without question a cost that the consumer will end up paying, without commensurate added value. The process, cost, and time of re-qualifying literally thousands of truss designs would prove detrimental to our company, all manufacturers, truss suppliers, and in the end our customers.



CMH Manufacturing, Inc

Mailing Address: Box 9780 - Maryville, Tennessee 37802 Street Address: 5000 Clayton Road - Maryville, Tennessee 37804
Phone: 865.380.3000 FAX: 865.380.3781 or 865.380.3782



Clayton

Third, the Waiver for Condensation Control (§3280.504(b)(4)) is very much needed in our industry to allow proper application of vapor retarders on the exterior side of walls in the Atlantic & Gulf coast "high humidity" regions of the country. However, as written, the waiver is useless by not excluding back splashes, tub/ shower surrounds, cabinets, and hardwood paneling from the 5.0 minimum perm rating required for interior surfaces when the waiver is used. There is literally no practical way to build a home in compliance with the waiver without these necessary exclusions.

Finally, we commend HUD and the MHCC for establishing a much needed consensus process for proposing changes to the MHCSS, and look forward to future necessary revisions and improvements to the standards and regulations.

Sincerely,

Mark Ezzo, P.E.
CMH Manufacturing, Inc.
Vice President – Engineering



CMH Manufacturing, Inc

Mailing Address: Box 9780 · Maryville, Tennessee 37802 · Street Address: 5000 Clayton Road · Maryville, Tennessee 37804
Phone 865.380.3000 · FAX 865.380.3781 or 865.380.3782



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January 31, 2005

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Regulations Division
Office of General Counsel, Room 10276
Department of Housing and Urban Development
451 Seventh Street, SW.
Washington, DC 20410-0500

Submitted Electronically

Re: Manufactured Home Construction and Safety Standards; Proposed Rule –
Federal Register December 1, 2004

Alcan Composites appreciates the opportunity to respond to the referenced Proposed Rule. Comment is focused on Section 3280.504 – Condensation control and installation of vapor retarders.

The proposed rule for 3280.504 has two areas that require revision.

1. The proposed paragraph (4) which allows a vapor retarder to be “. . . installed on the exterior side of the insulation in “humid climates” or “fringe climates” . . .”, does not resolve the problem of moisture laden air condensating on the exterior side of interior walls.
2. Additionally paragraph (3), which allows for ventilating walls should be removed for any climate zone.

Area 1. By focusing on a “vapor retarder” the Department has limited the performance measure to reducing moisture flow to vapor pressure only. Vapor retarder performance is measured by permeability, which is the capability of a product or group of products to not allow moisture, in a gaseous state, to pass through them. Limiting moisture problem resolution to just vapor pressure focuses only on the smaller part of the moisture movement problem in humid areas. Paragraph (4) does not address any effective construction measure to reduce the larger problem of air movement into the wall cavity. The performance measure that would impact the reduction of air movement would be the use of a continuous air barrier. Homes have been observed in the gulf coast with low permeable wood sheathings, and they have experienced moisture problems because the wood sheathing is installed with a required gap to allow for expansion and contraction. These expansion and contraction seams should be the focus not just vapor pressure. Existing testing, funded by the Department (Minimizing Moisture Problems in Manufactured Homes Located in Hot, Humid Climates), has shown that there are large swings in pressures in the home when mechanical equipment is operated. These pressures create air movement that negatively impact the home and draw moisture-laden air through construction seams. This much larger problem is not dealt with by paragraph (4).



Page 2

Comments - Manufactured Home Construction and Safety Standards; Proposed Rule – Federal Register
December 1, 2004

Area 2. The use of ventilated walls should be removed for two reasons. First, there is no ventilation rate or calculated method shown that provides a minimum performance to reduce an amount of moisture. How much flow of air is needed through what size of vent to alleviate moisture build-up in walls? Second, whole house testing has shown that air movement created by negative pressure draws moisture through construction seams. The creation of even more pathways by ventilating the wall will allow even more moisture to be drawn into the walls. Ventilated wall cavities exacerbate air movement and create more moisture problems.

HUD should not promulgate the changes to 3280.504 until the final testing phase of a HUD program on moisture migration in gulf coast homes is completed. With the completion of this final phase, questions of reduced pressure in the home and moisture movement can be more effectively answered. From this data more meaningful and comprehensive performance measures can be implemented.

Sincerely,

Mike McKittrick
Product Manager

COMPOSITE PANEL ASSOCIATIONSM
North American producers of particleboard, MDF, hardboard and other compatible products.

Comments HUD Proposal 120104



*This comment
came w/ additional
material. Please
Come to Rm. 10276
if you wish to see
it.*

25

January 28, 2005

William W. Matchneer III
Administrator, Office of Manufactured Housing Programs
Department of Housing and Urban Development
Regulations Division, Office of General Counsel,
451 Seventh Street, SW., Room 10276
Washington, DC 20410-0500.

HUD RULES DOCKET
FEB 2 10 27 AM '05
REC'D

Dear Administrator Matchneer:

Thank you for giving the Composite Panel Association (CPA) an opportunity to comment on the proposal to update the Chapter 24 CFR 3280 of the Manufactured Home Construction and Safety Standards, published in the Federal Register on December 1, 2004, docket number FR-4886-P-01. The CPA represents 92% of the North American particleboard, hardboard and medium density fiberboard (MDF) manufacturing capacity in the United States, Canada and Mexico and is the sponsor for the ANSI standards that cover each of these products. The composite panel industry operates over 50 facilities in 22 states. Composite panel products are extensively used in cabinetry, countertops, molding, furniture, shelf and stair systems, flooring and many other applications.

The CPA supports the efforts by HUD to update the standards references in 24 CFR 3280 and in particular the particleboard (ANSI A208.1) and hardboard (ANSI A135.4, ANSI A135.5 and ANSI A135.6) standards. We have two principal reasons for providing comments:

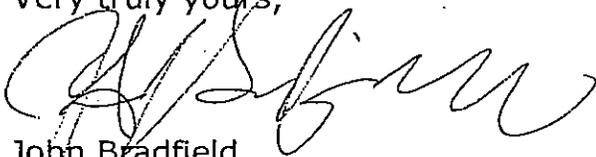
1. **The Final Rule should contain the most recent update.** Two of the standards referenced in the proposal have recently been updated:
 - a. **Basic Hardboard.** ANSI/AHA 134.4-1995 is now ANSI 134.4-2004 (note the AHA reference has been dropped).
 - b. **Prefinished Hardboard Paneling.** ANSI/AHA 134.5-1995 is now ANSI 134.5-2004. (note the AHA reference has been dropped).

2. **The Final Rule should contain a reference for MDF.** MDF is a commonly used material for built-in cabinets and moldings in manufactured homes. Furthermore, MDF is a common core material used in Hardwood Plywood, ANSI/HPVA HP-1, and another standard that is referenced in 24 CFR 3280. A reference to Medium Density Fiberboard (MDF) For Interior Applications, ANSI A208.2-2002 should be added to §3280.304(b) (1).

Copies of each of these standards are enclosed.

We believe HUD's should take prompt action to update the standards references in 24 CFR 3280, which date back to the early 1990's. We encourage the Department to promptly finalize the revision to the Manufactured Home Construction and Safety Standards and ask that the editorial changes noted above be included.

Very truly yours,

A handwritten signature in black ink, appearing to read "John Bradfield", written over a faint, illegible typed name.

John Bradfield
Director of Environmental Affairs

Enclosure



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Docket ID: HUD-2004-0012

Title: Comment submitted by Michael Lubliner, Northwest Energy Efficiency Alliance

Description:

Type: Public Comment

Phase: Proposed Rule

Company/Group/Association Name: Northwest Energy Efficiency Alliance

Author Date (mm/dd/yyyy): 01-31-2005

Effective Date:

HUD should reconsider its rejection. The removal of the Health Notice would likely be supported by the findings in NIST IAQ manufactured housing research for HUD's Healthy House program. Did HUD consult with NIST before rejecting the MHCC proposal?

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Phase: Proposed Rule

Company/Group/Association Name: Northwest Energy Efficiency Alliance

Author Date (mm/dd/yyyy): 01-31-2005

Effective Date:

Comment:

The proposed rule to permit window manufacturers the alternative to use NFRC 100 to rate window energy performance is a step in the right direction. The rule should also eliminate reference to AAMA 1500, because: 1) The majority of manufacturers have moved to NFRC. 2) NFRC supported by USDOE and EPA Energy Star. 3) HUD is the only federal agency still relying on AAMA 1500 thermal performance 4) NFRC-100 labels provide consumers, plant, and IPIA data on the window, while AAMA does not.

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Document Detail: HUD-2004-0012-0028

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Docket ID: HUD-2004-0012

Title: Comment submitted by Harold Woodside, R-Anell Housing Group, LLC

Description:

Type: Public Comment

Phase: Proposed Rule

Company/Group/Association Name: R-Anell Housing Group, LLC

Author Date (mm/dd/yyyy): 01-31-2005

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Comment:

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Last updated on Tuesday, August 10, 2004

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Agency : HOUSING AND URBAN DEVELOPMENT DEPARTMENT
Title : Manufactured Home Construction and Safety Standards
Subject Category : Manufactured home construction and safety standards: Manufacturing Housing Consensus Committee recommendations
Docket ID :
CFR Citation : 24 CFR 3280
Published : December 01, 2004
Comments Due : January 31, 2005
Phase : PROPOSED RULES

Your comment has been sent. To verify that this agency has received your comment, please contact the agency directly. If you wish to retain a copy of your comment, print out a copy of this document for your files.

Please note your REGULATIONS.GOV number.
Regulations.gov #: EREG - 7 Submitted Jan 31, 2005

Author : Mr. Harold Woodside
Organization : R-Anell Housing Group, LLC
Mailing Address : PO Box 428
Denver, NC 28037
US
Attached Files :

Comment : Section 3280.709

There is no substantiation that a water heater pan should be required in all cases. It should be limited only to cases where a water heater is located over a basement or in the rare case where the water heater is located over a conditioned space of the home. As a general rule, manufacturers are using engineered decking panels that are manufactured with exterior grade glue. If the rule is adopted it should match the model building codes that only require the pan when the water heater is located over a conditioned space.

Revisions to Standards Incorporated by Reference

AFPA 1997 Manual for Engineered Wood Construction Recommend that this standard is updated to the latest 2001 version. By updating to the latest version, manufacturers could better take advantage of utilizing and sharing designs with modular packages.

AFPA 1993 Design Values for Joists and Rafters Again this reference standard should be updated to the 2001 version.

ANSI/TPI 1 1990 This standard has been removed from the list of reference standards. Currently all truss designs utilize this standard. An alternate and current replacement should be referenced.

1996 NEC This standard should be updated to the latest version of the NEC.



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MANUFACTURED HOUSING
2005 MAR 11 A 3:32

March 3, 2005

Regulations Division
Office of General Counsel
Room 10276
Department of Housing and Urban Development
451 Seventh Street, SW
Washington, DC 20410-0500

Re: Docket No. FR-4886-P-01
RIN Number 2502-AI12
Manufactured Home Construction and Safety Standards

Introduction

The Manufactured Housing Institute (MHI) respectfully submits supplemental comments in response to the notice of proposed rulemaking (NPRM) noticed in the *Federal Register* of December 1, 2004, (69 FR 70015 – 70050). MHI filed its original docket comments on January 28, 2005. Even though the docket specified a public comment deadline date of January 31, 2005, MHI believes the department should be privy to any such information that may provide insight into rendering a decision on the revised roof truss test protocol proposed to 24 CFR 3280.402. This supplemental information is found at Enclosure I.

General Comments

The Manufactured Housing Consensus Committee (MHCC) was the organization that provided the department with the list of 20 standards issues found in the December 2004 NPRM. This NPRM is the first set of MHCC recommended changes put forth through the federal rulemaking process for public comment. Although MHI, and its MHCC representatives, did not articulate any objections to the revised roof truss test protocols noticed at pp. 70040 – 70043 during committee deliberations, new information has come to light for departmental review concerning this issue.

MHI obtained a consultant, RADCO Incorporated, to undertake a study of the performance of post-1994 HUD Code manufactured homes after Hurricane Charley made landfall on the Florida western coast in August 2004. This report entitled The Performance of Post-1994 HUD Code Manufactured Homes During Hurricane Charley: A Success Story, dated January 26, 2005, is provided at Enclosure I. The attached RADCO report revealed that manufactured homes produced and installed in accordance with the current Federal Standards successfully withstood the effects of Hurricane Charley. All homes inspected remained structurally sound, including roof structures, with minor damage to roof shingles and vinyl siding in some instances. The foundation and anchorage systems performed extremely well and there was no evidence of movement as homes continued to be adequately anchored and supported.

There appears to be no roof truss failures as a result of Hurricane Charley for manufactured housing designed and constructed to the HUD Code (post-1994) requirements. The homes investigated withstood the test of hurricane force winds with roof structures composed of assemblies tested to the existing roof truss certification requirements found in 24 CFR 3280.402. The RADCO report provides ample

empirical results that the current roof truss test protocols may not need to be revised, and status quo still provides safe and structurally sound roof truss systems for use in manufactured homes.

Conclusions

Therefore, in addition to comments expressed in our January 28, 2005 letter, and this more recent empirical evidence at Enclosure I, MHI has come to the conclusion that the recommended revised roof truss test protocol still warrants further study and evaluation by the MHCC before implementation into the HUD Code.

HUD should again be applauded for publishing these changes for updating the HUD Code. MHI, and the industry at large, hopes that this is the first of many continual updates. If there are any questions concerning the above comments, MHI will be happy to address them with the department staff.

Sincerely,

A handwritten signature in black ink, appearing to read "Mark A. Nunn", with a long horizontal flourish extending to the right.

Mark A. Nunn
Vice President – Technical Activities

cc: Bill Matchneer w/Enclosure
Liz Cocke w/Enclosure



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**THE PERFORMANCE OF POST-1994 HUD CODE
MANUFACTURED HOMES DURING HURRICANE CHARLEY:
A SUCCESS STORY**

Prepared by RADCO

Under contract with the

Manufactured Housing Institute
2101 Wilson Boulevard, Suite 61
Arlington, VA 22201

Report revised January 26, 2005



the airport and to a factory industrial building a quarter mile to the west of the Ventura Lakes.

RADCO also performed a limited review of homes at three other manufactured home communities in Punta Gorda: Riverside Oaks, which is located across Jones Loop Road immediately to the south of Ventura Lakes; Windmill Villa, which is approximately 5 miles west of Ventura Lakes; and Pelican Point, which also is approximately 5 miles west of Ventura Lakes. Hurricane Charley caused major damage to commercial buildings in the immediate vicinity of Windmill Villa and Pelican Point.

IV. INSPECTION IN VENTURA LAKES

There presently are 253 homes in Ventura Lakes, all of which were built and installed since July of 1999. Therefore, all of these homes were designed and built according to the current Federal Standards. The vast majority of the homes in Ventura Lakes are comprised of two factory-produced modules that are joined together on site to make a complete home (i.e., "double wide homes"). There are a few three-module homes (i.e., "triple wides"). There are no single module homes ("single wides") in this community. All of the homes have vinyl siding and composite shingle roof coverings.

The foundation systems for all homes in this community consist of concrete masonry piers installed beneath the main rails (I-beams) of the steel frame (chassis) of each module of the home. There also are piers installed at key load bearing points along the mate lines, where two modules of the home are joined together. The first twenty or so homes installed in Ventura Lakes were anchored using the traditional system of diagonal frame ties and ground anchors, combined with the vertical tie downs required by the Federal Standards. The rest of the homes are anchored using a proprietary anchoring system that includes ground anchors, straps and metal braces. All homes include non-load bearing masonry skirting around the entire perimeter of the home, with ventilation provided per local code.

The majority of the homes have one or more of the following site-built amenities attached to the factory built portion of the manufactured home: carport; screened porch; storage room. Inspection revealed that the overwhelming majority of the wind damage in Ventura Lakes was inflicted upon these site built amenities.

The inspection of homes throughout the entire Ventura Lakes community revealed that the homes performed very well during Hurricane Charley. There was no major damage to the factory built portions of the homes. All damage observed was repairable, and the homes were in livable condition. The minor damage to the factory built portions of the homes was limited to random and isolated loss of roof shingles and vinyl siding – which is typical for all types of housing (including site built housing) under hurricane winds, as well as under lower tropical storm winds.

Charley. The bolts that had anchored the lower framing members to the concrete slab remained imbedded in the concrete.

Many of the homes in Ventura Lakes have had site built storage sheds added to the homes. Several storage sheds lost their roofs during Hurricane Charley.

Inspection revealed that the structural damage to the site built amenities during Hurricane Charley typically caused secondary damage to the roofing and/or siding of the manufactured homes, because of the methods used to attach the amenities to the factory built portions of the homes. For example, when the wind removed a carport from a home, it often peeled off some of the siding, fascia and roofing where the carport had been attached to the home. In some cases the damage to the main portion of the home appeared to be limited to the fascia and siding at the top of the wall. In one extreme case, the homeowner reported that the loss of the carport also resulted in the loss of the roof shingles and the first two rows of roof sheathing along the edge of the roof. In other cases, the extent of the damage could not be determined, because the roofs had been covered with tarps to provide temporary weather protection until repairs could be made.

Based upon these observations, it appears that the design of the site built amenities and the methods used to anchor these to ground (or supporting concrete slabs or driveways) and to attach these to the manufactured homes need to be re-evaluated. These site built amenities should be free-standing structures, which are not attached to the manufactured home, unless the home manufacturer designs for and approves of such attachments.

Roof Shingles

As indicated above, many homes which lost carports and other attached amenities also lost some roof shingles along the edge of the roof, because the carports peeled away some of the adjacent fascia and roof coverings as they were being lifted off of the homes. The inspection of other portions of the roofs on these same homes and the overall inspection of roof coverings on other homes throughout the community indicated that, in general, the shingles remained well intact. There were a few isolated losses of random shingles, which is common when homes are exposed to high winds. By comparison, significant loss of shingles and tile roof coverings were observed on site built homes located in subdivisions approximately 3 to 4 miles to the west of Ventura Lakes.

Vinyl Siding

Many of the homes that lost carports also lost vinyl siding along the upper portions of the walls, where the carports had been attached to the homes. This apparently was due to the ripple effects of the carports being lifted off of the homes, and then pulling other exterior coverings along with them. In a few extreme cases, the siding had been removed from the upper half of the wall, not just along the top one or two laps. Inspection of some of these homes revealed that the staples used to fasten the siding remained well imbedded into the exterior sheathing and framing members; the siding apparently had torn at the perforated fastening slots.

and vinyl siding in some instances. The foundation and anchoring systems performed extremely well. There was no evidence of movement, and the homes continued to be adequately anchored and supported.

The overwhelming majority of the wind damage to the homes was inflicted upon the site-built amenities that were attached to the homes, such as carports, screened porches and storage rooms. The failures of these amenities typically caused secondary damage to the roofing and/or siding of the manufactured homes, because of the methods used to attach the amenities to the factory built portions of the homes. The design and installation of these site-built amenities should be re-evaluated. These site built amenities should be free-standing structures, which are not attached to the manufactured home, unless the home manufacturer designs for and approves of such attachments.

Photo #3: Anchor bracket for carport post - house in photo #1

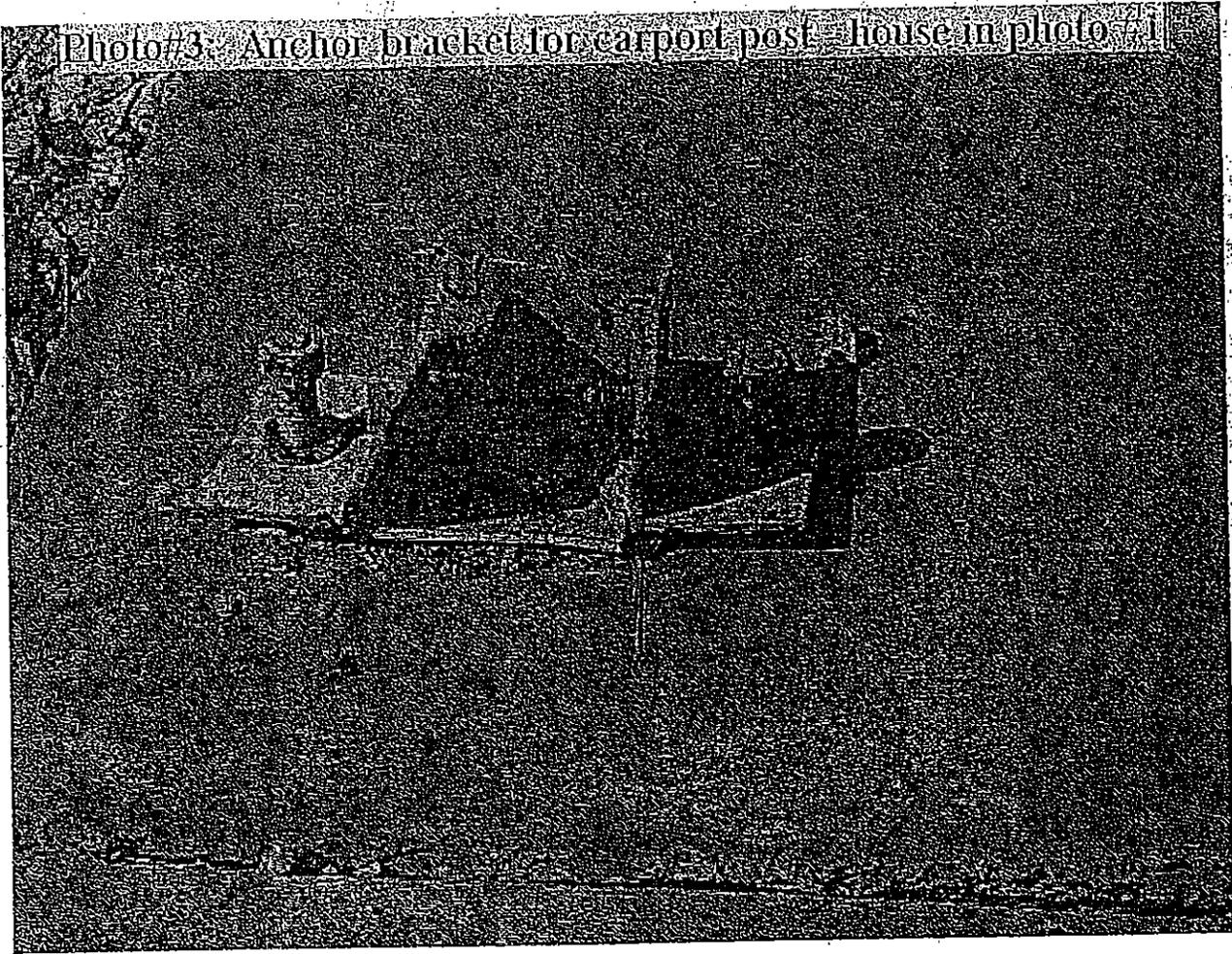


Photo #5. Carport missing. Shed roof missing

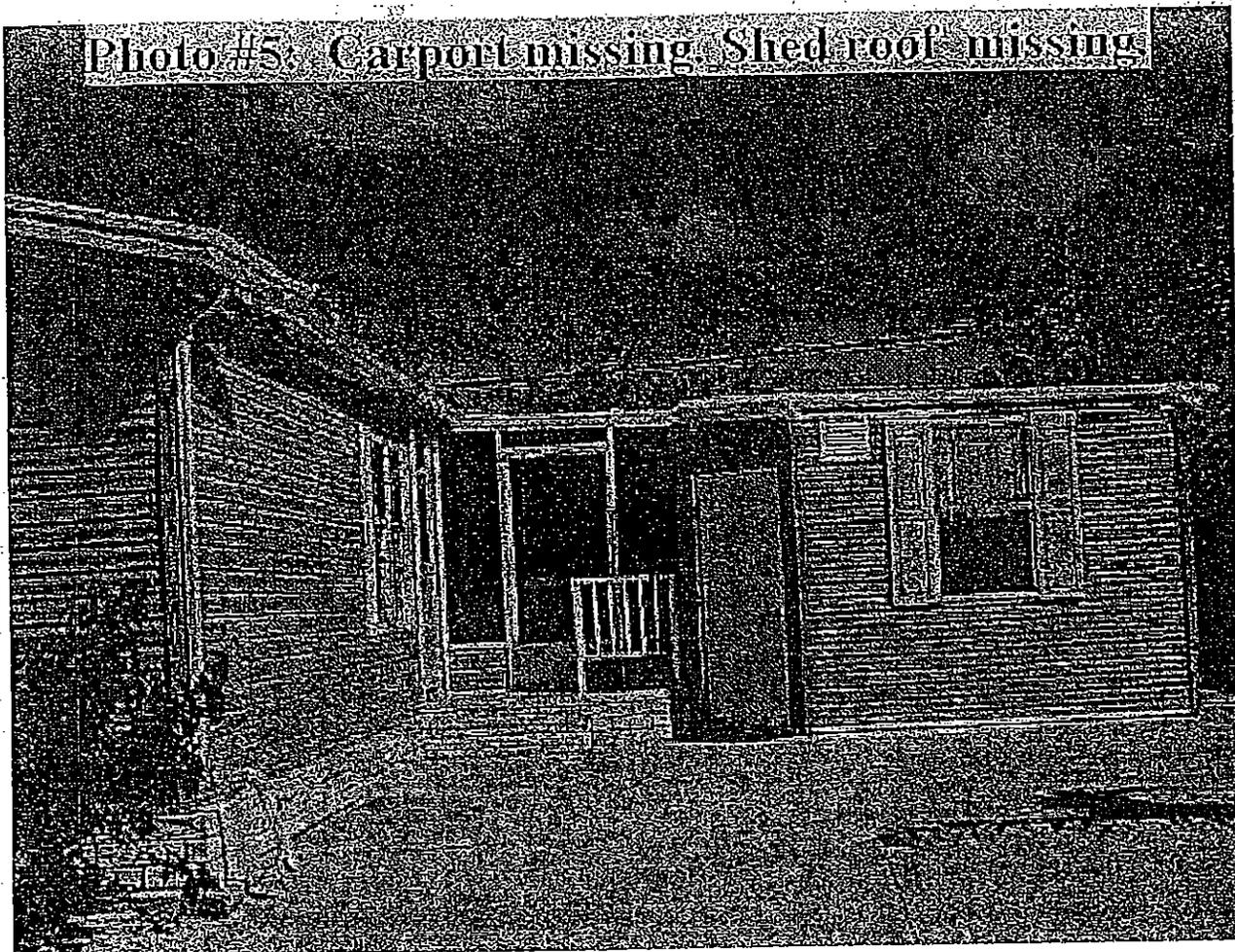


Photo #7: Screened porch missing

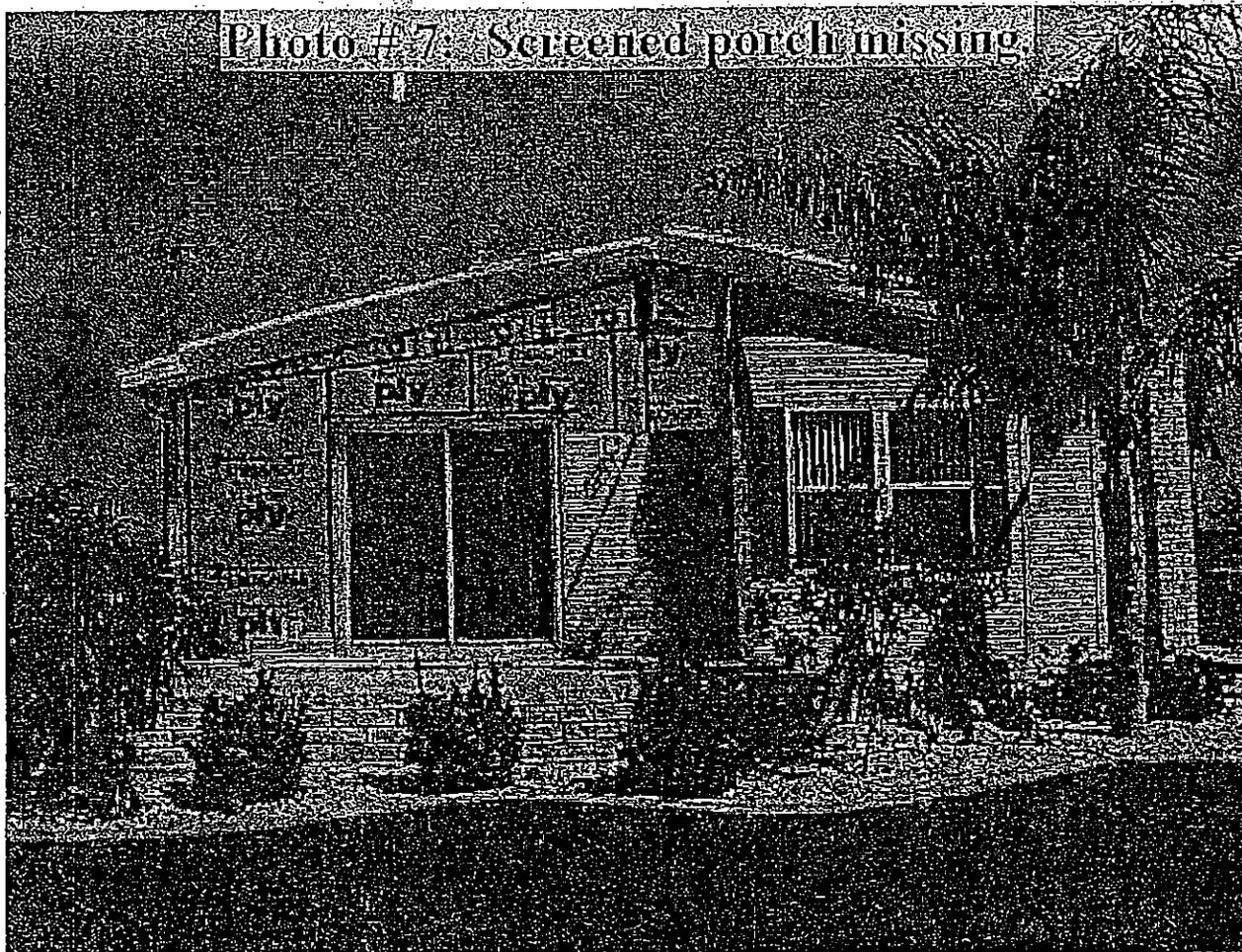


Photo # 9: New home being installed prior to Charley - No damage

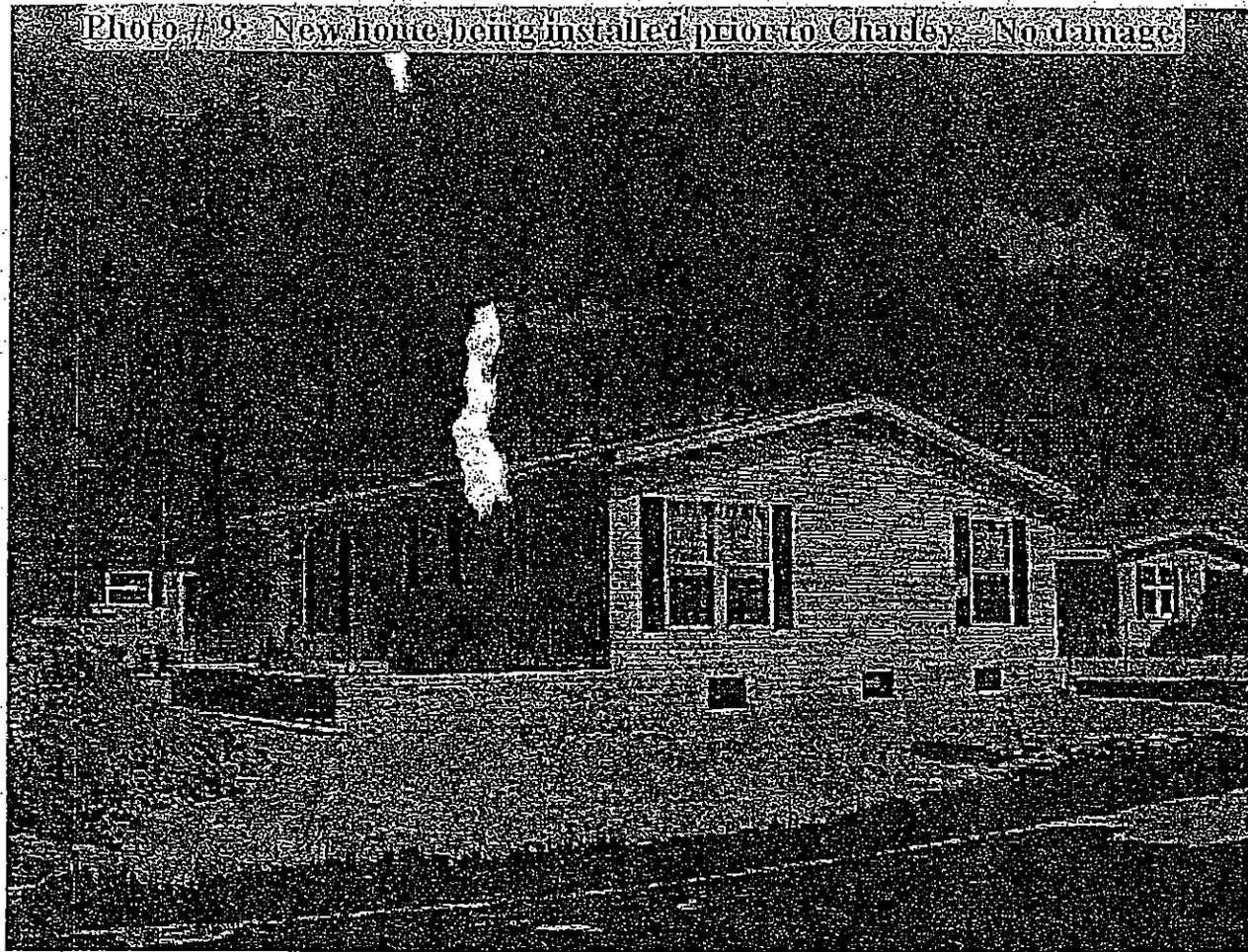


Photo # 11 - Siding missing in gable area



Photo # 13: Building at Charlotte County Airport

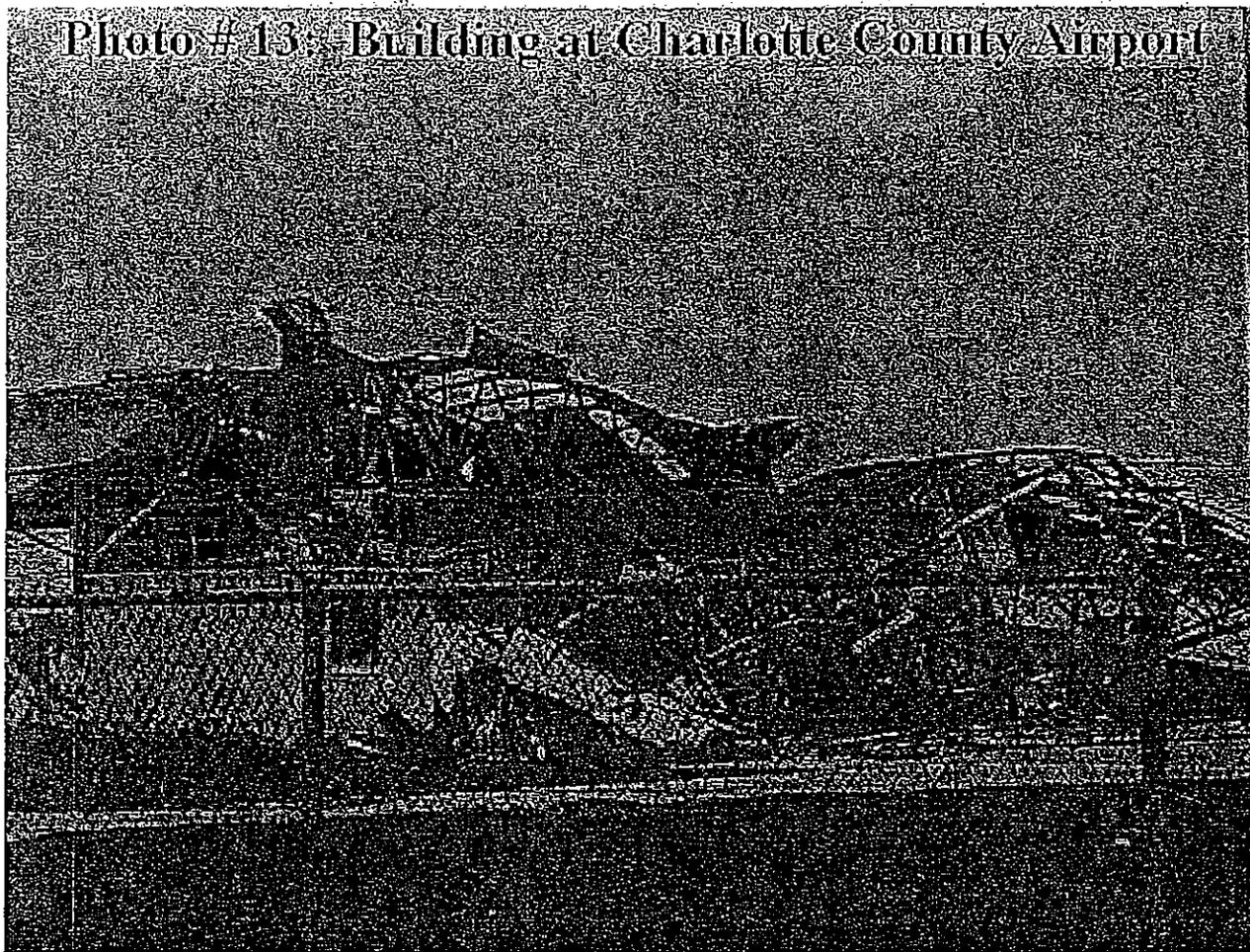


Photo # 15: Same house as Photo # 14. House on adjacent lot damaged.

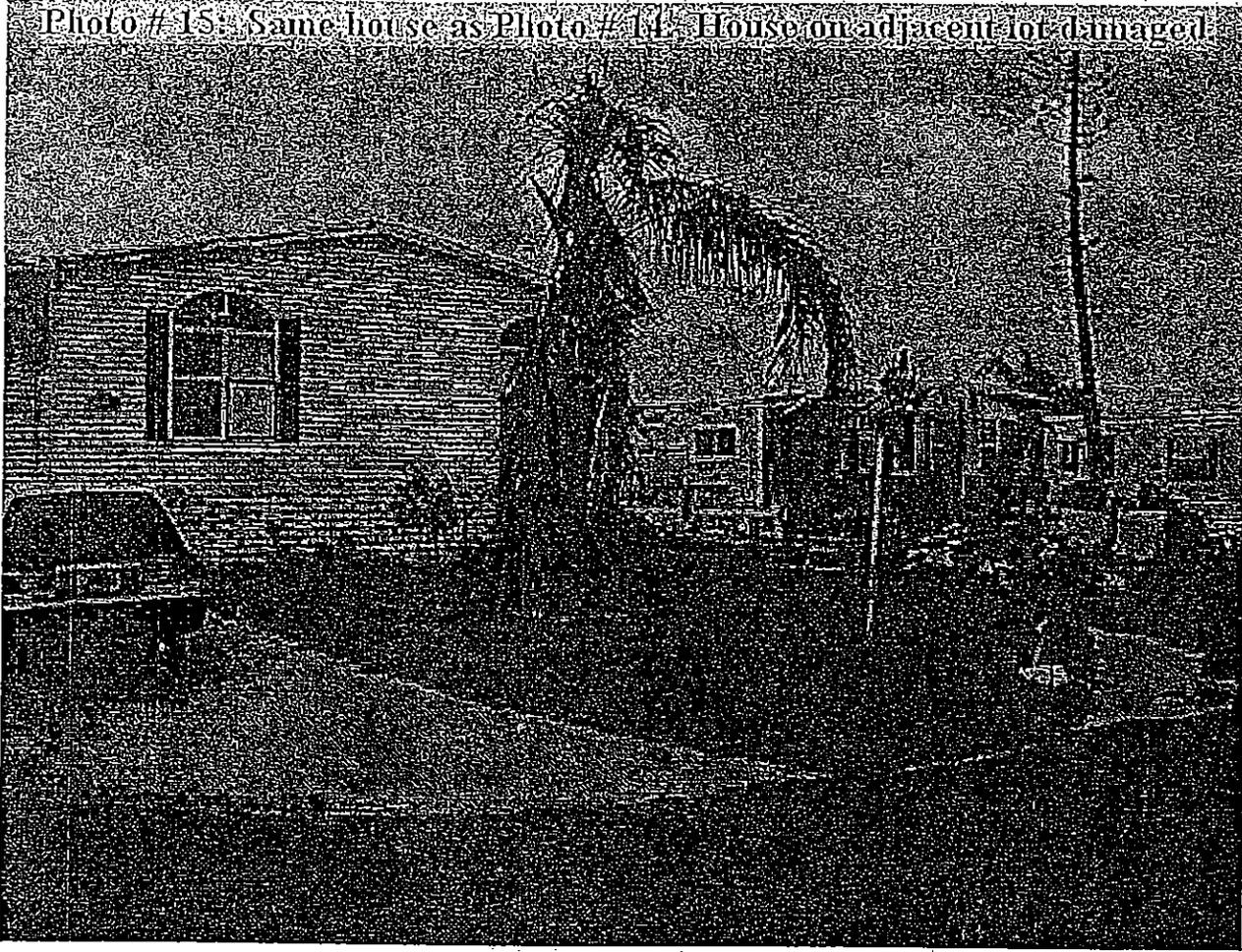


Photo # 17, 1996 Home in Pelican Point





Comment to Section 3280.306(b) proposed change -- Federal Register dated December 1, 2004.

29

Submitted By:

Richard St. Onge, Manager, Quality Audits & Evaluations, IBTS

Date Submitted:

March 23, 2005

Background

In this proposed section change, it is being proposed that the manufacturer provides in addition to its instruction with the each home each column support pier location along the marriage line of multi-section homes be identified.

There are still many floor system / chassis designs that require that the perimeter of the floor system be provide with piers to support the home. However, there has not been a definitive, uniform, and reliable method identified that indicates when this type of floor system requires perimeter support piers to be installed to adequately support the home once the home is in the field.

Recommendation

Consideration should be give to require a manufacturer to identify all locations under the home where piers would need to be provided to adequately support the home that is compatible with the particular floor / chassis system. In particular, when perimeter support is required along the perimeter of the floor the locations of the supports should be identified including large openings. The identification of support piers should not be limited to just the marriage line of multi-section homes. The identification of the support locations should be specific for the worst case roof loading condition that the home has been constructed to as indicated on the data plate.