

**Part 3280
Manufactured Home Construction and
Safety Standards**

**Part 3280
Interpretative Bulletins to the Standards**

**Part 3280, Manufactured Home Construction
and Safety Standards is excerpted from
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Housing and Urban Development**

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PART 3280
MANUFACTURED HOME CONSTRUCTION AND SAFETY STANDARDS

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Authority: 42 U.S.C. 3535(d), 5403, and 5424.

Source: 40 FR 58752, Dec. 18, 1975, unless otherwise noted. Redesignated at 44 FR 20679, Apr. 6, 1979.

Subpart A--General

§3280.1 Scope.

This standard covers all equipment and installations in the design, construction, transportation, fire safety, plumbing, heat-producing and electrical systems of manufactured homes which are designed to be used as dwelling units. This standard seeks to the maximum extent possible to establish performance requirements. In certain instances, however, the use of specific requirements is necessary.

[58 FR 55002, Oct. 25, 1993]

§3280.2 Definitions.

Definitions in this subpart are those common to all subparts of the standard and are in addition to the definitions provided in individual parts. The definitions are as follows:

Approved, when used in connection with any material, appliance or construction, means complying with the requirements of the Department of Housing and Urban Development.

Bay Window--a window assembly whose maximum horizontal projection is not more than two feet from the plane of an exterior wall and is elevated above the floor level of the home.

Certification label means the approved form of certification by the manufacturer that, under 3280.8, is permanently affixed to each transportable section of each manufactured home manufactured for sale in the United States.

Dwelling Unit means one or more habitable rooms which are designed to be occupied by one family with facilities for living, sleeping, cooking and eating.

Equipment includes materials, appliances, devices, fixtures, fittings or accessories both in the construction of, and in the fire safety, plumbing, heat-producing and electrical systems of manufactured homes.

Federal manufactured home construction and safety standard means a reasonable standard for the construction, design, and performance of a manufactured home which meets the needs of the public including the need for quality, durability, and safety.

Installations means all arrangements and methods of construction, as well as fire safety, plumbing, heat-producing and electrical systems used in manufactured homes.

Labeled means a label, symbol or other identifying mark of a nationally recognized testing laboratory, inspection agency, or other organization concerned with product evaluation that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling is indicated compliance with nationally recognized standards or tests to determine suitable usage in a specified manner.

Length of a Manufactured Home means its largest overall length in the traveling mode, including cabinets, and other projections which contain interior space. Length does not include bay windows, roof projections, overhangs, or eaves under which there is no interior space, nor does it include drawbars, couplings or hitches.

Listed or Certified means included in a list published by a nationally recognized testing laboratory, inspection agency, or other organization concerned with product evaluation that maintains periodic inspection of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

Manufacturer means any person engaged in manufacturing or assembling manufactured homes, including any person engaged in importing manufactured homes for resale.

Manufactured Home means a structure, transportable in one or more sections, which in the traveling mode, is eight body feet or more in width or forty body feet or more in length, or, when erected on site, is three hundred twenty or more square feet, and which is built on a permanent chassis and designed to be used as a dwelling with or without a permanent foundation when connected to the required utilities, and includes the plumbing, heating, air-conditioning, and electrical systems contained therein. Calculations used to determine the number of square feet in a structure will be based on the structure's exterior dimensions measured at the largest horizontal projections when erected on site. These dimensions will include all expandable rooms, cabinets, and other projections containing interior space, but do not include bay windows. This term includes all structures which meet the above requirements except the size requirements and with respect to which the manufacturer voluntarily files a certification pursuant to §3282.13 and complies with the standards set forth in part 3280. Nothing in this subsection should be interpreted to mean that a *manufactured home* necessarily meets the requirements of HUD's Minimum Property Standards (HUD Handbook 4900.1) or that it is automatically eligible for financing under 12 U.S.C. 1709(b).

Manufactured Home Construction means all activities relating to the assembly and manufacture of a manufactured home including, but not limited to, those relating to durability, quality and safety.

Manufactured Home Safety means the performance of a manufactured home in such a manner

that the public is protected against any unreasonable risk of the occurrence of accidents due to the design or construction of such manufactured home, or any unreasonable risk of death or injury to the user or to the public if such accidents do occur.

Registered Engineer or Architect means a person licensed to practice engineering or architecture in a state and subject to all laws and limitations imposed by the state's Board of Engineering and Architecture Examiners and who is engaged in the professional practice of rendering service or creative work requiring education, training and experience in engineering sciences and the application of special knowledge of the mathematical, physical and engineering sciences in such professional or creative work as consultation, investigation, evaluation, planning or design and supervision of construction for the purpose of securing compliance with specifications and design for any such work.

Secretary means the Secretary of Housing and Urban Development, or an official of the Department delegated the authority of the Secretary with respect to title VI of Pub. L. 93-383.

State includes each of the several States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, the Virgin Islands, the Canal Zone, and American Samoa.

Width of a Manufactured Home means its largest overall width in the traveling mode, including cabinets and other projections which contain interior space. Width does not include bay windows, roof projections, overhangs, or eaves under which there is no interior space.

[40 FR 58752, Dec. 18, 1975, as amended at 42 FR 960, Jan. 4, 1977. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 47 FR 28092, June 29, 1982; 58 FR 55002, Oct. 25, 1993; 61 FR 5216, Feb. 9, 1996]

§3280.3 **Manufactured home procedural and enforcement regulations and consumer manual requirements.**

A manufacturer must comply with the requirements of this part 3280, part 3282 of this chapter, and 42 U.S.C. 5416.

[61 FR 18250, Apr. 25, 1996]

§3280.4 **Incorporation by reference.**

3280.4(a)

The specifications, standards and codes of the following organizations are incorporated by reference in 24 CFR part 3280 (this Standard) pursuant to 5 U.S.C. 552(a) and 1 CFR part 51 as though set forth in full. The incorporation by reference of these standards has been approved by the Director of the

Federal Register. Reference standards have the same force and effect as this Standard (24 CFR part 3280) except that whenever reference standards and this Standard are inconsistent, the requirements of this Standard prevail to the extent of the inconsistency.

3280.4(b)

The abbreviations, and addresses of organizations issuing the referenced standards appear below. Reference standards which are not available from their producer organizations may be obtained from the Office of Manufactured Housing and Regulatory Functions, Manufactured Housing and Construction Standards Division, U.S. Department of Housing and Urban Development, 451 Seventh Street, SW., room B-133, Washington, DC 20410.

AA--Aluminum Association, 900 19th Street NW., suite 300, Washington, DC 20006.

AAMA--American Architectural Manufacturers Association, 1540 East Dundee Road, Palatine, Illinois 60067

AFPA [previously (N)FPA]--American Forest and Paper Association, 1250 Connecticut Avenue, NW., Washington, DC 20036 [previously named (N)FPA-National Forest Products Association]

AGA--American Gas Association, 8501 East Pleasant Valley Road, Cleveland, Ohio 44131

AISC--American Institute of Steel Construction, One East Wacker Drive, Chicago, IL 60601

AISI--American Iron and Steel Institute, 1101 17th Street, NW., Washington, DC 20036

AITC--American Institute of Timber Construction, 11818 SE Mill Plain Blvd., suite 415, Vancouver, Washington 98684

ANSI--American National Standards Institute, 1430 Broadway, New York, New York 10018

APA--American Plywood Association, P.O. Box 11700, Tacoma, Washington 98411

ARI--Air Conditioning and Refrigeration Institute, 1501 Wilson Blvd., 6th Floor, Arlington, VA 22209-2403

ASCE--American Society of Civil Engineers, 345 East 47th Street, New York, New York 10017-2398

ASHRAE--American Society of Heating, Refrigeration and Air Conditioning Engineers, 1791 Tulle Circle, NE., Atlanta, Georgia 30329

ASME--American Society of Mechanical Engineers, 345 East 47th Street, New York, New York

10017

ASSE--American Society of Sanitary Engineering, P.O. Box 40362, Bay Village, Ohio 44140

ASTM--American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103

CISPI--Cast Iron Soil Pipe Institute, 5959 Shallowford Road, suite 419, Chattanooga, TN 37421

DOC--U.S. Department of Commerce, National Institute of Standards and Technology, Office of Engineering Standards, room A-166, Technical Building, Washington, DC 20234

FS--Federal Specifications, General Services Administration, Specifications Branch, room 6039, GSA Building, 7th and D Streets, SW., Washington, DC 20407

HPVA (previously HPMA)--Hardwood Plywood and Veneer Association, P.O. Box 2789, Reston, VA 22090 (previously named HPMA Hardwood Plywood Manufacturers Association)

HUD-FHA--Department of Housing and Urban Development, 451 Seventh Street, SW., Washington, DC 20410

HUD--USER Department of Housing and Urban Development, HUD User, P.O. Box 280, Germantown, MD 20874

IAPMO--International Association of Plumbing and Mechanical Officials, 20001 Walnut Drive South, Walnut, CA 91784-2825

IITRI--IIT Research Institute, 10 West 35th Street, Chicago, IL 60616

MIL--Military Specifications and Standards, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120

NFPA--National Fire Protection Association, Batterymarch Park, Quincy, MA 02269

NPA--National Particleboard Association, 18928 Premiere Court, Gaithersburg, MD 20879

NSF--National Sanitation Foundation, P.O. Box 1468, Ann Arbor, MI 48105

NWWDA--National Wood Window and Door Association, 1400 E. Touhy Avenue, suite G-54, Des Plaines, IL 60018

SAE--Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, Pennsylvania 15096

SJI--Steel Joist Institute, 1205 48th Avenue North, suite A, Myrtle Beach, SC 29577

TPI--Truss Plate Institute, 583 D'Onofrio Drive, suite 200, Madison, Wisconsin 53719

UL--Underwriters' Laboratories, Inc., 333 Pfingsten Road, Northbrook, Illinois 60062

3280.4(c)

The Department will enforce the listed editions of material incorporated by reference into this standard. If a later edition is to be enforced, the Department will publish a notice of change in the Federal Register.

[47 FR 49385, Nov. 1, 1982, as amended at 52 FR 47553, Dec. 15, 1987; 58 FR 55002, Oct. 25, 1993; 59 FR 15113, Mar. 31, 1994]

§3280.5 Data plate.

Each manufactured home shall bear a data plate affixed in a permanent manner near the main electrical panel or other readily accessible and visible location. Each data plate shall be made of material that will receive typed information as well as preprinted information, and which can be cleaned of ordinary smudges or household dirt without removing information contained on the data plate; or the data plate shall be covered in a permanent manner with materials that will make it possible to clean the data plate of ordinary dirt and smudges without obscuring the information. Each data plate shall contain not less than the following information:

3280.5(a)

The name and address of the manufacturing plant in which the manufactured home was manufactured.

3280.5(b)

The serial number and model designation of the unit, and the date the unit was manufactured.

3280.5(c)

The statement:

This manufactured home is designed to comply with the Federal Manufactured Home Construction and Safety Standards in force at the time of manufacture.

3280.5(d)

A list of the certification label(s) number(s) that are affixed to each transportable manufactured section under §3280.8.

3280.5(e)

A list of major factory-installed equipment, including the manufacturer's name and the model designation of each appliance.

3280.5(f)

Reference to the roof load zone and wind load zone for which the home is designed and duplicates of the maps as set forth in §3280.305(c). This information may be combined with the heating/cooling certificate and insulation zone map required by §§3280.510 and 3280.511. The Wind Zone Map on the Data Plate shall also contain the statement:

This home has not been designed for the higher wind pressures and anchoring provisions required for ocean/coastal areas and should not be located within 1500_ of the coastline in Wind Zones II and III, unless the home and its anchoring and foundation system have been designed for the increased requirements specified for Exposure D in ANSI/ASCE 7-88.

3280.5(g)

The statement:

This home has--has not--(appropriate blank to be checked by manufacturer) been equipped with storm shutters or other protective coverings for windows and exterior door openings. For homes designed to be located in Wind Zones II and III, which have not been provided with shutters or equivalent covering devices, it is strongly recommended that the home be made ready to be equipped with these devices in accordance with the method recommended in the manufacturers printed instructions.

3280.5(h)

The statement: ``Design Approval by'', followed by the name of the agency that approved the design.

[59 FR 2469, Jan. 14, 1994]

§3280.6 Serial number.

3280.6(a)

A manufactured home serial number which will identify the manufacturer and the state in which the manufactured home is manufactured, must be stamped into the foremost cross member. Letters and numbers must be _ inch minimum in height. Numbers must not be stamped into hitch assembly or drawbar.

§3280.7 Excluded structures.

Certain structures may be excluded from these Standards as modular homes under 24 CFR 3282.12.

[52 FR 4581, Feb. 12, 1987]

§3280.8 Waivers.

3280.8(a)

Where any material piece of equipment, or system which does not meet precise requirements or specifications set out in the standard is shown, to the satisfaction of the Secretary, to meet an equivalent level of performance, the Secretary may waive the specifications set out in the Standard for that material, piece of equipment, or system.

3280.8(b)

Where the Secretary is considering issuing a waiver to a Standard, the proposed waiver shall be published in the Federal Register for public comment, unless the Secretary, for good cause, finds that notice is impractical, unnecessary or contrary to the public interest, and incorporates into the waiver that finding and a brief statement of the reasons therefor.

3280.8(c)

Each proposed and final waiver shall include:

3280.8(c)(1)

A statement of the nature of the waiver; and

3280.8(c)(2)

Identification of the particular standard affected.

3280.8(d)

All waivers shall be published in the Federal Register and shall state their effective date. Where a waiver has been issued, the requirements of the Federal Standard to which the waiver relates may be met either by meeting the specifications set out in the Standard or by meeting the requirements of the waiver published in the Federal Register.

[58 FR 55003, Oct. 25, 1993]

§3280.9 Interpretative bulletins.

Interpretative bulletins may be issued for the following purposes:

3280.9(a)

To clarify the meaning of the Standard; and

3280.9(b)

To assist in the enforcement of the Standard.

[58 FR 55003, Oct. 25, 1993]

§3280.10 Use of alternative construction.

Requests for alternative construction can be made pursuant to 24 CFR 3282.14 of this chapter.

[58 FR 55003, Oct. 25, 1993]

§3280.11 Certification label.

3280.11(a)

A permanent label shall be affixed to each transportable section of each manufactured home for sale or lease in the United States. This label shall be separate and distinct from the data plate which the manufacturer is required to provide under §3280.5 of the standards.

3280.11(b)

The label shall be approximately 2 in. by 4 in. in size and shall be permanently attached to the manufactured home by means of 4 blind rivets, drive screws, or other means that render it difficult to remove without defacing it. It shall be etched on 0.32 in. thick aluminum plate. The label number shall be etched or stamped with a 3 letter designation which identifies the production inspection primary inspection agency and which the Secretary shall assign. Each label shall be marked with a 6 digit number which the label supplier shall furnish. The labels shall be stamped with numbers sequentially.

3280.11(c)

The label shall read as follows:

As evidenced by this label No. ABC 000001, the manufacturer certifies to the best of the manufacturer's knowledge and belief that this manufactured home has been inspected in accordance with the requirements of the Department of Housing and Urban Development and is constructed in conformance with the Federal manufactured home construction and safety standards in effect on the date of manufacture. See date plate.

3280.11(d)

The label shall be located at the tail-light end of each transportable section of the manufactured home approximately one foot up from the floor and one foot in from the road side, or as near that location on a permanent part of the exterior of the manufactured home unit as practicable. The road side is the right

side of the manufactured home when one views the manufactured home from the tow bar end of the manufactured home.

[42 FR 960, Jan. 4, 1977. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 52 FR 47553, Dec. 15, 1987. Redesignated and amended at 58 FR 55003, Oct. 25, 1993]

Subpart B--Planning Considerations

§3280.101 Scope.

Subpart B states the planning requirements in manufactured homes. The intent of this subpart is to assure the adequacy of architectural planning considerations which assist in determining a safe and healthful environment.

§3280.102 Definitions.

3280.102(a)

Gross floor area means all space, wall to wall, including recessed entries not to exceed 5 sq. ft. and areas under built-in vanities and similar furniture. Where the ceiling height is less than that specified in §3280.104, the floor area under such ceilings shall not be included. Floor area of closets shall not be included in the gross floor area.

3280.102(b)

Habitable room means a room or enclosed floor space arranged for living, eating, food preparation, or sleeping purposes not including bathrooms, foyers, hallways, and other accessory floor space.

3280.102(c)

Laundry area means an area containing or designed to contain a laundry tray, clothes washer and/or clothes dryer.

§3280.103 Light and ventilation.

3280.103(a)

Lighting. Each habitable room shall be provided with exterior windows and/or doors having a total glazed area of not less than 8 percent of the gross floor area.

3280.103(a)(1) Kitchens, bathrooms, toilet compartments, laundry areas, and utility rooms may be provided with artificial light in place of windows.

3280.103(a)(2)

Rooms and areas may be combined for the purpose of providing the required natural lighting provided that at least one half of the common wall area is open and unobstructed, and the open area is at least equal to 10 percent of the combined floor area or 25 square feet whichever is greater.

3280.103(b)

Whole house ventilation. Each manufactured home shall be capable of providing a minimum of 0.35 air changes per hour continuously or at an equivalent hourly average rate. The following criteria shall be adhered to.

3280.103(b)(1)

Natural infiltration and exfiltration shall be considered as providing 0.25 air changes per hour.

3280.103(b)(2)

The remaining ventilation capacity of 0.10 air change per hour or its hourly average equivalent shall be calculated using 0.035 cubic feet per minute per square foot of interior floor space. This ventilation capacity shall be in addition to any openable window area.

3280.103(b)(3)

The remaining ventilation capacity may be provided by: a mechanical system, or a passive system, or a combination passive and mechanical system. 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. Mechanical systems shall be balanced. Combination passive and mechanical systems shall have adequately sized inlets or exhaust to release any unbalanced pressure. Passive systems shall have inlets and exhaust of sufficient size to alleviate unbalance pressure conditions under normal conditions. Temporary imbalances due to gusting or high winds are permitted.

3280.103(b)(4)

The ventilation system or provision shall exchange air directly with the exterior of the home, except it shall not draw or expel air with the space underneath the home. The ventilation system or provision shall not draw or expel air into the floor, wall, or ceiling/roof systems even if those systems are vented.

3280.103(b)(5)

The ventilation system or a portion thereof may be integral with the homes heating or cooling system. The system shall be capable of operating independently of the heating or cooling modes. A ventilation system that is integral with the heating or cooling system shall be listed as part of the heating and cooling system or listed as suitable for use therewith.

3280.103(b)(6)

A mechanical ventilation system, or mechanical portion thereof, shall be provided with a manual control and may be provided with automatic timers or humidistats.

3280.103(b)(7)

Substantiation of the ventilation capacity to provide 0.10 ACH shall be provided for a mechanical system, or a passive system, or a combination passive and mechanical system.

3280.103(c)

Additional ventilation.

3280.103(c)(1)

At least half of the minimum required glazed area in paragraph (a) of this section shall be openable directly to the outside of the manufactured home for unobstructed ventilation. These same ventilation requirements apply to rooms combined in accordance with §3280.103(a)(2).

3280.103(c)(2)

Kitchens shall be provided with a mechanical ventilation system that is capable of exhausting 100 cfm to the outside of the home. The exhaust fan shall be located as close as possible to the range or cook top, but in no case farther than 10 feet horizontally from the range or cook top.

3280.103(c)(3)

Each bathroom and separate toilet compartment shall be provided with a mechanical ventilation system capable of exhausting 50 cfm to the outside of the home. A separate toilet compartment may be provided with 1.5 square feet of openable glazed area in place of mechanical ventilation, except in Uo value Zone 3.

[58 FR 55003, Oct. 25, 1993]

§3280.104 Ceiling heights.

3280.104(a)

Every habitable room and bathroom shall have a minimum ceiling height of not less than 7 feet, 0 inches for a minimum of 50 percent of the room's floor area. The remaining area may have a ceiling with a minimum height of 5 feet, 0 inches. Minimum height under dropped ducts, beams, etc. shall be 6 feet, 4 inches.

3280.104(b)

Hallways and foyers shall have a minimum ceiling height of 6 feet, 6 inches.

§3280.105 Exit facilities; exterior doors.

3280.105(a)

Number and location of exterior doors. Manufactured homes shall have a minimum of two exterior doors located remote from each other.

3280.105(a)(1)

Required egress doors shall not be located in rooms where a lockable interior door must be used in order to exit.

3280.105(a)(2)

In order for exit doors to be considered remote from each other, they must comply with all of the following:

3280.105(a)(2)(i)

Both of the required doors must not be in the same room or in a group of rooms which are not defined by fixed walls.

3280.105(a)(2)(ii)

Single wide units. Doors may not be less than 12 ft. c-c from each other as measured in any straight line direction regardless of the length of path of travel between doors.

3280.105(a)(2)(iii)

Double wide units. Doors may not be less than 20 ft. c-c from each other as measured in any straight line direction regardless of the length of path of travel between doors.

3280.105(a)(2)(iv)

One of the required exit doors must be accessible from the doorway of each bedroom without traveling more than 35 ft.

3280.105(b)

Door design and construction.

3280.105(b)(1) Exterior swinging doors shall be constructed in accordance with §3280.405 the "Standard for Swinging Exterior Passage Doors for Use in Manufactured Homes". Exterior sliding glass doors shall be constructed in accordance with §3280.403 the "Standard for Windows and Sliding Glass Doors Used in Manufactured Homes".

3280.105(b)(2)

All exterior swinging doors shall provide a minimum 28 inch wide by 74 inch high clear opening. All exterior sliding glass doors shall provide a minimum 28 inch wide by 72 inch high clear opening.

3280.105(b)(3)

Each swinging exterior door other than screen or storm doors shall have a key-operated lock that has a deadlocking latch or a key-operated dead bolt with a passage latch. Locks shall not require the use of a key for operation from the inside.

3280.105(b)(4)

All exterior doors, including storm and screen doors, opening outward shall be provided with a safety door check.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 50 FR 9269, Mar. 7, 1985]

§3280.106 Exit facilities; egress windows and devices.

3280.106(a)

Every room designed expressly for sleeping purposes, unless it has an exit door (see §3280.105), shall have at least one outside window or approved exit device which meets the requirements of §3280.404, the "Standard for Egress Windows and Devices for Use in Manufactured Homes."

3280.106(b)

The bottom of the window opening shall not be more than 36 inches above the floor.

3280.106(c)

Locks, latches, operating handles, tabs, and any other window screen or storm window devices which need to be operated in order to permit exiting, shall not be located in excess of 54 inches from the finished floor.

3280.106(d)

Integral rolled-in screens shall not be permitted in an egress window unless the window is of the hinged-type.

[49 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 49 FR 36086, Sept. 14, 1984; 52 FR 4581, Feb. 12, 1987]

§3280.107 Interior privacy.

Bathroom and toilet compartment doors shall be equipped with a privacy lock.

§3280.108 Interior passage.

3280.108(a)

Interior doors having passage hardware without a privacy lock, or with a privacy lock not engaged, shall open from either side by a single movement of the hardware mechanism in any direction.

3280.108(b)

Each manufactured home interior door, when provided with a privacy lock, shall have a privacy lock that has an emergency release on the outside to permit entry when the lock has been locked by a locking knob, lever, button, or other locking device on the inside.

§3280.109 Room requirements.

3280.109(a)

Every manufactured home shall have at least one living area with not less than 150 sq. ft. of gross floor area.

3280.109(b)

Rooms designed for sleeping purposes shall have a minimum gross square foot floor area as follows:

3280.109(b)(1)

All bedrooms shall have at least 50 sq. ft. of floor area.

3280.109(b)(2)

Bedrooms designed for two or more people shall have 70 sq. ft. of floor area plus 50 sq. ft. for each person in excess of two.

3280.109(c)

Every room designed for sleeping purposes shall have accessible clothes hanging space with a minimum inside depth of 22 inches and shall be equipped with a rod and shelf.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and further redesignated at 58 FR 55004, Oct. 25, 1993]

§3280.110 Minimum room dimensions.

The gross floor area required by §3280.110 (a) and (b) shall have no clear horizontal dimension less than 5 feet except as permitted by §3280.102(a).

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and further redesignated at 58 FR 55004, Oct. 25, 1993]

§3280.111 Toilet compartments.

Each toilet compartment shall be a minimum of 30 inches in width, except, when the toilet is located adjacent to the short dimension of the tub, the distance from the tub to the center line of the toilet shall not be less than 12 inches. At least 21 inches of clear space shall be provided in front of each toilet.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and further redesignated at 58 FR 55004, Oct. 25, 1993]

§3280.112 Hallways.

Hallways shall have a minimum horizontal dimension of 28 inches measured from the interior finished surface to the interior finished surface of the opposite wall. When appliances are installed in a laundry area, the measurement shall be from the front of the appliance to the opposite finished interior surface. When appliances are not installed and a laundry area is provided, the area shall have a minimum clear depth of 27 inches in addition to the 28 inches required for passage. In addition, a notice of the available clearance for washer/dryer units shall be posted in the laundry area. Minor protrusions into the minimum hallway width by doorknobs, trim, smoke detectors or light fixtures are permitted.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and further redesignated at 58 FR 55004, Oct. 25, 1993]

§3280.113 Glass and glazed openings.

3280.113(a)

Windows and sliding glass doors. All windows and sliding glass doors shall meet the requirements of §3280.403 the "Standard for Windows and Sliding Glass Doors Used in Manufactured Homes".

3280.113(b)

Safety glazing. Glazing in all entrance or exit doors, sliding glass doors, units (fixed or moving sections), unframed glass doors, unbacked mirrored wardrobe doors (i.e., mirrors not secured to a backing capable of being the door itself), shower and bathtub enclosures and surrounds to a height of 6 feet above the bathroom floor level, storm doors or combination doors, and in panels located within 12 inches on either side of exit or entrance doors shall be of a safety glazing material. Safety glazing material is considered to be any glazing material capable of passing the requirements of Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings, ANSI Z97.1-1984.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 52 FR 4581, Feb. 12, 1987. Redesignated at 58 FR 55004, Oct. 25, 1993]

Subpart C--Fire Safety

Source: 49 FR 32008, Aug. 9, 1984, unless otherwise noted.

§3280.201 Scope.

The purpose of this subpart is to set forth requirements that will assure reasonable fire safety to the occupants by reducing fire hazards and by providing measures for early detection.

§3280.202 Definitions.

The following definitions are applicable to subparts C, H, and I of the Standards:

Combustible material: Any material not meeting the definition of limited-combustible or non-combustible material.

Flame-spread rating: The measurement of the propagation of flame on the surface of materials or their assemblies as determined by recognized standard tests conducted as required by this subpart.

Interior finish: The surface material of walls, fixed or movable partitions, ceilings, columns, and other exposed interior surfaces affixed to the home's structure including any materials such as paint or wallpaper and the substrate to which they are applied. Interior finish does not include:

3280.202(1)

Trim and sealant 2 inches or less in width adjacent to the cooking range and in furnace and water heater spaces provided it is installed in accordance with the requirements of §3280.203(b) (3) or (4), and trim 6 inches or less in width in all other areas;

3280.202(2)

Windows and frames;

3280.202(3)

Single doors and frames and a series of doors and frames not exceeding 5 feet in width;

3280.202(4)

Skylights and frames;

3280.202(5)

Casings around doors, windows, and skylights not exceeding 4 inches in width;

3280.202(6)

Furnishings which are not permanently affixed to the home's structure;

3280.202(7)

Baseboards not exceeding 6 inches in height;

3280.202(8)

Light fixtures, cover plates of electrical receptacle outlets, switches, and other devices;

3280.202(9)

Decorative items attached to walls and partitions (i.e., pictures, decorative objects, etc.) constituting no more than 10% of the aggregate wall surface area in any room or space not more than 32 square feet in surface area, whichever is less;

3280.202(10)

Plastic light diffusers when suspended from a material which meets the interior finish provisions of §3280.203(b);

3280.202(11)

Coverings and surfaces of exposed wood beams; and

3280.202(12)

Decorative items including the following:

3280.202(12)(i)

Non-structural beams not exceeding 6 inches in depth and 6 inches in width and spaced not closer than 4 feet on center;

3280.202(12)(ii)

Non-structural lattice work;

3280.202(12)(iii)

Mating and closure molding; and

3280.202(12)(iv)

Other items not affixed to the home's structure.

Limited combustible: A material meeting:

(1) The definition of Article 2-3 or NFPA 220-1992; or

(2) 5/16-inch or thicker gypsum board.

Noncombustible material: A material meeting the definition of contained in NFPA 220-1992.

Single-station alarm device: An assembly incorporating the smoke detector sensor, the electrical control equipment, and the alarm-sounding device in one unit.

Smoke detector: A wall-mounted detector of the ionization chamber or photoelectric type which detects visible or invisible particles of combustion and operates from a 120V AC source of current.

[58 FR 55004, Oct. 25, 1993]

§3280.203 Flame spread limitations and fire protection requirements.

3280.203(a)

Establishment of flame spread rating. The surface flame spread rating of interior-finish material shall not exceed the value shown in §3280.203(b) when tested by ``Standard Test Method for Surface Burning Characteristics of Building Materials, ASTM E 84-91a" except that the surface flame spread rating of interior-finish materials required by §3280.203(b) (5) and (6) may be determined by using the ``Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source, ASTM E 162-90". However, the following materials need not be tested to establish their flame spread rating unless a lower rating is required by these standards.

3280.203(a)(1)

Flame-spread rating--76 to 200.

3280.203(a)(1)(i)

.035-inch or thicker high pressure laminated plastic panel countertop;

3280.203(a)(1)(ii)

¼ inch or thicker unfinished plywood with phenolic or urea glue;

3280.203(a)(1)(iii)

Unfinished dimension lumber (1-inch or thicker nominal boards);

3280.203(a)(1)(iv)

½-inch or thicker unfinished particleboard with phenolic or urea binder;

3280.203(a)(1)(v)

Natural gum-varnished or latex- or alkyd-painted:

3280.203(a)(1)(v)(A)

¼-inch or thicker plywood, or

3280.203(a)(1)(v)(B)

½-inch or thicker particleboard, or

3280.203(a)(1)(v)(C)

1-inch or thicker nominal board;

3280.203(a)(1)(vi)

5/16-inch gypsum board with decorative wallpaper; and

3280.203(a)(1)(vii)

¼-inch or thicker unfinished hardboard,

3280.203(a)(2)

Flame-spread rating-25 to 200,

3280.203(a)(2)(i)

Painted metal;

3280.203(a)(2)(ii)

Mineral-base acoustic tile;

3280.203(a)(2)(iii)

5/16-inch or thicker unfinished gypsum wallboard (both latex- or alkyd-painted); and

3280.203(a)(2)(iv)

Ceramic tile.

(The above-listed material applications do not waive the requirements of §3280.203(c) or §3280.204 of this subpart.)

3280.203(b)

Flame-spread rating requirements.

3280.203(b)(1)

The interior finish of all walls, columns, and partitions shall not have a flame spread rating exceeding 200 except as otherwise specified herein.

3280.203(b)(2)

Ceiling interior finish shall not have a flame spread rating exceeding 75.

3280.203(b)(3)

Walls adjacent to or enclosing a furnace or water heater and ceilings above them shall have an interior finish with a flame spread rating not exceeding 25. Sealants and other trim materials 2 inches or less in width used to finish adjacent surfaces within these spaces are exempt from this provision provided that all joints are completely supported by framing members or by materials having a flame spread rating not exceeding 25.

3280.203(b)(4)

Exposed interior finishes adjacent to the cooking range shall have a flame spread rating not exceeding 50, except that backsplashes not exceeding 6 inches in height are exempted. Adjacent surfaces are the exposed vertical surfaces between the range top height and the overhead cabinets and/or ceiling and within 6 horizontal inches of the cooking range. (Refer also to §3280.204(a), Kitchen Cabinet Protection.) Sealants and other trim materials 2 inches or less in width used to finish adjacent surfaces are exempt from this provision provided that all joints are completely supported by a framing member.

3280.203(b)(5)

Kitchen cabinet doors, countertops, backsplashes, exposed bottoms, and end panels shall have a flame spread rating not to exceed 200. Cabinet rails, stiles, mullions, and top strips are exempted.

3280.203(b)(6)

Finish surfaces of plastic bathtubs, shower units, and tub or shower doors shall not exceed a flame spread rating of 200.

3280.203(c)

Fire protective requirements.

3280.203(c)(1)

Materials used to surface the following areas shall be of limited combustible material (e.g., 5/16-inch gypsum board, etc.):

3280.203(c)(1)(i)

The exposed wall adjacent to the cooking range (see §3280.203(b)(4));

3280.203(c)(1)(ii)

Exposed bottoms and sides of kitchen cabinets as required by §3280.204;

3280.203(c)(1)(iii)

Interior walls and ceilings enclosing furnace and/or water heater spaces; and

3280.203(c)(1)(iv)

Combustible doors which provide interior or exterior access to furnace and/or water heater spaces. The surface may be interrupted for louvers ventilating the enclosure. However, the louvers shall not be constructed of a material of greater combustibility than the door itself (e.g., plastic louvers on a wooden door).

3280.203(c)(2)

No burner of a surface cooking unit shall be closer than 12 horizontal inches to a window or an exterior door with glazing.

[49 FR 32008, Aug. 9, 1984, as amended at 58 FR 55005, Oct. 25, 1993]

§3280.204 Kitchen cabinet protection.

3280.204(a)

The bottom and sides of combustible kitchen cabinets over cooking ranges to a horizontal distance of 6 inches from the outside edge of the cooking range shall be protected with at least 5/16-inch thick gypsum board or equivalent limited combustible material. One-inch nominal framing members and trim are exempted from this requirement. The cabinet area over the cooking range or cooktops shall be protected by a metal hood (26-gauge sheet metal, or .017 stainless steel, or .024 aluminum, or .020 copper) with not less than a 3-inch eyebrow projecting horizontally from the front cabinet face. The 5/16-inch thick gypsum board or equivalent material which is above the top of the hood may be supported by the hood. A 1/2-inch enclosed air space shall be provided between the bottom surface of the cabinet and the gypsum board or equivalent material. The hood shall be at least as wide as the cooking range.

3280.204(b)

The 3-inch metal eyebrow required by paragraph (a) of this section will project from the front and rear cabinet faces when there is no adjacent surface behind the range, or the 5/16-inch thick gypsum board or equivalent material shall be extended to cover all exposed rear surfaces of the cabinet.

3280.204(c)

The metal hood required by paragraphs (a) and (b) of this section can be omitted when an oven of equivalent metal protection is installed between the cabinet and the range and all exposed cabinet surfaces are protected as described in paragraph (a) of this section.

3280.204(d)

When a manufactured home is designed for the future installation of a cooking range, the metal hood and cabinet protection required by paragraph (a) of this section and the wall-surfacing protection behind

the range required by §3280.203 shall be installed in the factory.

3280.204(e)

Vertical clearance above cooking top. Ranges shall have a vertical clearance above the cooking top of not less than 24 inches to the bottom of combustible cabinets.

§3280.205 Carpeting.

Carpeting shall not be used in a space or compartment designed to contain only a furnace and/or water heater. Carpeting may be used in other areas where a furnace or water heater is installed, provided that it is not located under the furnace or water heater.

§3280.206 Firestopping.

3280.206(a)

Firestopping of at least 1-inch nominal lumber, 5/16-inch thick gypsum board, or the equivalent, shall be provided to cut off concealed draft openings between walls and partitions, including furred spaces, and the roof or floors, so as to retard vertical movement of fire. In particular, such concealed spaces must be constructed so that floor-to-ceiling concealed spaces on one floor do not communicate with any concealed space on another floor, any concealed spaces in the floor, or any concealed space in the roof cavity. A barrier must be installed to prevent communication between adjacent concealed spaces.

3280.206(a)(1)

Where the barrier is vertical, it must be made of exterior or interior covering(s) equivalent to that used on the nearest exposed wall surface; and

3280.206(a)(2)

In all other cases, the barrier must be made of 1-inch nominal lumber, 5/16-inch thick gypsum board, or the equivalent.

3280.206(b)

A space does not lose its character as a concealed draft opening if it is filled with insulation or other material or if it is blocked by a barrier other than as required by paragraph (a) of this section.

3280.206(c)

All openings for pipes and vents and other penetrations in walls, floors, and ceilings of furnace and water heater spaces shall be tight-fitted or firestopped. Pipes, vents, and other penetrations are tight-fitted when they cannot be moved freely in the opening.

§3280.207 Requirements for foam plastic thermal insulating materials.

3280.207(a)

General. Foam plastic thermal insulating materials shall not be used within the cavity of walls (not including doors) or ceilings or be exposed to the interior of the home unless:

3280.207(a)(1)

The foam plastic insulating material is protected by an interior finish of 5/16-inch thick gypsum board or equivalent material for all cavities where the material is to be installed; or

3280.207(a)(2)

The foam plastic is used as a sheathing or siding backerboard, and it: (i) Has a flame spread rating of 75 or less and a smoke-developed rating of 450 or less (not including outer covering of sheathing); (ii) does not exceed $\frac{1}{2}$ -inch in thickness; and (iii) is separated from the interior of the manufactured home by a minimum of 2 inches of mineral fiber insulation or an equivalent thermal barrier; or

3280.207(a)(3)

The foam plastic insulating material has been previously accepted by the Department for use in wall and/or ceiling cavities of manufactured homes, and it is installed in accordance with any restrictions imposed at the time of that acceptance; or

3280.207(a)(4)

The foam plastic insulating material has been tested as required for its location in wall and/or ceiling cavities in accordance with testing procedures described in the Illinois Institute of Technology Research Institute (IITRI) Report, "Development of Mobile Home Fire Test Methods to Judge the Fire Safe Performance of Foam Plastic, J096461," or other full-scale fire tests accepted by the Department, and it is installed in a manner consistent with the way the material was installed in the foam plastic test module. The materials shall be capable of meeting the following acceptance criteria required for their location.

3280.207(a)(4)(i)

Wall assemblies. The foam plastic system shall demonstrate equivalent or superior performance to the control module as determined by:

3280.207(a)(4)(i)(A)

Time to reach flashover (600°C in the upper part of the room);

3280.207(a)(4)(i)(B)

Time to reach an oxygen (O₂) level of 14% (rate of O₂ depletion), a carbon monoxide (CO) level of 1%, a carbon dioxide (CO₂) level of 6%, and a smoke level of 0.26 optical density/meter measured at 5 feet high in the doorway; and

3280.207(a)(4)(i)(C)

Rate of change concentration for O₂, CO, CO₂ and smoke measured 3 inches below the top of the doorway.

3280.207(a)(4)(ii)

Ceiling assemblies. A minimum of three valid tests of the foam plastic system and one valid test of the control module shall be evaluated to determine if the foam plastic system demonstrates equivalent or superior performance to the control module. Individual factors to be evaluated include intensity of cavity fire (temperature-time) and post-test damage.

3280.207(a)(4)(iii)

Post-test damage assessment for wall and ceiling assemblies. The overall performance of each total system shall also be evaluated in determining the acceptability of a particular foam plastic insulating material.

3280.207(b)

All foam plastic thermal insulating materials used in manufactured housing shall have a flame spread rating of 75 or less (not including outer covering or sheathing) and a maximum smoke-developed rating of 450.

§3280.208 Fire detection equipment.

3280.208(a)

General. At least one smoke detector (which may be a single station alarm device) shall be installed in the home in the location(s) specified in paragraph (b) of this section.

3280.208(b)

Smoke detector locations.

3280.208(b)(1)

A smoke detector shall be installed on any wall in the hallway or space communicating with each bedroom area between the living area and the first bedroom door unless a door(s) separates the living area from that bedroom area, in which case the detector(s) shall be installed on the living area side as close to the door(s) as practicable. Homes having bedroom areas separated by any one or combination of common-use areas such as kitchen, dining room, living room, or family room (but not a bathroom or utility room), shall have at least one detector protecting each bedroom area.

3280.208(b)(2)

When located in hallways, the detector shall be between the return air intake and the living area.

3280.208(b)(3)

When a home is equipped or designed for future installation of a roof-mounted evaporative cooler or other equipment discharging conditioned air through a ceiling grille into the living space environment, the detector closest to the air discharge shall be located no closer than three horizontal feet from any discharge grille.

3280.208(b)(4)

A smoke detector shall not be placed in a location which impairs its effectiveness.

3280.208(c)

Labeling. Smoke detectors shall be labeled as conforming with the requirements of Underwriters' Laboratories Standard No. 217-Fourth Edition 1993 for Single and Multiple Station Smoke Detectors.

3280.208(d)

Installation. Each smoke detector shall be installed in accordance with its listing. The top of the detector shall be located on a wall 4 inches to 12 inches, or at a distance permitted by the listing, below the ceiling. However, when a detector is mounted on an interior wall below a sloping ceiling, it shall be located 4 inches to 12 inches below the intersection of the connecting exterior wall and the sloping ceiling (cathedral ceiling). The required detector(s) shall be attached to an electrical outlet box and the detector connected by a permanent wiring method into a general electrical circuit. There shall be no switches in the circuit to the detector between the over-current protection device protecting the branch circuit and the detector. Smoke detector(s) shall not be placed on the same branch circuit or any circuit protected by a ground fault circuit interrupter.

[49 FR 32008, Aug. 9, 1984, as amended at 58 FR 55005, Oct. 25, 1993]

§3280.209 Fire testing.

All fire testing conducted in accordance with this subpart shall be performed by nationally recognized testing laboratories which have expertise in fire technology. In case of dispute, the Secretary shall determine if a particular agency is qualified to perform such fire tests.

[49 FR 32011, Aug. 9, 1984]

Subpart D--Body and Frame Construction Requirements

§3280.301 Scope.

This subpart covers the minimum requirements for materials, products, equipment and workmanship needed to assure that the manufactured home will provide: (a) Structural strength and rigidity, (b) protection against corrosion, decay, insects and other similar destructive forces, (c) protection against hazards of windstorm, (d) resistance to the elements, and (e) durability and economy of maintenance.

§3280.302 Definitions.

The following definitions are applicable to subpart D only:

Anchoring equipment: means straps, cables, turnbuckles, and chains, including tensioning devices, which are used with ties to secure a manufactured home to ground anchors.

Anchoring system: means a combination of ties, anchoring equipment, and ground anchors that will, when properly designed and installed, resist overturning and lateral movement of the manufactured home from wind forces.

Diagonal tie: means a tie intended to primarily resist horizontal forces, but which may also be used to resist vertical forces.

Footing: means that portion of the support system that transmits loads directly to the soil.

Ground anchor: means any device at the manufactured home stand designed to transfer manufactured home anchoring loads to the ground.

Loads: (1) *Dead load:* means the weight of all permanent construction including walls, floors, roof, partition, and fixed service equipment.

(2) *Live load:* means the weight superimposed by the use and occupancy of the manufactured home, including wind load and snow load, but not including dead load.

(3) *Wind load:* means the lateral or vertical pressure or uplift on the manufactured home due to wind blowing in any direction.

Main frame: means the structural component on which is mounted the body of the manufactured home.

Pier: means that portion of the support system between the footing and manufactured home exclusive of caps and shims.

Sheathing: means material which is applied on the exterior side of a building frame under the exterior weather resistant covering.

Stabilizing devices: means all components of the anchoring and support system such as piers, footings, ties, anchoring equipment, ground anchors, and any other equipment which supports the manufactured home and secures it to the ground.

Support system: means a combination of footings, piers, caps, and shims that will, when properly installed, support the manufactured home.

Tie: means straps, cable, or securing devices used to connect the manufactured home to ground anchors.

Vertical tie: means a tie intended to resist the uplifting or overturning forces.

[58 FR 55005, Oct. 25, 1993; 59 FR 15113, Mar. 31, 1994]

§3280.303 General requirements.

3280.303(a)

Minimum requirements. The design and construction of a manufactured home shall conform with the provisions of this standard. Requirements for any size, weight, or quality of material modified by the terms of minimum, not less than, at least, and similar expressions are minimum standards. The manufacturer or installer may exceed these standards provided such deviation does not result in any inferior installation or defeat the purpose and intent of this standard.

3280.303(b)

Construction. All construction methods shall be in conformance with accepted engineering practices to insure durable, livable, and safe housing and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.

3280.303(c)

Structural analysis. The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur. (See subparts E and J.)

3280.303(d)

[Reserved]

3280.303(e)

New materials and methods.

3280.303(e)(1)

Any new material or method of construction not provided for in this standard and any material or method of questioned suitability proposed for use in the manufacture of the structure shall nevertheless conform in performance to the requirements of this standard.

3280.303(e)(2)

Unless based on accepted engineering design for the use indicated, all new manufactured home materials, equipment, systems or methods of construction not provided for in this standard shall be subjected to the tests specified in paragraph (g) of this section.

3280.303(f)

Allowable design stress. The design stresses of all materials shall conform to accepted engineering practice. The use of materials not certified as to strength or stress grade shall be limited to the minimum allowable stresses under accepted engineering practice.

3280.303(g)

Alternative test procedures. In the absence of recognized testing procedures either in these standards or the applicable provisions of those standards incorporated by reference, the manufacturer electing this option shall develop or cause to be developed testing procedures to demonstrate the structural properties and significant characteristics of the material, assembly, subassembly component or member. Such testing procedures shall become part of the manufacturer's approved design. (Refer to §3280.3.)

3280.303(g)(1)

Testing procedures so developed shall be submitted to the Department for approval.

3280.303(g)(2)

Upon notification of approval, the alternative test procedure is considered acceptable.

3280.303(g)(3)

Such tests shall be witnessed by an independent licensed professional engineer or architect or by a recognized testing organization. Copies of the test results shall be kept on file by the manufactured home manufacturer.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 58 FR 55005, Oct. 25, 1993; 59 FR 2469, Jan. 14, 1994]

§3280.304 Materials.

3280.304(a)

Dimension and board lumber shall not exceed 19 percent moisture content at time of installation.

3280.304(b)

3280.304(b)(1)

Standards for some of the generally used materials and methods of construction are listed in the following table.

Steel

Specification for Aluminum Structures Construction Manual Series--Section 1, Fifth Edition--1986, The Aluminum Association.

Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design, 1, 1989.

The following parts of this reference standard are not applicable: 1.3.3, 1.3.4, 1.3.5, 1.3.6, 1.4.6, 1.5.1.5, 1.5.5, 1.6, 1.7, 1.8, 1.9, 1.10.4 through 1.10.7, 1.10.9, 1.11, 1.13, 1.14.5, 1.17.7 through 1.17.9, 1.19.1, 1.19.3, 1.20, 1.21, 1.23.7, 1.24, 1.25.1 through 1.25.5, 1.26.4, 2.3, 2.4, 2.8 through 2.10.

Specification for the Design of Cold-Formed Steel Structural Members--AISI--1986 Edition With 1989 Addendum.

The following parts of this reference standard are not applicable: 3.1.2, 4.2.1, 4.2.4.

Stainless Steel Cold-Formed Structural Design Manual--AISI-1974.

The following part of this reference standard is not applicable: 3.1.2.

Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders, only Sections 1-6 and the table for "H series only" are applicable--Steel Joist Institute 1992.

Manual for Structural Applications of Steel Cables for Buildings--AISI-1973.

Standard Specification for Strapping, Flat Steel and Seals--ASTM D3953-91.

Wood and Wood Products

Basic Hardboard--ANSI/AHA A135.4-1982.

Prefinished Hardboard Paneling--ANSI/AHA A135.5-1988.

Hardboard Siding--ANSI/AHA A135.6-1990.

Interim Voluntary Standard for Hardwood and Decorative Plywood--HPVA Interim Standard

Structural Design Guide for Hardwood Plywood Wall Panels--HPMA Design Guide HP-SG-86.

For wood products--Structural Glued Laminated Timber--ANSI/AITC A190.1-1992.

Voluntary Product Standard, Construction and Industrial Plywood--PS-91-83.

APA Design/Construction Guide, Residential and Commercial--APA E30M-1993.

Design and Fabrication of All-Plywood Beams, Suppl. 5--APA-H 815D-1989.

Plywood Design Specification--APA-Y 510Q-1993.

Design and Fabrication of Glued Plywood-Lumber Beams, Suppl. 2--APA-S 812P-1992.

Design and Fabrication of Plywood Curved Panels, Suppl. 1--APA-S 811M-1990.

Design and Fabrication of Plywood Sandwich Panels, Suppl. 4--APA-9U 814G-1990.

Performance Standards and Policies for Structural Use Panels--APA-PRP-E-108P, E445N-1989.

Design and Fabrication of Plywood Stressed-Skin Panels, Suppl. 3--APA-U 813K-1990.

National Design Specifications for Wood Construction, 1991 Edition, With Supplement, Design Values for Wood Construction, AFPA.

Wood Structural Design Data, 1986 Edition With 1992 Revisions, AFPA.

Span Tables for Joists and Rafters--PS-20-70, 1993, AFPA.

Design Values for Joists and Rafters, American Softwood Lumber Standard Sizes, 1992, AFPA.

Design Specifications for Metal Plate Connected Wood Trusses--TPI-85.

Wood Particleboard--ANSI A208.1-1989,

Wood Flush Doors--ANSI/NWWDA I.S.1-87.

Wood Windows--ANSI/NWWDA I.S.2-87.

Wood Sliding Patio Doors--NWWDA-I.S.3-88.

Water Repellent Preservative Non Pressure Treatment for Millwork--NWWDA-I.S.4-81.

Standard Test Methods for Puncture and Stiffness of Paperboard, and Corrugated and Solid Fiberboard--ASTM D781-68 (73).

Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials_ASTM D4442.

Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters--ASTM D4444-92.

Other

Standard Specification for Gypsum Wallboard--ASTM C36-93.

Fasteners

Application and Fastening Schedule: Power-Driven, Mechanically Driven and Manually Driven Fasteners--HUD-FHA Use of Materials Bulletin--UM-25d-73.

Unclassified

American Society of Civil Engineering Minimum Design Loads for Buildings and Other Structures--ANSI/ASCE 7-88.

Performance Standard for Wood-Based Structural Use Panels--PS-2-92, APA (also known as NIST Standard PS-2-92).

Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Building--ANSI Z97.1-1984.

3280.304(b)(2)

Materials and methods of construction utilized in the design and construction of manufactured homes which are covered by the standards in the following table, or any applicable portion thereof shall comply with these requirements.

3280.304(b)(3)

Engineering analysis and testing methods contained in these references shall be utilized to judge conformance with accepted engineering practices required in §3280.303(c).

3280.304(b)(4)

Materials and methods of installation conforming to these standards shall be considered acceptable when installed in conformance with the requirements of this part.

3280.304(b)(5)

Materials meeting the standards (or the applicable portion thereof) are considered acceptable unless otherwise specified herein or unless substantial doubt exists as to conformance.

3280.304(c)

Wood products shall be identified as complying with the appropriate standards.

[40 FR 58752, Dec. 18, 1975, as amended at 42 FR 961, Jan. 4, 1977. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 58 FR 55006, Oct. 25, 1993; 59 FR 15113, Mar. 31, 1994]

§3280.305 Structural design requirements.

3280.305(a)

General. Each manufactured home shall be designed and constructed as a completely integrated structure capable of sustaining the design load requirements of this standard, and shall be capable of transmitting these loads to stabilizing devices without exceeding the allowable stresses or deflections. Roof framing shall be securely fastened to wall framing, walls to floor structure, and floor structure to chassis to secure and maintain continuity between the floor and chassis, so as to resist wind overturning, uplift, and sliding as imposed by design loads in this part. Uncompressed finished flooring greater than 1/8 inch in thickness shall not extend beneath load-bearing walls that are fastened to the floor structure.

3280.305(b)

Design loads--

3280.305(b)(1)

Design dead loads. Design dead loads shall be the actual dead load supported by the structural assembly under consideration.

3280.305(b)(2) Design live loads. The design live loads and wind and snow loads shall be as specified in this section and shall be considered to be uniformly distributed. The roof live load or snow load shall not be considered as acting simultaneously with the wind load and the roof live or snow load and floor live loads shall not be considered as resisting the overturning moment due to wind.

3280.305(b)(3)

When engineering calculations are performed, allowable unit stresses may be increased as provided in the documents referenced in §3280.304 except as otherwise indicated in §§3280.304(b)(1) and 3280.306(a).

3280.305(b)(4)

Whenever the roof slope does not exceed 20 degrees, the design horizontal wind loads required by §3280.305(c)(1) may be determined without including the vertical roof projection of the manufactured home. However, regardless of the roof slope of the manufactured home, the vertical roof projection shall be included when determining the wind loading for split level or clerestory-type roof systems.

3280.305(c)

Wind, snow, and roof loads--

3280.305(c)(1)

Wind loads--design requirements.

3280.305(c)(1)(i)

Standard wind Loads (Zone I). When a manufactured home is not designed to resist the wind loads for high wind areas (Zone II or Zone III) specified in paragraph (c)(1)(ii) of this section, the manufactured home and each of its wind resisting parts and portions shall be designed for horizontal wind loads of not less than 15 psf and net uplift load of not less than 9 psf.

3280.305(c)(1)(ii)

Wind loads for high wind areas (Zone II and Zone III). When designed for high wind areas (Zone II and Zone III), the manufactured home, each of its wind resisting parts (including, but not limited to, shear walls, diaphragms, ridge beams, and their fastening and anchoring systems), and its components and cladding materials (including, but not limited to, roof trusses, wall studs, exterior sheathing, roofing and siding materials, exterior glazing, and their connections and fasteners) shall be designed by a Professional Engineer or Architect to resist:

3280.305(c)(1)(ii)(A)

The design wind loads for Exposure C specified in ANSI/ASCE 7-88, “Minimum Design Loads for Buildings and Other Structures,” for a fifty-year recurrence interval, and a design wind speed of 100 mph, as specified for Wind Zone II, or 110 mph, as specified for Wind Zone III (Basic Wind Zone Map); or

3280.305(c)(1)(ii)(B)

The wind pressures specified in the following Table:

TABLE OF DESIGN WIND PRESSURES

Element	Wind zone II design wind speed 100 MPH	Wind zone II design wind speed 110 MPH
Anchorage for lateral and vertical stability (See §3280.306(a)):		
Net Horizontal Drag ^{1,2} :	³ ±39 PSF	³ ±47 PSF
Uplift ⁴ :	⁵ -27 PSF	-32 PSF
Main wind force resisting system:		
Shearwalls, Diaphragms and their Fastening and Anchorage Systems ^{1,2}	±39 PSF	±47 PSF
Ridge beams and other Main Roof Support Beams (Beams supporting expanding room sections)	-30 PSF	-36 PSF
Components and cladding:		
Roof trusses ⁴ in all areas; trusses shall be doubled within 3'-0" from each end of the	-30 PSF	-36 PSF
Exterior roof coverings, sheathing and fastenings ^{4,6,7} in all areas except the following		
Within 3'-0" from each gable end (overhang at end wall) of the roof or endwall if no	⁵ -39 PSF	⁵ -47 PSF
Within 3'-0" from the ridge and eave (overhang at sidewall) or sidewall if no eave is	⁵ -39 PSF	⁵ -47 PSF
Eaves (Overhangs at Sidewalls) ^{4,6,7}	⁵ -73 PSF	⁵ -89 PSF
Gables (Overhangs at Endwalls) ^{4,6,7}	⁵ -73 PSF	⁵ -89 PSF
Wall studs in sidewalls and endwalls, exterior windows and sliding glass doors (glazing and		
Within 3'-0" from each corner of the sidewall and endwall	⁵ -51 PSF	⁵ -62 PSF
All other areas	⁵ -51 PSF	⁵ -62 PSF
		⁵ -89 PSF

	⁵ -73 PSF	
	±48 PSF	±58 PSF
	±38 PSF	±46 PSF

NOTES:

¹The net horizontal drag of ±39 PSF to be used in calculating Anchorage for Lateral and Vertical Stability and for the design of Main Wind Force Resisting Systems is based on a distribution of wind pressures of +0.8 or +24 PSF to the windward wall and -0.5 or -15 PSF to the leeward wall.

²Horizontal drag pressures need not be applied to roof projections when the roof slope does not exceed 20 degrees.

³+ sign would mean pressures are acting towards or on the structure; - sign means pressures are acting away from sign means forces can act in either direction, towards or away from the structure.

⁴Design values in this “Table” are only applicable to roof slopes between 10 degrees (nominal 2/12 slope) and 30 degrees.

⁵The design uplift pressures are the same whether they are applied normal to the surface of the roof or to the horizontal projection of the roof.

⁶Shingle roof coverings that are secured with 6 fasteners per shingle through an underlayment which is cemented to a 3/8" structural rated roof sheathing need not be evaluated for these design wind pressures.

⁷Structural rated roof sheathing that is at least 3/8" in thickness, installed with the long dimension perpendicular to roof framing supports, and secured with fasteners at 4" on center within 3'-0" of each gable end or endwall if no overhang is provided and 6" on center in all other areas, need not be evaluated for these design wind pressures.

⁸Exterior coverings that are secured at 6" o.c. to a 3/8" structural rated sheathing that is fastened to wall framing members at 6" on center need not be evaluated for these design wind pressures.

3280.305(c)(2)

Wind loads--zone designations. The Wind Zone and specific wind design load requirements are determined by the fastest basic wind speed (mph) within each Zone and the intended location, based on the Basic Wind Zone Map, as follows:

3280.305(c)(2)(i)

Wind Zone I. Wind Zone I consists of those areas on the Basic Wind Zone Map that are not identified in paragraphs (c)(2)(ii) or (iii) of this section as being within Wind Zone II or III, respectively.

3280.305(c)(2)(ii)

Wind Zone II.....100 mph. The following areas are deemed to be within Wind Zone II of the Basic Wind Zone Map:

Local governments: The following local governments listed by State (counties, unless specified otherwise):

Alabama: Baldwin and Mobile.

Florida: All counties except those identified in paragraph (c)(1)(i)(C) of this section as within Wind Zone III.

Georgia: Bryan, Camden, Chatham, Glynn, Liberty, McIntosh.

Louisiana: Parishes of Acadia, Allen, Ascension, Assumption, Calcasieu, Cameron, East Baton Rouge, East Feliciana, Evangeline, Iberia, Iberville, Jefferson Davis, LaFayette, Livingston, Pointe Coupee, St. Helena, St. James, St. John the Baptist, St. Landry, St. Martin, St. Tammany, Tangipahoa, Vermillion, Washington, West Baton Rouge, and West Feliciana.

Maine: Hancock and Washington.

Massachusetts: Barnstable, Bristol, Dukes, Nantucket, and Plymouth.

Mississippi: George, Hancock, Harrison, Jackson, Pearl River, and Stone.

North Carolina: Beaufort, Brunswick, Camden, Chowan, Columbus, Craven, Currituck, Jones, New Hanover, Onslow, Pamlico, Pasquotank, Pender, Perquimans, Tyrrell, and Washington.

South Carolina: Beaufort, Berkeley, Charleston, Colleton, Dorchester, Georgetown, Horry, Jasper, and Williamsburg.

Texas: Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Jefferson, Kenedy, Kleberg, Matagorda, Nueces, Orange, Refugio, San Patricio, and Willacy.

Virginia: Cities of Chesapeake, Norfolk, Portsmouth, Princess Anne, and Virginia Beach.

3280.305(c)(2)(iii)

*Wind Zone III.....*110 mph. The following areas are considered to be within Wind Zone III of the Basic Wind Zone Map:

3280.305(c)(2)(iii)(A)

States and Territories: The entire State of Hawaii, the coastal regions of Alaska (as determined by the 90 mph isotach on the ANSI/ASCE 7-88 map), and all of the U.S. Territories of American Samoa, Guam, Northern Mariana Islands, Puerto Rico, Trust Territory of the Pacific Islands, and the United States Virgin Islands.

3280.305(c)(2)(iii)(B)

Local governments: The following local governments listed by State (counties, unless specified otherwise):

Florida: Broward, Charlotte, Collier, Dade, Franklin, Gulf, Hendry, Lee, Martin, Manatee, Monroe, Palm Beach, Pinellas, and Sarasota.

Louisiana: Parishes of Jefferson, La Fourche, Orleans, Plaquemines, St. Bernard, St. Charles, St. Mary, and Terrabonne.

North Carolina: Carteret, Dare, and Hyde.

3280.305(c)(2)(iv)

Consideration of local requirements. For areas where local building code requirements exceed the design wind speed requirements of these standards, the Department will consider the adoption through rulemaking of the more stringent requirements of the State or local building authority.

3280.305(c)(3)

Snow and roof loads.

3280.305(c)(3)(i)

Flat, curved and pitched roofs shall be designed to resist the following live loads, applied downward on the horizontal projection as appropriate for the design zone marked on the manufactured home:

	Pounds per square foot
North Zone	40
Middle Zone	30
South Zone	20

3280.305(c)(3) (ii)

For exposures in areas (mountainous or other) where snow or wind records or experience indicate significant differences from the loads stated above, the Department may establish more stringent requirements for homes known to be destined for such areas. For snow loads, such requirements are to be based on a roof snow load of 0.6 of the ground snow load for areas exposed to wind and a roof snow load of 0.8 of the ground snow load for sheltered areas.

3280.305(c)(3) (iii)

Eaves and cornices shall be designed for a net uplift pressure of 2.5 times the design uplift wind pressure cited in §3280.305(c)(1)(i) for Wind Zone I, and for the design pressures cited in §3280.305(c)(1)(ii) for Wind Zones II and III.

3280.305(c)(3) (iii) (4)

Data plate requirements. The Data Plate posted in the manufactured home (see §3280.5) shall

designate the wind and roof load zones or, if designed for higher loads, the actual design external snow and wind loads for which the home has been designed. The Data Plate shall include reproductions of the Load Zone Maps shown in this section, with any related information. The Load Zone Maps shall be not less than either 3½ in. by 2¼ in., or onehalf the size illustrated in the Code of Federal Regulations.

3280.305(d)

Design load deflection.

3280.305(d)(1)

When a structural assembly is subjected to total design live loads, the deflection for structural framing members shall not exceed the following (where L equals the clear span between supports or two times the length of a cantilever):

Floor-- $L/240$

Roof and ceiling-- $L/180$

Headers, beams, and girders (vertical load)-- $L/180$

Walls and partitions-- $L/180$

3280.305(d)(2)

The allowable eave or cornice deflection for uplift is to be measured at the design uplift load of 9 psf for Wind Zone I, and at the design uplift pressure cited in paragraph (c)(1)(ii) of this section for Wind Zones II and III. The allowable deflection shall be $(2 \times L_c)/180$, where L_c is the measured horizontal eave projection from the wall.

3280.305(e)

Fastening of structural systems.

3280.305(e)(1)

Roof framing shall be securely fastened to wall framing, walls to floor structure, and floor structure to chassis to secure and maintain continuity between the floor and chassis, so as to resist wind overturning, uplift, and sliding as specified in this part.

3280.305(e)(2)

For Wind Zones II and III, roof trusses shall be secured to exterior wall framing members (studs), and exterior wall framing members (studs) shall be secured to floor framing members, with 26 gage minimum steel strapping or brackets or by a combination of 26 gage minimum steel strapping or brackets and structural rated wall sheathing that overlaps the roof and floor. Steel strapping or brackets shall be installed at a maximum spacing of 24" on center in Wind Zone II and at a maximum of 16" on center in Wind Zone III. The number and type of fasteners used to secure the steel straps or brackets or structural sheathing shall be capable of transferring all uplift forces between elements being joined.

3280.305(f)

Walls. The walls shall be of sufficient strength to withstand the load requirements as defined in

§3280.305(c) of this part, without exceeding the deflections as specified in §3280.305(d). The connections between the bearing walls, floor, and roof framework members shall be fabricated in such a manner as to provide support for the material used to enclose the manufactured home and to provide for transfer of all lateral and vertical loads to the floor and chassis.

3280.305(f)(1)

Except where substantiated by engineering analysis or tests, studs shall not be notched or drilled in the middle one-third of their length.

3280.305(f)(2)

Interior walls and partitions shall be constructed with structural capacity adequate for the intended purpose and shall be capable of resisting a horizontal load of not less than five pounds per square foot. An allowable stress increase of 1.33 times the permitted published design values may be used in the design of wood framed interior partitions. Finish of walls and partitions shall be securely fastened to wall framing.

3280.305(g)

Floors.

3280.305(g)(1)

Floor assemblies shall be designed in accordance with accepted engineering practice standards to support a minimum uniform live load of 40 lb/ft² plus the dead load of the materials. In addition (but not simultaneously), floors shall be able to support a 200-pound concentrated load on a one-inch diameter disc at the most critical location with a maximum deflection not to exceed one-eighth inch relative to floor framing. Perimeter wood joists of more than six inches depth shall be stabilized against overturning from superimposed loads as follows: at ends by solid blocking not less than two-inch thickness by full depth of joist, or by connecting to a continuous header not less than two-inch thickness and not less than the depth of the joist with connecting devices; at eight-foot maximum intermediate spacing by solid blocking or by wood cross-bridging of not less than one inch by three inches, metal cross-bridging of equal strength, or by other approved methods.

3280.305(g)(2)

Wood, wood fiber or plywood floors or subfloors in kitchens, bathrooms (including toilet compartments), laundry areas, water heater compartments, and any other areas subject to excessive moisture shall be moisture resistant or shall be made moisture resistant by sealing or by an overlay of nonabsorbent material applied with water-resistant adhesive. Use of one of the following methods would meet this requirement:

3280.305(g)(2)(i)

Sealing the floor with a water-resistant sealer; or

3280.305(g)(2)(ii)

Installing an overlay of a non-absorbent floor covering material applied with water-resistant adhesive; or

3280.305(g)(2)(iii)

Direct application of a water-resistant sealer to the exposed wood floor area when covered with a non-absorbent overlay; or

3280.305(g)(2)(iv)

The use of a non-absorbent floor covering which may be installed without a continuous application of a water-resistant adhesive or sealant when the floor covering meets the following criteria:

3280.305(g)(2)(iv)(A)

The covering is a continuous membrane with any seams or patches seam bonded or welded to preserve the continuity of the floor covering; and

3280.305(g)(2)(iv)(B)

The floor is protected at all penetrations in these areas by sealing with a compatible water-resistant adhesive or sealant to prevent moisture from migrating under the nonabsorbent floor covering; and

3280.305(g)(2)(iv)(C)

The covering is fastened around the perimeter of the subfloor in accordance with the floor covering manufacturer's instructions; and,

3280.305(g)(2)(iv)(D)

The covering is designed to be installed to prevent moisture penetration without the use of a water-resistant adhesive or sealer except as required in this paragraph (g). The vertical edges of penetrations for plumbing shall be covered with a moisture-resistant adhesive or sealant. The vertical penetrations located under the bottom plates of perimeter walls of rooms, areas, or compartments are not required to be sealed; this does not include walls or partitions within the rooms or areas.

3280.305(g)(3)

Carpet or carpet pads shall not be installed under concealed spaces subject to excessive moisture, such as plumbing fixture spaces, floor areas under installed laundry equipment. Carpet may be installed in laundry space provided:

3280.305(g)(3)(i)

The appliances are not provided;

3280.305(g)(3)(ii)

The conditions of paragraph (g)(2) of this section are followed; and

3280.305(g)(3)(iii)

Instructions are provided to remove carpet when appliances are installed.

3280.305(g)(4)

Except where substantiated by engineering analysis or tests:

3280.305(g)(4)(i)

Notches on the ends of joists shall not exceed one-fourth the joist depth.

3280.305(g)(4)(ii)

Holes bored in joists shall not be within 2 inches of the top or bottom of the joist, and the diameter of any such hole shall not exceed one-third the depth of the joist.

3280.305(g)(4)(iii)

Notches in the top or bottom of the joists shall not exceed one-sixth the depth and shall not be located in the middle third of the span.

3280.305(g)(5)

Bottom board material (with or without patches) shall meet or exceed the level of 48 inch-pounds of puncture resistance as tested by the Beach Puncture Test in accordance with Standard Test Methods for Puncture and Stiffness of Paperboard, and Corrugated and Solid Fiberboard, ASTM D-781-1968 (73). The material shall be suitable for patches and the patch life shall be equivalent to the material life. Patch installation instruction shall be included in the manufactured home manufacturer's instructions.

3280.305(h)

Roofs.

3280.305(h)(1)

Roofs shall be of sufficient strength to withstand the load requirements as defined in §3280.305 (b) and (c) without exceeding the deflections specified in §3280.305(d). The connections between roof framework members and bearing walls shall be fabricated in such a manner to provide for the transfer of design vertical and horizontal loads to the bearing walls and to resist uplift forces.

3280.305(h)(2)

Roofing membranes shall be of sufficient rigidity to prevent deflection which would permit ponding of water or separation of seams due to wind, snow, ice, erection or transportation forces.

3280.305(h)(3)

Cutting of roof framework members for passage of electrical, plumbing or mechanical systems shall not be allowed except where substantiated by engineering analysis.

3280.305(h)(4)

All roof penetrations for electrical, plumbing or mechanical systems shall be properly flashed and sealed. In addition, where a metal roof membrane is penetrated, a wood backer shall be installed. The backer plate shall be not less than $\frac{5}{16}$ inch plywood, with exterior glues, secured to the roof framing system beneath the metal roof, and shall be of a size to assure that all screws securing the flashing are held by the backer plate.

3280.305(h)(4)(i)

Frame construction. The frame shall be capable of transmitting all design loads to stabilizing devices without exceeding the allowable load and deflections of this section. The frame shall also be capable of withstanding the effects of transportation shock and vibration without degradation as required by subpart J.

3280.305(h)(4)(i)(1)

Welded connections.

3280.305(h)(4)(i)(1)(i)

All welds shall be made in accordance with the applicable provisions of the Specification for Structural Steel Buildings, Allowable Stress Design and Plastic Design, AISC, June 1, 1989. The Specification for the Design of Cold-Formed Steel Structural Members, AISI-1986 with 1989 addendum, and the Stainless Steel Cold-Formed Structural Design Manual, AISI-1974.

3280.305(h)(4)(i)(1)(ii)

Regardless of the provisions of any reference standard contained in this subpart, deposits of weld slag or flux shall be required to be removed only from welded joints at the following locations:

3280.305(h)(4)(i)(1)(ii)(A)

Drawbar and coupling mechanisms;

3280.305(h)(4)(i)(1)(ii)(B)

Main member splices, and

3280.305(h)(4)(i)(1)(ii)(C)

Spring hanger to main member connections.

3280.305(h)(4)(i)(2)

Protection of metal frames against corrosion. Metal frames shall be made corrosion resistant or protected against corrosion. Metal frames may be protected against corrosion by painting.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 44 FR 66195, Nov. 19, 1979; 52 FR 4582, Feb. 12, 1987; 58 FR 55006, Oct. 25, 1993; 59 FR 2469, Jan. 14, 1994; 59 FR 15113, 15114, Mar. 31, 1994]

§3280.306 Windstorm protection.

3280.306(a)

Provisions for support and anchoring systems. Each manufactured home shall have provisions for support/anchoring or foundation systems that, when properly designed and installed, will resist overturning and lateral movement (sliding) of the manufactured home as imposed by the respective design loads. For Wind Zone I, the design wind loads to be used for calculating resistance to overturning and lateral movement shall be the simultaneous application of the wind loads indicated in §3280.305(c)(1)(i), increased by a factor of 1.5. The 1.5 factor of safety for Wind Zone I is also to be applied simultaneously to both the vertical building projection, as horizontal wind load, and across the surface of the full roof structure, as uplift loading. For Wind Zones II and III, the resistance shall be determined by the simultaneous application of the horizontal drag and uplift wind loads, in accordance with §3280.305(c)(1)(ii). The basic allowable stresses of materials required to resist overturning and lateral movement shall not be increased in the design and proportioning of these members. No additional shape or location factors need to be applied in the design of the tiedown system. The dead load of the structure may be used to resist these wind loading effects in all Wind Zones.

3280.306(a)(1)

The provisions of this section shall be followed and the support and anchoring systems shall be designed by a Registered Professional Engineer or Architect.

3280.306(a)(2)

The manufacturer of each manufactured home is required to make provision for the support and anchoring systems but is not required to provide the anchoring equipment or stabilizing devices. When the manufacturer's installation instructions provide for the main frame structure to be used as the points for connection of diagonal ties, no specific connecting devices need be provided on the main frame structure.

3280.306(b)

Contents of instructions.

3280.306(b)(1)

The manufacturer shall provide printed instructions with each manufactured home specifying the location and required capacity of stabilizing devices on which the design is based. The manufacturer shall provide drawings and specifications certified by a registered professional engineer or architect indicating at least one acceptable system of anchoring, including the details of required straps or cables, their end connections, and all other devices needed to transfer the wind loads from the manufactured home to an anchoring or foundation system.

3280.306(b)(2)

For anchoring systems, the instructions shall indicate:

3280.306(b)(2)(i)

The minimum anchor capacity required;

3280.306(b)(2)(ii)

That anchors should be certified by a professional engineer, architect, or a nationally recognized testing laboratory as to their resistance, based on the maximum angle of diagonal tie and/or vertical tie loading (see paragraph (c)(3) of this section) and angle of anchor installation, and type of soil in which the anchor is to be installed;

3280.306(b)(2)(iii)

That ground anchors should be embedded below the frost line and be at least 12 inches above the water table; and

3280.306(b)(2)(iv)

That ground anchors should be installed to their full depth, and stabilizer plates should be installed to provide added resistance to overturning or sliding forces.

3280.306(b)(2)(v)

That anchoring equipment should be certified by a registered professional engineer or architect to resist these specified forces in accordance with testing procedures in ASTM Standard Specification D3953-91, Standard Specification for Strapping, Flat Steel and Seals.

3280.306(c)

Design criteria. The provisions made for anchoring systems shall be based on the following design criteria for manufactured homes.

3280.306(c)(1)

The minimum number of ties provided per side of each home shall resist design wind loads required in §3280.305(c)(1).

3280.306(c)(2)

Ties shall be as evenly spaced as practicable along the length of the manufactured home, with not more than two (2) feet open-end spacing on each end.

3280.306(c)(3) Vertical ties or straps shall be positioned at studs. Where a vertical tie and a diagonal tie are located at the same place, both ties may be connected to a single anchor, provided that the anchor used is capable of carrying both loadings, simultaneously.

3280.306(c)(4)

Add-on sections of expandable manufactured homes shall have provisions for vertical ties at the exposed ends.

3280.306(d)

Requirements for ties. Manufactured homes in Wind Zone I require only diagonal ties. These ties shall be placed along the main frame and below the outer side walls. All manufactured homes designed to be located in Wind Zones II and III shall have a vertical tie installed at each diagonal tie location.

3280.306(e)

Protection requirements. Protection shall be provided at sharp corners where the anchoring system requires the use of external straps or cables. Protection shall also be provided to minimize damage to siding by the cable or strap.

3280.306(f)

Anchoring equipment--load resistance. Anchoring equipment shall be capable of resisting an allowable working load equal to or exceeding 3,150 pounds and shall be capable of withstanding a 50 percent overload (4,725 pounds total) without failure of either the anchoring equipment or the attachment point on the manufactured home.

3280.306(g)

Anchoring equipment--weatherization. Anchoring equipment exposed to weathering shall have a resistance to weather deterioration at least equivalent to that provided by a coating of zinc on steel of not less than 0.30 ounces per square foot of surface coated, and in accordance with the following:

3280.306(g)(1)

Slit or cut edges of zinc-coated steel strapping do not need to be zinc coated.

3280.306(g)(2) Type 1, Finish B, Grade 1 steel strapping, 1_1/4 inches wide and 0.035 inches in thickness, certified by a registered professional engineer or architect as conforming with ASTM Standard Specification D3953-91, Standard Specification for Strapping, Flat Steel, and Seals.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 52 FR 4583, Feb. 12, 1987; 59 FR 2473, Jan. 14, 1994]

§3280.307 Resistance to elements and use.

3280.307(a)

Exterior coverings shall be of moisture and weather resistive materials attached with corrosion resistant fasteners to resist wind, snow and rain. Metal coverings and exposed metal structural members shall be of corrosion resistant materials or shall be protected to resist corrosion. All joints between portions of

the exterior covering shall be designed, and assembled to protect against the infiltration of air and water, except for any designed ventilation of wall or roof cavity.

3280.307(b)

Joints between dissimilar materials and joints between exterior coverings and frames of openings shall be protected with a compatible sealant suitable to resist infiltration of air or water.

3280.307(c)

Where adjoining materials or assemblies of materials are of such nature that separation can occur due to expansion, contraction, wind loads or other loads induced by erection or transportation, sealants shall be of a type that maintains protection against infiltration or penetration by air, moisture or vermin.

3280.307(d)

Exterior surfaces shall be sealed to resist the entrance of rodents.

§3280.308 Formaldehyde emission controls for certain wood products.

3280.308(a)

Formaldehyde emission levels. All plywood and particleboard materials bonded with a resin system or coated with a surface finish containing formaldehyde shall not exceed the following formaldehyde emission levels when installed in manufactured homes:

3280.308(a)(1)

Plywood materials shall not emit formaldehyde in excess of 0.2 parts per million (ppm) as measured by the air chamber test method specified in §3280.406.

3280.308(a)(2)

Particleboard materials shall not emit formaldehyde in excess of 0.3 ppm as measured by the air chamber test specified in §3280.406.

3280.308(b)

Product certification and continuing qualification. All plywood and particleboard materials to be installed in manufactured homes which are bonded with a resin system or coated with a surface finish containing formaldehyde, other than an exclusively phenol-formaldehyde resin system or finish, shall be certified by a nationally recognized testing laboratory as complying with paragraph (a) of this section.

3280.308(b)(1)

Separate certification shall be done for each plant where the particleboard is produced or where the plywood or particleboard is surface-finished.

3280.308(b)(2)

To certify plywood or particleboard, the testing laboratory shall witness or conduct the air chamber test specified in 3280.406 on randomly selected panels initially and at least quarterly thereafter.

3280.308(b)(3)

The testing laboratory must approve a written quality control plan for each plant where the particleboard is produced or finished or where the plywood is finished. The quality control plan must be designed to assure that all panels comply with paragraph (a) of this section. The plan must establish ongoing procedures to identify increases in the formaldehyde emission characteristics of the finished product resulting from the following changes in production.

3280.308(b)(3)(i)

In the case of plywood:

3280.308(b)(3)(i)(A)

The facility where the unfinished panels are produced is changed;

3280.308(b)(3)(i)(B)

The thickness of the panels is changed so that the panels are thinner; or

3280.308(b)(3)(i)(C)

The grooving pattern on the panels is changed so that the grooves are deeper or closer together.

3280.308(b)(3)(ii)

In the case of particleboard:

3280.308(b)(3)(ii)(A)

The resin formulation is changed so that the formaldehyde-to-urea ratio is increased;

3280.308(b)(3)(ii)(B)

The amount of formaldehyde resin used is increased; or

3280.308(b)(3)(ii)(C)

The press time is decreased.

3280.308(b)(3)(iii)

In the case of plywood or particleboard:

3280.308(b)(3)(iii)(A)

The finishing or top coat is changed and the new finishing or top coat has a greater formaldehyde

content; or

3280.308(b)(3)(iii)(B)

The amount of finishing or top coat used on the panels is increased, provided that such finishing or top coat contains formaldehyde.

3280.308(b)(4)

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

3280.308(b)(5)

To maintain its certification, plywood or particleboard must be tested by the air chamber test specified in §3280.406 whenever one of the following events occurs:

3280.308(b)(5)(i)

In the case of particleboard, the resin formulation is changed so that the formaldehyde-to-urea ratio is increased; or

3280.308(b)(5)(ii)

In the case of particleboard or plywood, the finishing or top coat is changed and the new finishing or top coat contains formaldehyde; or

3280.308(b)(5)(iii)

In the case of particleboard or plywood, the testing laboratory determines that an air chamber test is necessary to assure that panels comply with paragraph (a) of this section.

3280.308(b)(6)

In the event that an air chamber test measures levels of formaldehyde from plywood or particleboard in excess of those permitted under paragraph (a) of this section, then the tested product's certification immediately lapses 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 may be used or certified for use in manufactured homes.

3280.308(b)(6)(i)

Provided, however, that a new product certification may be obtained by testing randomly selected panels which were produced on any day following the date of production of the tested panels. If such panels pass the air chamber test specified in §3280.406, then the plywood or particleboard produced on that day and subsequent days may be used and certified for use in manufactured homes.

3280.308(b)(6)(ii)

Provided further, that plywood or particleboard produced on the same day as the tested panels, and panels produced on subsequent days, if not certified pursuant to paragraph (b)(4)(i) of this section, may

be used in manufactured homes only under the following circumstances:

3280.308(b)(6)(ii)(A)

Each panel is treated with a scavenger, sealant, or other means of reducing formaldehyde emissions which does not adversely affect the structural quality of the product; and

3280.308(b)(6)(ii)(B)

Panels randomly selected from the treated panels are tested by and pass the air chamber test specified in 3280.406.

3280.308(c)

Panel identification. Each plywood and particleboard panel to be installed in manufactured homes which is bonded or coated with a resin system containing formaldehyde, other than an exclusively phenol-formaldehyde resin system, 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.

3280.308(d)

Treatment after certification. If certified plywood or particleboard subsequently is treated with paint, varnish, or any other substance containing formaldehyde, then the certification is no longer valid. In such a case, each stamp or label placed on the panels pursuant to paragraph (c) of this section must be obliterated. In addition, the treated panels may be recertified and reidentified in accordance with paragraphs (b) and (c) of this section.

[49 FR 32011, Aug. 9, 1984]

§3280.309 Health Notice on formaldehyde emissions.

3280.309(a)

Each manufactured home shall have a Health Notice on formaldehyde emissions prominently displayed in a temporary manner in the kitchen (i.e., 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. 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.

3280.309(b)

The Notice shall be legible and typed using letters at least ¼ inch in size. The title shall be typed using

3280.309(c)

The Notice shall not be removed by any party until the entire sales transaction has been completed (refer to part 3282--Manufactured Home Procedural and Enforcement Regulations for provisions regarding a sales transaction).

3280.309(d)

A copy of the Notice shall be included in the Consumer Manual (refer to part 3283--Manufactured Home Consumer Manual Requirements).

[49 FR 32012, Aug. 9, 1984, as amended at 54 FR 46049, Nov. 1, 1989; 58 FR 55007, Oct. 25, 1993]

Subpart E--Testing

§3280.401 Structural load tests.

Every structural assembly tested shall be capable of meeting the Proof Load Test or the Ultimate Load Test as follows:

3280.401(a)

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 $\frac{1}{4}$ 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) which is greater than the limits set in §3280.305(d), rupture, fracture, or excessive yielding. 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 or grade of material. All assemblies, components or subassemblies qualifying under this section shall be subject to a continuing qualification testing program acceptable to the Department.

3280.401(b)

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 load plus the design live load increased by a factor of safety of at least 2.5. A factor of safety greater than 2.5 shall be used when required by an applicable reference standard in §3280.304(b)(1). Tests shall be conducted with loads applied and deflections -minute intervals until 1.25 times design live load plus dead load has been reached. Additional loading shall then be applied continuously until failure occurs or the total of the factor of safety times the design live load plus the dead load is reached. Assembly failure shall be considered as design live load deflection greater than the limits set in §3208.305(d), rupture, fracture, or excessive yielding. Assemblies to be tested shall be representative of average quality or materials and workmanship of the production. Each test assembly, component, or sub-assembly shall be identified as to type and quality or grade of material. All assemblies, components, or sub-assemblies qualifying under this section shall be subject to a periodic qualification testing program acceptable to the Department.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 58 FR 55007, Oct. 25, 1993]

§3280.402 Test procedure for roof trusses.

3280.402(a)

Roof load tests. The following is an acceptable test procedure, consistent with the provisions of §3280.401, for roof trusses that are supported at the ends and support design loads. Where roof trusses act as support for other members, act as cantilevers, or support concentrated loads, they shall be tested accordingly.

3280.402(b)

General. Trusses may be tested in pairs or singly in a suitable test facility. When tested singly, simulated lateral support of the test assembly may be provided, but in no case shall this lateral support exceed that which is specified for the completed manufactured home. When tested in pairs, the trusses shall be spaced at the design spacing and shall be mounted on solid support accurately positioned to give the required clear span distance (L) as specified in the design. The top and bottom chords shall be braced and covered with the material, with connections or method of attachment, as specified by the completed manufactured home.

3280.402(b)(1)

As an alternate test procedure, the top chord may be sheathed with ¼ inch by 12 inch plywood strips. The plywood strips shall be at least long enough to cover the top chords of the trusses at the designated design truss spacing. Adjacent plywood strips must be separated by at least _ inch. The plywood strip shall be nailed with 4d nails or equivalent staples not closer than 8 inches on center along the top chord. The bottom chords of the adjacent trusses may be either:

3280.402(b)(1)(i)

Unbraced,

3280.402(b)(1)(ii)

laterally braced together (not cross braced) with 1" x 2" stripping not closer than 24 inches on center nailed with only one 6d nail at each truss, or

3280.402(b)(1)(iii)

covered with the material, with connections or methods of attachment, as specified for the completed manufactured home.

3280.402(b)(2)

Truss deflections will be measured relative to a taut wire running over the support and weighted at the end to insure constant tension or other approved methods. Deflections will be measured at the two quarter points and at midspan. Loading shall be applied to the top chord through a suitable hydraulic, pneumatic, or mechanical system, masonry units, or weights to simulate design loads. Load units for uniformly distributed loads shall be separated so that arch action does not occur, and shall be spaced

not greater than 12 inches on center so as to simulate uniform loading.

3280.402(c)

Nondestructive test procedure--

3280.402(c)(1)

Dead load plus live load.

3280.402(c)(1)(i)

Noting figure A-1, measure and record initial elevation of the truss in test position at no load.

Insert figure from page 237 - Figure A-1. Test Procedures for Roof Trusses

3280.402(c)(1)(ii)

Apply load units to the top chord of the truss equal to the full dead load of roof and ceiling. Measure and record deflections.

3280.402(c)(1)(iii)

Maintaining the dead load, add live load in approximate $\frac{1}{4}$ design live load increments. Measure the deflections after each loading increment. Apply incremental loads at a uniform rate such that approximately one-half hour is required to establish the total design load condition. Measure and record the deflections five minutes after loads have been applied. The maximum deflection due to design live load (deflection measured in step (iii) minus step (ii)) shall not exceed $L/180$, where L is a clear span measured in the same units.

3280.402(c)(1)(iv)

Continue to load truss to dead load plus 1.75 times the design live load. Maintain this loading for 12 hours and inspect the truss for failure.

3280.402(c)(1)(v)

Remove the total superimposed live load. Trusses not recovering to at least the $L/180$ position within 12 hours shall be considered as failing.

3280.402(c)(2)

Uplift loads. This test shall only be required for truss designs which may be critical under uplift load conditions.

3280.402(c)(2)(i)

Measure and record initial elevation of the truss in an inverted test position at no load. Bottom chord of the truss shall be mounted in the horizontal position.

3280.402(c)(2)(ii)

Apply the uplift load as stated in §3280.305(c) to the bottom chord of the truss. Measure and record the deflections 5 minutes after the load has been applied.

3280.402(c)(2)(iii)

Continue to load the truss to 1.75 times the design uplift load. Maintain this load for 3 hours and inspect the truss for failure.

3280.402(c)(2)(iv)

Remove applied loads and within three hours the truss must recover to at least $L/180$ position, where L is a clear span measured in the same units.

3280.402(d)

Destructive test procedure.

3280.402(d)(1)

Destructive tests shall be performed on three trusses to generally evaluate the truss design.

3280.402(d)(2)

Noting Figure A-1, apply the load units to the top chord of the truss assembly equal to full dead load of roof and ceiling. Measure and record deflections. Then apply load and record deflections in $1/4$ design live load increments at 10-minute intervals until 1.25 times design live load plus dead load has been reached.

3280.402(d)(3)

Additional loading shall then be applied continuously until failure occurs or the factor of safety times the design live load plus the dead load is reached.

3280.402(d)(4)

Assembly failure shall be considered as design live load deflection greater than the limits set in §3280.305(d), rupture, fracture, or excessive yielding.

3280.402(d)(5)

The assembly shall be capable of sustaining the dead load plus the applicable factor of safety times the design live load (the applicable factor of safety for wood trusses shall be taken as 2.50).

3280.402(e)

Trusses qualifying under the nondestructive test procedure. Tests §3208.402(c) (1) and (2) (when required), shall be subject to a continuing qualification testing program acceptable to the Department. Trusses qualifying under the destructive test procedures, Tests §3280.402 (c)(2) (when required), and (d), shall be subject to periodic tests only.

[40 FR 58752, Dec. 18, 1975, as amended at 42 FR 961, Jan. 4, 1977. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 58 FR 55008, Oct. 25, 1993]

§3280.403 Standard for windows and sliding glass doors used in manufactured homes.

3280.403(a)

Scope. This section sets the requirements for prime windows and sliding glass doors except for windows used in entry doors. Windows so mounted are components of the door and thus are excluded from this standard.

3280.403(b)

Standard. All primary windows and sliding glass doors shall comply with AAMA Standard 1701.2-1985, Primary Window and Sliding Glass Door Voluntary Standard for Utilization in Manufactured Housing, except that by January 17, 1995, the exterior and interior pressure tests shall be conducted at the design wind loads required for components and cladding specified in 3280.305(c)(1).

3280.403(c)

Installation. All primary windows and sliding glass doors shall be installed in a manner which allows proper operation and provides protection against the elements (see §3280.307).

3280.403(d)

Glass.

3280.403(d)(1)

Safety glazing materials, where used, shall meet ANSI Z97.1-1984, "Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings."

3280.403(d)(2)

Sealed insulating glass, where used, shall meet all performance requirements for Class C in accordance with ASTM E-774-92, Standard Specification for Sealed Insulating Glass Units. The sealing system shall be qualified in accordance with ASTM E-773-88 Standard Test Methods for Seal Durability of Sealed Insulating Glass Units. Each glass unit shall be permanently identified with the name of the insulating glass manufacturer.

3280.403(e)

Certification. All primary windows and sliding glass doors to be installed in manufactured homes shall be certified as complying with AAMA Standard 1701.2-1985. As of January 17, 1995, this certification must be based on tests conducted at the design wind loads specified in §3280.305(c)(1).

3280.403(e)(1)

All such windows and doors shall show evidence of certification by affixing a quality certification label to the product in accordance with ANSI Z34.1-1987, ``For Certification-Third-Party Certification Program."

3280.403(e)(2)

In determining certifiability of the products, an independent quality assurance agency shall conduct preproduction specimen tests in accordance with AAMA 1702.2-1985. Further, such agency shall inspect the product manufacturer's facility at least twice per year.

3280.403(f)

Protection of primary window and sliding glass door openings in high wind areas. For homes designed to be located in Wind Zones II and III, manufacturers shall design exterior walls surrounding the primary window and sliding glass door openings to allow for the installation of shutters or other protective covers, such as plywood, to cover these openings. Although not required, the Department encourages manufacturers to provide the shutters or protective covers and to install receiving devices, sleeves, or anchors for fasteners to be used to secure the shutters or protective covers to the exterior walls. If the manufacturer does not provide shutters or other protective covers to cover these openings, the manufacturer must provide to the homeowner instructions for at least one method of protecting primary window and sliding glass door openings. This method must be capable of resisting the design wind pressures specified in §3280.305 without taking the home out of conformance with the standards in this part. These instructions must be included in the printed instructions that accompany each manufactured home. The instructions shall also indicate whether receiving devices, sleeves, or anchors, for fasteners to be used to secure the shutters or protective covers to the exterior walls, have been installed or provided by the manufacturer.

[52 FR 4583, Feb. 12, 1987, as amended at 52 FR 35543, Sept. 22, 1987; 58 FR 55009, Oct. 25, 1993; 59 FR 2474, Jan. 14, 1994]

§3280.404 Standard for egress windows and devices for use in manufactured homes.**3280.404(a)**

Scope and purpose. The purpose of this section is to establish the requirements for the design, construction, and installation of windows and approved devices intended to be used as an emergency exit during conditions encountered in a fire or similar disaster.

3280.404(b)

Performance. Egress windows including auxiliary frame and seals, if any, shall meet all requirements of AAMA Standard 1701.2-1985, Primary Window and Sliding Glass Door Voluntary Standard for Utilization in Manufactured Housing and AAMA Standard 1704-1985, Voluntary Standard Egress

Window Systems for Utilization in Manufactured--Housing, except that by January 17, 1995, the exterior and interior pressure tests for components and cladding shall be conducted at the design wind loads required by 3280.305(c)(1).

3280.404(c)

Installation.

3280.404(c)(1)

The installation of egress windows or devices shall be installed in a manner which allows for proper operation and provides protection against the elements. (See §3280.307.)

3280.404(c)(2)

An operational check of each installed egress window or device shall be made at the manufactured home factory. All egress windows and devices shall be operable to the minimum required dimension without binding or requiring the use of tools. Any window or device failing this check shall be repaired or replaced. A repaired window shall conform to its certification. Any repaired or replaced window or device shall pass the operational check.

3280.404(d)

Operating instructions. Operating instructions shall be affixed to each egress window and device and carry the legend "Do Not Remove."

3280.404(e)

Certification of egress windows and devices. Egress windows and devices shall be listed in accordance with the procedures and requirements of AAMA Standard 1704-1985. As of January 17, 1995, this certification must be based on tests conducted at the design wind loads specified in 3280.305(c)(1).

3280.404(f)

Protection of egress window openings in high wind areas. For homes designed to be located in Wind Zones II and III, manufacturers shall design exterior walls surrounding the egress window openings to allow for the installation of shutters or other protective covers, such as plywood, to cover these openings. Although not required, the Department encourages manufacturers to provide the shutters or protective covers and to install receiving devices, sleeves, or anchors for fasteners to be used to secure the shutters or protective covers to the exterior walls. If the manufacturer does not provide shutters or other protective covers to cover these openings, the manufacturer must provide to the homeowner instructions for at least one method of protecting egress window openings. This method must be capable of resisting the design wind pressures specified in §3280.305 without taking the home out of conformance with the standards in this part. These instructions must be included in the printed instructions that accompany each manufactured home. The instructions shall also indicate whether receiving devices, sleeves, or anchors, for fasteners to be used to secure the shutters or protective

covers to the exterior walls, have been installed or provided by the manufacturer.

[52 FR 4583, Feb. 12, 1987, as amended at 59 FR 2474, Jan. 14, 1994]

§3280.405 Standard for swinging exterior passage doors for use in manufactured homes.

3280.405(a)

Introduction. This standard applies to all exterior passage door units, excluding sliding doors and doors used for access to utilities and compartments. This standard applies only to the door frame consisting of jambs, head and sill and the attached door or doors.

3280.405(b)

Performance requirements. The design and construction of exterior door units shall meet all requirements of AAMA 1702.2-1985, Swinging Exterior Passage Doors Voluntary Standard for Utilization in Manufactured--Housing.

3280.405(c)

Materials and methods. Any material or method of construction shall conform to the performance requirements as outlined in paragraph (b) of this section. Wood materials or wood based materials shall also conform to the following:

3280.405(c)(1)

Wood. Doors shall conform to the type 1 requirements of ANSI/NWWDA I.S.1-87, Wood Flush Doors.

3280.405(c)(2)

Plywood. Plywood shall be exterior type and preservative treated in accordance with NWWDA I.S.4-81, Water Repellent Preservative Non-Pressure Treatment for Millwork.

3280.405(d)

Exterior doors. All swinging exterior doors shall be installed in a manner which allows proper operation and provides protection against the elements (see §3280.307).

3280.405(e)

Certification. All swinging exterior doors to be installed in manufactured homes shall be certified as complying with AAMA Standard 1702.2-1985.

3280.405(e)(1)

All such doors shall show evidence of certification by affixing a quality certification label to the product

in accordance with ANSI Z34.1-1982, ``For Certification-Third-Party Certification Program."`

3280.405(e)(2)

In determining certifiability of the products, an independent quality assurance agency shall conduct preproduction specimen test in accordance with AAMA 1701.2-1985. Further, such agency shall inspect the product manufacturer's facility at least twice per year.

3280.405(f)

Protection of exterior doors in high wind areas. For homes designed to be located in Wind Zones II and III, manufacturers shall design exterior walls surrounding the exterior door openings to allow for the installation of shutters or other protective covers, such as plywood, to cover these openings. Although not required, the Department encourages manufacturers to provide the shutters or protective covers and to install receiving devices, sleeves, or anchors for fasteners to be used to secure the shutters or protective covers to the exterior walls. If the manufacturer does not provide shutters or other protective covers to cover these openings, the manufacturer must provide to the homeowner instructions for at least one method of protecting exterior door openings. This method must be capable of resisting the design wind pressures specified in §3280.305 without taking the home out of conformance with the standards in this part. These instructions must be included in the printed instructions that accompany each manufactured home. The instructions shall also indicate whether receiving devices, sleeves, or anchors, for fasteners to be used to secure the shutters or protective covers to the exterior walls, have been installed or provided by the manufacturer.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 52 FR 4583, Feb. 12, 1987; 52 FR 35543, Sept. 22, 1987; 58 FR 55009, Oct. 25, 1993; 59 FR 2474, Jan. 14, 1994]

§3280.406 Air chamber test method for certification and qualification of formaldehyde emission levels.

3280.406(a)

Preconditioning. Preconditioning of plywood or particleboard panels for air chamber tests shall be initiated as soon as practicable but not in excess of 30 days after the plywood or particleboard is produced or surface-finished, whichever is later, using randomly selected panels.

3280.406(a)(1)

If preconditioning is to be initiated more than two days after the plywood or particleboard is produced or surface-finished, whichever is later, the panels must be dead-stacked or air-tight wrapped until preconditioning is initiated.

3280.406(a)(2)

Panels selected for testing in the air chamber shall not be taken from the top or bottom of the stack.

3280.406(b)

Testing. Testing shall be conducted in accordance with the Standard Test Method for Determining Formaldehyde Levels from Wood Products Under Defined Test Conditions Using a Large Chamber, ASTM E-1333-90, with the following exceptions:

3280.406(b)(1)

The chamber shall be operated indoors.

3280.406(b)(2)

Plywood and particleboard panels shall be individually tested in accordance with the following loading ratios:

3280.406(b)(2)(i)

Plywood--0.29 Ft²/Ft³, and

3280.406(b)(2)(ii)

Particleboard--0.13 Ft²/Ft³.

3280.406(b)(3)

Temperature to be maintained inside the chamber shall be 77° plus or minus 2°F.

3280.406(b)(4)

The test concentration (C) shall be standardized to a level (C_o) at a temperature (t_o) of 77° F and 50% relative humidity (H_o) by the following formula:

$$C = C_o \times [1 + Ax (H - H_o)] \times e^{-R(1/t - 1/t_o)} \text{ where:}$$

C = Test formaldehyde concentration

C_o = Standardized formaldehyde concentration

e = Natural log base

R = Coefficient of temperature (9799)

t = Actual test condition temperature (°K)

t_o = Standardized temperature (°K)

A = Coefficient of humidity (0.0175)

H = Actual relative humidity (%)

H_o = Standardized relative humidity (%)

The standardized level (C_o) is the concentration used to determine compliance with §3280.308(a).

3280.406(b)(5)

The air chamber shall be inspected and recalibrated at least annually to insure its proper operation under test conditions.

[49 FR 32012, Aug. 9, 1984, as amended at 58 FR 55009, Oct. 25, 1993]

Subpart E--Testing

§3280.401 Structural load tests.

Every structural assembly tested shall be capable of meeting the Proof Load Test or the Ultimate Load Test as follows:

3280.401(a)

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 $\frac{1}{4}$ 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) which is greater than the limits set in §3280.305(d), rupture, fracture, or excessive yielding. 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 or grade of material. All assemblies, components or subassemblies qualifying under this section shall be subject to a continuing qualification testing program acceptable to the Department.

3280.401(b)

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 load plus the design live load increased by a factor of safety of at least 2.5. A factor of safety greater than 2.5 shall be used when required by an applicable reference standard in §3280.304(b)(1). Tests shall be conducted with loads applied and deflections -minute intervals until 1.25 times design live load plus dead load has been reached. Additional loading shall then be applied continuously until failure occurs or the total of the factor of safety times the design live load plus the dead load is reached. Assembly failure shall be considered as design live load deflection greater than the limits set in §3280.305(d), rupture, fracture, or excessive yielding. Assemblies to be tested shall be representative of average quality or materials and workmanship of the production. Each test assembly, component, or sub-assembly shall be identified as to type and quality or grade of material. All assemblies, components, or sub-assemblies qualifying under this section shall be subject to a periodic qualification testing program acceptable to the Department.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 58 FR 55007, Oct. 25, 1993]

§3280.402 Test procedure for roof trusses.

3280.402(a)

Roof load tests. The following is an acceptable test procedure, consistent with the provisions of §3280.401, for roof trusses that are supported at the ends and support design loads. Where roof trusses act as support for other members, act as cantilevers, or support concentrated loads, they shall be tested accordingly.

3280.402(b)

General. Trusses may be tested in pairs or singly in a suitable test facility. When tested singly, simulated lateral support of the test assembly may be provided, but in no case shall this lateral support exceed that which is specified for the completed manufactured home. When tested in pairs, the trusses shall be spaced at the design spacing and shall be mounted on solid support accurately positioned to give the required clear span distance (L) as specified in the design. The top and bottom chords shall be braced and covered with the material, with connections or method of attachment, as specified by the completed manufactured home.

3280.402(b)(1)

As an alternate test procedure, the top chord may be sheathed with ¼ inch by 12 inch plywood strips. The plywood strips shall be at least long enough to cover the top chords of the trusses at the designated design truss spacing. Adjacent plywood strips must be separated by at least _ inch. The plywood strip shall be nailed with 4d nails or equivalent staples not closer than 8 inches on center along the top chord. The bottom chords of the adjacent trusses may be either:

3280.402(b)(1)(i)

Unbraced,

3280.402(b)(1)(ii)

laterally braced together (not cross braced) with 1" x 2" stripping not closer than 24 inches on center nailed with only one 6d nail at each truss, or

3280.402(b)(1)(iii)

covered with the material, with connections or methods of attachment, as specified for the completed manufactured home.

3280.402(b)(2)

Truss deflections will be measured relative to a taut wire running over the support and weighted at the end to insure constant tension or other approved methods. Deflections will be measured at the two quarter points and at midspan. Loading shall be applied to the top chord through a suitable hydraulic, pneumatic, or mechanical system, masonry units, or weights to simulate design loads. Load units for uniformly distributed loads shall be separated so that arch action does not occur, and shall be spaced

not greater than 12 inches on center so as to simulate uniform loading.

3280.402(c)

Nondestructive test procedure--

3280.402(c)(1)

Dead load plus live load.

3280.402(c)(1)(i)

Noting figure A-1, measure and record initial elevation of the truss in test position at no load.

Insert figure from page 237 - Figure A-1. Test Procedures for Roof Trusses

3280.402(c)(1)(ii)

Apply load units to the top chord of the truss equal to the full dead load of roof and ceiling. Measure and record deflections.

3280.402(c)(1)(iii)

Maintaining the dead load, add live load in approximate $\frac{1}{4}$ design live load increments. Measure the deflections after each loading increment. Apply incremental loads at a uniform rate such that approximately one-half hour is required to establish the total design load condition. Measure and record the deflections five minutes after loads have been applied. The maximum deflection due to design live load (deflection measured in step (iii) minus step (ii)) shall not exceed $L/180$, where L is a clear span measured in the same units.

3280.402(c)(1)(iv)

Continue to load truss to dead load plus 1.75 times the design live load. Maintain this loading for 12 hours and inspect the truss for failure.

3280.402(c)(1)(v)

Remove the total superimposed live load. Trusses not recovering to at least the $L/180$ position within 12 hours shall be considered as failing.

3280.402(c)(2)

Uplift loads. This test shall only be required for truss designs which may be critical under uplift load conditions.

3280.402(c)(2)(i)

Measure and record initial elevation of the truss in an inverted test position at no load. Bottom chord of the truss shall be mounted in the horizontal position.

3280.402(c)(2)(ii)

Apply the uplift load as stated in §3280.305(c) to the bottom chord of the truss. Measure and record the deflections 5 minutes after the load has been applied.

3280.402(c)(2)(iii)

Continue to load the truss to 1.75 times the design uplift load. Maintain this load for 3 hours and inspect the truss for failure.

3280.402(c)(2)(iv)

Remove applied loads and within three hours the truss must recover to at least L/180 position, where L is a clear span measured in the same units.

3280.402(d)

Destructive test procedure.

3280.402(d)(1)

Destructive tests shall be performed on three trusses to generally evaluate the truss design.

3280.402(d)(2)

Noting Figure A-1, apply the load units to the top chord of the truss assembly equal to full dead load of roof and ceiling. Measure and record deflections. Then apply load and record deflections in ¼ design live load increments at 10-minute intervals until 1.25 times design live load plus dead load has been reached.

3280.402(d)(3)

Additional loading shall then be applied continuously until failure occurs or the factor of safety times the design live load plus the dead load is reached.

3280.402(d)(4)

Assembly failure shall be considered as design live load deflection greater than the limits set in §3280.305(d), rupture, fracture, or excessive yielding.

3280.402(d)(5)

The assembly shall be capable of sustaining the dead load plus the applicable factor of safety times the design live load (the applicable factor of safety for wood trusses shall be taken as 2.50).

3280.402(e)

Trusses qualifying under the nondestructive test procedure. Tests §3208.402(c) (1) and (2) (when required), shall be subject to a continuing qualification testing program acceptable to the Department. Trusses qualifying under the destructive test procedures, Tests §3280.402 (c)(2) (when required), and (d), shall be subject to periodic tests only.

[40 FR 58752, Dec. 18, 1975, as amended at 42 FR 961, Jan. 4, 1977. Redesignated at 44 FR 20679. Apr. 6, 1979, and amended at 58 FR 55008, Oct. 25, 1993]

§3280.403 Standard for windows and sliding glass doors used in manufactured homes.

3280.403(a)

Scope. This section sets the requirements for prime windows and sliding glass doors except for windows used in entry doors. Windows so mounted are components of the door and thus are excluded from this standard.

3280.403(b)

Standard. All primary windows and sliding glass doors shall comply with AAMA Standard 1701.2-1985, Primary Window and Sliding Glass Door Voluntary Standard for Utilization in Manufactured Housing, except that by January 17, 1995, the exterior and interior pressure tests shall be conducted at the design wind loads required for components and cladding specified in §3280.305(c)(1).

3280.403(c)

Installation. All primary windows and sliding glass doors shall be installed in a manner which allows proper operation and provides protection against the elements (see §3280.307).

3280.403(d)

Glass.

3280.403(d)(1)

Safety glazing materials, where used, shall meet ANSI Z97.1-1984, "Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings."

3280.403(d)(2)

Sealed insulating glass, where used, shall meet all performance requirements for Class C in accordance with ASTM E-774-92, Standard Specification for Sealed Insulating Glass Units. The sealing system shall be qualified in accordance with ASTM E-773-88 Standard Test Methods for Seal Durability of Sealed Insulating Glass Units. Each glass unit shall be permanently identified with the name of the insulating glass manufacturer.

3280.403(e)

Certification. All primary windows and sliding glass doors to be installed in manufactured homes shall be certified as complying with AAMA Standard 1701.2-1985. As of January 17, 1995, this certification must be based on tests conducted at the design wind loads specified in §3280.305(c)(1).

3280.403(e)(1)

All such windows and doors shall show evidence of certification by affixing a quality certification label to the product in accordance with ANSI Z34.1-1987, ``For Certification-Third-Party Certification Program."''

3280.403(e)(2)

In determining certifiability of the products, an independent quality assurance agency shall conduct preproduction specimen tests in accordance with AAMA 1702.2-1985. Further, such agency shall inspect the product manufacturer's facility at least twice per year.

3280.403(f)

Protection of primary window and sliding glass door openings in high wind areas. For homes designed to be located in Wind Zones II and III, manufacturers shall design exterior walls surrounding the primary window and sliding glass door openings to allow for the installation of shutters or other protective covers, such as plywood, to cover these openings. Although not required, the Department encourages manufacturers to provide the shutters or protective covers and to install receiving devices, sleeves, or anchors for fasteners to be used to secure the shutters or protective covers to the exterior walls. If the manufacturer does not provide shutters or other protective covers to cover these openings, the manufacturer must provide to the homeowner instructions for at least one method of protecting primary window and sliding glass door openings. This method must be capable of resisting the design wind pressures specified in §3280.305 without taking the home out of conformance with the standards in this part. These instructions must be included in the printed instructions that accompany each manufactured home. The instructions shall also indicate whether receiving devices, sleeves, or anchors, for fasteners to be used to secure the shutters or protective covers to the exterior walls, have been installed or provided by the manufacturer.

[52 FR 4583, Feb. 12, 1987, as amended at 52 FR 35543, Sept. 22, 1987; 58 FR 55009, Oct. 25, 1993; 59 FR 2474, Jan. 14, 1994]

§3280.404 Standard for egress windows and devices for use in manufactured homes.**3280.404(a)**

Scope and purpose. The purpose of this section is to establish the requirements for the design, construction, and installation of windows and approved devices intended to be used as an emergency exit during conditions encountered in a fire or similar disaster.

3280.404(b)

Performance. Egress windows including auxiliary frame and seals, if any, shall meet all requirements of AAMA Standard 1701.2-1985, Primary Window and Sliding Glass Door Voluntary Standard for

Utilization in Manufactured Housing and AAMA Standard 1704-1985, Voluntary Standard Egress Window Systems for Utilization in Manufactured--Housing, except that by January 17, 1995, the exterior and interior pressure tests for components and cladding shall be conducted at the design wind loads required by §3280.305(c)(1).

3280.404(c)

Installation.

3280.404(c)(1)

The installation of egress windows or devices shall be installed in a manner which allows for proper operation and provides protection against the elements. (See §3280.307.)

3280.404(c)(2)

An operational check of each installed egress window or device shall be made at the manufactured home factory. All egress windows and devices shall be openable to the minimum required dimension without binding or requiring the use of tools. Any window or device failing this check shall be repaired or replaced. A repaired window shall conform to its certification. Any repaired or replaced window or device shall pass the operational check.

3280.404(d)

Operating instructions. Operating instructions shall be affixed to each egress window and device and carry the legend "Do Not Remove."

3280.404(e)

Certification of egress windows and devices. Egress windows and devices shall be listed in accordance with the procedures and requirements of AAMA Standard 1704-1985. As of January 17, 1995, this certification must be based on tests conducted at the design wind loads specified in §3280.305(c)(1).

3280.404(f)

Protection of egress window openings in high wind areas. For homes designed to be located in Wind Zones II and III, manufacturers shall design exterior walls surrounding the egress window openings to allow for the installation of shutters or other protective covers, such as plywood, to cover these openings. Although not required, the Department encourages manufacturers to provide the shutters or protective covers and to install receiving devices, sleeves, or anchors for fasteners to be used to secure the shutters or protective covers to the exterior walls. If the manufacturer does not provide shutters or other protective covers to cover these openings, the manufacturer must provide to the homeowner instructions for at least one method of protecting egress window openings. This method must be capable of resisting the design wind pressures specified in §3280.305 without taking the home out of conformance with the standards in this part. These instructions must be included in the printed instructions that accompany each manufactured home. The instructions shall also indicate whether

receiving devices, sleeves, or anchors, for fasteners to be used to secure the shutters or protective covers to the exterior walls, have been installed or provided by the manufacturer.

[52 FR 4583, Feb. 12, 1987, as amended at 59 FR 2474, Jan. 14, 1994]

§3280.405 Standard for swinging exterior passage doors for use in manufactured homes.

3280.405(a)

Introduction. This standard applies to all exterior passage door units, excluding sliding doors and doors used for access to utilities and compartments. This standard applies only to the door frame consisting of jambs, head and sill and the attached door or doors.

3280.405(b)

Performance requirements. The design and construction of exterior door units shall meet all requirements of AAMA 1702.2-1985, Swinging Exterior Passage Doors Voluntary Standard for Utilization in Manufactured--Housing.

3280.405(c)

Materials and methods. Any material or method of construction shall conform to the performance requirements as outlined in paragraph (b) of this section. Wood materials or wood based materials shall also conform to the following:

3280.405(c)(1)

Wood. Doors shall conform to the type 1 requirements of ANSI/NWWDA I.S.1-87, Wood Flush Doors.

3280.405(c)(2)

Plywood. Plywood shall be exterior type and preservative treated in accordance with NWWDA I.S.4-81, Water Repellent Preservative Non-Pressure Treatment for Millwork.

3280.405(d)

Exterior doors. All swinging exterior doors shall be installed in a manner which allows proper operation and provides protection against the elements (see §3280.307).

3280.405(e)

Certification. All swinging exterior doors to be installed in manufactured homes shall be certified as complying with AAMA Standard 1702.2-1985.

3280.405(e)(1)

All such doors shall show evidence of certification by affixing a quality certification label to the product in accordance with ANSI Z34.1-1982, ``For Certification-Third-Party Certification Program."`

3280.405(e)(2)

In determining certifiability of the products, an independent quality assurance agency shall conduct preproduction specimen test in accordance with AAMA 1701.2-1985. Further, such agency shall inspect the product manufacturer's facility at least twice per year.

3280.405(f)

Protection of exterior doors in high wind areas. For homes designed to be located in Wind Zones II and III, manufacturers shall design exterior walls surrounding the exterior door openings to allow for the installation of shutters or other protective covers, such as plywood, to cover these openings. Although not required, the Department encourages manufacturers to provide the shutters or protective covers and to install receiving devices, sleeves, or anchors for fasteners to be used to secure the shutters or protective covers to the exterior walls. If the manufacturer does not provide shutters or other protective covers to cover these openings, the manufacturer must provide to the homeowner instructions for at least one method of protecting exterior door openings. This method must be capable of resisting the design wind pressures specified in §3280.305 without taking the home out of conformance with the standards in this part. These instructions must be included in the printed instructions that accompany each manufactured home. The instructions shall also indicate whether receiving devices, sleeves, or anchors, for fasteners to be used to secure the shutters or protective covers to the exterior walls, have been installed or provided by the manufacturer.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 52 FR 4583, Feb. 12, 1987; 52 FR 35543, Sept. 22, 1987; 58 FR 55009, Oct. 25, 1993; 59 FR 2474, Jan. 14, 1994]

§3280.406 Air chamber test method for certification and qualification of formaldehyde emission levels.

3280.406(a)

Preconditioning. Preconditioning of plywood or particleboard panels for air chamber tests shall be initiated as soon as practicable but not in excess of 30 days after the plywood or particleboard is produced or surface-finished, whichever is later, using randomly selected panels.

3280.406(a)(1)

If preconditioning is to be initiated more than two days after the plywood or particleboard is produced or surface-finished, whichever is later, the panels must be dead-stacked or air-tight wrapped until preconditioning is initiated.

3280.406(a)(2)

Panels selected for testing in the air chamber shall not be taken from the top or bottom of the stack.

3280.406(b)

Testing. Testing shall be conducted in accordance with the Standard Test Method for Determining Formaldehyde Levels from Wood Products Under Defined Test Conditions Using a Large Chamber, ASTM E-1333-90, with the following exceptions:

3280.406(b)(1)

The chamber shall be operated indoors.

3280.406(b)(2)

Plywood and particleboard panels shall be individually tested in accordance with the following loading ratios:

3280.406(b)(2)(i)

Plywood--0.29 Ft²/Ft³, and

3280.406(b)(2)(ii)

Particleboard--0.13 Ft²/Ft³.

3280.406(b)(3)

Temperature to be maintained inside the chamber shall be 77° plus or minus 2°F.

3280.406(b)(4)

The test concentration (C) shall be standardized to a level (C_o) at a temperature (t_o) of 77° F and 50% relative humidity (H_o) by the following formula:

$$C = C_o \times [1 + A \times (H - H_o)] \times e^{-R(1/t - 1/t_o)} \text{ where:}$$

C = Test formaldehyde concentration

C_o = Standardized formaldehyde concentration

e = Natural log base

R = Coefficient of temperature (9799)

t = Actual test condition temperature (°K)

t_o = Standardized temperature (°K)

A = Coefficient of humidity (0.0175)

H = Actual relative humidity (%)

H_o = Standardized relative humidity (%)

The standardized level (C_o) is the concentration used to determine compliance with §3280.308(a).

3280.406(b)(5)

The air chamber shall be inspected and recalibrated at least annually to insure its proper operation under test conditions.

[49 FR 32012, Aug. 9, 1984, as amended at 58 FR 55009, Oct. 25, 1993]

Subpart F--Thermal Protection

§3280.501 Scope.

This subpart sets forth the requirements for condensation control, air infiltration, thermal insulation and certification for heating and comfort cooling.

§3280.502 Definitions.

3280.502(a)

The following definitions are applicable to subpart F only:

3280.502(a)(1)

Pressure envelope means that primary air barrier surrounding the living space which serves to limit air leakage. In construction using ventilated cavities, the pressure envelope is the interior skin.

3280.502(a)(2)

Thermal envelope area means the sum of the surface areas of outside walls, ceiling and floor, including all openings. The wall area is measured by multiplying outside wall lengths by the inside wall height from floor to ceiling. The floor and ceiling areas are considered as horizontal surfaces using exterior width and length.

§3280.503 Materials.

Materials used for insulation shall be of proven effectiveness and adequate durability to assure that required design conditions concerning thermal transmission are attained.

§3280.504 Condensation control and installation of vapor retarders.

3280.504(a)

Ceiling vapor retarders.

3280.504(a)(1) In Uo Value Zones 2 and 3, ceilings shall have a vapor retarder with a permanence of not greater than 1 perm (as measured by ASTM E-96-93 Standard Test Methods for Water Vapor Transmission of Materials) installed on the living space side of the roof cavity.

3280.504(a)(2)

For manufactured homes designed for U. Value Zone 1, the vapor retarder may be omitted.

3280.504(b)

Exterior walls.

3280.504(b)(1)

Exterior walls shall have a vapor barrier not greater than 1 perm (dry cup method) installed on the living space side of the wall, or

3280.504(b)(2)

unventilated wall cavities shall have an external covering and/or sheathing which forms the pressure envelope. The covering and/or sheathing shall have a combined permeance of not less than 5.0 perms. In the absence of test data, combined permeance may be computed using the formula:

$$P_{\text{Total}} = (1 / [(1/P_1) + (1/P_2)])$$

where P_1 and P_2 are the permeance values of the exterior covering and sheathing in perms.

Formed exterior siding applied in sections with joints not caulked or sealed shall not be considered to restrict water vapor transmission, or

3280.504(b)(3)

wall cavities shall be constructed so that ventilation is provided to dissipate any condensation occurring in these cavities.

3280.504(c)

Attic or roof ventilation.

3280.504(c)(1)

Attic and roof cavities shall be vented in accordance with one of the following:

3280.504(c)(1)(i)

A minimum free ventilation area of not less than 1/300 of the attic or roof cavity floor area. At least 50 percent of the required free ventilation area shall be provided by ventilators located in the upper portion of the space to be ventilated. At least 40 percent shall be provided by eave, soffit or low gable vents. The location and spacing of the vent openings and ventilators shall provide cross-ventilation to the entire attic or roof cavity space. A clear air passage space having a minimum height of 1 inch shall be provided between the top of the insulation and the roof sheathing or roof covering. Baffles or other means shall be provided where needed to insure the 1 inch height of the clear air passage space is maintained.

3280.504(c)(1)(ii)

A mechanical attic or roof ventilation system may be installed instead of providing the free ventilation

area when the mechanical system provides a minimum air change rate of 0.02 cubic feet per minute (cfm) per sq. ft. of attic floor area. Intake and exhaust vents shall be located so as to provide air movement throughout space.

3280.504(c)(2)

Single section manufactured homes constructed with metal roofs and having no sheathing or underlayment installed, are not required to be provided with attic or roof cavity ventilation provided that the air leakage paths from the living space to the roof cavity created by electrical outlets, electrical junctions, electrical cable penetrations, plumbing penetrations, flue pipe penetrations and exhaust vent penetrations are sealed.

3280.504(c)(3)

Parallel membrane roof section of a closed cell type construction are not required to be ventilated.

3280.504(c)(4)

The vents provided for ventilating attics and roof cavities shall be designed to resist entry of rain and insects.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 58 FR 55009, Oct. 25, 1993]

§3280.505 Air infiltration.

3280.505(a)

Envelope air infiltration. The opaque envelope shall be designed and constructed to limit air infiltration to the living area of the home. Any design, material, method or combination thereof which accomplishes this goal may be used. The goal of the infiltration control criteria is to reduce heat loss/heat gain due to infiltration as much as possible without impinging on health and comfort and within the limits of reasonable economics.

3280.505(a)(1)

Envelope penetrations. Plumbing, mechanical and electrical penetrations of the pressure envelope not exempted by this part, and installations of window and door frames shall be constructed or treated to limit air infiltration. Penetrations of the pressure envelope made by electrical equipment, other than distribution panel boards and cable and conduit penetrations, are exempt from this requirement. Cable penetrations through outlet boxes are considered exempt.

3280.505(a)(2)

Joints between major envelope elements. Joints not designed to limit air infiltration between wall-to-wall, wall-to-ceiling and wall-to-floor connections shall be caulked or otherwise sealed. When

walls are constructed to form a pressure envelope on the outside of the wall cavity, they are deemed to meet this requirement.

§3280.506 Heat loss/heat gain.

The manufactured home heat loss/heat gain shall be determined by methods outlined in §§3280.508 and 3280.509. The U_o (Coefficient of heat transmission) value zone for which the manufactured home is acceptable and the lowest outdoor temperature to which the installed heating equipment will maintain a temperature of 70 F shall be certified as specified in §3280.510 of this subpart. The U_o value zone shall be determined from the map in Figure 506.

P. 246 - U/O Value Zone Map for Manufactured Housing belongs here

3280.506(a)

Coefficient of heat transmission. The overall coefficient of heat transmission (U_o) of the manufactured home for the respective zones and an indoor design temperature of 70 F, including internal and external ducts, and excluding infiltration, ventilation and condensation control, shall not exceed the Btu/(hr.) (sq. ft.) (F) of the manufactured home envelope are as tabulated below:

U _o value zone	Maximum coefficient of heat transmission
1.....	0.116 Btu/(hr.) (sq. ft.) (F).
2.....	0.096 Btu/(hr.) (sq. ft.) (F).
3.....	0.079 Btu/(hr.) (sq. ft.) (F).

3280.506(b)

To assure uniform heat transmission in manufactured homes, cavities in exterior walls, floors, and ceilings shall be provided with thermal insulation.

3280.506(c)

Manufactured homes designed for U_o Value Zone 3 shall be factory equipped with storm windows or insulating glass.

[58 FR 55009, Oct. 25, 1993; 59 FR 15113, Mar. 31, 1994]

§3280.507 Comfort heat gain.

Information necessary to calculate the home cooling load shall be provided as specified in this part.

3280.507(a)

Transmission heat gains. Homes complying with this section shall meet the minimum heat loss transmission coefficients specified in §3280.506(a).

§3280.508 Heat loss, heat gain and cooling load calculations.

3280.508(a)

Information, values and data necessary for heat loss and heat gain determinations shall be taken from the 1989 ASHRAE Handbook of Fundamentals, Chapters 20 through 27. The following portions of those chapters are not applicable:

- 21.1 Steel Frame Construction
- 21.2 Masonry Construction
- 21.3 Floor Systems
- 21.14 Pipes
- 21.16 Tanks, Vessels and Equipment
- 21.17 Refrigerated Rooms and Buildings
- 22.15 Mechanical and Industrial Systems
- 23.13 Commercial Building Envelope Leakage
- 25.4 Calculation of Heat Loss from Crawl Spaces

3280.508(b)

The calculation of the manufactured home's transmission heat loss coefficient (U_o) shall be in accordance with the fundamental principals of the 1989 ASHRAE Handbook of Fundamentals and, at a minimum, shall address all the heat loss or heat gain considerations in a manner consistent with the calculation procedures provided in the document Overall U-values and Heating/Cooling Loads-Manufactured Homes--February 1992-PNL 8006, HUD User No. 0005945.

3280.508(c)

Areas where the insulation does not fully cover a surface or is compressed shall be accounted for in the U-calculation (see §3280.506). The effect of framing on the U-value must be included in the U_o calculation. Other low-R-value heat-flow paths (“thermal shorts”) shall be explicitly accounted for in the calculation of the transmission heat loss coefficient if in the aggregate all types of low-R-value paths amount to more than 1% of the total exterior surface area. Areas are considered low-R-value heat-flow paths if:

3280.508(c)(1)

They separate conditioned and unconditioned space; and

3280.508(c)(2)

They are not insulated to a level that is at least one-half the nominal insulation level of the surrounding building component.

3280.508(d)

High efficiency heating and cooling equipment credit. The calculated transmission heat loss coefficient (Uo) used for meeting the requirement in §3280.506(a) may be adjusted for heating and cooling equipment above that required by the National Appliance Energy Conservation Act of 1987 (NAECA) by applying the following formula:

Uo adjusted = Uo standard x [1 + (0.6 (heating efficiency increase factor) + (cooling multiplier) (cooling efficiency increase factor))] where:

Uo standard = Maximum Uo for Uo Zone required by §3280.506(a)

Uo adjusted = Maximum Uo standard adjusted for high efficiency HVAC equipment

Heating efficiency increase factor = The increase factor in heating equipment efficiency measured by the Annual Fuel Utilization Efficiency (AFUE), or the Heating Seasonal Performance Factor (HSPF) for heat pumps, above that required by NAECA (indicated as “NAECA” in formula). The formula is heating efficiency increase factor = AFUE (HSPF) home – AFUE (or HSPF) NAECA divided by AFUE (HSPF) NAECA.

Cooling efficiency increase factor = the increase factor in the cooling equipment efficiency measured by the Seasonal Energy Efficiency Ratio (SEER) above that required by NAECA.

The formula being cooling equipment = SEER home -- SEER NAECA divided by SEER NAECA.

The cooling multiplier for the Uo Zone is from the following table:

Uo zone	Cooling multiplier (Cm)
1.....	0.60 (Florida only).
1.....	0.20 (All other locations).
2.....	0.07.
3.....	0.03.

3280.508(e)

U-values for any glazing (windows, skylights, and the glazed portions of any door) shall be based on tests using American Architectural Manufacturers Association (AAMA) 1503.1-1988, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections. In the absence of tests, manufacturers shall use the residential window U values contained in Table 13 in Chapter 27, the 1989 ASHRAE Handbook of Fundamentals. In the event that the classification of the window type is indeterminate, the manufacturer shall use the classification which

gives the higher U value. For the purpose of calculating Uo values, storm windows shall be treated as an additional pane.

3280.508(f)

Annual energy used based compliance. As an alternative, homes may demonstrate compliance with the annual energy used implicit in the coefficient of heat transmission (Uo) requirement. The annual energy use determination must be based on generally accepted engineering practices. The general requirement is to demonstrate that the home seeking compliance approval has a projected annual energy use, including both heating and cooling, less than or equal to a similar "base case" home that meets the standard. The energy use for both homes must be calculated based on the same assumptions; including assuming the same dimensions for all boundaries between conditioned and unconditioned spaces, site characteristics, usage patterns and climate.

[58 FR 55011, Oct. 25, 1993]

§3280.509 Criteria in absence of specific data.

In the absence of specific data, for purposes of heat-loss/gain calculation, the following criteria shall be used:

3280.509(a)

Infiltration Heat Loss. In the absence of measured infiltration heat loss data, the following formula shall be used to calculate heat loss due to infiltration and intermittently operated fans exhausting to the outdoors. The perimeter calculation shall be based on the dimensions of the pressure envelope.

Infiltration Heat-Loss=0.7 (T) (ft. of perimeter), BTU/hr.

where: T=70 minus the heating system capacity certification temperature stipulated in the Heating Certificate, in F.

3280.509(b)

Framing areas.

Wall.....	15 percent of wall area less windows and doors.
Floor and Ceiling.....	10 percent of the area.

3280.509(c)

Insulation compression. Insulation compressed to less than nominal thickness shall have its nominal R-values reduced for that area which is compressed in accordance with the following graph:

Graphic on Page 250 insert here - Thermal Resistance (R)

When insulation is installed over the framing members the thermal performance of the insulation is reduced due to compression at the framing members. The Resistance value of the insulation between the framing members is reduced by 12.5 percent for framing members 16" O.C., 8.5 percent for framing members 24" O.C., and 4 percent for framing members 48" O.C.

3280.509(d)

Air supply ducts within floor cavity. Air supply ducts located within a floor cavity shall be assumed to be heating or cooling the floor cavity to living space temperatures unless the duct is structurally isolated by the framing system or thermally insulated from the rest of the floor cavity with a thermal insulation at least equal to R-4.

3280.509(e)

Air supply ducts within ceiling cavity. Where supply ducts are located in ceiling cavities, the influence of the duct on cavity temperatures shall be considered in calculating envelope heat loss or heat gain.

3280.509(f)

The supply duct loss (and/or heat gain where applicable--See §3280.511) shall be calculated using the actual duct surface area and the actual thickness of insulation between the duct and outside of the manufactured home. If there is an air space of at least $\frac{1}{2}$ inch between the duct and the insulation, heat loss/gain need not be calculated if the cavity in which the duct is located is assumed to be at living space temperature. The average temperature inside the supply duct, including ducts installed outside the manufactured home, shall be assumed to be 130 F for purposes of calculation of heat loss and 60 F for heat gain.

3280.509(g)

Return air cavities. Cavities used as return air plenums shall be considered to be at living space temperature.

§3280.510 Heat loss certificate.

The manufactured home manufacturer shall permanently affix the following “Certificate” to an interior surface of the home that is readily visible to the homeowner. The “Certificate” shall specify the following:

3280.510(a)

Heating zone certification. The design zone at which the manufactured home heat loss complies with §3280.506(a).

3280.510(b)

Outdoor certification temperature. The lowest outdoor temperature at which the installed heating equipment will maintain a 70°F temperature inside the home without storm sash or insulating glass for Zones 1 and 2, and with storm sash or insulating glass for Zone 3 and complying with §3280.508 and

3280.510(c)

Operating economy certification temperature. The temperature to be specified for operating economy and energy conservation shall be 20°F or 30% of the design temperature difference, whichever is greater, added to the temperature specified as the heating system capacity certification temperature without storm windows or insulating glass in Zones 1 and 2 and with storm windows or insulating glass in Zone 3. Design temperature difference is 70° minus the heating system capacity certification temperature in degrees Fahrenheit.

HEATING CERTIFICATE

Home Manufacturer _____
Plant Location _____
Home Model _____

(Include Uo Value Zone Map)

This manufactured home has been thermally insulated to conform with the requirements of the Federal Manufactured Home Construction and Safety Standards for all locations within Uo Value Zone ____.

Heating Equipment Manufacturer _____
Heating Equipment Model _____

The above heating equipment has the capacity to maintain an average 70F temperature in this home at outdoor temperatures of [see paragraph (b) of this section] F. To maximize furnace operating economy and to conserve energy, it is recommended that this home be installed where the outdoor winter design temperature (97 1/2%) is not higher than [see paragraph (c) of this section] F degrees Fahrenheit.

The above information has been calculated assuming a maximum wind velocity of 15 MPH at standard atmospheric pressure.

§3280.511 Comfort cooling certificate and information.

3280.511(a)

The manufactured home manufacturer shall permanently affix a "Comfort Cooling Certificate" to an interior surface of the home that is readily visible to the home owner. This certificate may be combined with the heating certificate required in §3280.510. The manufacturer shall comply with one of the following three alternatives in providing the certificate and additional information concerning the cooling of the manufactured home:

3280.511(a)(1)

Alternative I. If a central air conditioning system is provided by the home manufacturer, the heat gain calculation necessary to properly size the air conditioning equipment shall be in accordance with procedures outlined in Chapter 22 of the 1989 ASHRAE Handbook of Fundamentals, with an assumed location and orientation. The following shall be supplied in the Comfort Cooling Certificate:

Air Conditioner Manufacturer _____
Air Conditioner Model _____
Certified Capacity _____ BTU/Hr. in accordance with the appropriate Air Conditioning and Refrigeration Institute Standards

The central air conditioning system provided with this home has been sized, assuming an orientation of the front (hitch) end of the home facing _____ and is designed on the basis of a 75°F indoor temperature and an outdoor temperature of _____ °F dry bulb and _____ °F wet bulb.

EXAMPLE ALTERNATE I

COMFORT COOLING CERTIFICATE

Manufactured Home Mfg _____
Plant Location _____
Manufactured Home Model _____
Air Conditioner Manufacturer _____
Certified Capacity _____ BTU/Hr. in accordance with the appropriate Air Conditioning and Refrigeration Institute Standards.

The central air conditioning system provided with this home has been sized assuming an orientation of the front (hitch end) of the home facing _____. On this basis, the system is designed to maintain an indoor temperature of 75°F when outdoor temperatures are _____ °F dry bulb and _____ °F wet bulb.

The temperature to which this home can be cooled will change depending upon the amount of exposure of the windows to the sun's radiant heat. Therefore, the home's heat gains will vary dependent upon its orientation to the sun and any permanent shading provided. Information concerning the calculation of cooling loads at various locations, window exposures and shadings are provided in chapter 22 of the 1989 edition of the ASHRAE Handbook of Fundamentals.

3280.511(a)(2)

Alternative 2. For each home suitable for a central air cooling system, the manufacturer shall provide the following statement: “This air distribution system of this home is suitable for the installation of a

Example Alternate 2

COMFORT COOLING CERTIFICATE

Manufactured Home Manufacturer _____
Plant Location _____
Manufactured Home Model _____

This air distribution system of this home is suitable for the installation of central air conditioning.

The supply air distribution system installed in this home is sized for Manufactured Home Central Air Conditioning System of up to _____ B.T.U./Hr. rated capacity which are certified in accordance with the appropriate Air Conditioning and Refrigeration Institute Standards. When the air circulators of such air conditioners are rated at 0.3 inch water column static pressure or greater for the cooling air delivered to the manufactured home supply air duct system.

Information necessary to calculate cooling loads at various locations and orientations is provided in the special comfort cooling information provided with this manufactured home.

3280.511(a)(3)

Alternative 3. If the manufactured home is not equipped with an air supply duct system, or if the manufacturer elects not to designate the home as being suitable for the installation of a central air conditioning system, the manufacturer shall provide the following statement: “This air distribution system of this home has not been designed in anticipation of its use with a central air conditioning system.”

Example Alternate 3

COMFORT COOLING CERTIFICATE

Manufactured Home Mfg _____
Plant Location _____
Manufactured Home Model _____

The air distribution system of this home has not been designed in anticipation of its use with a central air conditioning system.

3280.511(b)

For each home designated as suitable for central air conditioning the manufacturer shall provide the maximum central manufactured home air conditioning capacity certified in accordance with the ARI Standard 210/240-89 Unitary Air-Conditioning and Air-Source Heat Pump Equipment and in

accordance with §3280.715(a)(3). If the capacity information provided is based on entrances to the air supply duct at other than the furnace plenum, the manufacturer shall indicate the correct supply air entrance and return air exit locations.

3280.511(c)

Comfort cooling information. For each manufactured home designated, either “suitable for” or “provided with” a central air conditioning system, the manufacturer shall provide comfort cooling information specific to the manufactured home necessary to complete the cooling load calculations. The comfort cooling information shall include a statement to read as follows:

To determine the required capacity of equipment to cool a home efficiently and economically, a cooling load (heat gain) calculation is required. The cooling load is dependent on the orientation, location and the structure of the home. Central air conditioners operate most efficiently and provide the greatest comfort when their capacity closely approximates the calculated cooling load. Each home's air conditioner should be sized in accordance with Chapter 22 of the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Handbook of Fundamentals, 1989 Edition, once the location and orientation are known.

Information Provided by the Manufacturer Necessary to Calculate Sensible Heat Gain

Walls (without windows and doors)	U
Ceilings and roofs of light color	U
Ceilings and roofs of dark color	U
Floors.....	U
Air ducts in floor.....	U
Air ducts in ceiling	U
Air ducts installed outside the home.....	U

Information necessary to calculate duct areas.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 58 FR 55012, Oct. 25, 1993]

Subpart G--Plumbing Systems

§3280.601 Scope.

Subpart G of this standard covers the plumbing materials, fixtures, and equipment installed within or on manufactured homes. It is the intent of this subpart to assure water supply, drain, waste and vent systems which permit satisfactory functioning and provide for health and safety under all conditions of normal use.

§3280.602 Definitions.

The following definitions are applicable to subpart G only:

Accessible, when applied to a fixture, connection, appliance or equipment, means having access thereto, but which may require removal of an access panel or opening of a door.

Air gap (water distribution system) means the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture, water supplied appliances, or other device and the flood level rim of the receptacle.

Anti-siphon trap vent device means a device which automatically opens to admit air to a fixture drain above the connection of the trap arm so as to prevent siphonage, and closes tightly when the pressure within the drainage system is equal to or greater than atmospheric pressure so as to prevent the escape of gases from the drainage system into the manufactured home.

Backflow means the flow of water or other liquids, mixtures, or substances into the distributing pipes of a potable supply of water from any source or sources other than its intended sources.

Backflow connection means any arrangement whereby backflow can occur.

Backflow preventer means a device or means to prevent backflow.

Branch means any part of the piping system other than a riser, main or stack.

Common vent means a vent connecting at the junction of fixture drains and serving as a vent for more than one fixture.

Continuous vent means a vertical vent that is a continuation of the drain to which it connects.

Continuous waste means a drain from two or more fixtures connected to a single trap.

Critical level means a point established by the testing laboratory (usually stamped on the device by the manufacturer) which determines the minimum elevation above the flood level rim of the fixture or receptacle served on which the device may be installed. When a backflow prevention device does not bear a critical level marking, the bottom of the vacuum breaker, combination valve, or of any such approved or listed device shall constitute the critical level.

Cross connection means any physical connection or arrangement between two otherwise separate systems or sources, one of which contains potable water and the other either water, steam, gas or chemical of unknown or questionable safety whereby there may be a flow from one system or source to the other, the direction of flow depending on the pressure differential between the two systems.

Developed length means that length of pipe measured along the center line of the pipe and fittings.

Diameter, unless otherwise specifically stated, means the nominal (inside) diameter designated commercially.

Drain means a pipe that carries waste, water, or water-borne waste in a drainage system.

Drain connector means the removable extension, consisting of all pipes, fittings and appurtenances, from the drain outlet to the drain inlet serving the manufactured home.

Drain outlet means the lowest end of the main or secondary drain to which a sewer connection is made.

Drainage system means all piping within or attached to the structure that conveys sewage or other liquid waste to the drain outlet, not including the drain connector.

Fixture drain means the drain from the trap of a fixture to the junction of that drain with any other drain pipe.

Fixture supply means the water supply pipe connecting a fixture to a branch water supply pipe or directly to a main water supply pipe.

Flood-level means the level in the receptacle over which water would overflow to the outside of the receptacle.

Flooded means the condition which results when the liquid in a container or receptacle rises to the flood-level.

Flush tank means that portion of a water closet that is designed to contain sufficient water to

adequately flush the fixture.

Flush valve means a device located at the bottom of a flush tank for flushing a water closet.

Flushometer tank: means a device integrated within an air accumulator vessel which is designed to discharge a predetermined quantity of water to fixtures for flushing purposes.

Flushometer valve means a device which discharges a predetermined quantity of water to a fixture for flushing purposes and is closed by direct water pressure.

Grade means the fall (slope) of a pipe in reference to a horizontal plane expressed in inches per foot length.

Horizontal branch means any pipe extending laterally, which receives the discharge from one or more fixture drains and connects to the main drain.

Horizontal pipe means any pipe or fitting which makes an angle of not more than 45 degrees with the horizontal.

Individual vent means a pipe installed to vent a fixture drain.

Inlet coupling means the terminal end of the water system to which the water service connection is attached. It may be a swivel fitting or threaded pipe end.

Main means the principal artery of the system to which branches may be connected.

Main drain means the lowest pipe of a drainage system which receives sewage from all the fixtures within a manufactured home and conducts these wastes to the drain outlet.

Main vent means the principal artery of the venting system to which vent branches may be connected.

Offset means a combination of pipe and/or fittings that brings one section of the pipe out of line but into a line parallel with the other section.

Pitch. See Grade.

Plumbing appliance: means any one of a special class of plumbing fixture which is intended to perform a special plumbing function. Its operation and/or control may be dependent upon one or more energized components, such as motors, control, heating elements, or pressure or temperature-sensing elements. Such fixture may operate automatically through one or more of the following actions: A time cycle, a temperature range, a pressure range, a measured volume or weight, or the fixture may be manually adjusted or controlled by the user or operator.

Plumbing appurtenance: means a manufactured device, or a prefabricated assembly, or an on-the-job assembly of component parts, and which is an adjunct to the basic piping system and plumbing system and plumbing fixtures. An appurtenance demands no additional water supply, nor does it add any discharge load to a fixture or the drainage system.

Plumbing fixtures means receptacles, devices, or appliances which are supplied with water or which receive liquid or liquid-borne wastes for discharge into the drainage system.

Plumbing system means the water supply and distribution pipes; plumbing fixtures, faucets and traps; soil, waste and vent pipes; and water-treating or water-using equipment.

Primary vent. See Main Vent.

Relief vent means an auxiliary vent which permits additional circulation of air in or between drainage and vent systems.

Secondary vent means any vent other than the main vent or those serving each toilet.

Sewage means any liquid waste containing animal or vegetable matter in suspension or solution, and may include liquids containing chemicals in solution.

Siphonage means the loss of water seal from fixture traps resulting from partial vacuum in the drainage system which may be of either of the following two types, or a combination of the two: (a) Self-siphonage resulting from vacuum in a fixture drain generated solely by the discharge of the fixture served by that drain, or, (b) Induced siphonage resulting from vacuum in the drainage system generated by the discharge of one or more fixtures other than the one under observation.

Trap means a fitting or device designed and constructed to provide a liquid seal that will prevent the back passage of air without materially affecting the flow of liquid waste through it.

Trap Arm means the portion of a fixture drain between a trap and its vent.

Trap seal means the verticle depth of liquid that a trap will retain.

Vacuum breaker. See Backflow Preventer.

Vent cap means the device or fitting which protects the vent pipe from foreign substance with an opening to the atmosphere equal to the area of the vent it serves.

Vent system means that part of a piping installation which provides circulation of air within a drainage

system.

Vertical pipe means any pipe or fitting which makes an angle of not more than 45 degrees with the vertical.

Water closet drain means that part of the drainage piping which receives the discharge from each individual water closet.

Water connection means the fitting or point of connection for the manufactured home water distribution system designed for connection to a water supply.

Water connector means the removable extension connecting the manufactured home water distribution system to the water supply.

Water distribution system means potable water piping within or permanently attached to the manufactured home.

Wet vent means a vent which also serves as a drain for one or more fixtures.

Wet vented drainage system means the specially designed system of drain piping that also vents one or more plumbing fixtures by means of a common waste and vent pipe.

Whirlpool bathtub: means a plumbing appliance consisting of a bathtub fixture which is equipped and fitted with a circulation piping system, pump, and other appurtenances and is so designed to accept, circulate, and discharge bathtub water upon each use.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 52 FR 4584, Feb. 12, 1987; 52 FR 47553, Dec. 15, 1987; 58 FR 55012, Oct. 25, 1993]

§3280.603 General requirements.

3280.603(a)

Minimum requirements. Any plumbing system installed in a manufactured home shall conform, at least, with the provisions of this subpart.

3280.603(a)(1)

General. The plumbing system shall be of durable material, free from defective workmanship, and so designed and constructed as to give satisfactory service for a reasonable life expectancy.

3280.603(a)(2)

Conservation. Water closets shall be selected and adjusted to use the minimum quantity of water

consistent with proper performance and cleaning.

3280.603(a)(3)

Connection to drainage system. All plumbing, fixtures, drains, appurtenances, and appliances designed or used to receive or discharge liquid waste or sewage shall be connected to the manufactured home drainage system in a manner provided by this standard.

3280.603(a)(4)

Workmanship. All design, construction, and workmanship shall be in conformance with accepted engineering practices and shall be of such character as to secure the results sought to be obtained by this standard.

3280.603(a)(5)

Components. Plumbing materials, devices, fixtures, fittings, equipment, appliances, appurtenance, and accessories intended for use in or attached to a manufactured home shall conform to one of the applicable standards referenced in §3280.604. Where an applicable standard is not referenced, or an alternative recognized standard is utilized, the plumbing component shall be listed by a nationally recognized testing laboratory, inspection agency or other qualified organization as suitable for the intended use.

3280.603(a)(6)

Prohibited fittings and practices.

3280.603(a)(6)(i)

Drainage or vent piping shall not be drilled and tapped for the purpose of making connections.

3280.603(a)(6)(ii)

Except as specifically provided elsewhere in this standard, vent pipes shall not be used as waste or drain pipes.

3280.603(a)(6)(iii)

Fittings, connections, devices, or methods of installation that obstruct or retard the flow of sewage, or air in the drainage or venting systems in an amount greater than the normal frictional resistance to flow shall not be used unless their use is acceptable in this standard or their use is accepted as having a desirable and acceptable function of ultimate benefit to the proper and continued functioning of the plumbing system.

3280.603(a)(6)(iv)

Cracks, holes, or other imperfections in materials shall not be concealed by welding, brazing, or soldering or by paint, wax, tar, or other leak-sealing or repairing agents.

3280.603(a)(6)(v)

Piping, fixtures or equipment shall be located so as not to interfere with the normal use or with the normal operation and use of windows, doors or other required facilities.

3280.603(a)(6)(vi) Galvanized pipe shall not be bent or welded.

3280.603(a)(7)

Alignment of fittings. All valves, pipes, and fittings shall be installed in correct relationship to the direction of flow.

3280.603(b)

Protective requirements.

3280.603(b)(1)

Cutting structural members. Structural members shall not be unnecessarily or carelessly weakened by cutting or notching.

3280.603(b)(2)

Exposed piping. All piping, pipe threads, hangers, and support exposed to the weather, water, mud, and road hazard, and subject to damage therefrom, shall be painted, coated, wrapped, or otherwise protected from deterioration.

3280.603(b)(3)

Road damage. Pipes, supports, drains, outlets, or drain hoses shall not extend or protrude in a manner where they could be unduly subjected to damage during transit.

3280.603(b)(4)

Freezing. All piping and fixtures subject to freezing temperatures shall be insulated or protected to prevent freezing, under normal occupancy. The manufacturer shall provide:

3280.603(b)(4)(i)

Written installation instructions for the method(s) required for compliance to this section;

3280.603(b)(4)(ii)

a statement in his installation instructions that if heat tape is used it shall be listed for use with manufactured homes;

3280.603(b)(4)(iii)

a receptacle outlet for the use of a heat tape located on the underside of the manufactured home within 2 feet of the water supply inlet. The receptacle outlet provided shall not be placed on a branch circuit which is protected by a ground fault circuit interrupter.

3280.603(b)(5)

All piping, except the fixture trap, shall be designed to allow drainage.

3280.603(b)(6)

Rodent resistance. All exterior openings around piping and equipment shall be sealed to resist the entrance of rodents.

3280.603(b)(7)

Piping and electrical wiring shall not pass through the same holes in walls, floors or roofs. Plastic piping shall not be exposed to heat in excess of manufacturers recommendation or radiation from heat producing appliances.

[40 FR 58752, Dec. 18, 1975, as amended at 42 FR 54383, Oct. 5, 1977. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 58 FR 55012, Oct. 25, 1993]

§3280.604 Materials.

3280.604(a)

Minimum standards. Materials, devices, fixtures, fittings, equipment, appliances, appurtenances and accessories shall conform to one of the standards in the following table and be free from defects. Where an appropriate standard is not indicated in the table or a standard not indicated in the table is preferred, the item may be used if it is listed. A listing is also required when so specified in other sections of this subpart.

3280.604(b)

Where more than one standard is referenced for a particular material or component, compliance with only one of those standards is acceptable. Exceptions:

3280.604(b)(1)

When one of the reference standards requires evaluation of chemical, toxicity or odor properties which are not included in the other standard, then conformance to the applicable requirements of each standard shall be demonstrated;

3280.604(b)(2)

When a plastic material or component is not covered by the Standards in the following table, it shall be certified as non-toxic in accordance with NSF14-1990, "Plastic Piping Components and Related Materials."

Gray Iron Threaded Fittings--ANSI/ASME B16.4-1992.
Malleable Iron Threaded Fittings--ANSI/ASME B16.3-1992.
Material and Property Standard for Special Cast Iron Fittings--IAPMO PS 5-84.
Welding and Seamless Wrought Steel Pipe--ANSI/ASME B36.10-1979.
Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless--*ASTM A53-93.
Pipe Threads, General Purpose (Inch)ANSI/ASME B1.20.1-1983.
Standard Specification for Cast Iron Soil Pipe and Fittings--ASTM A74-92.
Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications--CISPI-301-90.

Nonferrous Pipe and Fittings

Standard Specification for Seamless Copper Pipe, Standard Sizes--ASTM B42-93.
Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube--ASTM B251-93.
Standard Specification for Seamless Copper Water Tube--ASTM B 88-93.
Standard Specification for Copper Drainage Tube (DWV)--ASTM B306-92.
Wrought Copper and Copper Alloy Solder-Joint Pressure Fitting--ASME/ANSI B16.22-1989.
Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings-DWV--ASME/ANSI B16.29-1986.
Cast Copper Alloy Solder-Joint Pressure Fittings--ANSI B16.18-1984.
Cast Copper Alloy Solder-Joint Drainage Fittings-DWV--ASME B16.23-1992.
Cast Copper Alloy Fittings for Flared Copper Tubes--ASME/ANSI B16.26-1988.

Standard Specification for Seamless Red Brass Pipe, Standard Sizes--A
Cast Bronze Threaded Fittings, Classes 125 and 250--ANSI/ASME B16.15-1985.

Plastic Pipe and Fittings

Standard Specification Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings--ASTM D2661-91.
Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings--ASTM D2665-91b.
Standard Specification for Drain, Waste, and Vent (DWV) Plastic Fittings Patterns--ASTM

Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40, Plastic Drain, Waste, and Vent Pipe With a Cellular Core--ASTM F628-91.
Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems--ASTM D2846-92.

Standard Specification for Polybutylene (PB) Plastic Hot- and Cold-Water Distribution Systems--ASTM D3309-92a.
Plastic Piping Components and Related Materials--ANSI/NSF 14-1990.

Miscellaneous

Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings--ASTM C564-88.
Backflow Valves--ANSI A112.14.1-1975.
Plumbing Fixture Setting Compound--TTP 1536A-1975.
Material and Property Standard for Cast Brass and Tubing P-Traps--IAPMO PS 2-89.
Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems--*ANSI Z21.22-1986, With Addendum Z21.22a-1990.

Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings--ASTM D2235-88.

Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems--ASTM D2564-91a.

Specification for Neoprene Rubber Gaskets for HUB and Spigot Cast Iron Soil Pipe and Fittings--CISPI-HSN-85.

Plumbing System Components for Manufactured Homes and Recreational Vehicles--ANSI/NSF

Material and Property Standard for Diversion Tees and Twin Waste Elbow--IAPMO PS 9-84.

Material and Property Standard for Flexible Metallic Water Connectors--IAPMO PS 14-89.

Material and Property Standard for Dishwasher Drain Airgaps--IAPMO PS 23-89.

Material and Property Standards for Backflow Prevention Assemblies--IAPMO PS 31-91.

Plumbing Fixtures

Plumbing Fixtures (General Specifications)--FS WW-P-541E/GEN-1980.

Vitreous China Plumbing Fixtures--ANSI/ASME A112.19.2(M)-1990.

Enameled Cast Iron Plumbing Fixtures--ANSI/ASME A112.19.1M-1987.

Porcelain Enameled Formed Steel Plumbing Fixtures--ANSI/ASME A112.19.4(M)-1984.

Plastic Bathtub Units With Addenda Z124.1a-1990 and Z124.16-1991--ANSI Z124.1-1987.

Standard for Porcelain Enameled Formed Steel Plumbing Fixtures--IAPMO TSC 22-85.

Plastic Shower Receptors and Shower Stalls With Addendum Z124.2a-1990--ANSI Z124.2-1987.

Stainless Steel Plumbing Fixtures (Designed for Residential Use)--ANSI/ASME A112.19.3M-1987.

Material and Property Standard for Drains for Prefabricated and Precast Showers--IAPMO PS

Plastic Lavatories with addendum Z124.3a-1990--ANSI Z124.3-1986.

Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Building--ANSI Z97.1-1984.

Plumbing Fixture Fittings--ANSI/ASME A112.18.1M-1989.
 Trim for Water Closet, Bowls, Tanks, and Urinals--ANSI A112.19.5-1979.
 Plastic Water Closets, Bowls and Tanks with Addenda Z124.4a-1990--ANSI Z124.4-1986.
 Whirlpool Bathtub Appliances--ASME/ANSI A112.19.7M-1987.
 Performance Requirements for Individual Thermostatic Pressure Balancing and Combination Control for Bathing Facilities--ASSE 1016-1988, (ANSI 1990).
 Performance Requirements for Pressurized Flushing Devices (Flushometers) For Plumbing Fixtures--ASSE 1037-1990 (ANSI-1990).
 Performance Requirements for Water Closet Flush Tank Fill Valves (Ballcocks)--ASSE 1002 Revision 5-1986, (ANSI/ASSE-1979).
 Performance Requirements for Hand-held Showers--ASSE 1014-1989 (ANSI-1990).
 Hydrants for Utility and Maintenance Use--ANSI/ASME A112.21.3M-1985.
 Performance Requirements for Home Laundry Equipment--ASSE 1007-1986.
 Performance Requirements for Hot Water Dispensers, Household Storage Type Electrical--ASSE

Plumbing Requirements for Residential Use (Household) Dishwashers--ASSE 1006,

Performance Requirements for Household Food Waste Disposer Units--ASSE 1008-1986.
 Performance Requirements for Temperature Activated Mixing Valves for Primary Domestic Use--ASSE 1017-1986.
 Water Hammer Arresters--ANSI A112.26.1-1969 (R 1975).
 Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, Hot Tubs and Whirlpool Bathtub Appliances--ASME/ANSI A112.19.8M-1989.
 Air Gaps in Plumbing Systems--ASME A112.1.2-1991.
 Performance Requirements for Diverters for Plumbing Faucets with Hose Spray, Anti-Siphon Type, Residential Applications--ASSE 102509ANSI/ASSE091978.
 Performance Requirements for Pipe Applied Atmospheric Type Vacuum Breakers--ASSE 1001 ASSE/ASNI091990.
 Performance Requirements for Hose Connection Vacuum Breakers--ASSE 1011091981 (ANSI091982).
 Performance Requirements for Wall Hydrants, Frost Proof Automatic Draining, Anti-Backflow Types--ANSI/ASSE 1019091978.

[58 FR 55013, Oct. 25, 1993]

§3280.605 Joints and connections.

3280.605(a)

Tightness. Joints and connections in the plumbing system shall be gastight and watertight for the pressures required under testing procedures.

3280.605(a)(1)

Assembling of pipe. All joints and connections shall be correctly assembled for tightness. Pipe threads shall be fully engaged with the threads of the fitting. Plastic pipe and copper tubing shall be inserted to the full depth of the solder cup or welding sockets of each fitting. Pipe threads and slip joints shall not be wrapped with string, paper, putty, or similar fillers.

3280.605(a)(2)

Threaded joints. Threads for screw pipe and fittings shall conform to the approved or listed standard. Pipe ends shall be reamed out to size of bore. All burrs, chips, cutting oil and foreign matter shall be removed. Pipe joint cement or thread lubricant shall be of approved type and applied to male threads only.

3280.605(a)(3)

Solder joints. Solder joints for tubing shall be made with approved or listed solder type fittings. Surfaces to be soldered shall be cleaned bright. The joints shall be properly fluxed with noncorrosive paste type flux and, for manufactured homes to be connected to a public water system, made with solder having not more than 0.2 percent lead.

3280.605(a)(4)

Plastic pipe, fittings and joints. Plastic pipe and fittings shall be joined by installation methods recommended by the manufacturer or in accordance with the provisions of a recognized, approved, or listed standard.

3280.605(a)(5)

Union joints. Metal unions in water piping shall have metal-to-metal ground seats.

3280.605(a)(6)

Flared joints. Flared joints for soft-copper water tubing shall be made with approved or listed fittings. The tubing shall be expanded with a proper flaring tool.

3280.605(a)(7)

Cast iron soil pipe joints. Approved or listed cast iron pipe may be joined as follows:

3280.605(a)(7)(i)

Approved or listed hubless pipe as per the manufacturer's recommendation.

3280.605(a)(7)(ii)

Hub and plain-end soil pipe may be joined by compression fittings per the manufacturer's recommendation.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 53 FR 23611, June 23, 1988]

§3280.606 Traps and cleanouts.

3280.606(a)

Traps--

3280.606(a)(1)

Traps required. Each plumbing fixture, except listed toilets, shall be separately trapped by approved water seal "P" traps. All traps shall be effectively vented.

3280.606(a)(2)

Dual fixtures. A two-compartment sink, two single sinks, two lavatories, or a single sink and a single lavatory with waste outlets not more than 30 inches apart and in the same room and flood level rims at the same level may be connected to one "P" trap and may be considered as a single fixture for the purpose of drainage and vent requirements.

3280.606(a)(3)

Prohibited traps. A trap which depends for its seal upon concealed interior partitions shall not be used. Full "S" traps, bell traps, drum traps, crown-vented traps, and running traps are prohibited. Fixtures shall not be double-trapped.

3280.606(a)(4)

Material and design. Each trap shall be self-cleaning with a smooth and uniform interior waterway. Traps shall be manufactured of cast iron, cast brass, or drawn brass tubing of not less than No. 20 Brown and Sharpe gage, or approved or listed plastic, or other approved or listed material. Union joints for a trap shall be beaded to provide a shoulder for the union nut. Each trap shall have the manufacturer's name stamped or cast in the body of the trap, and each tubing trap shall show the gage of the tubing.

3280.606(a)(5)

Trap seal. Each "P" trap shall have a water seal of not less than 2 inches and not more than 4 inches and shall be set true to its seal.

3280.606(a)(6)

Size. Traps shall be not less than 1¼ inches in diameter. A trap shall not be larger than the waste pipe to which it is connected.

3280.606(a)(7)

Location. Each trap shall be located as close to its vent and to its fixture outlet as structural conditions

will permit.

3280.606(a)(8)

Length of tailpiece. The vertical distance from a trap to the fixture outlet shall not exceed 24 inches.

3280.606(a)(9)

Installation.

3280.606(a)(9)(i)

Grade of trap arm. The piping between a “P” trap and the fixture tee or the vented waste line shall be graded ¼ inch per foot towards the vent and in no event shall have a slope greater than its diameter. The vent opening at fixture tees shall not be below the weir of the “P” trap outlet.

3280.606(a)(9)(ii)

Trap arm offset. The piping between the “P” trap and vent may change direction or be offset horizontally with the equivalent of no more than 180 degrees total change in direction with a maximum of 90 degrees by any one fitting.

3280.606(a)(9)(iii)

Concealed traps. Traps with mechanical joints shall be accessible for repair and inspection.

3280.606(a)(9)(iv)

Removability of Traps, Etc. Traps shall be designed and installed so the “U” bend is removable without removing the strainers from the fixture. Continuous waste and tail pieces which are permanently attached to the “U” bend shall also be removable without removing the strainer from the fixture.

3280.606(b)

Cleanout openings--

3280.606(b)(1)

Location of cleanout fittings.

3280.606(b)(1)(i)

Cleanouts shall be installed if the drainage system cannot be cleaned through fixtures, drains, or vents. Cleanouts shall also be provided when fittings of more than 45 degrees are used to affect an offset except where long turn ells are used which provide sufficient “sweep” for cleaning.

3280.606(b)(1)(ii)

A full size cleanout shall be installed at the upper end of any section of drain piping which does not have the required minimum slope of ¼ inch per foot grade.

3280.606(b)(1)(iii)

A cleaning tool shall not be required to pass through more than 360 degrees of fittings, excluding removable “P” traps, to reach any part of the drainage system. Water closets may be removed for drainage system access.

3280.606(b)(2)

Access to cleanouts. Cleanouts shall be accessible through an unobstructed minimum clearance of 12 inches directly in front of the opening. Each cleanout fitting shall open in a direction opposite to the flow or at right angles to the pipe. Concealed cleanouts that are not provided with access covers shall be extended to a point above the floor or outside of the manufactured home, with pipe and fittings installed, as required, for drainage piping without sags and pockets.

3280.606(b)(3)

Material. Plugs and caps shall be brass or approved or listed plastic, with screw pipe threads.

3280.606(b)(4)

Design. Cleanout plugs shall have raised heads except that plugs at floor level shall have counter-sunk slots.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 58 FR 55014, Oct. 25, 1993]

§3280.607 Plumbing fixtures.

3280.607(a)

General requirements--

3280.607(a)(1)

Quality of fixtures. Plumbing fixtures shall have smooth impervious surfaces, be free from defects and concealed fouling surfaces, be capable of resisting road shock and vibration, and shall conform in quality and design to listed standards. Fixtures shall be permanently marked with the manufacturer's name or trademark.

3280.607(a)(2)

Strainers. The waste outlet of all plumbing fixtures, other than toilets, shall be equipped with a drain fitting that will provide an adequate unobstructed waterway.

3280.607(a)(3)

Fixture connections. Fixture tailpieces and continuous wastes in exposed or accessible locations shall be not less than No. 20 Brown and Sharpe gage seamless drawn-brass tubing or other approved pipe or tubing materials. Inaccessible fixture connections shall be constructed according to the requirements

for drainage piping. Each fixture tailpiece, continuous waste, or waste and overflow shall be not less than 1½ inches for sinks of two or more compartments, dishwashers, clothes washing machines, laundry tubs, bath tubs, and not less than 1¼ inches for lavatories and single compartment sinks having a 2 inch maximum drain opening.

3280.607(a)(4)

Concealed connections. Concealed slip joint connections shall be provided with adequately sized unobstructed access panels and shall be accessible for inspection and repair.

3280.607(a)(5)

Directional fitting. An approved or listed “Y” or other directional-type branch fitting shall be installed in every tailpiece or continuous waste that receives the discharge from food waste disposal units, dishwashing, or other force-discharge fixture or appliance. (See also §3280.607(b)(4)(ii).)

3280.607(b)

Fixtures.

3280.607(b)(1)

Spacing. All plumbing fixtures shall be so installed with regard to spacing as to be reasonably accessible for their intended use.

3280.607(b)(2)

Water closets.

3280.607(b)(2)(i)

Water closets shall be designed and manufactured according to approved or listed standards and shall be equipped with a water flushing device capable of adequately flushing and cleaning the bowl at each operation of the flushing mechanism.

3280.607(b)(2)(ii)

Water closet flushing devices shall be designed to replace the water seal in the bowl after each operation. Flush valves, flushometer valves, flushometer tanks and ballcocks shall operate automatically to shut off at the end of each flush or when the tank is filled to operating capacity.

3280.607(b)(2)(iii)

Flush tanks shall be fitted with an overflow pipe large enough to prevent flooding at the maximum flow rate of the ball cock. Overflow pipes shall discharge into the toilet, through the tank.

3280.607(b)(2)(iv)

Water closets that have fouling surfaces that are not thoroughly washed at each discharge shall be prohibited. Any water closet that might permit the contents of the bowl to be siphoned back into the water system shall be prohibited.

3280.607(b)(2)(v)

Floor connection. Water closets shall be securely bolted to an approved flange or other approved fitting which is secured to the floor by means of corrosion-resistant screws. The bolts shall be of solid brass or other corrosion-resistant material and shall be not less than one-fourth inch in diameter. A watertight seal shall be made between the water closet and flange or other approved fitting by use of a gasket or sealing compound.

3280.607(b)(3)

Shower compartment.

3280.607(b)(3)(i)

Each compartment stall shall be provided with an approved watertight receptor with sides and back extending at least 1 inch above the finished dam or threshold. In no case shall the depth of a shower receptor be less than 2 inches or more than 9 inches measured from the top of the finished dam or threshold to the top of the drain. The wall area shall be constructed of smooth, noncorrosive, and nonabsorbent waterproof materials to a height not less than 6 feet above the bathroom floor level. Such walls shall form a watertight joint with each other and with the bathtub, receptor or shower floor. The floor of the compartment shall slope uniformly to the drain at not less than one-fourth nor more than one-half inch per foot.

3280.607(b)(3)(ii)

The joint around the drain connection shall be made watertight by a flange, clamping ring, or other approved listed means.

3280.607(b)(3)(iii)

Shower doors and tub and shower enclosures shall be constructed so as to be waterproof and, if glazed, glazing shall comply with the standard for Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings, ANSI Z97.1-1984.

3280.607(b)(3)(iv)

Prefabricated plumbing fixtures shall be approved or listed.

3280.607(b)(4)

Dishwashing machines.

3280.607(b)(4)(i)

A dishwashing machine shall not be directly connected to any waste piping, but shall discharge its waste through a fixed air gap installed above the machine, or through a high loop as specified by the dishwashing machine manufacturer, or into an open standpipe-receptor with a height greater than the washing compartment of the machine. When a standpipe is used, it shall be at least 18 inches but not more than 30 inches above the trap weir. The drain connections from the air gap or high loop may

connect to an individual trap, to a directional fitting installed in the sink tailpiece or to an opening provided on the inlet side of a food waste disposal unit.

3280.607(b)(4)(ii)

Drain from a dishwashing machine shall not be connected to a sink tailpiece, continuous waste line, or trap on the discharge side of a food waste disposal unit.

3280.607(b)(5)

Clothes washing machines.

3280.607(b)(5)(i)

Clothes washing machines shall drain either into a properly vented trap, into a laundry tub tailpiece with watertight connections, into an open standpipe receptor, or over the rim of a laundry tub.

3280.607(b)(5)(ii)

Standpipes shall be 1½ inches minimum nominal iron pipe size, 1½ inches diameter nominal brass tubing not less than No. 20 Brown and Sharpe gage, or 1½ inches approved plastic materials. Receptors shall discharge into a vented trap or shall be connected to a laundry tub tailpiece by means of an approved or listed directional fitting. Each standpipe shall extend not less than 18 inches or more than 30 inches above its trap and shall terminate in an accessible location no lower than the top of clothes washing machine. A removable tightfitting cap or plug shall be installed on the standpipe when clothes washer is not provided.

3280.607(b)(5)(iii)

Clothes washing machine drain shall not be connected to the tailpiece, continuous waste, or trap of any sink or dishwashing machine.

3280.607(c)

Installation--

3280.607(c)(1)

Access. Each plumbing fixture and standpipe receptor shall be located and installed in a manner to be accessible for usage, cleaning, repair and replacement. Access to diverter valves and other connections from the fixture hardware is not required.

3280.607(c)(2)

Alignment. Fixtures shall be set level and in true alignment with adjacent walls. Where practical, piping from fixtures shall extend to nearest wall.

3280.607(c)(3)

Brackets. Wall-hung fixtures shall be rigidly attached to walls by metal brackets or supports without any

strain being transmitted to the piping connections. Flush tanks shall be securely fastened to toilets or to the wall with corrosive-resistant materials.

3280.607(c)(4)

Tub supports. Bathtub rims at wall shall be supported on metal hangers or on end-grain wood blocking attached to the wall unless otherwise recommended by the manufacturer of the tub.

3280.607(c)(5)

Fixture fittings. Faucets and diverters shall be installed so that the flow of hot water from the fittings corresponds to the left-hand side of the fitting.

3280.607(c)(6)

Whirlpool bathtub appliances--

3280.607(c)(6)(i)

Access panel. A door or panel of sufficient size shall be installed to provide access to the pump for repair and/or replacement.

3280.607(c)(6)(ii)

Piping drainage. The circulation pump shall be accessibly located above the crown weir of the trap. The pump drain line shall be properly sloped to drain the volute after fixture use.

3280.607(c)(6)(iii)

Piping. Whirlpool bathtub circulation piping shall be installed to be self-draining.

3280.607(c)(6)(iv)

Electrical. Refer to the National Electrical Code, NFPA 70-1993, Article 685G.

[40 FR 58752, Dec. 18, 1975, as amended at 42 FR 961, Jan. 4, 1977. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 52 FR 4586, Feb. 12, 1987; 58 FR 55014, Oct. 25, 1993]

§3280.608 Hangers and supports.

3280.608(a)

Strains and stresses. Piping in a plumbing system shall be installed without undue strains and stresses, and provision shall be made for expansion, contraction, and structural settlement.

3280.608(b)

Piping supports. Piping shall be secured at sufficiently close intervals to keep the pipe in alignment and carry the weight of the pipe and contents. Unless otherwise stated in the standards for specific materials shown in the table in 3280.604(a), or unless specified by the pipe manufacturer, plastic drainage piping

shall be supported at intervals not to exceed 4 feet and plastic water piping shall be supported at intervals not to exceed 3 feet.

3280.608(c)

Hangers and anchors.

3280.608(c)(1)

Hangers and anchors shall be of sufficient strength to support their proportional share of the pipe alignments and prevent rattling.

3280.608(c)(2)

Piping shall be securely attached to the structure by hangers, clamps, or brackets which provide protection against motion, vibration, road shock, or torque in the chassis.

3280.608(c)(3)

Hangers and straps supporting plastic pipe shall not compress, distort, cut or abrade the piping and shall allow free movement of the pipe.

§3280.609 Water distribution systems.

3280.609(a)

Water supply--

3280.609(a)(1)

Supply piping. Piping systems shall be sized to provide an adequate quantity of water to each plumbing fixture at a flow rate sufficient to keep the fixture in a clean and sanitary condition without any danger of backflow or siphonage. (See table in §3280.609(f)(1)). The manufacturer shall include in his written installation instructions that the manufactured home has been designed for an inlet water pressure of 80 psi, and a statement that when the manufactured home is to be installed in areas where the water pressure exceeds 80 psi, a pressure reducing valve should be installed.

3280.609(a)(2)

Hot water supply. Each manufactured home equipped with a kitchen sink, and bathtub and/or shower shall be provided with a hot water supply system including a listed water heater.

3280.609(b)

Water outlets and supply connections.

3280.609(b)(1)

Water connection. Each manufactured home with a water distribution system shall be equipped with a ¾ inch threaded inlet connection. This connection shall be tagged or marked “Fresh Water Connection” (Fill”). A matching cap or plug shall be provided to seal the water inlet when it is not in use, and shall be permanently attached to the manufactured home or water supply piping. When a master cold water shutoff full flow valve is not installed on the main feeder line in an accessible location, the manufacturer's installation instructions shall indicate that such a valve is to be installed in the water supply line adjacent to the home. When a manufactured home includes expandable rooms or is composed of two or more units, fittings or connectors designed for such purpose shall be provided to connect any water piping. When not connected, the water piping shall be protected by means of matching threaded caps or plugs.

3280.609(b)(2)

Prohibited connections.

3280.609(b)(2)(i)

The installation of potable water supply piping or fixture or appliance connections shall be made in a manner to preclude the possibility of backflow.

3280.609(b)(2)(ii)

No part of the water system shall be connected to any drainage or vent piping.

3280.609(b)(3)

Rim outlets. The outlets of faucets, spouts, and similar devices shall be spaced at least 1 inch above the flood level of the fixture.

3280.609(b)(4)

Appliance connections. Water supplies connected to clothes washing or dishwashing machines shall be protected by an approved or listed fixed air gap provided within the appliance by the manufacturer.

3280.609(b)(5)

Flushometer valves or manually operated flush valves. An approved or listed vacuum breaker shall be installed and maintained in the water supply line on the discharge side of a water closet flushometer valve or manually operated flush valve. Vacuum breakers shall have a minimum clearance of 6 inches above the flood level of the fixture to the critical level mark unless otherwise permitted in their approval.

3280.609(b)(6)

Flush tanks. Water closet flush tanks shall be equipped with an approved or listed anti-siphon ball cock which shall be installed and maintained with its outlet or critical level mark not less than 1 inch above the full opening of the overflow pipe.

3280.609(b)(7)

Hose bibbs. When provided, all exterior hose bibbs and laundry sink hose connections shall be protected by a listed non-removable backflow prevention device. This is not applicable to hose connections provided for automatic washing machines with built-in backflow prevention.

3280.609(b)(8) Flushometer tanks. Flushometer tanks shall be equipped with an approved air gap on the vacuum breaker assembly located above the flood level rim above the fixture.

3280.609(c)

Water heater safety devices--

3280.609(c)(1)

Relief valves.

3280.609(c)(1)(i)

All water heaters shall be installed with approved and listed fully automatic valve or valves designed to provide temperature and pressure relief.

3280.609(c)(1)(ii)

Any temperature relief valve or combined pressure and temperature relief valve installed for this purpose shall have the temperature sensing element immersed in the hottest water within the upper 6 inches of the tank. It shall be set to start relieving at a pressure of 150 psi or the rated working pressure of the tank whichever is lower and at or below a water temperature of 210° F.

3280.609(c)(1)(iii)

Relief valves shall be provided with full-sized drains, with cross sectional areas equivalent to that of the relief valve outlet, which shall be directed downward and discharge beneath the manufactured home. Drain lines shall be of a material listed for hot water distribution and shall drain fully by gravity, shall not be trapped, and shall not have their outlets threaded, and the end of the drain shall be visible for inspection.

3280.609(d)

Materials--

3280.609(d)(1)

Piping material. Water pipe shall be of standard weight brass, galvanized wrought iron, galvanized steel, Type K, L or M copper tubing, approved or listed plastic or other approved or listed material.

3280.609(d)(1)(i)

Plastic piping. All plastic water piping and fittings in manufactured homes must be listed for use with hot water.

3280.609(d)(1)(ii)

[Reserved]

3280.609(d)(2)

Fittings. Appropriate fittings shall be used for all changes in size and where pipes are joined. The material and design of fittings shall conform to the type of piping used. Special consideration shall be given to prevent corrosion when dissimilar metals are joined.

3280.609(d)(2)(i) Fittings for screw piping shall be standard weight galvanized iron for galvanized iron and steel pipe, and of brass for brass piping. They shall be installed where required for change in direction, reduction of size, or where pipes are joined together.

3280.609(d)(2)(ii)

Fittings for copper tubing shall be cast brass or drawn copper (sweat-soldered) or shall be approved or listed fittings for the purpose intended.

3280.609(d)(3)

Prohibited material. Used piping materials shall not be permitted. Those pipe dopes, solder, fluxes, oils, solvents, chemicals, or other substances that are toxic, corrosive, or otherwise detrimental to the water system shall not be used. In addition, for those manufactured homes to be connected to a public water system, all water piping shall be lead-free (as defined in section 109(c)(2) of the Safe Drinking Water Act Amendments of 1986) with solders and flux containing not more than 0.2 percent lead and pipes and pipe fittings containing not more than 8.0 percent lead.

3280.609(e)

Installation of piping--

3280.609(e)(1)

Minimum requirement. All piping equipment, appurtenances, and devices shall be installed in workmanlike manner and shall conform with the provisions and intent of this standard.

3280.609(e)(2)

Screw pipe. Iron pipe-size brass or galvanized iron or steel pipe fittings shall be joined with approved or listed standard pipe threads fully engaged in the fittings. Pipe ends shall be reamed to the full bore of the pipe. Pipe-joint compound shall be insoluble in water, shall be nontoxic and shall be applied to male threads only.

3280.609(e)(3)

Solder fittings. Joints in copper water tubes shall be made by the appropriate use of approved cast brass or wrought copper fittings, properly soldered together. The surface to be soldered shall be thoroughly cleaned bright mechanically. The joints shall be properly fluxed and made with a solder that contains no more than 0.2 percent lead.

3280.609(e)(4)

Flared fittings. A flaring tool shall be used to shape the ends of flared tubing to match the flare of fittings.

3280.609(e)(5)

Plastic pipe and fittings. Plastic pipe and fittings shall be joined by installation methods recommended by the manufacturer or in accordance with provisions of a listed standard.

3280.609(f)

Size of water supply piping--

3280.609(f)(1)

Minimum size. The size of water supply piping and branch lines shall not be less than sizes shown in the following table:

Minimum Size Tubing and Pipe for Water Distribution Systems

Number of fixtures	Tubing (nominal)		Pipe iron pipe size (inches)
	Diameter (inches)	Outer diameter (inches)	
1.....	¹ / ₄	—	¹ / ₂
2.....	—	¹ / ₂	¹ / ₂
3.....	¹ / ₂	—	¹ / ₂
4.....	¹ / ₂	—	¹ / ₂
5 or more.....	³ / ₄	—	³ / ₄

* 6 ft maximum length

Exceptions to table: _ inch nominal diameter or ¹/₂ inch OD minimum size for clothes washing or dishwashing machines, unless larger size is recommended by the fixture manufacturer. ¹/₂ inch nominal diameter or _ inch OD minimum size for flushometer or metering type valves unless otherwise specified in their listing. No galvanized screw piping shall be less than ¹/₂ inch iron pipe size.

3280.609(f)(2)

Sizing procedure. Both hot and cold water piping systems shall be computed by the following method:

3280.609(f)(2)(i)

Size of branch. Start at the most remote outlet on any branch of the hot or cold water piping and progressively count towards the water service connection, computing the total number of fixtures supplied along each section of piping. Where branches are joined together, the number of fixtures on each branch shall be totalled so that no fixture is counted twice. Following down the left-hand column of the preceding table a corresponding number of fixtures will be found. The required pipe or tubing size is indicated in the other columns on the same line.

3280.609(f)(2)(ii)

A water heater, food waste disposal unit, evaporative cooler or ice maker shall not be counted as a water-using fixture when computing pipe sizes.

3280.609(g)

Line valves. Valves, when installed in the water supply distribution system (except those immediately controlling one fixture supply) and when fully opened, shall have a cross-sectional area of the smallest orifice or opening, through which the water flows, at least equal to the cross-sectional area of the nominal size of the pipe in which the valve is installed.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 52 FR 4586, Feb. 12, 1987; 53 FR 23611, June 23, 1988; 58 FR 55014, Oct. 25, 1993]

§3280.610 Drainage systems.

3280.610(a)

General.

3280.610(a)(1)

Each fixture directly connected to the drainage system shall be installed with a water seal trap (§3280.606(a)).

3280.610(a)(2)

The drainage system shall be designed to provide an adequate circulation of air in all piping with no danger of siphonage, aspiration, or forcing of trap seals under conditions of ordinary use.

3280.610(b)

Materials--

3280.610(b)(1)

Pipe. Drainage piping shall be standard weight steel, wrought iron, brass, copper tube DWV, listed plastic, cast iron, or other listed or approved materials.

3280.610(b)(2)

Fittings. Drainage fittings shall be recessed drainage pattern with smooth interior waterways of the same diameter as the piping and shall be of a material conforming to the type of piping used. Drainage fittings shall be designed to provide for a ¼ inch per foot grade in horizontal piping.

3280.610(b)(2)(i)

Fittings for screw pipe shall be cast iron, malleable iron, brass, or listed plastic with standard pipe threads.

3280.610(b)(2)(ii)

Fittings for copper tubing shall be cast brass or wrought copper.

3280.610(b)(2)(iii)

Socket-type fittings for plastic piping shall comply with listed standards.

3280.610(b)(2)(iv)

Brass or bronze adaptor or wrought copper fittings shall be used to join copper tubing to threaded pipe.

3280.610(c)

Drain outlets.

3280.610(c)(1)

Each manufactured home shall have only one drain outlet.

3280.610(c)(2)

Clearance from drain outlet. The drain outlet shall be provided with a minimum clearance of 3 inches in any direction from all parts of the structure or appurtenances and with not less than 18 inches unrestricted clearance directly in front of the drain outlet.

3280.610(c)(3)

Drain connector. The drain connector shall not be smaller than the piping to which it is connected and shall be equipped with a water-tight cap or plug matching the drain outlet. The cap or plug shall be permanently attached to the manufactured home or drain outlet.

3280.610(c)(4)

The drain outlet and drain connector shall not be less than 3 inches inside diameter.

3280.610(c)(5)

Preassembly of drain lines. Section(s) of the drain system, designed to be located underneath the home, are not required to be factory installed when the manufacturer designs the system for site assembly and also provides all materials and components, including piping, fittings, cement, supports,

and instructions necessary for proper site installation.

3280.610(d)

Fixture connections. Drainage piping shall be provided with approved or listed inlet fittings for fixture connections, correctly located according to the size and type of fixture to be connected.

3280.610(d)(1)

Water closet connection. The drain connection for each water closet shall be 3 inches minimum inside diameter and shall be fitted with an iron, brass, or listed plastic floor flange adaptor ring securely screwed, soldered or otherwise permanently attached to the drain piping, in an approved manner and securely fastened to the floor.

3280.610(d)(2)

[Reserved]

3280.610(e)

Size of drainage piping--

3280.610(e)(1)

Fixture load. Except as provided by §3280.611(d), drain pipe sizes shall be determined by the type of fixture and the total number connected to each drain.

3280.610(e)(1)(i)

A 1½ inch minimum diameter piping shall be required for one and not more than three individually vented fixtures.

3280.610(e)(1)(ii)

A 2-inch minimum diameter piping shall be required for four or more fixtures individually vented.

3280.610(e)(1)(iii)

A 3-inch minimum diameter piping shall be required for water closets.

3280.610(f)

Wet-vented drainage system. Plumbing fixture traps may connect into a wet-vented drainage system which shall be designed and installed to accommodate the passage of air and waste in the same pipe.

3280.610(f)(1)

Horizontal piping. All parts of a wet-vented drainage system, including the connected fixture drains, shall be horizontal except for wet-vented vertical risers which shall terminate with a 1½ inch minimum diameter continuous vent. Where required by structural design, wet-vented drain piping may be offset vertically when other vented fixture drains or relief vents are connected to the drain piping at or below

the vertical offsets.

3280.610(f)(2)

Size. A wet-vented drain pipe shall be 2 inches minimum diameter and at least one pipe size larger than the largest connected trap or fixture drain. Not more than three fixtures may connect to a 2-inch diameter wet-vented drain system.

3280.610(f)(3)

Length of trap arm. Fixture traps shall be located within the distance given in §3280.611(c)(5). Not more than one trap shall connect to a trap arm.

3280.610(g)

Offsets and branch fittings--

3280.610(g)(1)

Changes in direction. Changes in direction of drainage piping shall be made by the appropriate use of approved or listed fittings, and shall be of the following angles: 11¼, 22 ½, 45, 60, or 90 degrees; or other approved or listed fittings or combinations of fittings with equivalent radius or sweep.

3280.610(g)(2)

Horizontal to vertical. Horizontal drainage lines, connecting with a vertical pipe shall enter through 45-degree “Y” branches, 60-degree “Y” branches, long-turn “TY” branches, sanitary “T” branches, or other approved or listed fittings or combination of fittings having equivalent sweep. Fittings having more than one branch at the same level shall not be used, unless the fitting is constructed so that the discharge from any one branch cannot readily enter any other branch. However, a double sanitary “T” may be used when the drain line is increased not less than two pipe sizes.

3280.610(g)(3)

Horizontal to horizontal and vertical to horizontal. Horizontal drainage lines connecting with other horizontal drainage lines or vertical drainage lines connected with horizontal drainage lines shall enter through 45-degree “Y” branches, long-turn “TY” branches, or other approved or listed fittings or combination of fittings having equivalent sweep.

3280.610(h)

Grade of horizontal drainage piping. Except for fixture connections on the inlet side of the trap, horizontal drainage piping shall be run in practical alignment and have a uniform grade of not less than ¼ inch per foot toward the manufactured home drain outlet. Where it is impractical, due to the structural features or arrangement of any manufactured home, to obtain a grade of ¼ inch per foot, the pipe or piping may have a grade of not less than _ inch per foot, when a full size cleanout is installed at the upper end.

§3280.611 Vents and venting.

3280.611(a)

General. Each plumbing fixture trap shall be protected against siphonage and back pressure, and air circulation shall be ensured throughout all parts of the drainage system by means of vents installed in accordance with the requirements of this section and as otherwise required by this standard.

3280.611(b)

Materials--

3280.611(b)(1)

Pipe. Vent piping shall be standard weight steel, wrought iron, brass, copper tube DWV, listed plastic, cast iron or other approved or listed materials.

3280.611(b)(2)

Fittings. Appropriate fittings shall be used for all changes in direction or size and where pipes are joined. The material and design of vent fittings shall conform to the type of piping used.

3280.611(b)(2)(i)

Fittings for screw pipe shall be cast iron, malleable iron, plastic, or brass, with standard pipe threads.

3280.611(b)(2)(ii)

Fittings for copper tubing shall be cast brass or wrought copper.

3280.611(b)(2)(iii)

Fittings for plastic piping shall be made to approved applicable standards.

3280.611(b)(2)(iv)

Brass adaptor fittings or wrought copper shall be used to join copper tubing to threaded pipe.

3280.611(b)(2)(v)

Listed rectangular tubing may be used for vent piping only providing it has an open cross section at least equal to the circular vent pipe required. Listed transition fittings shall be used.

3280.611(c)

-inch trap arms undiminished in size through the roof,

3280.611(c)(1)(ii)

A 1½ inch diameter (min.) continuous vent or equivalent, indirectly connected to the toilet drain piping within the distance allowed in §3280.611(c)(5) for 3 inch trap arms through a 2-inch wet vented drain that carries the waste of not more than one fixture, or,

3280.611(c)(1)(iii)

Two or more vented drains when at least one is wet-vented, or 2-inch diameter (minimum), and each drain is separately connected to the toilet drain. At least one of the drains shall connect within the distance allowed in §3280.611(c)(5) for 3-inch trap arms.

3280.611(c)(2)

Vent pipe areas. Each individually vented fixture with a 1½ inch or smaller trap shall be provided with a vent pipe equivalent in area to a 1¼ inch nominal pipe size. The main vent, toilet vent and relief vent, and the continuous vent of wet-vented systems shall have an area equivalent to 1½ inch nominal pipe size.

3280.611(c)(3)

Common vent. When two fixture traps located within the distance allowed from their vent have their trap arms connected separately at the same level into an approved double fitting, an individual vent pipe may serve as a common vent without any increase in size.

3280.611(c)(4)

Intersecting vents. Where two or more vent pipes are joined together, no increase in size shall be required; however, the largest vent pipe shall extend full size through the roof.

3280.611(c)(5)

Distance of fixture trap from vent shall not exceed the values given in the following table:

Maximum Distance of Fixtures From Vent Trap	
Size of fixture drain (inches)	Distance trap to vent

1¼.....	4 ft. 6 in.
1½.....	4 ft. 6 in.
2.....	5 ft.
3.....	6 ft.

3280.611(d)

Anti-siphon trap vent. An anti-siphon trap vent may be used as a secondary vent system for plumbing fixtures protected by traps not larger than 1½ inches, when installed in accordance with the manufacturers' recommendations and the following conditions:

3280.611(d)(1)

Not more than two fixtures individually protected by the device shall be drained by a common 1½ inch drain.

3280.611(d)(2)

Minimum drain size for three or more fixtures individually protected by the device shall be 2 inches.

3280.611(d)(3)

A primary vent stack must be installed to vent the toilet drain at the point of heaviest drainage fixture unit loading.

3280.611(d)(4)

The device shall be installed in a location that permits a free flow of air and shall be accessible for inspection, maintenance, and replacement and the sealing function shall be at least 6 inches above the top of the trap arm.

3280.611(d)(5)

Materials for the anti-siphon trap vent shall be as follows:

3280.611(d)(5)(i)

Cap and housing shall be listed acrylonitrile-butadiene-styrene, DWV grade;

3280.611(d)(5)(ii)

stem shall be DWV grade nylon or acetal;

3280.611(d)(5)(iii)

spring shall be stainless steel wire, type 302;

3280.611(d)(5)(iv)

sealing disc shall be neoprene, conforming to CISPI-HSN-85, the Specification for Neoprene Rubber Gaskets for HUB and Spigot Cast Iron Soil Pipe and Fittings, and ASTM C 564-88, Standard Specification for Rubber Gaskets for Case Iron Soil Pipe and Fittings, or, Silicone Rubber, Low and High Temperature and Tear Resistant, Conforming to Rubber, Silicone, FS ZZ-R-765B-1970, With 1971 Amendment 1; and Liners, Case, and Sheet, Overwrap; Water-Vapor Proof or Waterproof, Flexible, MIL-L-10547E-1975.

3280.611(e)

Grade and connections--

3280.611(e)(1)

Horizontal vents. Each vent shall extend vertically from its fixture "T" or point of connection with the waste piping to a point not less than 6 inches above the extreme flood level of the fixture it is venting before offsetting horizontally or being connected with any other vent pipe. Vents for horizontal drains shall connect above the centerline of the drain piping ahead (downstream) of the trap. Where required by structural conditions, vent piping may offset below the rim of the fixture at the maximum angle or height possible.

3280.611(f)

Vent terminal--

3280.611(f)(1)

Roof extension. Each vent pipe shall extend through its flashing and terminate vertically, undiminished in size, not less than 2 inches above the roof. Vent openings shall not be less than 3 feet away from any motor-driven air intake that opens into habitable areas.

3280.611(f)(2)

Flashing. The opening around each vent pipe shall be made watertight by an adequate flashing or flashing material.

3280.611(g)

Vent caps. Vent caps, if provided, shall be of the removable type (without removing the flashing from the roof). When vent caps are used for roof space ventilation and the caps are identical to vent caps used for the plumbing system, plumbing system caps shall be identified with permanent markings.

[40 FR 58752, Dec. 18, 1975, as amended at 42 FR 961, Jan. 4, 1977. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 58 FR 55015, Oct. 25, 1993]

§3280.612 Tests and inspection.

3280.612(a)

Water system. All water piping in the water distribution system shall be subjected to a pressure test. The test shall be made by subjecting the system to air or water at 100 psi for 15 minutes without loss of pressure.

3280.612(b)

Drainage and vent system and plumbing fixtures. The waste and vent system shall be tested by one of the three following alternate methods for evidence or indication of leakage:

3280.612(b)(1)

Water test. Before plumbing fixtures are connected, all of the openings into the piping shall be plugged and the entire piping system subjected to a static water test for 15 minutes by filling it with water to the top of the highest vent opening. There shall be no evidence of leakage.

3280.612(b)(2)

Air test. After all fixtures have been installed, the traps filled with water, and the remaining openings securely plugged, the entire system shall be subjected to a 2-inch (manometer) water column air pressure test. If the system loses pressure, leaks may be located with smoke pumped into the system, or with soap suds spread on the exterior of the piping (Bubble test).

3280.612(b)(3)

Flood level test. The manufactured home shall be in a level position, all fixtures shall be connected, and the entire system shall be filled with water to the rim of the water closet bowl. (Tub and shower drains shall be plugged). After all trapped air has been released, the test shall be sustained for not less than 15 minutes without evidence of leaks. Then the system shall be unplugged and emptied. The waste piping above the level of the water closet bowl shall then be tested and show no indication of leakage when the high fixtures are filled with water and emptied simultaneously to obtain the maximum possible flow in the drain piping.

3280.612(c)

Fixture test. The plumbing fixtures and connections shall be subjected to a flow test by filling them with water and checking for leaks and retarded flow while they are being emptied.

3280.612(d)

Shower compartments. Shower compartments and receptors shall be tested for leaks prior to being covered by finish material. Each pan shall be filled with water to the top of the dam for not less than 15 minutes without evidence of leakage.

[40 FR 58752, Dec. 18, 1975, as amended at 42 FR 961, Jan. 4, 1977; 42 FR 54383, Oct. 5, 1977. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 58 FR 55015, Oct. 25, 1993]

Subpart H--Heating, Cooling and Fuel Burning Systems

§3280.701 Scope.

Subpart H of this standard covers the heating, cooling and fuel burning equipment installed within, on, or external to a manufactured home.

§3280.702 Definitions.

The definitions in this subpart apply to subpart H only.

Accessible, when applied to a fixture, connection, appliance or equipment, means having access thereto, but which may require the removal of an access panel, door or similar obstruction.

Air conditioner blower coil system means a comfort cooling appliance where the condenser section is placed external to the manufactured home and evaporator section with circulating blower attached to the manufactured home air supply duct system. Provision must be made for a return air system to the evaporator/blower section. Refrigerant connection between the two parts of the system is accomplished by tubing.

Air conditioner split system means a comfort cooling appliance where the condenser section is placed external to the manufactured home and the evaporator section incorporated into the heating appliance or with a separate blower/coil section within the manufactured home. Refrigerant connection between the two parts of the system is accomplished by tubing.

Air conditioning condenser section means that portion of a refrigerated air cooling or (in the case of a heat pump) heating system which includes the refrigerant pump (compressor) and the external heat exchanger.

Air conditioning evaporator section means a heat exchanger used to cool or (in the case of a heat pump) heat air for use in comfort cooling (or heating) the living space.

Air conditioning self contained system means a comfort cooling appliance combining the condenser section, evaporator and air circulating blower into one unit with connecting ducts for the supply and return air systems.

Air duct means conduits or passageways for conveying air to or from heating, cooling, air conditioning or ventilation equipment, but not including the plenum.

Automatic pump (oil lifter) means a pump, not an integral part of the oil-burning appliance, that automatically pumps oil from the supply tank and delivers the oil under a constant head to an oil-burning appliance.

Btu. British thermal units means the quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit.

Btuh means British thermal units per hour.

Burner means a device for the final conveyance of fuel or a mixture of fuel and air to the combustion zone.

Central air conditioning system means either an air conditioning split system or an external combination heating/cooling system.

Class 0 air ducts means ducts of materials and connectors having a fire-hazard classification of zero.

Class 1 air ducts means ducts of materials and connectors having a flame-spread rating of not over 25 without evidence of continued progressive combustion and a smoke-developed rating of not over 50.

Class 2 air ducts means ducts of materials and connectors having a flame-spread rating of not over 50 without evidence of continued progressive combustion and a smoke-developed rating of not over 50 for the inside surface and not over 100 for the outside surface.

Clearance means the distance between the appliance, chimney, vent, chimney or vent connector or plenum and the nearest surface.

Connector-Gas appliance: means a flexible or semi-rigid connector used to convey fuel gas between a gas outlet and a gas appliance.

Energy Efficiency Ratio (EER) means the ratio of the cooling capacity output of an air conditioner for each unit of power input.

$EER = \text{Capacity (Btuh)} / \text{Power input (watts)}$

External combination heating/cooling system means a comfort conditioning system placed external to the manufactured home with connecting ducts to the manufactured home for the supply and return air systems.

Factory-built fireplace means a hearth, fire chamber and chimney assembly composed of listed factory-built components assembled in accordance with the terms of listing to form a complete fireplace.

Fireplace stove means a chimney connected solid fuel-burning stove having part of its fire chamber open to the room.

Fuel gas piping system means the arrangement of piping, tubing, fittings, connectors, valves and devices designed and intended to supply or control the flow of fuel gas to the appliance(s).

Fuel oil piping system means the arrangement of piping, tubing, fittings, connectors, valves and devices designed and intended to supply or control the flow of fuel oil to the appliance(s).

Gas clothes dryer means a device used to dry wet laundry by means of heat derived from the combustion of fuel gases.

Gas refrigerator means a gas-burning appliance which is designed to extract heat from a suitable chamber.

Gas supply connection means the terminal end or connection to which a gas supply connector is attached.

Gas supply connector, manufactured home means a listed flexible connector designed for connecting the manufactured home to the gas supply source.

Gas vents means factory-built vent piping and vent fittings listed by an approved testing agency, that are assembled and used in accordance with the terms of their listings, for conveying flue gases to the outside atmosphere.

(1) *Type B Gas Vent* means a gas vent for venting gas appliances with draft hoods and other gas appliances listed for use with Type B Gas Vents.

(2) *Type BW Gas Vent* means a gas vent for venting listed gas-fired vented wall furnaces.

Heat producing appliance means all heating and cooking appliances and fuel burning appliances.

Heating appliance means an appliance for comfort heating or for domestic water heating.

Liquefied petroleum gases. The terms Liquefied petroleum gases, LPG and LP-Gas as used in this standard shall mean and include any material which is composed predominantly of any of the following hydrocarbons, or mixtures of them: propane, propylene butanes (normal butane or isobutane), and butylenes.

Plenum means an air compartment which is part of an air-distributing system, to which one or more

ducts or outlets are connected. (1) Furnace supply plenum is a plenum attached directly to, or an integral part of, the air supply outlet of the furnace. (2) Furnace return plenum is a plenum attached directly to, or an integral part of, the return inlet of the furnace.

Quick-disconnect device means a hand-operated device which provides a means for connecting and disconnecting a gas supply or connecting gas systems and which is equipped with an automatic means to shut off the gas supply when the device is disconnected.

Readily accessible means direct access without the necessity of removing any panel, door, or similar obstruction.

Roof jack means that portion of a manufactured home heater flue or vent assembly, including the cap, insulating means, flashing, and ceiling plate, located in and above the roof of a manufactured home.

Sealed combustion system appliance means an appliance which by its inherent design is constructed so that all air supplied for combustion, the combustion system of the appliance, and all products of combustion are completely isolated from the atmosphere of the space in which it is installed.

Water heater means an appliance for heating water for domestic purposes other than for space heating.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 52 FR 4586, Feb. 12, 1987; 58 FR 55015, Oct. 25, 1993]

§3280.703 Minimum standards.

Heating, cooling and fuel burning appliances and systems in manufactured homes shall be free of defects, and shall conform to applicable standards in the following table unless otherwise specified in this standard. (See §3280.4) When more than one standard is referenced, compliance with any one such standard shall meet the requirements of this standard.

Appliances

Central Cooling Air Conditioners--UL 465-Seventh Edition-1987 With Revisions through December 24, 1987.

Liquid Fuel-Burning Heating Appliances for Manufactured Homes and Recreational Vehicle--UL 307A-Sixth Edition-1990, With Revisions through August 21, 1990.

Electrical Air Heaters-UL 1025-Second Edition-1987 With Revisions July 13, 1989, February 6, 1990 and December 3, 1991.

Electric Baseboard Heating Equipment--UL 1042-Third Edition-1987 With Revision July 15, 1993.

Electric Central Air Heating Equipment--UL 1096-Fourth Edition-1986 With Revisions July 16, 1986 and January 30, 1988.

Gas Burning Heating Appliances for Mobile Homes and Recreational Vehicles--UL 307B-First Edition-1982 With Revision May 18, 1987.

Gas Clothes Dryers Vol. 1, Type 1 Clothes Dryers--ANSI Z21.5.1-1992.

Gas Fired Absorption Summer Air Conditioning Appliances--ANSI Z21.40.1-1981, With Addenda

Gas-Fired Central Furnaces [Except Direct Vent System Central Furnaces]--ANSI Z21.47-1990, With Addendum Z21.47a-1990 and Z21.47b-1992.

Household Cooking Gas Appliances ANSI Z21.1-1990 With Addenda Z21.1a-1991 and Z21.1b-1993.

Refrigerators Using Gas Fuel--ANSI Z21.19-1990, With Addenda Z21.19a-1992.

Gas Water Heaters Vol. 1, Storage Water Heaters With Input Ratings of 75,000 BTU per hour or Less--ANSI Z21.10.1-1990, With Addendum Z21.10.1a-1991 and Z21.10.1b-1992.

Household Electric Storage Tank Water Heaters--UL 174-Seventh Edition-1989 With Revisions May 8, 1990 and January 22, 1991.

Ferrous Pipe and Fittings

Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless--ASTM A53-93.

Standard Specification for Electric-Resistance-Welded Coiled Steel Tubing for Gas and Fuel Oil Lines--*ASTM A539-90a.

Pipe Threads, General Purpose (Inch)--ANSI/ASME B1.20.1-1983.

Welding and Seamless Wrought Steel Pipe--ANSI/ASME B36.10-1979.

Nonferrous Pipe, Tubing and Fittings

Standard Specification for Seamless Copper Water Tube--ASTM B88-93.

Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service--ASTM B280-93.

Metal Connectors for Gas Appliances--ANSI Z21.24-1987, With Addenda Z21.24a 1990 and Z21.24b-1992.

Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves--ANSI Z21.15-1992.

Standard for Gas Supply Connectors for Manufactured Homes--IAPMO TSC 9-92.

Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tubes--ASTM B251-93.

Standard Specification for Seamless Copper Pipe, Standard Sizes--ASTM B42-93.

Direct Vent Central Furnaces--ANSI Z21.64-1990, With Addenda Z21.64a-1992.

Miscellaneous

Factory-Made Air Ducts and Connectors--UL 181-Seventh Edition-1990, With Revision November 20, 1990.

Tube Fittings for Flammable and Combustible Fluids, Refrigeration Service, and Marine Use--1993.

Pigtails and Flexible Hose Connectors for LP-Gas--UL 569-Sixth Edition-1990.

Roof Jacks for Manufactured Homes and Recreational Vehicles--UL 311-Seventh Edition-1990.

Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems--ANSI Z21.22-1986, With Addenda Z21.22a-1990.

Automatic Gas Ignition Systems and Components--ANSI Z21.20-1989, With Addendum

Automatic Valves for Gas Appliances--ANSI Z21.21-1987, With Addendum Z21.21a-1989 and Z21.21b-1992.

Gas Appliance Thermostats--ANSI Z21.23-1989, With Addenda Z21.23a-1991.

Gas Vents--UL 441-Seventh Edition-1991.

Installation of Oil-Burning Equipment, NFPA 31-1992 Edition.

The following sections are applicable:

1-1

1-2

1-3

1-4 except 1-4.1

1-5.1

1-5.2

1-5.4.2

1-5.4.3

1-5.5

1-5.6

1-6

1-7.2 except 1-7.2.4

1-8

1-9

1-10.1

3-1.1

3-1.3

3-1.4

3-1.5

3-1.6

3-10

4-1.3
4-1.4
4-1.5
4-2
4-3 except 4-3.2
4-4 except 4-4.2, 4-4.5.4, 4-4.6
4-4.7, 4-4.9 and 4-4.10 Appendices B, C, and E

National Fuel Gas Code--NFPA 54-1992 ANSI 223.1.

Warm Air Heating and Air Conditioning Systems, 1993 Edition, NFPA-90B.

The following sections are applicable:

2-2.4

2-3.6

Table 3-1.3, Section B

4-1.6

Standard for the Storage and Handling of Liquefied Petroleum Gases, 1992 Edition--NFPA-58.
Flares for Tubing (1972)--SAE-J533b.

Chimneys, Factory-Built Residential Type and Building Heating Appliance--UL 103-Seventh Edition--1989 With Revision February 23, 1989.

Factory-Built Fireplaces--UL 127-Sixth Edition With Revisions January 4, 1989, June 10, 1991, June 29, 1992.

Room Heaters Solid-Fuel Type--UL 1482--Third Edition--1988 With Revision September 13, 1988.

Fireplace Stoves--UL 737--Sixth Edition--1988 With Revisions September 19, 1988, July 10, 1990 and June 10, 1991.

Unitary Air-Conditioning and Air-Source Heat Pump Equipment--ANSI/ARI 210/240-89.

AGA Requirements for Gas Connectors for Connection of Fixed Appliances for Outdoor Installation, Park Trailers and Manufactured (Mobile) Homes to the Gas Supply--No. 3-87.

[58 FR 55015, Oct. 25, 1993]

§3280.704 Fuel supply systems.

3280.704(a)

LP--Gas system design and service line pressure.

3280.704(a)(1)

Systems shall be of the vapor-withdrawal type.

3280.704(a)(2)

Gas, at a pressure not over 14 inches water column (½ psi), shall be delivered from the system into the gas supply connection.

3280.704(b)

LP-gas containers--

3280.704(b)(1)

Maximum capacity. No more than two containers having an individual water capacity of not more than 105 pounds (approximately 45 pounds LP-Gas capacity), shall be installed on or in a compartment of any manufactured home.

3280.704(b)(2)

Construction of containers. Containers shall be constructed and marked in accordance with the specifications for LP-Gas Containers of the U.S. Department of Transportation (DOT) or the Rules for Construction of Pressure Vessels 1986, ASME Boiler and Pressure Vessel Code section VIII, Division 1 ASME Containers shall have a design pressure of at least 312.5 psig.

3280.704(b)(2)(i)

Container supply systems shall be arranged for vapor withdrawal only.

3280.704(b)(2)(ii)

Container openings for vapor withdrawal shall be located in the vapor space when the container is in service or shall be provided with a suitable internal withdrawal tube which communicates with the vapor space on or near the highest point in the container when it is mounted in service position, with the vehicle on a level surface. Containers shall be permanently and legibly marked in a conspicuous manner on the outside to show the correct mounting position and the position of the service outlet connection. The method of mounting in place shall be such as to minimize the possibility of an incorrect positioning of the container.

3280.704(b)(3)

Location of LP-gas containers and systems.

3280.704(b)(3)(i)

LP-gas containers shall not be installed, nor shall provisions be made for installing or storing any LP-Gas container, even temporarily, inside any manufactured home except for listed, completely self-contained hand torches, lanterns, or similar equipment with containers having a maximum water capacity of not more than 2½ pounds (approximately one pound LP Gas capacity).

3280.704(b)(3)(ii)

Containers, control valves, and regulating equipment, when installed, shall be mounted on the “A” frame of the manufactured home, or installed in a compartment that is vaportight to the inside of the

manufactured home and accessible only from the outside. The compartment shall be ventilated at top and bottom to facilitate diffusion of vapors. The compartment shall be ventilated with two vents having an aggregate area of not less than two percent of the floor area of the compartment and shall open unrestricted to the outside atmosphere. The required vents shall be equally distributed between the floor and ceiling of the compartment. If the lower vent is located in the access door or wall, the bottom edge of the vent shall be flush with the floor level of the compartment. The top vent shall be located in the access door or wall with the bottom of the vent not more than 12 inches below the ceiling level of the compartment. All vents shall have an unrestricted discharge to the outside atmosphere. Access doors or panels of compartments shall not be equipped with locks or require special tools or knowledge to open.

3280.704(b)(3)(iii)

Permanent and removable fuel containers shall be securely mounted to prevent jarring loose, slipping or rotating and the fastenings shall be designed and constructed to withstand static loading in any direction equal to twice the weight of the tank and attachments when filled with fuel, using a safety factor of not less than four based on the ultimate strength of the material to be used.

3280.704(b)(4)

LP-gas container valves and accessories.

3280.704(b)(4)(i)

Valves in the assembly of a two-cylinder system shall be arranged so that replacement of containers can be made without shutting off the flow of gas to the appliance(s). This provision is not to be construed as requiring an automatic change-over device.

3280.704(b)(4)(ii)

Shutoff valves on the containers shall be protected as follows, in transit, in storage, and while being moved into final utilization by setting into a recess of the container to prevent possibility of their being struck if container is dropped upon a flat surface, or by ventilated cap or collar, fastened to the container, capable of withstanding a blow from any direction equivalent to that of a 30-pound weight dropped 4 feet. Construction shall be such that the blow will not be transmitted to the valve.

3280.704(b)(4)(iii)

[Reserved]

3280.704(b)(4)(iv)

Regulators shall be connected directly to the container shutoff valve outlets or mounted securely by means of a support bracket and connected to the container shutoff valve or valves with listed high pressure connections. If the container is permanently mounted the connector shall be as required above or with a listed semi-rigid tubing connector.

3280.704(b)(5)

LP-gas safety devices.

3280.704(b)(5)(i)

DOT containers shall be provided with safety relief devices as required by the regulations of the U.S. Department of Transportation. ASME containers shall be provided with relief valves in accordance with subsection 221 of the Standard for the Storage and Handling Liquefied Petroleum Gases, NFPA No. 58-1992, Safety relief valves shall have direct communication with the vapor space of the vessel.

3280.704(b)(5)(ii)

The delivery side of the gas pressure regulator shall be equipped with a safety relief device set to discharge at a pressure not less than two times and not more than three times the delivery pressure of the regulator.

3280.704(b)(5)(iii)

Systems mounted on the "A" frame assembly shall be so located that the discharge from the safety relief devices shall be into the open air and not less than three feet horizontally from any opening into the manufactured home below the level of such discharge.

3280.704(b)(5)(iv)

Safety relief valves located within liquefied petroleum gas container compartments may be less than three feet from openings provided the bottom vent of the compartment is at the same level or lower than the bottom of any opening into the vehicle, or the compartment is not located on the same wall plane as the opening(s) and is at least two feet horizontally from such openings.

3280.704(b)(6)

LP-gas system enclosure and mounting.

3280.704(b)(6)(i)

Housings and enclosures shall be designed to provide proper ventilation at least equivalent to that specified in §3280.704(b)(3)(ii).

3280.704(b)(6)(ii)

Doors, hoods, domes, or portions of housings and enclosures required to be removed or opened for replacement of containers shall incorporate means for clamping them firmly in place and preventing them from working loose during transit.

3280.704(b)(6)(iii)

Provisions shall be incorporated in the assembly to hold the containers firmly in position and prevent their movement during transit.

3280.704(b)(6)(iv)

Containers shall be mounted on a substantial support or a base secured firmly to the vehicle chassis. Neither the container nor its support shall extend below the manufactured home frame.

3280.704(c)

Oil tanks--

3280.704(c)(1)

Installation. Oil tanks and listed automatic pumps (oil lifters) installed for gravity flow of oil to heating equipment shall be installed so that the top of the tank is no higher than 8 feet above the appliance oil control and the bottom of the tank is not less than 18 inches above the appliance oil control.

3280.704(c)(2)

Auxiliary oil storage tank. Oil supply tanks affixed to a manufactured home shall be so located as to require filling and draining from the outside and shall be in a place readily available for inspection. If the fuel supply tank is located in a compartment of a manufactured home, the compartment shall be ventilated at the bottom to permit diffusion of vapors and shall be insulated from the structural members of the body. Tanks so installed shall be provided with an outside fill and vent pipe and an approved liquid level gage.

3280.704(c)(3)

Shutoff valve. A readily accessible, approved manual shutoff valve shall be installed at the outlet of an oil supply tank. The valve shall be installed to close against the supply.

3280.704(c)(4)

Fuel oil filters. All oil tanks shall be equipped with an approved oil filter or strainer located downstream from the tank shutoff valve. The fuel oil filter or strainer shall contain a sump with a drain for the entrapment of water.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 47 FR 49390, Nov. 1, 1982; 52 FR 4587, Feb. 12, 1987; 58 FR 55016, Oct. 25, 1993]

§3280.705 Gas piping systems.

3280.705(a)

General. The requirements of this section shall govern the installation of all fuel gas piping attached to any manufactured home. The gas piping supply system shall be designed for a pressure not exceeding 14 inch water column (½ psi) and not less than 7 inch water column (¼ psi). The manufacturer shall indicate in his written installation instructions the design pressure limitations for safe and effective

operation of the gas piping system. None of the requirements listed in this section shall apply to the piping supplied as a part of an appliance. All exterior openings around piping, ducts, plenums or vents shall be sealed to resist the entrance of rodents.

3280.705(b)

Materials. All materials used for the installation, extension, alteration, or repair of any gas piping system shall be new and free from defects or internal obstructions. It shall not be permissible to repair defects in gas piping or fittings. Inferior or defective materials shall be removed and replaced with acceptable material. The system shall be made of materials having a melting point of not less than 1,450 F, except as provided in §3280.705(e). They shall consist of one or more of the materials described in

3280.705(b)(1)

Steel or wrought-iron pipe shall comply with ANSI Standard B36.10-1979, Welded and Seamless Wrought Steel Pipe. Threaded brass pipe in iron pipe sizes may be used. Threaded brass pipe shall comply with ASTM B43-91, Standard Specification for Seamless Red Brass Pipe, Standard Sizes.

3280.705(b)(2)

Fittings for gas piping shall be wrought iron, malleable iron, steel, or brass (containing not more than 75 percent copper).

3280.705(b)(3)

Copper tubing shall be annealed type, Grade K or L, conforming to the Standard Specification for Seamless Copper Water Tube (ASTM B88-93) or shall comply with the Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service, ASTM B 280-93. Copper tubing shall be internally tinned.

3280.705(b)(4)

Steel tubing shall have a minimum wall thickness of 0.032 inch for tubing of ½ inch diameter and smaller and 0.049 inch for diameters ½ inch and larger. Steel tubing shall be constructed in accordance with ASTM Standard Specification for Electric-Resistance-Welded Coiled Steel Tubing for Gas and Fuel Oil Lines, ASTM A 539-83, and shall be externally corrosion protected.

3280.705(c)

Piping design. Each manufactured home requiring fuel gas for any purpose shall be equipped with a natural gas piping system acceptable for LP-Gas. Where fuel gas piping is to be installed in more than one section of an expandable or multiple unit home, the design and construction of the crossover(s) shall be as follows:

3280.705(c)(1)

All points of crossover shall be readily accessible from the exterior of the home.

3280.705(c)(2)

The connection(s) between units shall be made with a connector(s) listed for exterior use or direct plumbing sized in accordance with §3280.705(d). A shutoff valve of the nondisplaceable rotor type conforming to ANSI Z21.15-1992 Manually Operated Gas Valves for Appliances, Appliances Connector Valves and Hose End Valves, suitable for outdoor use shall be installed at each crossover point upstream of the connection when listed connectors are used.

3280.705(c)(3)

The connection(s) may be made by a listed quick disconnect device which shall be designed to provide a positive seal of the supply side of the gas system when such device is separated.

3280.705(c)(4)

The flexible connector, direct plumbing pipe, or "quick disconnect" device shall be provided with protection from mechanical and impact damage and located to minimize the possibility of tampering.

3280.705(c)(5)

For gas line cross over connections made with either hard pipe or flexible connectors, the crossover point(s) shall be capped on the supply side to provide a positive seal and covered on the other side with a suitable protective covering.

3280.705(c)(6)

Suitable protective coverings for the connection device(s) when separated, shall be permanently attached to the device or flexible connector.

3280.705(c)(7)

When a quick disconnect device is installed, a 3 inch by 1¾ inch minimum size tag made of etched, metal-stamped or embossed brass, stainless steel, anodized or alclad aluminum not less than 0.020 inch thick or other approved material (e.g., 0.005 inch plastic laminates) shall be permanently attached on the exterior wall adjacent to the access to the "quick disconnect" device. Each tag shall be legibly inscribed with the following information using letters no smaller than ¼ inch high:

Do Not Use Tools To Separate the "Quick-Disconnect" Device

3280.705(d)

Gas pipe sizing. Gas piping systems shall be sized so that the pressure drop to any appliance inlet connection from any gas supply connection, when all appliances are in operation at maximum capacity, is not more than 0.5 inch water column as determined on the basis of test, or in accordance with Table 3280.705(d). When determining gas pipe sizing in the table, gas shall be assumed to have a specific

gravity of 0.65 and rated at 1000 B.T.U. per cubic foot. The natural gas supply connection(s) shall be not less than the size of the gas piping but shall be not smaller than ¾ inch nominal pipe size.

3280.705(e)

Joints for gas pipe. All pipe joints in the piping system, unless welded or brazed, shall be threaded joints that comply with Pipe Threads, General Purpose (Inch), adopted 25 October 1984, ANSI/ASME B1.20.1-1983. Right and left nipples or couplings shall not be used. Unions, if used, shall be of ground joint type. The material used for welding or brazing pipe connections shall have a melting temperature in excess of 1,000 F.

3280.705(f)

Joints for tubing.

3280.705(f)(1)

Tubing joints shall be made with either a single or a double flare of 45 degrees in accordance with Flares For Tubing, SAE-J533b-1972 or with other listed vibration-resistant fittings, or joints may be brazed with material having a melting point exceeding 1,000 F. Metallic ball sleeve compression-type tubing fittings shall not be used.

3280.705(f)(2)

Steel tubing joints shall be made with a double-flare in accordance with Flares For Tubing, SAE-J533b-1972.

3280.705(g)

Pipe joint compound. Screw joints shall be made up tight with listed pipe joint compound, insoluble in liquefied petroleum gas, and shall be applied to the male threads only.

3280.705(h)

Concealed tubing. Tubing shall not be run inside walls, floors, partitions, or roofs. Where tubing passes through walls, floors, partitions, roofs, or similar installations, such tubing shall be protected by the use of weather resistant grommets that shall snugly fit both the tubing and the hole through which the tubing passes.

PART I--MAXIMUM CAPACITY OF DIFFERENT SIZES OF PIPE AND TUBING IN
THOUSANDS OF
BTU'S PER HOUR OF NATURAL GAS FOR GAS PRESSURES OF 0.5 PSIG OR
LESS AND A MAXIMUM PRESSURE DROP OF ½ INCH WATER COLUMN

Iron pipe sizes--Length in feet									

I.D.	10	20	30	40	50	60	70	80	90	100
¼"	43	29	24	20	18	16	15	14	13	12
½"	95	65	52	45	40	36	33	31	29	27
¾"	175	120	97	82	73	66	61	57	53	50
1"	360	250	200	170	151	138	125	118	110	103
1 ½"	680	465	375	320	285	260	240	220	215	195

O.D.	10	20	30	40	50	60	70	80	90	100
¾"	27	18	15	13	11	10	9	9	8	8
1"	56	38	31	26	23	21	19	18	17	16
1 ½"	113	78	62	53	47	43	39	37	34	33
2"	197	136	109	93	83	75	69	64	60	57
2 ½"	280	193	155	132	117	106	98	91	85	81

Part II--[Reserved]

3280.705(i)

Concealed joints. Piping or tubing joints shall not be located in any floor, wall partition, or similar concealed construction space.

3280.705(j)

Gas supply connections. When gas appliances are installed, at least one gas supply connection shall be provided on each home. The connection shall not be located beneath an exit door. Where more than one connection is provided, the piping system shall be sized to provide adequate capacity from each supply connection.

3280.705(k)

Identification of gas supply connections. Each manufactured home shall have permanently affixed to the exterior skin at or near each gas supply connection or the end of the pipe, a tag of 3 inches by 1¾ inches minimum size, made of etched, metal-stamped or embossed brass, stainless steel, anodized or alclad aluminum not less than 0.020 inch thick, or other approved material (e.g., 0.005 inch plastic laminates), which reads as follows. The connector capacity indicated on this tag shall be equal to or greater than the total Btuh rating of all intended gas appliances.

Combination LP-Gas and Natural Gas System
 This gas piping system is designed for use of either liquefied petroleum gas or

natural gas.

NOTICE: BEFORE TURNING ON GAS BE CERTAIN APPLIANCES ARE DESIGNED FOR THE GAS CONNECTED AND ARE EQUIPPED WITH CORRECT ORIFICES. SECURELY CAP THIS INLET WHEN NOT CONNECTED FOR USE.

When connecting to lot outlet, use a listed gas supply connector for mobile homes rated at 100,000 Btuh or more; 250,000 Btuh or more.

Before turning on gas, make certain all gas connections have been made tight, all appliance valves are turned off, and any unconnected outlets are capped.

After turning on gas, test gas piping and connections to appliances for leakage with soapy water or bubble solution, and light all pilots.

The connector capacity indicated on this tag shall be equal to or greater than the total Btuh rating of all intended gas appliances.

3280.705(I)

LP-Gas supply connectors.

3280.705(I)(1)

A listed LP-Gas flexible connection conforming to the UL Standard for Pigtailed, and Flexible Hose Connectors for LP-Gas, UL 569--Sixth Edition--1990, or equal shall be supplied when LP-Gas cylinder(s) and regulator(s) are supplied.

3280.705(I)(2)

Appliance connections. All gas burning appliances shall be connected to the fuel piping. Materials as provided in §3280.705(b) or listed appliance connectors shall be used. Listed appliance connectors when used shall not run through walls, floors, ceilings or partitions, except for cabinetry, and shall be 3 feet or less in length or 6 feet or less for cooking appliances. Connectors of aluminum shall not be used outdoors. A manufactured home containing a combination LP-natural-gas-system may be provided with a gas outlet to supply exterior appliances when installed in accordance with the following:

3280.705(I)(2)(i)

No portion of the completed installation shall project beyond the wall of the manufactured home.

3280.705(1)(2)(ii)

The outlet shall be provided with an approved quick-disconnect device, which shall be designed to provide a positive seal on the supply side of the gas system when the appliance is disconnected. A shutoff valve of the nondisplaceable rotor type conforming to ANSI Z21.15-1992, Manually Operated Gas Valves, shall be installed immediately upstream of the quick-disconnect device. The complete device shall be provided as part of the original installation.

3280.705(1)(2)(iii)

Protective caps or plugs for the “quick-disconnect device“, when disconnected, shall be permanently attached to the manufactured home adjacent to the device.

3280.705(1)(2)(iv)

A tag shall be permanently attached to the outside of the exterior wall of the manufactured home as close as possible to the gas supply connection. The tag shall indicate the type of gas and the Btuh capacity of the outlet and shall be legibly inscribed as follows:

THIS OUTLET IS DESIGNED FOR USE WITH GAS PORTABLE APPLIANCES
WHOSE TOTAL INPUT DO NOT EXCEED ----- BTUH. REPLACE PROTECTIVE
COVERING OVER CONNECTOR WHEN NOT IN USE.

3280.705(1)(3)

Valves. A shutoff valve shall be installed in the fuel piping at each appliance inside the manufactured home structure, upstream of the union or connector in addition to any valve on the appliance and so arranged to be accessible to permit serving of the appliance and removal of its components. The shutoff valve shall be located within 6 feet of a cooking appliance and within 3 feet of any other appliance. A shutoff valve may serve more than one appliance if located as required above. Shut off valves shall be of the nondisplaceable rotor type and conform ANSI Z21.15-1992, Manually Operated Gas Valves.

3280.705(1)(4)

Gas piping system openings. All openings in the gas piping system shall be closed gas-tight with threaded pipe plugs or pipe caps.

3280.705(1)(5)

Electrical ground. Gas piping shall not be used for an electrical ground.

3280.705(1)(6)

Couplings. Pipe couplings and unions shall be used to join sections of threaded piping. Right and left nipples or couplings shall not be used.

3280.705(1)(7)

Hangers and supports. All gas piping shall be adequately supported by galvanized or equivalently

protected metal straps or hangers at intervals of not more than 4 feet, except where adequate support and protection is provided by structural members. Solid-iron-pipe gas supply connection(s) shall be rigidly anchored to a structural member within 6 inches of the supply connection(s).

3280.705(1)(8)

Testing for leakage.

3280.705(1)(8)(i)

Before appliances are connected, piping systems shall stand a pressure of at least six inches mercury or three PSI gage for a period of not less than ten minutes without showing any drop in pressure. Pressure shall be measured with a mercury manometer or slope gage calibrated so as to be read in increments of not greater than one-tenth pound, or an equivalent device. The source of normal operating pressure shall be isolated before the pressure tests are made. Before a test is begun, the temperature of the ambient air and of the piping shall be approximately the same, and constant air temperature be maintained throughout the test.

3280.705(1)(8)(ii)

After appliances are connected, the piping system shall be pressurized to not less than 10 inches nor more than 14 inches water column and the appliance connections tested for leakage with soapy water or bubble solution.

[40 FR 58752, Dec. 18, 1975, as amended at 42 FR 54383, Oct. 5, 1977. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 52 FR 4587, Feb. 12, 1987; 58 FR 55016, Oct. 25, 1993]

§3280.706 Oil piping systems.

3280.706(a)

General. The requirements of this section shall govern the installation of all liquid fuel piping attached to any manufactured home. None of the requirements listed in this section shall apply to the piping in the appliance(s).

3280.706(b)

Materials. All materials used for the installation extension, alteration, or repair, of any oil piping systems shall be new and free from defects or internal obstructions. The system shall be made of materials having a melting point of not less than 1,450 F, except as provided in §3280.706(d) and (e). They shall consist of one or more of the materials described in §3280.706(b) (1) through (4).

3280.706(b)(1)

Steel or wrought-iron pipe shall comply with ANSI B 36.10-1979, Welded and Seamless Wrought

Steel Pipe. Threaded copper or brass pipe in iron pipe sizes may be used.

3280.706(b)(2)

Fittings for oil piping shall be wrought-iron, malleable iron, steel, or brass (containing not more than 75 percent copper).

3280.706(b)(3)

Copper tubing shall be annealed type, Grade K or L conforming to the Standard Specification for Seamless Copper Water Tube, ASTM B88-93, or shall comply with the Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service, ASTM B280-93.

3280.706(b)(4)

Steel tubing shall have a minimum wall thickness of 0.032 inch for diameters up to $\frac{1}{2}$ inch and 0.049 inch for diameters $\frac{1}{2}$ inch and larger. Steel tubing shall be constructed in accordance with the Specification for Electric-Resistance-Welded Coiled Steel Tubing for Gas and Field Oil Lines, ASTM, A539-90a, and shall be externally corrosion protected.

3280.706(c)

Size of oil piping. The minimum size of all fuel oil tank piping connecting outside tanks to the appliance shall be no smaller than $\frac{3}{8}$ inch OD copper tubing or $\frac{1}{4}$ inch IPS. If No. 1 fuel oil is used with a listed automatic pump (fuel lifter), copper tubing shall be sized as specified by the pump manufacturer.

3280.706(d)

Joints for oil piping. All pipe joints in the piping system, unless welded or brazed, shall be threaded joints which comply with ANSI/ASME B1.20.1-1983, Pipe Threads, General Purpose (Inch). The material used for brazing pipe connections shall have a melting temperature in excess of 1,000 F.

3280.706(e)

Joints for tubing. Joints in tubing shall be made with either a single or double flare of the proper degree, as recommended by the tubing manufacturer, by means of listed tubing fittings, or brazed with materials having a melting point in excess of 1,000 F.

3280.706(f)

Pipe joint compound. Threaded joints shall be made up tight with listed pipe joint compound which shall be applied to the male threads only.

3280.706(g)

Couplings. Pipe couplings and unions shall be used to join sections of threaded pipe. Right and left nipples or couplings shall not be used.

3280.706(h)

Grade of piping. Fuel oil piping installed in conjunction with gravity feed systems to oil heating equipment shall slope in a gradual rise upward from a central location to both the oil tank and the appliance in order to eliminate air locks.

3280.706(i)

Strap hangers. All oil piping shall be adequately supported by galvanized or equivalently protected metal straps or hangers at intervals of not more than 4 feet, except where adequate support and protection is provided by structural members. Solid-iron-pipe oil supply connection(s) shall be rigidly anchored to a structural member within 6 inches of the supply connection(s).

3280.706(j)

Testing for leakage. Before setting the system in operation, tank installations and piping shall be checked for oil leaks with fuel oil of the same grade that will be burned in the appliance. No other material shall be used for testing fuel oil tanks and piping. Tanks shall be filled to maximum capacity for the final check for oil leakage.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 52 FR 4588, Feb. 12, 1987; 58 FR 55017, Oct. 25, 1993]

§3280.707 Heat producing appliances.

3280.707(a)

Heat-producing appliances and vents, roof jacks and chimneys necessary for their installation in manufactured homes shall be listed or certified by a nationally recognized testing agency for use in manufactured homes.

3280.707(a)(1)

A manufactured home shall be provided with a comfort heating system.

3280.707(a)(1)(i)

When a manufactured home is manufactured to contain a heating appliance, the heating appliance shall be installed by the manufacturer of the manufactured home in compliance with applicable sections of this subpart.

3280.707(a)(1)(ii)

When a manufactured home is manufactured for field application of an external heating or combination heating/cooling appliance, preparation of the manufactured home for this external application shall comply with the applicable sections of this part.

3280.707(a)(2)

Gas and oil burning comfort heating appliances shall have a flue loss of not more than 25 percent, and a thermal efficiency of not less than that specified in nationally recognized standards (See §3280.703).

3280.707(b)

Fuel-burning heat-producing appliances and refrigeration appliances, except ranges and ovens, shall be of the vented type and vented to the outside.

3280.707(c)

Fuel-burning appliances shall not be converted from one fuel to another fuel unless converted in accordance with the terms of their listing and the appliance manufacturer's instructions.

3280.707(d)

Performance efficiency.

3280.707(d)(1)

All automatic electric storage water heaters installed in manufactured homes shall have a standby loss not exceeding 43 watts/meter² (4 watts/ft²) of tank surface area. The method of test for standby loss shall be as described in section 4.3.1 of Household Automatic Electric Storage Type Water Heaters, ANSI C72.1-1972.

3280.707(d)(2)

All gas and oil-fired automatic storage water heaters shall have a recovery efficiency, E, and a standby loss, S, as described below. The method of test of E and S shall be as described in Section 2.7 of Gas Water heaters, Vol. I, Storage Water Heaters with Input/Ratings of 75,000 BTU per hour or less, ANSI Z21.10.1-1990, with addendums Z21.10.1a-1991 and Z21.10.1b-1992 except that for oil-fired units. CF=1.0, Q=total gallons of oil consumed and H=total heating value of oil in BTU/gallon.

Storage capacity in gallons	Recovery efficiency	Standby loss
Less than 25.....	At least 75 percent.....	Not more than 7.5 per-cent.
25 up to 35	00.....	Not more than 7 per-cent.
35 or more	00.....	Not more than 6 per-cent.

3280.707(e)

Each space heating, cooling or combination heating and cooling system shall be provided with at least

one readily adjustable automatic control for regulation of living space temperature. The control shall be placed a minimum of 3 feet from the vertical edge of the appliance compartment door. It shall not be located on an exterior wall or on a wall separating the appliance compartment from a habitable room.

3280.707(f)

Oil-fired heating equipment. All oil-fired heating equipment shall conform to liquid fuel-burning heating appliances for UL 307A--Fifth Edition--1987, Liquid Fuel-Burning Heating Appliances for Mobile Homes and Recreational Vehicles, and be installed in accordance with Installation of Oil Burning Equipment, NFPA 31-1983. Regardless of the requirements of the above referenced standards, or any other referenced standards, the following are not required:

3280.707(f)(1)

External switches or remote controls which shut off the burner or the flow of oil to the burner, or

3280.707(f)(2)

An emergency disconnect switch to interrupt electric power to the equipment under conditions of excessive temperature.

[40 FR 58752, Dec. 17, 1975, as amended at 42 FR 54383, Oct. 5, 1977. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 47 FR 49391, Nov. 1, 1982; 52 FR 4588, Feb. 12, 1987; 52 FR 47553, Dec. 15, 1987; 58 FR 55017, Oct. 25, 1993]

§3280.708 Exhaust duct system and provisions for the future installation of a clothes dryer.

3280.708(a)

Clothes dryers.

3280.708(a)(1)

All gas and electric clothes dryers shall be exhausted to the outside by a moisture-lint exhaust duct and termination fitting. When the clothes dryer is supplied by the manufacturer, the exhaust duct and termination fittings shall be completely installed by the manufacturer. However, if the exhaust duct system is subject to damage during transportation, it need not be completely installed at the factory when:

3280.708(a)(1)(i)

The exhaust duct system is connected to the clothes dryer, and

3280.708(a)(1)(ii)

a moisture lint exhaust duct system is roughed in and installation instructions are provided in accordance with paragraph (b) (3) or (c) of this section.

3280.708(a)(2)

A clothes dryer moisture-lint exhaust duct shall not be connected to any other duct, vent or chimney.

3280.708(a)(3)

The exhaust duct shall not terminate beneath the manufactured home.

3280.708(a)(4)

Moisture-lint exhaust ducts shall not be connected with sheet metal screws or other fastening devices which extend into the interior of the duct.

3280.708(a)(5)

Moisture-lint exhaust duct and termination fittings shall be installed in accordance with the appliance manufacturer's printed instructions.

3280.708(b)

Provisions for future intallation of a gas clothes dryer. A manufactured home may be provided with “stubbed in” equipment at the factory to supply a gas clothes dryer for future installation by the owner provided it complies with the following provisions:

3280.708(b)(1)

The “stubbed in” gas outlet shall be provided with a shutoff valve, the outlet of which is closed by threaded pipe plug or cap;

3280.708(b)(2)

The “stubbed in” gas outlet shall be permanently labeled to identify it for use only as the supply connection for a gas clothes dryer;

3280.708(b)(3)

A moisture lint duct system consisting of a complete access space (hole) through the wall or floor cavity with a cap or cover on the interior and exterior of the cavity secured in such a manner that they can be removed by a common household tool shall be provided. The cap or cover in place shall limit air infiltration and be designed to resist the entry of water or rodents. The manufacturer is not required to provide the moisture-lint exhaust duct or the termination fitting. The manufacturer shall provide written instructions to the owner on how to complete the exhaust duct installation in accordance with provisions of §3280.708(a)(1) through (5).

3280.708(c)

Provisions for future installation of a electric clothes dryers. When wiring is installed to supply an electric clothes dryer for future installation by the owner, the manufacturer shall:

3280.708(c)(1)

Provide a roughed in moisture-lint exhaust duct system consisting of a complete access space (hole) through the wall or floor cavity with a cap or cover on the interior and exterior of the cavity which are secured in such a manner that they can be removed by the use of common household tools. The cap or cover in place shall limit air filtration and be designed to resist the entry of water or rodents into the home. The manufacturer is not required to provide the moisture-lint exhaust duct or the termination fitting;

3280.708(c)(2)

install a receptacle for future connection of the dryer;

3280.708(c)(3)

provide written instructions on how to complete the exhaust duct installation in accordance with the provisions of paragraphs (a) (1) through (5) of this section.

[42 FR 54383, Oct. 5, 1977. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 58 FR 55018, Oct. 25, 1993]

§3280.709 Installation of appliances.

3280.709(a)

The installation of each appliance shall conform to the terms of its listing and the manufacturer's instructions. The installer shall leave the manufacturer's instructions attached to the appliance. Every appliance shall be secured in place to avoid displacement. For the purpose of servicing and replacement, each appliance shall be both accessible and removable.

3280.709(b)

Heat-producing appliances shall be so located that no doors, drapes, or other such material can be placed or swing closer to the front of the appliance than the clearances specified on the labeled appliances.

3280.709(c) Clearances surrounding heat producing appliances shall not be less than the clearances specified in the terms of their listings.

3280.709(c)(1)

Prevention of storage. The area surrounding heat producing appliances installed in areas with interior or exterior access shall be framed-in or guarded with noncombustible material such that the distance from the appliance to the framing or guarding material is not greater than three inches unless the appliance is installed in compliance with paragraph (c)(2), of this section. When clearance required by the listing is greater than three inches, the guard or frame shall not be closer to the appliance than the distance provided in the listing.

3280.709(c)(2)

Clearance spaces surrounding heat producing appliances are not required to be framed-in or guarded when:

3280.709(c)(2)(i)

A space is designed specifically for a clothes washer or dryer;

3280.709(c)(2)(ii)

Dimensions surrounding the appliance do not exceed three inches; or

3280.709(c)(2)(iii)

The manufacturer affixes either to a side of an alcove or compartment containing the appliance, or to the appliance itself, in a clearly visible location, a 3"x5" adhesive backed plastic laminated label or the equivalent which reads as follows:

“Warning”

This compartment is not to be used as a storage area. Storage of combustible materials or containers on or near any appliance in this compartment may create a fire hazard. Do not store such materials or containers in this compartment.

3280.709(d)

All fuel-burning appliances, except ranges, ovens, illuminating appliances, clothes dryers, solid fuel-burning fireplaces and solid fuel-burning fireplace stoves, shall be installed to provide for the complete separation of the combustion system from the interior atmosphere of the manufactured home. Combustion air inlets and flue gas outlets shall be listed or certified as components of the appliance. The required separation may be obtained by:

3280.709(d)(1)

The installation of direct vent system (sealed combustion system) appliances, or

3280.709(d)(2)

The installation of appliances within enclosures so as to separate the appliance combustion system and venting system from the interior atmosphere of the manufactured home. There shall not be any door, removable access panel, or other opening into the enclosure from the inside of the manufactured home. Any opening for ducts, piping, wiring, etc., shall be sealed.

3280.709(e)

A forced air appliance and its return-air system shall be designed and installed so that negative pressure created by the air-circulating fan cannot affect its or another appliance's combustion air supply or act to mix products of combustion with circulating air.

3280.709(e)(1)

The air circulating fan of a furnace installed in an enclosure with another fuel-burning appliance shall be operable only when any door or panel covering an opening in the furnace fan compartment or in a return air plenum or duct is in the closed position. This does not apply if both appliances are direct vent system (sealed combustion system) appliances.

3280.709(e)(2)

If a warm air appliance is installed within an enclosure to conform to §3280.709(d)(2), each warm-air outlet and each return air inlet shall extend to the exterior of the enclosure. Ducts, if used for that purpose, shall not have any opening within the enclosure and shall terminate at a location exterior to the enclosure.

3280.709(e)(3)

Cooling coils installed as a portion of, or in connection with, any forced-air furnace shall be installed on the downstream side unless the furnace is specifically otherwise listed.

3280.709(e)(4)

An air conditioner evaporator section shall not be located in the air discharge duct or plenum of any forced-air furnace unless the manufactured home manufacturer has complied with certification required in §3280.511.

3280.709(e)(5)

If a cooling coil is installed with a forced-air furnace, the coil shall be installed in accordance with its listing. When a furnace-coil unit has a limited listing, the installation must be in accordance with that listing.

3280.709(e)(6)

When an external heating appliance or combination cooling/heating appliance is to be field installed, the home manufacturer shall make provision for proper location of the connections to the supply and return air systems. The manufacturer is not required to provide said appliance(s). The preparation by the manufacturer for connection to the home's supply and return air system shall include all fittings and connection ducts to the main duct and return air system such that the installer is only required to provide:

3280.709(e)(6)(i)

The appliance;

3280.709(e)(6)(ii)

Any appliance connections to the home; and

3280.709(e)(6)(iii)

The connecting duct between the external appliance and the fitting installed on the home by the manufacturer. The above connection preparations by the manufacturer do not apply to supply or return

air systems designed only to accept external cooling (i.e., self contained air conditioning systems, etc.)

3280.709(e)(7)

The installation of a self contained air conditioner comfort cooling appliance shall meet the following requirements:

3280.709(e)(7)(i)

The installation on a duct common with an installed heating appliance shall require the installation of an automatic damper or other means to prevent the cooled air from passing through the heating appliance unless the heating appliance is certified or listed for such application and the supply system is intended for such an application.

3280.709(e)(7)(ii)

The installation shall prevent the flow of heated air into the external cooling appliance and its connecting ducts to the manufactured home supply and return air system during the operation of the heating appliance installed in the manufactured home.

3280.709(e)(7)(iii)

The installation shall prevent simultaneous operation of the heating and cooling appliances.

3280.709(f)

Vertical clearance above cooking top. Ranges shall have a vertical clearance above the cooking top of not less than 24 inches. (See §3280.204).

3280.709(g)

Solid fuel-burning factory-built fireplaces and fireplace stoves listed for use in manufactured homes may be installed in manufactured homes provided they and their installation conform to the following paragraphs. A fireplace or fireplace stove shall not be considered as a heating facility for determining compliance with subpart F.

3280.709(g)(1)

A solid fuel-burning fireplace or fireplace stove shall be equipped with integral door(s) or shutter(s) designed to close the fireplace or fireplace stove fire chamber opening and shall include complete means for venting through the roof, a combustion air inlet, a hearth extension, and means to securely attach the fireplace or the fireplace stove to the manufactured home structure. The installation shall conform to the following paragraphs (g)(1) (i) to (vii) inclusive:

3280.709(g)(1)(i)

A listed factory-built chimney designed to be attached directly to the fireplace or fireplace stove shall be used. The listed factory built chimney shall be equipped with and contain as part of its listing a termination device(s) and a spark arrester(s).

3280.709(g)(1)(ii)

A fireplace or fireplace stove, air intake assembly, hearth extension and the chimney shall be installed in accordance with the terms of their listings and their manufacturer's instructions.

3280.709(g)(1)(iii)

The combustion air inlet shall conduct the air directly into the fire chamber and shall be designed to prevent material from the hearth dropping onto the area beneath the manufactured home.

3280.709(g)(1)(iv)

The fireplace or fireplace stove shall not be installed in a sleeping room.

3280.709(g)(1)(v)

Hearth extension shall be of noncombustible material not less than $\frac{1}{2}$ -inch thick. The hearth shall extend at least 16 inches in front or and at least 8 inches beyond each side of the fireplace or fireplace stove opening. Furthermore the hearth shall extend over the entire surface beneath a fireplace stove and beneath an elevated or overhanging fireplace.

3280.709(g)(1)(vi)

The label on each solid fuel-burning fireplace and solid fuel-burning fireplace stove shall include the following wording: For use with solid fuel only.

3280.709(g)(1)(vii)

The chimney shall extend at least three feet above the part of the roof through which it passes and at least two feet above the highest elevation of any part of the manufactured home within 10 feet of the chimney. Portions of the chimney and termination that exceed an elevation of 13 $\frac{1}{2}$ ft. above ground level may be designed to be removed for transporting the manufactured home.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 44 FR 66195, Nov. 19, 1979; 58 FR 55018, Oct. 25, 1993]

§3280.710 Venting, ventilation and combustion air.

3280.710(a)

The venting as required by §3280.707(b) shall be accomplished by one or more of the methods given in (a) (1) and (2) of this section:

3280.710(a)(1)

An integral vent system listed or certified as part of the appliance.

3280.710(a)(2)

A venting system consisting entirely of listed components, including roof jack, installed in accordance with the terms of the appliance listing and the appliance manufacturer's instructions.

3280.710(b) Venting and combustion air systems shall be installed in accordance with the following:

3280.710(b)(1)

Components shall be securely assembled and properly aligned at the factory in accordance with the appliance manufacturer's instructions except vertical or horizontal sections of a fuel fired heating appliance venting system that extend beyond the roof line or outside the wall line may be installed at the site. Sectional venting systems shall be listed for such applications and installed in accordance with the terms of their listings and manufacturers' instructions. In cases where sections of the venting system are removed for transportation, a label shall be permanently attached to the appliance indicating the following:

Sections of the venting system have not been installed. Warning-do not operate the appliance until all sections have been assembled and installed in accordance with the manufacturer's instructions.

3280.710(b)(2)

Draft hood connectors shall be firmly attached to draft hood outlets or flue collars by sheet metal screws or by equivalent effective mechanical fasteners.

3280.710(b)(3)

Every joint of a vent, vent connector, exhaust duct and combustion air intake shall be secure and in alignment.

3280.710(c)

Venting systems shall not terminate underneath a manufactured home.

3280.710(d)

Venting system terminations shall be not less than three feet from any motor-driven air intake discharging into habitable areas.

3280.710(e)

The area in which cooking appliances are located shall be ventilated by a metal duct which may be single wall, not less than 12.5 square inches in cross-sectional area (minimum dimension shall be two inches) located above the appliance(s) and terminating outside the manufactured home, or by listed mechanical ventilating equipment discharging outside the home, that is installed in accordance with the terms of listing and the manufacturer's instructions. Gravity or mechanical ventilation shall be installed within a horizontal distance of not more than ten feet from the vertical front of the appliance(s).

3280.710(f)

Mechanical ventilation which exhausts directly to the outside atmosphere from the living space of a home shall be equipped with an automatic or manual damper. Operating controls shall be provided such that mechanical ventilation can be separately operated without directly energizing other energy consuming devices.

[49 FR 32012, Aug. 9, 1984, as amended at 58 FR 55018, Oct. 25, 1993]

§3280.711 Instructions.

Operating instructions shall be provided with each appliance. These instructions shall include directions and information covering the proper use and efficient operation of the appliance and its proper maintenance.

§3280.712 Marking.

3280.712(a)

Information on clearances, input rating, lighting and shutdown shall be attached to the appliances with the same permanence as the nameplate, and so located that it is easily readable when the appliance is properly installed or shutdown for transporting of manufactured home.

3280.712(b)

Each fuel-burning appliance shall bear permanent marking designating the type(s) of fuel for which it is listed.

§3280.713 Accessibility.

Every appliance shall be accessible for inspection, service, repair, and replacement without removing permanent construction. For those purposes, inlet piping supplying the appliance shall not be considered permanent construction. Sufficient room shall be available to enable the operator to observe the burner, control, and ignition means while starting the appliance.

[58 FR 55018, Oct. 25, 1993]

§3280.714 Appliances, cooling.

3280.714(a)

Every air conditioning unit or a combination air conditioning and heating unit shall be listed or certified by a nationally recognized testing agency for the application for which the unit is intended and installed in accordance with the terms of its listing.

3280.714(a)(1)

Mechanical air conditioners shall be rated in accordance with the ARI Standard 210/240-89 Unitary Air Conditioning and Air Source Unitary Heat Pump Equipment and certified by ARI or other nationally recognized testing agency capable of providing follow-up service.

3280.714(a)(1)(i)

Electric motor-driven unitary cooling systems with rated capacity less than 65,000 BTU/Hr when rated at ARI Standard rating conditions in ARI Standard 210/240-89 Unitary Air-Conditioning and Air-Source Heat Pump Equipment, shall show energy efficiency (EER) values not less than 7.2.

3280.714(a)(1)(ii)

Heat pumps shall be certified to comply with all the requirements of the ARI Standard 210/240-89 Unitary Air Conditioning and Air Source Unitary Heat Pump Equipment. Electric motor-driven vapor compression heat pumps with supplemental electrical resistance heat shall be sized to provide by compression at least 60 percent of the calculated annual heating requirements for the manufactured home being served. A control shall be provided and set to prevent operation of supplemental electrical resistance heat at outdoor temperatures above 40 F, except for defrost operation.

3280.714(a)(1)(iii)

Electric motor-driven vapor compression heat pumps with supplemental electric resistance heat conforming to ARI Standard 210/240-89 Unitary Air-Conditioning and Air-Source Heat Pump Equipment shall show coefficient of performance ratios not less than shown below:

COP	
Temperature degrees fahrenheit	Coefficient of performance
47	2.5
17	1.7
0	1.0

3280.714(a)(2)

Gas-fired absorption air conditioners shall be listed or certified in accordance with ANSI Standard Z21.40.1-1981 “Gas-fired Absorption Summer Air Conditioning Appliances” with addenda la-1982, and certified by a nationally recognized testing agency capable of providing follow-up service.

3280.714(a)(3)

Direct refrigerating systems serving any air conditioning or comfort-cooling system installed in a manufactured home shall employ a type of refrigerant that ranks no lower than Group 5 in the Underwriters' Laboratories, Inc. ``Classification of Comparative Life Hazard of Various Chemicals."

3280.714(a)(4)

When a cooling or heat pump coil and air conditioner blower are installed with a furnace or heating appliance, they shall be tested and listed in combination for heating and safety performance by a nationally recognized testing agency.

3280.714(a)(5)

Cooling or heat pump indoor coils and outdoor sections shall be certified, listed and rated in combination for capacity and efficiency by a nationally recognized testing agency(ies). Rating procedures shall be based on U.S. Department of Energy test procedures.

3280.714(b)

Installation and instructions.

3280.714(b)(1)

The installation of each appliance shall conform to the terms of its listing as specified on the appliance and in the manufacturer's instructions. The installer shall include the manufacturer's installation instructions in the manufactured home. Appliances shall be secured in place to avoid displacement and movement from vibration and road shock.

3280.714(b)(2)

Operating instructions shall be provided with the appliance.

3280.714(c)

Fuel-burning air conditioners shall also comply with §3280.707.

3280.714(d)

The appliance rating plate shall be so located that it is easily readable when the appliance is properly installed.

3280.714(e)

Every installed appliance shall be accessible for inspection, service, repair and replacement without removing permanent construction.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 58 FR 55018, Oct. 25, 1993]

§3280.715 Circulating air systems.

3280.715(a)

Supply system.

3280.715(a)(1)

Supply ducts and any dampers contained therein shall be made from galvanized steel, tin-plated steel, or aluminum, or shall be listed Class 0, Class 1, or Class 2 air ducts. Class 2 air ducts shall be located at least 3 feet from the furnace bonnet or plenum. A duct system integral with the structure shall be of durable construction that can be demonstrated to be equally resistant to fire and deterioration. Ducts constructed from sheet metal shall be in accordance with the following table:

MINIMUM METAL THICKNESS FOR DUCTS¹

Duct type	Diameter 14 in. or less	Width over 14 in.
Round	0.013	0.016
Enclosed rectangular013	.016
Exposed rectangular016	.019

¹When "nominal" thicknesses are specified, 0.003 in. shall be added to these

3280.715(a)(2)

Sizing of ducts for heating.

3280.715(a)(2)(i)

Ducts shall be so designed that when a labeled forced-air furnace is installed and operated continuously at its normal heating air circulating rate in the manufactured home, with all registers in the full open position, the static pressure measured in the casing shall not exceed 90% of that shown on the label of the appliance. For upflow furnaces the static pressure shall be taken in the duct plenum. For external heating or combination heating/cooling appliances the static pressure shall be taken at the point used by the agency listing or certifying the appliance.

3280.715(a)(2)(ii)

When an evaporator-coil specifically designed for the particular furnace is installed between the furnace and the duct plenum, the total static pressure shall be measured downstream of the coil in accordance with the appliance label and shall not exceed 90 percent of that shown on the label of the appliance.

3280.715(a)(2)(iii)

When any other listed air-cooler coil is installed between the furnace and the duct plenum, the total static pressure shall be measured between the furnace and the coil and it shall not exceed 90 percent of that shown on the label of the furnace.

3280.715(a)(2)(iv)

The minimum dimension of any branch duct shall be at least 1½ inches, and of any main duct, 2½ inches.

3280.715(a)(3)

Sizing of ducts.

3280.715(a)(3)(i)

The manufactured home manufacturer shall certify the capacity of the air cooling supply duct system for the maximum allowable output of ARI certified central air conditioning systems. The certification shall be at operating static pressure of 0.3 inches of water or greater. (See §3280.511).

3280.715(a)(3)(ii)

The refrigerated air cooling supply duct system including registers must be capable of handling at least 300 cfm per 10,000 btuh with a static pressure no greater than 0.3 inches of water when measured at room temperature. In the case of application of external self contained comfort cooling appliances or the cooling mode of combination heating/cooling appliances, either the external ducts between the appliance and the manufactured home supply system shall be considered part of, and shall comply with the requirements for the refrigerated air cooling supply duct system, or the connecting duct between the external appliance and the mobile supply duct system shall be a part of the listed appliance. The minimum dimension of any branch duct shall be at least 1½ inches, and of any main duct, 2½ inches.

3280.715(a)(4) Airtightness of supply duct systems. A supply duct system shall be considered substantially airtight when the static pressure in the duct system, with all registers sealed and with the furnace air circulator at high speed, is at least 80 percent of the static pressure measured in the furnace casing, with its outlets sealed and the furnace air circulator operating at high speed. For the purpose of this paragraph and §3280.715(b) pressures shall be measured with a water manometer or equivalent device calibrated to read in increments not greater than 1/10 inch water column.

3280.715(a)(5)

Expandable or multiple manufactured home connections.

3280.715(a)(5)(i)

An expandable or multiple manufactured home may have ducts of the heating system installed in the various units. The points of connection must be so designed and constructed that when the manufactured home is fully expanded or coupled, the resulting duct joint will conform to the

requirements of this part.

3280.715(a)(5)(ii)

Installation instructions for supporting the crossover duct from the manufactured home shall be provided for onsite installation. The duct shall not be in contact with the ground.

3280.715(a)(6)

Air supply ducts shall be insulated with material having an effective thermal resistance (R) of not less than 4.0 unless they are within manufactured home insulation having a minimum effective value of R094.0 for floors or R-6.0 for ceilings.

3280.715(a)(7)

Supply and return ducts exposed directly to outside air, such as under chassis crossover ducts or ducts connecting external heating, cooling or combination heating/cooling appliances shall be insulated with material having a minimum thermal resistance of R=4.0, with a continuous vapor barrier having a perm rating of not more than 1 perm. Where exposed underneath the manufactured home, all such ducts shall comply with §3280.715(a)(5)(ii).

3280.715(b)

Return air systems--

3280.715(b)(1)

Return air openings. Provisions shall be made to permit the return of circulating air from all rooms and living spaces, except toilet room(s), to the circulating air supply inlet of the furnace.

3280.715(b)(2)

Duct material. Return ducts and any diverting dampers contained therein shall be in accordance with the following:

3280.715(b)(2)(i)

Portions of return ducts directly above the heating surfaces, or closer than 2 feet from the outer jacket or casing of the furnace shall be constructed of metal in accordance with §3280.715(a)(1) or shall be listed Class 0 or Class 1 air ducts.

3280.715(b)(2)(ii)

Return ducts, except as required by paragraph (a) of this section, shall be constructed of one-inch (nominal) wood boards (flame spread classification of not more than 200), other suitable material no more flammable than one-inch board or in accordance with §3280.715(a)(1).

3280.715(b)(2)(iii)

The interior of combustible ducts shall be lined with noncombustible material at points where there might

be danger from incandescent particles dropped through the register or furnace such as directly under floor registers and the bottom return.

3280.715(b)(2)(iv)

Factory made air ducts used for connecting external heating, cooling or combination heating/cooling appliances to the supply system and return air system of a manufactured home shall be listed by a nationally recognized testing agency. Ducts applied to external heating appliances or combination heating/cooling appliances supply system outlets shall be constructed of metal in accordance with §3280.715(a)(1) or shall be listed Class 0 or Class 1 air ducts for those portions of the duct closer than 2 feet from the outer casing of the appliance.

3280.715(b)(2)(v)

Ducts applied to external appliances shall be resistant to deteriorating environmental effects, including but not limited to ultraviolet rays, cold weather, or moisture and shall be resistant to insects and rodents.

3280.715(b)(3)

Sizing. The cross-sectional areas of the return air duct shall not be less than 2 square inches for each 1,000 Btu per hour input rating of the appliance. Dampers shall not be placed in a combination fresh air intake and return air duct so arranged that the required cross-sectional area will not be reduced at all possible positions of the damper.

3280.715(b)(4)

Permanent uncloseable openings. Living areas not served by return air ducts or closed off from the return opening of the furnace by doors, sliding partitions, or other means shall be provided with permanent uncloseable openings in the doors or separating partitions to allow circulated air to return to the furnace. Such openings may be grilled or louvered. The net free area of each opening shall be not less than 1 square inch for every 5 square feet of total living area closed off from the furnace by the door or partition serviced by that opening. Undercutting doors connecting the closed-off space may be used as a means of providing return air area. However, in the event that doors are undercut, they shall be undercut a minimum of 2 inches and not more than 2½ inches, as measured from the top surface of the floor decking to the bottom of the door and no more than one half of the free air area so provided shall be counted as return air area.

3280.715(c)

Joints and seams. Joints and seams of ducts shall be securely fastened and made substantially airtight. Slip joints shall have a lap of at least 1 inch and shall be individually fastened. Tape or caulking compound may be used for sealing mechanically secure joints. Where used, tape or caulking compound shall not be subject to deterioration under long exposures to temperatures up to 200°F. and to conditions of high humidity, excessive moisture, or mildew.

3280.715(d)

Supports. Ducts shall be securely supported.

3280.715(e)

Registers or grilles. Fittings connecting the registers or grilles to the duct system shall be constructed of metal or material which complies with the requirements of Class 1 or 2 ducts under UL 181--Sixth Edition--1984, Factory Made Air Ducts and Connectors. Air supply terminal devices (registers) when installed in kitchens, bedrooms, and bathrooms shall be equipped with adjustable closeable dampers. Registers or grilles shall be constructed of metal or conform with the following:

3280.715(e)(1)

Be made of a material classified 94V-0 or 94V-1 when tested as described in Underwriters' Laboratories, Inc., Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94-Fourth Edition-1991.

3280.715(e)(2)

Floor registers or grilles shall resist without structural failure a 200 lb. concentrated load on a 2-inch diameter disc applied to the most critical area of the exposed face of the register or grille. For this test the register or grille is to be at a temperature of not less than 165° F and is to be supported in accordance with the manufacturer's instructions.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 52 FR 4589, Feb. 12, 1987; 58 FR 55019, Oct. 25, 1993]

Subpart I--Electrical Systems

§3280.801 Scope.

3280.801(a)

Subpart I of this standard and part A of Article 550 of the National Electrical Code (NFPA No. 70-1993) cover the electrical conductors and equipment installed within or on manufactured homes and the conductors that connect manufactured homes to a supply of electricity.

3280.801(b)

In addition to the requirements of this standard and Article 550 of the National Electrical Code (NFPA No. 70-1993) the applicable portions of other Articles of the National Electrical Code shall be followed covering electrical installations in manufactured homes. Wherever the requirements of this standard differ from the National Electrical Code, this standard shall apply.

3280.801(c)

The provisions of this standard apply to manufactured homes intended for connection to a wiring system nominally rated 120/240 volts, 3-wire AC, with grounded neutral.

3280.801(d)

All electrical materials, devices, appliances, fittings and other equipment shall be listed or labeled by a nationally recognized testing agency and shall be connected in an approved manner when in service.

3280.801(e)

Aluminum conductors, aluminum alloy conductors, and aluminum core conductors such as copper clad aluminum; are not acceptable for use in branch circuit wiring in manufactured homes.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 58 FR 55019, Oct. 25, 1993]

§3280.802 Definitions.

3280.802(a)

The following definitions are applicable to subpart I only.

3280.802(a)(1)

Accessible

3280.802(a)(1)(i)

(As applied to equipment) means admitting close approach because not guarded by locked doors, elevation, or other effective means. (See readily accessible.)

3280.802(a)(1)(ii)

(As applied to wiring methods) means capable of being removed or exposed without damaging the manufactured home structure or finish, or not permanently closed-in by the structure or finish of the manufactured home (see concealed and exposed).

3280.802(a)(2)

Air conditioning or comfort cooling equipment means all of that equipment intended or installed for the purpose of processing the treatment of air so as to control simultaneously its temperature, humidity, cleanliness, and distribution to meet the requirements of the conditioned space.

3280.802(a)(3)

3280.802(a)(3)(i)

Appliance means utilization equipment, generally other than industrial, normally built in standardized sizes or types, which is installed or connected as a unit to perform one or more functions, such as clothes washing, air conditioning, food mixing, deep frying, etc.

3280.802(a)(3)(ii)

Appliance, fixed means an appliance which is fastened or otherwise secured at a specific location.

3280.802(a)(3)(iii)

Appliance, portable means an appliance which is actually moved or can easily be moved from one place to another in normal use. For the purpose of this Standard, the following major appliances are considered portable if cord-connected: refrigerators, clothes washers, dishwashers without booster heaters, or other similar appliances.

3280.802(a)(3)(iv)

Appliance, stationary means an appliance which is not easily moved from one place to another in normal use.

3280.802(a)(4)

Attachment plug (plug cap) (cap) means a device which, by insertion in a receptacle, establishes connection between the conductors of the attached flexible cord and the conductors connected permanently to the receptacle.

3280.802(a)(5)

Bonding means the permanent joining of metallic parts to form an electrically conductive path which will assure electrical continuity and the capacity to conduct safely any current likely to be imposed.

3280.802(a)(6)

Branch circuit

3280.802(a)(6)(i)

means the circuit conductors between the final overcurrent device protecting the circuit and the outlet(s). A device not approved for branch circuit protection, such as a thermal cutout or motor overload protective device, is not considered as the overcurrent device protecting the circuit.

3280.802(a)(6)(ii)

Branch circuit--appliance means a branch circuit supplying energy to one or more outlets to which appliances are to be connected, such circuits to have no permanently connected lighting fixtures not a part of an appliance.

3280.802(a)(6)(iii)

Branch circuit--general purpose means a circuit that supplies a number of outlets for lighting and appliances.

3280.802(a)(6)(iv)

Branch circuit--individual means a branch circuit that supplies only one utilization equipment.

3280.802(a)(7)

Cabinet means an enclosure designed either for surface or flush mounting, and provided with a frame, mat, or trim in which swinging doors are hung.

3280.802(a)(8)

Circuit breaker means a device designed to open and close a circuit by nonautomatic means, and to open the circuit automatically on a predetermined overload of current without injury to itself when properly applied within its rating.

3280.802(a)(9)

Concealed means rendered inaccessible by the structure or finish of the manufactured home. Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them. (See accessible (As applied to wiring methods))

3280.802(a)(10)

Connector, pressure (solderless) means a device that establishes a connection between two or more conductors or between one or more conductors and a terminal by means of mechanical pressure and without the use of solder.

3280.802(a)(11)

Dead front (as applied to switches, circuit-breakers, switchboards, and distribution panelboard) means so designed, constructed, and installed that no current-carrying parts are normally exposed on

the front.

3280.802(a)(12)

Demand factor means the ratio of the maximum demand of a system, or part of a system, to the total connected load of a system or the part of the system under consideration.

3280.802(a)(13)

Device means a unit of an electrical system that is intended to carry but not utilize electrical energy.

3280.802(a)(14)

Disconnecting means means a device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.

3280.802(a)(15)

Distribution panelboard means a single panel or a group of panel units designed for assembly in the form of a single panel, including buses, and with or without switches or automatic overcurrent protective devices or both, for the control of light, heat, or power circuits of small individual as well as aggregate capacity; designed to be placed in a cabinet placed in or against a wall or partition and accessible only from the front.

3280.802(a)(16)

Enclosed means surrounded by a case that will prevent a person from accidentally contacting live parts.

3280.802(a)(17)

Equipment means a general term, including material, fittings, devices, appliances, fixtures, apparatus, and the like used as a part of, or in connection with, an electrical installation.

3280.802(a)(18)

Exposed

3280.802(a)(18)(i)

(As applied to live parts) means capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts not suitably guarded, isolated, or insulated. (See accessible and concealed.)

3280.802(a)(18)(ii)

(As applied to wiring method) means on or attached to the surface or behind panels designed to allow access. (See Accessible (As Applied to Wiring Methods))

3280.802(a)(19)

Externally operable means capable of being operated without exposing the operator to contact with live parts.

3280.802(a)(20)

Feeder assembly means the overhead or under-chassis feeder conductors, including the grounding conductor, together with the necessary fittings and equipment, or a power supply cord approved for manufactured home use, designed for the purpose of delivering energy from the source of electrical supply to the distribution panelboard within the manufactured home.

3280.802(a)(21)

Fitting means an accessory, such as a locknut, bushing, or other part of a wiring system, that is intended primarily to perform a mechanical rather than an electrical function.

3280.802(a)(22)

Ground means a conducting connection, whether intentional or accidental, between an electrical circuit or equipment and earth, or to some conducting body that serves in place of the earth.

3280.802(a)(23)

Grounded means connected to earth or to some conducting body that serves in place of the earth.

3280.802(a)(24)

Grounded conductor means a system or circuit conductor that is intentionally grounded.

3280.802(a)(25)

Grounding conductor means a conductor used to connect equipment or the grounded circuit of a wiring system to a grounding electrode or electrodes.

3280.802(a)(26)

Guarded means covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats or platforms to remove the likelihood of approach or contact by persons or objects to a point of danger.

3280.802(a)(27)

Isolated means not readily accessible to persons unless special means for access are used.

3280.802(a)(28)

Laundry area means an area containing or designed to contain either a laundry tray, clothes washer and/or clothes dryer.

3280.802(a)(29)

Lighting outlet means an outlet intended for the direct connection of a lampholder, a lighting fixture, or

a pendant cord terminating in a lampholder.

3280.802(a)(30)

Manufactured home accessory building or structure means any awning, cabana, ramada, storage cabinet, carport, fence, windbreak or porch established for the use of the occupant of the manufactured home upon a manufactured home lot.

3280.802(a)(31)

Manufactured home service equipment means the equipment containing the disconnecting means, overcurrent protective devices, and receptacles or other means for connecting a manufactured home feeder assembly.

3280.802(a)(32)

Outlet means a point on the wiring system at which current is taken to supply utilization equipment.

3280.802(a)(33)

Panelboard means a single panel or group of panel units designed for assembly in the form of a single panel; including buses, automatic overcurrent protective devices, and with or without switches for the control of light, heat, or power circuits; designed to be placed in a cabinet or cutout box placed in or against a wall or partition and accessible only from the front.

3280.802(a)(34)

Raceway means any channel for holding wires, cables, or busbars that is designed expressly for, and used solely for, this purpose. Raceways may be of metal or insulating material, and the term includes rigid metal conduit, rigid nonmetallic conduit, flexible metal conduit, electrical metallic tubing, underfloor raceways, cellular concrete floor raceways, cellular metal floor raceways, surface raceways, structural raceways, wireways, and busways.

3280.802(a)(35)

Raintight means so constructed or protected that exposure to a beating rain will not result in the entrance of water.

3280.802(a)(36)

Readily accessible means capable of being reached quickly for operation, renewal, or inspection, without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders, chairs, etc. (See Accessible.)

3280.802(a)(37)

Receptacle means a contact device installed at an outlet for the connection of a single attachment plug. A single receptacle is a single contact device with no other contact device on the same yoke. A multiple

receptacle is a single device containing two or more receptacles.

3280.802(a)(38)

Receptacle outlet means an outlet where one or more receptacles are installed.

3280.802(a)(39)

Utilization equipment means equipment which utilizes electric energy for mechanical, chemical, heating, lighting, or similar purposes.

3280.802(a)(40)

Voltage (of a circuit) means the greatest root-mean-square (effective) difference of potential between any two conductors of the circuit concerned. Some systems, such as 3-phase 4-wire, single-phase 3-wire, and 3-wire direct-current may have various circuits of various voltages.

3280.802(a)(41)

Weatherproof means so constructed or protected that exposure to the weather will not interfere with successful operation. Rainproof, raintight, or watertight equipment can fulfill the requirements for weatherproof where varying weather conditions other than wetness, such as snow, ice, dust, or temperature extremes, are not a factor.

§3280.803 Power supply.

3280.803(a)

The power supply to the manufactured home shall be a feeder assembly consisting of not more than one listed 50 ampere manufactured home power-supply cords, or a permanently installed circuit. A manufactured home that is factory-equipped with gas or oil-fired central heating equipment and cooking appliances shall be permitted to be provided with a listed manufactured home power-supply cord rated 40 amperes.

3280.803(b)

If the manufactured home has a power-supply cord, it shall be permanently attached to the distribution panelboard or to a junction box permanently connected to the distribution panelboard, with the free end terminating in an attachment plug cap.

3280.803(c)

Cords with adapters and pigtail ends, extension cords, and similar items shall not be attached to, or shipped with, a manufactured home.

3280.803(d)

A listed clamp or the equivalent shall be provided at the distribution panelboard knockout to afford strain relief for the cord to prevent strain from being transmitted to the terminals when the power-supply cord is handled in its intended manner.

3280.803(e)

The cord shall be of an approved type with four conductors, one of which shall be identified by a continuous green color or a continuous green color with one or more yellow stripes for use as the grounding conductor.

3280.803(f)

The attachment plug cap shall be a 3-pole, 4-wire grounding type, rated 50 amperes, 125/250 volts with a configuration as shown herein and intended for use with the 50-ampere, 125/250 receptacle configuration shown. It shall be molded of butyl rubber, neoprene, or other approved materials which have been found suitable for the purpose, and shall be molded to the flexible cord so that it adheres tightly to the cord at the point where the cord enters the attachment-plug cap. If a right-angle cap is used, the configuration shall be so oriented that the grounding member is farthest from the cord.

3280.803(g)

The overall length of a power-supply cord, measured from the end of the cord, including bared leads, to the face of the attachment-plug cap shall not be less than 21 feet and shall not exceed 36½ feet. The length of cord from the face of the attachment-plug cap to the point where the cord enters the manufactured home shall not be less than 20 feet.

INSERT DRAWINGS FROM PAGE 304 HERE

50-ampere 125/250 volt receptacle and attachment-plug-cap configurations, 3 pole, 4-wire grounding types used for manufactured home supply cords and manufactured home parks. Complete details of the 50-ampere cap and receptacle can be found in the American National Standard Dimensions of Caps, Plugs and Receptacles, Grounding Type (ANSI C73.17--1972).

3280.803(h)

The power supply cord shall bear the following marking: “For use with manufactured homes--40 amperes” or “For use with manufactured homes--50 amperes.”

3280.803(i)

Where the cord passes through walls or floors, it shall be protected by means of conduit and bushings or equivalent. The cord may be installed within the manufactured home walls, provided a continuous raceway is installed from the branch-circuit panelboard to the underside of the manufactured home

floor. The raceway may be rigid conduit, electrical metallic tubing or polyethylene (PE), poly-vinylchloride (PVC) or acrylonitrile-butadiene-styrene (ABS) plastic tubing having a minimum wall thickness of nominal _ inch.

3280.803(j)

Permanent provisions shall be made for the protection of the attachment-plug cap of the power supply cord and any connector cord assembly or receptacle against corrosion and mechanical damage if such devices are in an exterior location while the manufactured home is in transit.

3280.803(k)

Where the calculated load exceeds 50 amperes or where a permanent feeder is used, the supply shall be by means of:

3280.803(k)(1)

One mast weatherhead installation installed in accordance with Article 230 of the National Electrical Code NFPA No. 70-1993 containing four continuous insulated, color-coded, feeder conductors, one of which shall be an equipment grounding conductor; or

3280.803(k)(2)

An approved raceway from the disconnecting means in the manufactured home to the underside of the manufactured home with provisions for the attachment of a suitable junction box or fitting to the raceway on the underside of the manufactured home. The manufacturer shall provide in his written installation instructions, the proper feeder conductor sizes for the raceway and the size of the junction box to be used; or

3280.803(k)(3)

Service equipment installed on the manufactured home in accordance with Article 230 of the National Electrical Code NFPA No. 70-1993; and

3280.803(k)(3)(i)

The installation shall be completed by the manufacturer except for the service connections, the meter and the grounding electrode conductor;

3280.803(k)(3)(ii)

Exterior equipment, or the enclosure in which it is installed shall be weatherproof and installed in accordance with Article 373-2 of the National Electrical Code NFPA No. 70-1993. Conductors shall be suitable for use in wet locations;

3280.803(k)(3)(iii)

The neutral conductor shall be connected to the system grounding conductor on the supply side of the main disconnect in accordance with Articles 250-23, 25, and 53 of NFPA No. 70-1993.

3280.803(k)(3)(iv)

The manufacturer shall include in its written installation instructions one method of grounding the service equipment at the installation site;

3280.803(k)(3)(v)

The minimum size grounding electrode conductor shall be specified in the instructions; and

3280.803(k)(3)(vi)

A red "Warning" label shall be mounted on or adjacent to the service equipment. The label shall state: Warning--do not provide electrical power until the grounding electrode is installed and connected (see installation instructions).

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 52 FR 4589, Feb. 12, 1987; 58 FR 55019, Oct. 25, 1993]

§3280.804 Disconnecting means and branch-circuit protective equipment.

3280.804(a) The branch-circuit equipment shall be permitted to be combined with the disconnecting means as a single assembly. Such a combination shall be permitted to be designated as a distribution panelboard. If a fused distribution panelboard is used, the maximum fuse size of the mains shall be plainly marked with lettering at least ¼ inch high and visible when fuses are changed. See section 110-22 of the National Electrical Code (NFPA No. 70-1993) concerning identification of each disconnecting means and each service, feeder, or branch circuit at the point where it originated and the type marking needed.

3280.804(b)

Plug fuses and fuseholders shall be tamper-resistant, Type "S," enclosed in dead-front fuse panelboards. Electrical distribution panels containing circuit breakers shall also be dead-front type.

3280.804(c)

Disconnecting means. A single disconnecting means shall be provided in each manufactured home consisting of a circuit breaker, or a switch and fuses and their accessories installed in a readily accessible location near the point of entrance of the supply cord or conductors into the manufactured home. The main circuit breakers or fuses shall be plainly marked "Main." This equipment shall contain a solderless type of grounding connector or bar for the purposes of grounding with sufficient terminals for all grounding conductors. The neutral bar termination of the grounded circuit conductors shall be insulated.

3280.804(d)

The disconnecting equipment shall have a rating suitable for the connected load. The distribution equipment, either circuit breaker or fused type, shall be located a minimum of 24 inches from the bottom of such equipment to the floor level of the manufactured home.

3280.804(e)

A distribution panelboard employing a main circuit breaker shall be rated 50 amperes and employ a 2-pole circuit breaker rated 40 amperes for a 40-ampere supply cord, or 50 amperes for a 50-ampere supply cord. A distribution panelboard employing a disconnect switch and fuses shall be rated 60 amperes and shall employ a single 2-pole, 60-ampere fuseholder with 40- or 50-ampere main fuses for 40- or 50-ampere supply cords, respectively. The outside of the distribution panelboard shall be plainly marked with the fuse size.

3280.804(f)

The distribution panelboard shall not be located in a bathroom, or in any other inaccessible location, but shall be permitted just inside a closet entry if the location is such that a clear space of 6 inches to easily ignitable materials is maintained in front of the distribution panelboard, and the distribution panelboard door can be extended to its full open position (at least 90 degrees). A clear working space at least 30 inches wide and 30 inches in front of the distribution panelboard shall be provided. This space shall extend from floor to the top of the distribution panelboard.

3280.804(g)

Branch-circuit distribution equipment shall be installed in each manufactured home and shall include overcurrent protection for each branch circuit consisting of either circuit breakers or fuses.

3280.804(g)(1)

The branch circuit overcurrent devices shall be rated:

3280.804(g)(1)(i)

Not more than the circuit conductors; and

3280.804(g)(1)(ii)

Not more than 150 percent of the rating of a single appliance rated 13.3 amperes or more which is supplied by an individual branch circuit; but

3280.804(g)(1)(iii)

Not more than the fuse size marked on the air conditioner or other motor-operated appliance.

3280.804(h)

A 15-ampere multiple receptacle shall be acceptable when connected to a 20-ampere laundry circuit.

3280.804(i)

When circuit breakers are provided for branch-circuit protection 240 circuits shall be protected by 2-pole common or companion trip, or handle-tied paired circuit breakers.

3280.804(j)

A 3 inch by 1-3/4 inch minimum size tag made of etched, metal-stamped or embossed brass, stainless steel, anodized or alclad aluminum not less than 0.020 inch thick, or other approval material (e.g., 0.005 inch plastic laminates) shall be permanently affixed on the outside adjacent to the feeder assembly entrance and shall read: This connection for 120/240 Volt, 3-Pole, 4-Wire, 60 Hertz, _____ Ampere Supply. The correct ampere rating shall be marked on the blank space.

3280.804(k)

When a home is provided with installed service equipment, a single disconnecting means for disconnecting the branch circuit conductors from the service entrance conductors shall be provided in accordance with Part F of Article 230 of the National Electrical Code, NFPA No. 70-1993. The disconnecting means shall be listed for use as service equipment. The disconnecting means may be combined with the disconnect required by §3280.804(c). The disconnecting means shall be rated not more than the ampere supply or service capacity indicated on the tag required by paragraph (l) of this section.

3280.804(l)

When a home is provided with installed service equipment, the electrical nameplate required by §3280.804(j) shall read: "This connection for 120/240 volt, 3 pole, 3 wire, 60 Hertz, _____ Ampere Supply." The correct ampere rating shall be marked in the blank space.

[40 FR 58752, Dec. 18, 1975, as amended at 42 FR 961, Jan. 4, 1977. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 52 FR 4589, Feb. 12, 1987; 58 FR 55019, Oct. 25, 1993]

§3280.805 Branch circuits required.

3280.805(a)

The number of branch circuits required shall be determined in accordance with the following:

3280.805(a)(1)

Lighting, based on 3 volt-amperes per square foot times outside dimensions of the manufactured home (coupler excluded) divided by 120 volts times amperes to determine number of 15 or 20 ampere lighting area circuits. e.g. $[3 \times \text{length} \times \text{width} - [120 \times (15 \text{ or } 20)] = \text{number of 15 or 20 ampere circuits}$.

3280.805(a)(2)

Small appliances. For the small appliance load in kitchen, pantry dining room and breakfast rooms of

manufactured homes, two or more 20-ampere appliance branch circuits, in addition to the branch circuit specified in §3280.805(a)(1), shall be provided for all receptacle outlets in these rooms, and such circuits shall have no other outlets. Receptacle outlets supplied by at least two appliance receptacle branch circuits shall be installed in the kitchen.

3280.805(a)(3)

General appliances (Including furnace, water heater, range, and central or room air conditioner, etc.). There shall be one or more circuits of adequate rating in accordance with the following:

3280.805(a)(3)(i)

Ampere rating of fixed appliances not over 50 percent of circuit rating if lighting outlets (receptacles, other than kitchen, dining area, and laundry, considered as lighting outlets) are on same circuit;

3280.805(a)(3)(ii)

For fixed appliances on a circuit without lighting outlets, the sum of rated amperes shall not exceed the branch-circuit rating. Motor loads or other continuous duty loads shall not exceed 80 percent of the branch circuit rating.

3280.805(a)(3)(iii)

The rating of a single cord and plug connected appliances on a circuit having no other outlets, shall not exceed 80 percent of the circuit rating.

3280.805(a)(3)(iv)

The rating of range branch circuit shall be based on the range demand as specified or ranges in §3280.811, Item B(5) of Method 1. For central air conditioning, see Article 440 of the National

3280.805(a)(3)(v)

Where a laundry area is provided, a 20 ampere branch circuit shall be provided to supply laundry receptacle outlets. This circuit shall have no other outlets. See §3280.806(a)(7).

3280.805(b)

[Reserved]

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 58 FR 55020, Oct. 25, 1993]

§3280.806 Receptacle outlets.

3280.806(a)

All receptacle outlets shall be:

3280.806(a)(1)

Of grounding type;

3280.806(a)(2)

Installed according to section 210-7 of the National Electrical Code (NFPA No. 70-1993).

3280.806(a)(3)

Except when supplying specific appliances, be parallel-blade, 15-ampere, 125-volt, either single or duplex.

3280.806(b)

All 120 volt single phase, 15 and 20 ampere receptacle outlets, including receptacles in light fixtures, installed outdoors, in compartments accessible from the outdoors, in bathrooms, and within 6 feet of a kitchen sink to serve counter top surfaces shall have ground-fault circuit protection for personnel. Feeders supplying branch circuits may be protected by a ground-fault circuit-interrupter in lieu of the provision for such interrupters specified above. Receptacles dedicated for washer and dryers, also located in a bathroom, are exempt from this requirement.

3280.806(c)

There shall be an outlet of the grounding type for each cord-connected fixed appliance installed.

3280.806(d)

Receptacle outlets required. Except in the bath and hall areas, receptacle outlets shall be installed at wall spaces 2 feet wide or more, so that no point along the floor line is more than 6 feet, measured horizontally, from an outlet in that space. In addition, a receptacle outlet shall be installed:

3280.806(d)(1)

Over or adjacent to counter tops in the kitchen (at least one on each side of the sink if counter tops are on each side and 12 inches or over in width).

3280.806(d)(2)

Adjacent to the refrigerator and free-standing gas-range space. A duplex receptacle may serve as the outlet for a countertop and a refrigerator.

3280.806(d)(3)

At counter top spaces for built-in vanities.

3280.806(d)(4)

At counter top spaces under wall-mounted cabinets.

3280.806(d)(5)

In the wall, at the nearest point where a bar type counter attaches to the wall.

3280.806(d)(6)

In the wall at the nearest point where a fixed room divider attaches to the wall.

3280.806(d)(7)

In laundry areas within 6 feet of the intended location of the appliance(s).

3280.806(d)(8)

At least one receptacle outlet shall be installed outdoors.

3280.806(d)(9)

Adjacent to bathroom basins or integral with the light fixture over the bathroom basin.

3280.806(d)(10)

Receptacle outlets are not required in the following locations:

3280.806(d)(10)(i)

wall space occupied by built-in kitchen or wardrobe cabinets,

3280.806(d)(10)(ii)

wall space behind doors which may be opened fully against a wall surface,

3280.806(d)(10)(iii)

room dividers of the lattice type, less than 8 feet long, not solid within 6 inches of the floor,

3280.806(d)(10)(iv)

wall space afforded by bar type counters.

3280.806(e)

Receptacle outlets shall not be installed in or within reach (30 inches) of a shower or bathtub space.

3280.806(f)

Receptacle outlets shall not be installed above electric baseboard heaters.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 58 FR 55020, Oct. 25, 1993]

§3280.807 Fixtures and appliances.

3280.807(a)

Electrical materials, devices, appliances, fittings, and other equipment installed, intended for use in, or attached to the manufactured home shall be approved for the application and shall be connected in an approved manner when in service. Facilities shall be provided to securely fasten appliances when the manufactured home is in transit. (See §3280.809.)

3280.807(b)

Specifically listed pendant-type fixtures or pendant cords shall be permitted in manufactured homes.

3280.807(c)

If a lighting fixture is provided over a bathtub or in a shower stall, it shall be of the enclosed and gasketed type, listed for wet locations. See also Article 410-4(d) of the National Electrical Code NFPA No. 70-1993.

3280.807(d)

The switch for shower lighting fixtures and exhaust fans located over a tub or in a shower stall shall be located outside the tub shower space. (See §3280.806(e).)

3280.807(e)

Any combustible wall or ceiling finish exposed between the edge of a fixture canopy, or pan and an outlet box shall be covered with non-combustible or limited combustible material.

3280.807(f)

Every appliance shall be accessible for inspection, service, repair, or replacement without removal of permanent construction.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 52 FR 35543, Sept. 22, 1987; 58 FR 55020, Oct. 25, 1993]

§3280.808 Wiring methods and materials.

§3280.808(a)

Except as specifically limited in this part, the wiring methods and materials specified in the National Electrical Code (NFPA No. 70-1993) shall be used in manufactured homes.

§3280.808(b)

Nonmetallic outlet boxes shall be acceptable only with nonmetallic cable.

§3280.808(c)

Nonmetallic cable located 15 inches or less above the floor, if exposed, shall be protected from physical damage by covering boards, guard strips, or conduit. Cable likely to be damaged by stowage shall be so protected in all cases.

§3280.808(d)

Nonmetallic sheathed cable shall be secured by staples, straps, or similar fittings so designed and installed as not to injure any cable. Cable shall be secured in place at intervals not exceeding 4½ feet and within 12 inches from every cabinet, box or fitting.

§3280.808(e)

Metal-clad and nonmetallic cables shall be permitted to pass through the centers of the wide side of 2-inch by 4-inch studs. However, they shall be protected where they pass through 2-inch by 2-inch studs or at other studs or frames where the cable or armor would be less than 1½ inches from the inside or outside surface of the studs when the wall covering materials are in contact with the studs. Steel plates on each side of the cable, or a tube, with not less than No. 16 MSG wall thickness shall be required to protect the cable. These plates or tubes shall be securely held in place.

§3280.808(f)

Where metallic faceplates are used they shall be effectively grounded.

§3280.808(g)

If the range, clothes dryer, or similar appliance is connected by metalclad cable or flexible conduit, a length of not less than three feet of free cable or conduit shall be provided to permit moving the appliance. Type NM or Type SE cable shall not be used to connect a range or a dryer. This shall not prohibit the use of Type NM or Type SE cable between the branch circuit overcurrent protective device and a junction box or range or dryer receptacle.

§3280.808(h)

Threaded rigid metal conduit shall be provided with a locknut inside and outside the box, and a conduit bushing shall be used on the inside. Rigid nonmetallic conduit shall be permitted. Inside ends of the conduit shall be reamed.

§3280.808(i)

Switches shall be rated as follows:

3280.808(i)(1)

For lighting circuits, switches, shall have a 10-ampere, 120-125 volt rating; or higher if needed for the connected load.

3280.808(i)(2)

For motors or other loads, switches shall have ampere or horsepower ratings, or both, adequate for

loads controlled. (An “AC general-use” snap switch shall be permitted to control a motor 2 horsepower or less with full-load current not over 80 percent of the switch ampere rating).

3280.808(j)

At least 4 inches of free conductor shall be left at each outlet box except where conductors are intended to loop without joints.

3280.808(k)

When outdoor or under-chassis line-voltage wiring is exposed to moisture or physical damage, it shall be protected by rigid metal conduit. The conductors shall be suitable for wet locations. Electrical metallic tubing may be used when closely routed against frames, and equipment enclosures.

3280.808(l)

The cables or conductors shall be Type NMC, TW, or equivalent.

3280.808(m)

Outlet boxes of dimensions less than those required in Table 370-6(a) of the National Electrical Code (NFPA No. 70-1993) shall be permitted provided the box has been tested and approved for the purpose.

3280.808(n)

Boxes, fittings, and cabinets shall be securely fastened in place, and shall be supported from a structural member of the home, either directly or by using a substantial brace. Snap-in type boxes provided with special wall or ceiling brackets that securely fasten boxes in walls or ceilings shall be permitted.

3280.808(o)

Outlet boxes shall fit closely to openings in combustible walls and ceilings, and they shall be flush with such surfaces.

3280.808(p)

Appliances having branch-circuit terminal connections which operate at temperatures higher than 60° C (140° F) shall have circuit conductors as described in paragraphs (p) (1) and (2) of this section:

3280.808(p)(1)

Branch-circuit conductors having an insulation suitable for the temperature encountered shall be permitted to run directly to the appliance.

3280.808(p)(2)

Conductors having an insulation suitable for the temperature encountered shall be run from the appliance terminal connections to a readily accessible outlet box placed at least one foot from the appliance. These conductors shall be in a suitable raceway which shall extend for at least 4 feet.

3280.808(q)

A substantial brace for securing a box, fitting or cabinet shall be as described in the National Electrical Code, NFPA 70-1993 Article 370-13(d), or the brace, including the fastening mechanism to attach the brace to the home structure, shall withstand a force of 50 lbs. applied to the brace at the intended point(s) of attachment for the box in a direction perpendicular to the surface in which the box is installed.

3280.808(r)

Outlet boxes shall fit closely to the openings in combustible wall and ceilings with a maximum of a inch gap. They shall be flush with the finish surface or project therefrom.

3280.808(s)

Where the sheathing of NM cable has been cut or damaged and visual inspection reveals that the conductor and its insulation has not been damaged, it shall be permitted to repair the cable sheath with electrical tape which provides equivalent protection to the sheath.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 58 FR 55020, Oct. 25, 1993]

§3280.809 Grounding.**3280.809(a)**

General. Grounding of both electrical and nonelectrical metal parts in a manufactured home shall be through connection to a grounding bus in the manufactured home distribution panelboard. The grounding bus shall be grounded through the green-colored conductor in the supply cord or the feeder wiring to the service ground in the service-entrance equipment located adjacent to the manufactured home location. Neither the frame of the manufactured home nor the frame of any appliance shall be connected to the neutral conductor in the manufactured home.

3280.809(b)

Insulated neutral.

3280.809(b)(1)

The grounded circuit conductor (neutral) shall be insulated from the grounding conductors and from equipment enclosures and other grounded parts. The grounded (neutral) circuit terminals in the distribution panelboard and in ranges, clothes dryers, counter-mounted cooking units, and wall-mounted ovens shall be insulated from the equipment enclosure. Bonding screws, straps, or buses in the distribution panelboard or in appliances shall be removed and discarded. However, when service equipment is installed on the manufactured home, the neutral and the ground bus may be connected in the distribution panel.

3280.809(b)(2)

Connection of ranges and clothes dryers with 120/240 volt, 3-wire ratings shall be made with 4 conductor cord and 3 pole, 4-wire grounding type plugs, or by type AC metal clad conductors enclosed in flexible metal conduit. For 120 volt rated devices a 3-conductor cord and a 2-pole, 3-wire grounding type plug shall be permitted.

3280.809(c)

Equipment grounding means.

3280.809(c)(1)

The green-colored grounding wire in the supply cord or permanent feeder wiring shall be connected to the grounding bus in the distribution panelboard or disconnecting means.

3280.809(c)(2)

In the electrical system, all exposed metal parts, enclosures, frames, lamp fixture canopies, etc., shall be effectively bonded to the grounding terminal or enclosure of the distribution panelboard.

3280.809(c)(3)

Cord-connected appliances, such as washing machines, clothes dryers, refrigerators, and the electrical system of gas ranges, etc., shall be grounded by means of an approved cord with grounding conductor and grounding-type attachment plug.

3280.809(d)

Bonding of noncurrent-carrying metal parts.

3280.809(d)(1)

All exposed noncurrent-carrying metal parts that may become energized shall be effectively bonded to the grounding terminal or enclosure of the distribution panelboard. A bonding conductor shall be connected between each distribution panelboard and an accessible terminal on the chassis.

3280.809(d)(2)

Grounding terminals shall be of the solderless type and approved as pressure-terminal connectors recognized for the wire size used. Star washers or other approved paint-penetrating fitting shall be used to bond terminals to chassis or other coated areas. The bonding conductor shall be solid or stranded, insulated or bare and shall be No. 8 copper minimum, or equal. The bonding conductor shall be routed so as not to be exposed to physical damage. Protection can be afforded by the configuration of the chassis.

3280.809(d)(3)

Metallic gas, water and waste pipes and metallic air-circulating ducts shall be considered bonded if they are connected to the terminal on the chassis (see §3280.809) by clamps, solderless connectors, or by suitable grounding-type straps.

3280.809(d)(4)

Any metallic roof and exterior covering shall be considered bonded if

3280.809(d)(4)(i)

the metal panels overlap one another and are securely attached to the wood or metal frame parts by metallic fasteners, and (ii) if the lower panel of the metallic exterior covering is secured by metallic fasteners at a cross member of the chassis by two metal straps per manufactured home unit or section at opposite ends. The bonding strap material shall be a minimum of 4 inches in width of material equivalent to the skin or a material of equal or better electrical conductivity. The straps shall be fastened with paint-penetrating fittings (such as screws and star washers or equivalent).

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 58 FR 55020, Oct. 25, 1993]

§3280.810 Electrical testing.

3280.810(a)

Dielectric strength test. The wiring of each manufactured home shall be subjected to a 1-minute, 900 to 1079 volt dielectric strength test (with all switches closed) between live parts and the manufactured home ground, and neutral and the manufactured home ground. Alternatively, the test may be performed at 1080 to 1250 volts for 1 second. This test shall be performed after branch circuits are complete and after fixtures or appliances are installed. Fixtures or appliances which are listed shall not be required to withstand the dielectric strength test.

3280.810(b)

Each manufactured home shall be subject to:

3280.810(b)(1)

A continuity test to assure that metallic parts are properly bonded;

3280.810(b)(2)

Operational test to demonstrate that all equipment, except water heaters, electric furnaces, dishwashers, clothes washers/dryers, and portable appliances, is connected and in working order; and

3280.810(b)(3)

Polarity checks to determine that connections have been properly made. Visual verification shall be an acceptable check.

[58 FR 55020, Oct. 25, 1993]

§3280.811 Calculations.

3280.811(a)

The following method shall be employed in computing the supply cord and distribution-panelboard load for each feeder assembly for each manufactured home and shall be based on a 3-wire, 120/240 volt supply with 120 volt loads balanced between the two legs of the 3-wire system. The total load for determining power supply by this method is the summation of:

3280.811(a)(1)

Lighting and small appliance load as calculated below:

3280.811(a)(1)(i)

Lighting volt-amperes: Length time width of manufactured home (outside dimensions exclusive of coupler) times 3 volt-amperes per square foot; e.g. Length \times width \times 3=lighting volt-amperes.

3280.811(a)(1)(ii)

Small appliance volt-amperes: Number of circuits time 1,500 volt-amperes for each 20-ampere appliance receptacle circuit (see definition of "Appliance Portable" with Note): e.g. Number of circuits \times 1,500=small appliance volt-amperes.

3280.811(a)(1)(iii)

Total volts-amperes: Lighting volts-amperes plus small appliance=total volt-amperes.

3280.811(a)(1)(iv)

First 3,000 total volts-amperes at 100 percent plus remainder at 35 percent=watts to be divided by 240 volts to obtain current (amperes) per leg.

3280.811(a)(2)

Nameplate amperes for motors and heater loads (exhaust fans, air conditioners, electric, gas, or oil heating). Omit smaller of air conditioning and heating except include blower motor if used as air conditioner evaporator motor. When an air conditioner is not installed and a 40-ampere power supply cord is provided, allow 15 amperes per leg for air conditioning.

3280.811(a)(3)

25 percent of current of largest motor in paragraph (a)(2) of this section.

3280.811(a)(4)

Total of nameplate amperes for: Disposal, dishwasher, water heater, clothes dryer, wall-mounted oven, cooking units. Where number of these appliances exceeds three, use 75 percent of total.

3280.811(a)(5)

Derive amperes for free-standing range (as distinguished from separate ovens and cooking units) by dividing values below by 240 volts.

Nameplate rating (in watts)	Use (in watts)
10,000 or less	80 percent of rating.
10,001 to 12,500	8,000.
12,501 to 13,500.....	8,400.
13,501 to 14,500.....	8,800.
14,501 to 15,500.....	9,200.
15,501 to 16,500.....	9,600.
16,501 to 17,500.....	10,000.

3280.811(a)(6)

If outlets or circuits are provided for other than factory-installed appliances, include the anticipated load. The following example is given to illustrate the application of this Method of Calculation:

Example. A manufactured home is 70×10 feet and has two portable appliance circuits, a 1000 volt-ampere 240 volt heater, a 200 volt-ampere 120 volt exhaust fan, a 400 volts-ampere 120 volt dishwasher and a 7000 volt-ampere electric range.

Lighting and small appliance load	Volt-amperes
Lighting 70×10×3	2,100
Small Appliance	3,000
Total	
1st. 3,000 Volt-Amperes at 100%	
Remainder (5,100 -3,000 =2,100, at 35%.....	
Total	
	5,100
	3,000
	735
	3,735

	Amperes per leg A	Amperes per leg B
Lighting and small Appliance		
Heater 240 volt.....	15.5	15.5
Fan 120 volt.....		
Dishwasher 120 volt.....	4.1	4.1
Range	1.7
	3.3
	23.3	23.3
Total.....	44.6	46.2

Note: Based on the higher current calculated for either leg, use one 50-A supply cord.

3280.811(b)

The following is an optional method of calculation for lighting and appliance loads for manufactured homes served by single 3-wire 120/240 volt set of feeder conductors with an ampacity of 100 or greater. The total load for determining the feeder ampacity may be computed in accordance with the following table instead of the method previously specified. Feeder conductors whose demand load is determined by this optional calculation shall be permitted to have the neutral load determined by section 220-22 of the National Electrical Code (NFPA No. 70-1993). The loads identified in the table as remainder of other load” shall include the following:

3280.811(b)(1)

1500 volt-amperes for each 2-wire, 20-ampere small appliance branch circuit and each laundry branch circuit specified.

3280.811(b)(2)

3 volt-amperes per square foot for general lighting and general-use receptacles.

3280.811(b)(3)

The nameplate rating of all fixed appliances, ranges, wall-mounted ovens, counter-mounted cooking units, and including 4 or more separately controlled space heating loads.

3280.811(b)(4)

The nameplate ampere or kVA rating of all motors and of all low-power-factor loads.

3280.811(b)(5)

The largest of the following:

3280.811(b)(5)(i)

Air conditioning load;

3280.811(b)(5)(ii)

The 65 percent diversified demand of the central electric space heating load;

3280.811(b)(5)(iii)

The 65 percent diversified demand of the load of less than four separately-controlled electric space heating units.

3280.811(b)(5)(iv)

The connected load of four or more separately-controlled electric space heating units.

Optional Calculation for Manufactured Homes With 110-Ampere or Larger Service	
Load (in kilowatt or kilovoltampere)	Demand factor (percent)
Air-conditioning and cooling including heat pump comp	
Central electric space heating.....	100

Less than 4 separately controlled electric space heating units	65
1st 10 kW of all other load.....	65
Remainder of other load	100
	40

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979 and amended at 58 FR 55021, Oct. 25, 1993]

§3280.812 Wiring of expandable units and dual units.

3280.812(a)

Expandable or multiple unit manufactured homes shall use fixed-type wiring methods and materials for connecting such units to each other.

3280.812(b)

Expandable or multiple unit manufactured homes not having permanently installed feeders and which are to be moved from one location to another, shall be permitted to have disconnecting means with branch circuit protective equipment in each unit when so located that after assembly or joining together of units the requirements of §3280.803 will be met.

§3280.813 Outdoor outlets, fixtures, air-conditioning equipment, etc.

3280.813(a)

Outdoor fixtures and equipment shall be listed for use in wet locations, except that if located on the underside of the home or located under roof extensions or similarly protected locations, they may be listed for use in damp locations.

3280.813(b)

A manufactured home provided with an outlet designed to energize heating and/or air conditioning equipment located outside the manufactured home, shall have permanently affixed, adjacent to the outlet, a metal tag which reads:

This Connection Is for Air Conditioning Equipment Rated at Not More Than ----- Amperes, at ----- Volts, 60 Hertz. A disconnect shall be located within sight of the appliance.

The correct voltage and ampere ratings shall be given. The tag shall not be less than 0.020 inch, etched Brass, stainless steel, anodized or alclad aluminum or equivalent or other approved material (e.g., .005 inch plastic laminates). The tag shall be not less than 3 inches by 1¾ inches minimum size.

[40 FR 58752, Dec. 18, 1975, as amended at 42 FR 961, Jan. 4, 1977. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 58 FR 55021, Oct. 25, 1993]

§3280.814 Painting of wiring.

During painting or staining of the manufactured home, it shall be permitted to paint metal raceways (except where grounding continuity would be reduced) or the sheath of the nonmetallic cable. Some arrangement, however, shall be made so that no paint shall be applied to the individual wires, as the

color coding may be obliterated by the paint.

§3280.815 Polarization.

3280.815(a)

The identified (white) conductor shall be employed for grounding circuit conductors only and shall be connected to the identified (white) terminal or lead on receptacle outlets and fixtures. It shall be the unswitched wire in switched circuits, except that a cable containing an identified conductor (white) shall be permitted for single-pole three-way or four-way switch loops where the connections are made so that the unidentified conductor is the return conductor from the switch to the outlet. Painting of the terminal end of the wire shall not be required.

3280.815(b)

If the identified (white) conductor of a cable is used for other than grounded conductors or for other than switch loops as explained above (for a 240 volt circuit for example), the conductor shall be finished in a color other than white at each outlet where the conductors are visible and accessible.

3280.815(c)

Green-colored wires or green with yellow stripe shall be used for grounding conductors only.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 58 FR 55021, Oct. 25, 1993]

§3280.816 Examination of equipment for safety.

The examination or inspection of equipment for safety, according to this standard, shall be conducted under uniform conditions and by organizations properly equipped and qualified for experimental testing, inspections of the run of goods at factories, and service-value determinations through field examinations.

Subpart J--Transportation

§3280.901 Scope.

Subpart J of this standard covers the general requirement for designing the structure of the manufactured home to fully withstand the adverse effects of transportation shock and vibration without degradation of the integrated structure or of its component parts and the specific requirements pertaining to the transportation system and its relationship to the structure.

3280.902 Definitions.

3280.902(a)

Chassis means the entire transportation system comprising the following subsystems: drawbar and coupling mechanism, frame, running gear assembly, and lights.

3280.902(b)

Drawbar and coupling mechanism means the rigid assembly, (usually an A frame) upon which is mounted a coupling mechanism, which connects the manufactured home's frame to the towing vehicle.

3280.902(c)

Frame means the fabricated rigid substructure which provides considerable support to the affixed manufactured home structure both during transport and on-site; and also provides a platform for securement of the running gear assembly, the drawbar and coupling mechanism.

3280.902(d)

Running gear assembly means the subsystem consisting of suspension springs, axles, bearings, wheels, hubs, tires, and brakes, with their related hardware.

3280.902(e)

Lights means those safety lights and associated wiring required by applicable U.S. Department of Transportation regulations.

3280.902(f)

Transportation system, (Same as chassis, above).

3280.902(g)

Highway, includes all roads and streets to be legally used in transporting the manufactured home.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, and amended at 47 FR 28093, June 29, 1982]

§3280.903 General requirements for designing the structure to withstand transportation shock and vibration.

3280.903(a)

The cumulative effect of highway transportation shock and vibration upon a manufactured home structure may result in incremental degradation of its designed performance in terms of providing a safe, healthy and durable dwelling. Therefore, the manufactured home shall be designed, in terms of its structural, plumbing, mechanical and electrical systems, to fully withstand such transportation forces during its intended life. (See §§3280.303(c) and 3280.305(a)).

3280.903(b)

Particular attention shall be given to maintaining watertight integrity and conserving energy by assuring that structural components in the roof and walls (and their interfaces with vents, windows, doors, etc.) are capable of resisting highway shock and vibration forces during primary and subsequent secondary transportation moves.

3280.903(c)

In place of an engineering analysis, either of the following may be accepted: (1) Documented technical data of suitable highway tests which were conducted to simulate transportation loads and conditions; or (2) acceptable documented evidence of actual transportation experience which meets the intent of this subpart.

§3280.904 Specific requirements for designing the transportation system.**3280.904(a)**

General. The entire system (frame, drawbar and coupling mechanism, running gear assembly, and lights) shall be designed and constructed as an integrated, balanced and durable unit which is safe and suitable for its specified use during the intended life of the manufactured home. In operation, the transportation system (supporting the manufactured home structure and its contents) shall effectively respond to the control of the braking, while traveling at applicable towing vehicle in terms of tracking and highway speeds and in normal highway traffic conditions.

(Note: While the majority of manufactured homes utilize a fabricated steel frame assembly, upon which the manufactured home structure is constructed, it is not the intent of this standard to limit innovation. Therefore, other concepts, such as integrating the frame function into the manufactured home structure, are acceptable provided that such design meets the intent and requirements of this part).

3280.904(b)

Specific requirements--

3280.904(b)(1)

Drawbar. The drawbar shall be constructed of sufficient strength, rigidity and durability to safely withstand those dynamic forces experienced during highway transportation. It shall be securely fastened to the manufactured home frame by either a continuous weld or by bolting.

3280.904(b)(2)

Coupling mechanism. The coupling mechanism (which is usually of the socket type) shall be securely fastened to the drawbar in such a manner as to assure safe and effective transfer of the maximum loads, including dynamic loads, between the manufactured home structure and the hitch-assembly of the towing

vehicle. The coupling shall be equipped with a manually operated mechanism so adapted as to prevent disengagement of the unit while in operation. The coupling shall be so designed that it can be disconnected regardless of the angle of the manufactured home to the towing vehicle. With the manufactured home parked on level ground, the center of the socket of the coupler shall not be less than 20 inches nor more than 26 inches from ground level.

3280.904(b)(3)

Chassis. The chassis, in conjunction with the manufactured home structure, shall be designed and constructed to effectively sustain the designed loads consisting of the dead load plus a minimum of 3 pounds per square foot floor load, (example: free-standing range, refrigerator, and loose furniture) and the superimposed dynamic load resulting from highway movement but shall not be required to exceed twice the dead load. The integrated design shall be capable of insuring rigidity and structural integrity of the complete manufactured home structure and to insure against deformation of structural or finish members during the intended life of the home.

3280.904(b)(4)

Running gear assembly.

3280.904(b)(4)(i)

The running gear assembly, as part of the chassis, shall be designed to perform, as a balanced system, in order to effectively sustain the designed loads set forth in §3280.904(b)(3) and to provide for durable dependable safe mobility of the manufactured home. It shall be designed to accept shock and vibration, both from the highway and the towing vehicle and effectively dampen these forces so as to protect the manufactured home structure from damage and fatigue. Its components shall be designed to facilitate routine maintenance, inspection and replacement.

3280.904(b)(4)(ii)

Location of the running gear assembly shall be determined by documented engineering analysis, taking into account the gross weight (including all contents), total length of the manufactured home, the necessary coupling hitch weight, span distance, and turning radius. The coupling weight shall be not less than 12 percent nor more than 25 percent of the gross weight.

3280.904(b)(5)

Spring assemblies. Spring assemblies (springs, hangers, shackles, bushings and mounting bolts) shall be capable of withstanding all the design loads as outlined in §3280.904(b)(3) without exceeding maximum allowable stresses for design spring assembly life as recommended by the spring assembly manufacturer. The capacity of the spring system shall assure, that under maximum operating load conditions, sufficient clearance shall be maintained between the tire and manufactured home frame or structure to permit unimpeded wheel movement and for changing tires.

3280.904(b)(6)

Axles. Axles, and their connecting hardware, shall be capable of withstanding all of the design loads outlined in §3280.904(b)(3) without exceeding maximum allowable stresses for design axle life as recommended by the axle manufacturer. The number of axles required to provide a safe tow and good ride characteristics shall be determined and documented by engineering analysis. Those alternatives listed in §3280.903(c) may be accepted in place of such an analysis.

3280.904(b)(7)

Hubs and bearings. Hubs and bearings shall meet the requirements of §3280.904(b)(3) and good engineering practice. Both of these components shall be accessible for inspection, routine maintenance and replacement of parts.

3280.904(b)(8)

Tires, wheels and rims. Tires, wheels and rims shall meet the requirements of §3280.904(b)(3). Tires shall be selected for anticipated usage.

3280.904(b)(9)

Brake assemblies.

3280.904(b)(9)(i)

The number, type, size and design of brake assemblies required to assist the towing vehicle in providing effective control and stopping of the manufactured home shall be determined and documented by engineering analysis. Those alternatives listed in §3280.903(c) may be accepted in place of such an analysis.

3280.904(b)(9)(ii)

Brakes on the towing vehicle and the manufactured home shall be capable of assuring that the maximum stopping distance from an initial velocity of 20 miles per hour does not exceed 40 feet (U.S. Department of Transportation Regulations).

3280.904(b)(10)

Lights and associated wiring. Highway safety electrical lights and associated wiring shall conform to applicable Federal requirements in terms of location and performance. The manufacturer shall have the option of meeting this requirement by utilizing a temporary light/wiring harness provided by the manufactured home transportation carrier.

INTERPRETATIVE BULLETINS TO THE STANDARDS

As a result of changes to the Standards effective July 13, 1994, (Wind) and October 25, 1994, (Energy), several previous Interpretative Bulletins have been incorporated into 24 CFR Part 3280, and therefore, are not reprinted here.

All Interpretative Bulletins are indexed and available to the public from HUD at the following address:

Department of Housing and Urban Development
Manufactured Housing Standards Division
Office of Manufactured Housing and
Regulatory Functions
Room B133
451 Seventh Street, S.W.
Washington, DC 20410

INTERPRETATIVE BULLETINS TO THE STANDARDS

Interpretative Bulletins A-1-77 Identification of Manufacturer and State of Manufacture in the Mobile Home Serial Number - 3280.6(a)

Numeric and alphanumeric coded serial number identification of manufacturer and state of manufacture are acceptable under this section if the manufacturer and state of manufacture can be identified from the serial number itself, or where they cannot be so identified, if a record of the coded identifications is furnished to the Secretary's agent NCSBCS, and the manufacturer or state of manufacture can be identified by comparing the serial number to the reference document. There must be no duplication of serial numbers within the industry. When a duplication is found, the manufacturers in question will be informed, and they will be allowed to develop new, non-duplicative identifications, or the Secretary or her agent will assign such identifications and require their use in further serial numbers.

This interpretative bulletin is issued pursuant to 24 CFR 3280.1(c) and 3282.133. The Secretary deems that it would not be in the public interest to issue this interpretation for public comment in the Federal Register or otherwise treat this interpretative bulletin as rulemaking.

INTERPRETATIVE BULLETIN A-1-78 APPLICABLE OF REFERENCE STANDARDS AND SECOND GENERATION REFERENCE STANDARDS 3280.4(a), 3280.304(b), 3280.604(a), 3280.703, et al

Standards that are referenced in the various sections of the Federal mobile home construction and safety standards at 24 CFR Part 3280 apply to mobile homes according to the language of the Federal mobile home construction and safety standards and the language of the referenced standard. Where, for example, the Federal mobile home standards require that materials, methods of construction, fixtures, systems, devices or practices comply with or conform to cited reference standards, those reference standards are mandatory to the extent that they apply to materials, methods of construction, fixtures, systems, devices or practices in question. Further, where "second generation reference standards" are included in standards referenced in 24 CFR Part 3280, those standards are also mandatory to the extent that they are applicable according to the terms of the reference standards, the second generation reference standards, and any other standards referenced therein.

All Design Approval Inspection Agencies (DAPIAs) and Production Inspection Primary Inspection Agencies (IPIAs) shall insure that mobile home manufacturers under their surveillance follow this interpretation. Where questions arise concerning the applicability of portion of reference standards or

second generation reference standards, the Department will respond on a case-by-case basis based on the reasonableness of the interpretation in light of the purpose of the Act and the regulations and the urgency of the question raised. Typically, a manufacturer, DAPIA, IPIA would request a determination relative to the applicability of a reference standard or second generation reference standard, providing the opposing positions and the basis for those positions. The Department would then review that material and supplement it as necessary to reach a decision. That decision would then be communicated to the parties raising the question. Where the interpretation appeared to be a general interest, the Department would also publish it as a bulletin under 24 CFR 3280.1(c) and 3282.113.

**INTERPRETATIVE BULLETIN B-1-76
SWINGING EXTERIOR PASSAGE DOOR DIMENSION - 3280.105**

For swinging exterior passage doors, the dimensions required by this section may be determined by measuring the door itself. However, the door stops may not reduce the clear opening to less than 27" x 73" dimension.

**INTERPRETATIVE BULLETIN B-2-76
INTERIOR DOOR CONSTRUCTION - 3280.108 AND 3280.304**

The standards do not have specific requirements for materials used in the construction of interior doors, other than the flame spread and combustibility limitations of 3280.203 with respect to doors to water heater and furnace compartments and the requirements for a privacy lock for bathroom and toilet compartment doors in 3280.107 and for passage hardware when installed on interior doors in accordance with 3280.108.

**INTERPRETATIVE BULLETIN B-3-76
INTERIOR DOOR IN HALLWAY - 3280.113
[REDESIGNATED AS 3280.112 EFFECTIVE OCTOBER 25, 1994]**

An interior door placed in a hallway or extension of a hallway providing egress from the mobile home, shall provide a minimum 90 degree door swing and a minimum clear width opening for egress of 27".

**INTERPRETATIVE BULLETIN C-2-76
FIRE PROTECTION FOR FURNACE AND
WATER HEATER SPACES - 3280.203(a)(3) AND 3280.203(b)**

A furnace listed for an alcove installation may be installed without a door to the enclosure, but if a

combustible door to the enclosure is provided, it shall be protected by 5/16" gypsum board or a material having equivalent fire protective properties to the side of the door facing the furnace. The 5/16" gypsum board surface may be interrupted on a combustible door containing louvers for ventilation of the enclosure. Regardless of the type of door construction, the louvers may not be constructed of a material which provides a greater fire hazard than the door itself (e.g. - plastic louvers on a wood door).

All furnace and water heater spaces, regardless of the type of appliances (including the direct vent or sealed combustion type) shall be protected by 5/16" gypsum board or material having equivalent fire protective properties.

**INTERPRETATIVE BULLETIN C-3-76
COMBUSTIBLE KITCHEN CABINET PROTECTION - 3280.204**

The exposed bottom, end panel, and sides of overhead combustible kitchen cabinets within a space of 6 horizontal inches from the side of the cooking range may, in lieu of 1/4" thick asbestos millboard covered with 26 gage sheet metal, be protected with an exposed interior finish material having a flame spread rating not to exceed 50 and fire protective properties equivalent to 5/16" gypsum board.

The following are considered to be equivalent protection for combustible kitchen cabinets over the cooking range or over and extending beyond the cooking range area:

- (1) 1/4" minimum thick asbestos millboard covered with a 26 gage sheet metal hood; or
- (2) A 26 gage sheet metal range hood which provides at least a 3/8 inch enclosed air space between the bottom surface of the cabinet and a material having a flame spread rating which does not exceed 50 and fire protective properties equivalent to 5/16" gypsum board. The material shall be adequately supported by the top of the range hood.

Vertical dimensional clearance between the cook top surface and the bottom of the combustible cabinet does not constitute equivalent protection for the cabinet.

**INTERPRETATIVE BULLETIN C-4-76
3/8" MAXIMUM FOAM PLASTIC SIDING
BACKER BOARD - 3280.207(b)**

The maximum allowed flame spread rating of 75 or less as determined by ASTM E-84 is only applicable to the foam plastic contained in the 3/8" siding backer board or sheathing. The 75 or less

flame spread rating is not applicable to the outer covering of the sheathing containing the foam plastic (i.e. liner material, etc.)

**INTERPRETATIVE BULLETIN C-5-76
FOAM PLASTIC INSULATION SHEATHING
MATERIALS - 3280.207(A)**

Extruded expanded polystyrene foam plastic not to exceed one inch in thickness may be used within the cavity of walls or ceilings as sheathing or backer board for exterior coverings under the following conditions:

- (I) The sheathing shall have a minimum compression strength of 25 psi when tested as per ASTM-D 1621-64 and an average thermal conductivity (k factor) of 0.20 BTU-in/hr ft² °F at 75° F mean when tested as per ASTM-C518-70.
- (ii) A minimum of two inches of mineral fiber insulation is provided within the wall cavity and a minimum of four inches of mineral fiber insulation is provided in the ceiling cavity.
- (iii) An interior finish material is provided on exterior wall and ceiling surfaces with equivalent fire resistive properties to 5/16" gypsum board.
- (iv) A wall framing system consisting of 2" x 4" studs at 16" o.c. or equivalent when the sheathing is installed within the wall cavity.
- (v) A roof framing system consisting of roof trusses or equivalent framing members installed at a minimum spacing of 16" o.c.
- (vi) The sheathing shall not be placed in contact with heat sources such as chimneys, heater vents or other surfaces which provide long term exposure to temperatures above 150° F. Clearance from the sheathing to the heat source shall be provided in accordance with NFPA 89M, heat producing appliance clearances.
- (vii) A vapor barrier is provided on the warm side of the wall and ceiling cavity in accordance with subpart F of the standards.
- (viii) The sheathing is installed in accordance with the manufacturers installation instructions including the provision for controlling joint locations by either the use of tongue and groove sheathing or by placement of joints over structural framing members.

**INTERPRETATIVE BULLETIN C-1-91
NOTICE OF WAIVER, 24 CFR 3280.204(a)
KITCHEN CABINET PROTECTION,
DIMENSIONS OF THE RANGE HOOD**

Section 3280.204(a) requires that the metal hood over the cooking range be at least as wide as the cooking range or cook top and project at least 3 inches horizontally from the front of the cabinets it protects.

Waiver of 24 CFR 3280.204(a)

The requirement in Section 3280.204(a), which states “the hood shall be at least as wide as the cooking range”, is waived, provided that (1) the width of the hood is maintained as wide as the range directly underneath the protected kitchen cabinet; (2) the angle at which the eyebrow is beveled inward does not exceed 30 degrees; (3) the horizontal projection from the cabinet face is at least 5 inches; (4) the installation of the range hood complies with 3280.204(a) in all other respects. The Interpretative Bulletin, Notice of Waiver is issued pursuant to 24 CFR 3280.1(b) and 24 CFR 3282.113. Accordingly, authority is exercised under 24 CFR 3280.1 and 24 CFR 3282.113 to issue an Interpretative Bulletin to give notice that certain provisions of 3280.204(a) will be waived under certain circumstances.

**INTERPRETATIVE BULLETIN D-1-76
ALLOWABLE DESIGN STRESSES FOR BOARD
LUMBER - 3280.303(F) AND 3280.304**

Allowable design stresses for board lumber less than 2" in nominal thickness may be assigned from the recommended design values shown for 2" to 4" thick size classifications in the National Design Specification for Stress Graded Lumber and its Fastenings when each member identified as conforming to stress-rated board criteria by a grade marking from a nationally recognized grading agency.

**INTERPRETATIVE BULLETIN D-2-76
CARPET APPLICATION - 3280.305(a)**

Carpeting may be placed under non-load bearing interior partitions which are not shear walls.

INTERPRETATIVE BULLETIN D-476
STRUCTURAL DESIGN CRITERIA - "NET"
UPLIFT - 3280.305(c)(1) AND 3280.302(c)(2)

"Net" uplift roof loading means that design wind uplift load (9 PSF, 15 PSF). The net uplift roof loading may not be reduced by the dead load of the roof structure for purposes of engineering design or structural load testing. [DELETE REFERENCE TO 15 PSF, EFFECTIVE JULY 13, 1994]

INTERPRETATIVE BULLETIN D-1-77
LUMBER MOISTURE CONTENT
MEASUREMENT AND EVALUATION - 3280.304

Moisture content for dimensional and board lumber shall be evaluated by test methods described in ASTM D-2016 [ASTM D-4444, EFFECTIVE JULY 13, 1994]. The moisture content shall be measured near the middle of the wide face of the lumber at least 20 inches from the end of the species if the specimen being evaluated. The moisture content reading may be corrected for temperature and species if the specimen being evaluated is different from the specimen used to calibrate the meter.

If an electrode resistance type moisture meter is used to evaluate content, a meter with insulated needles shall be used. The needles shall be driven to a depth of 1/8" - 3/16" for board lumber of 1" nominal thickness and 5/16" for dimensional lumber of 2" nominal thickness. Electrical resistance meters shall not be used on material that has recently been exposed to rain, dew, or high humidity and is in a temporarily wet condition. Lumber in a temporarily wet condition shall be allowed adequate time to dry prior to checking the moisture content.

Dimensional and board lumber which is identified by a nationally recognized grading agency as having a moisture content not to exceed 19 percent may be accepted as in compliance with the requirements of this section. However, if a lot or components of a lot of identified lumber is suspected of having excessive moisture, the moisture content may be re-verified as not being in excess of 19 percent by evaluating a random sampling of lot specimens.

The moisture content of each of non-identified dimensional and board lumber shall be verified by sampling procedures described in ASTM D-2016 [ASTM D-4444, EFFECTIVE JULY 13, 1994] (20 specimens or 10 percent of the lot, whichever is greater).

Regardless of the method used to establish that the moisture content of lumber does not exceed 19 percent, all lumber surfaces shall be dry and all lumber subject to verification as to moisture content at the time of installation in the factory.

The sampling and measurement criteria set out in this bulletin are also applicable to preassembled components containing dimensional and board lumber.

INTERPRETATIVE BULLETIN E-2-76
UPLIFT TESTING - 3280.402(c)(2)

Trussed rafter designs require uplift testing when web or chord member are composed of metal straps or other materials or shapes which are designed to take only tensile or bending stresses in vertical loading conditions.

The total uplift load required for testing truss designs with eaves for compliance with 3280.305(c)(3)(iii) is 4.375 x design uplift load, specified in 3280.305(c)(1) and (2). (2.5 x 1.75 x design uplift load 9 PSF) [DELETE REFERENCE TO 15 PSF, EFFECTIVE JULY 13, 1994]. The section of the truss supported between the eave(s) is to be tested to 1.75 x design uplift (9 PSF or 15 PSF)[DELETE REFERENCE TO 15 PSF, EFFECTIVE JULY 13, 1994]. Eaves or cornices may also be tested utilizing the above described procedures.

INTERPRETATIVE BULLETIN E-3-76
EGRESS WINDOWS - 3280.404

Integral rolled-in screens are not permitted in egress windows.

INTERPRETATIVE BULLETIN E-1-78

Attachment of Latches Required to Hold Open Vertically
Opening Egress Windows Section 3280.404(b)(4)(iv)

Where a latch is required to hold open a vertically opening egress window for the purpose of emergency escape, it must be attached by a permanent method or a mechanical method that requires a tool not commonly available in the home for removal of the latch. Tools considered commonly available in the home include regular screwdrivers, Phillips screwdrivers, pliers, and wrenches. Acceptable attachment methods include rivets, one-way screw, and other devices that cannot be removed with those or similar tools.

This attachment requirement does not apply if the window will stay open by itself indefinitely until it is closed by some force other than gravity and the forces exerted on the window that it is used for egress.

INTERPRETATIVE BULLETIN F-1-76
CONDENSATION CONTROL - EXTERIOR
SHEATHING - 3280.504(b)(2)

In unventilated wall cavities, the exterior covering and/or sheathing may have a combined permeance of less than 5.0 perms, provided that there is a vapor barrier of one perm (dry cup method) or less on the warm side of the wall, and that neither the sheathing nor the exterior covering have an individual perm rating of less than the vapor barrier installed on the warm side of the wall. When no vapor barrier is installed on the warm side of the ventilated wall cavity, the combined permeance of the covering and/or sheathing shall be not less than 5.0 perms.

INTERPRETATIVE BULLETIN F-1-77
AIR INFILTRATION AT WALL-TO-WALL,
WALL-TO-CEILING, AND
WALL-TO-FLOOR CONNECTIONS - 3280.505(a)(2)

Joints not designed to limit air infiltration between wall-to-wall, wall-to-ceiling, and wall-to-floor connections shall be caulked or otherwise sealed.

Where a method other than caulking is used to seal joints between major envelopes not themselves designed to limit air infiltration between wall-to-wall, wall-to-ceiling, and wall-to-floor connections, that method of sealing shall provide a level of protection against air infiltration equivalent to that which would be provided by caulking or the forming of a pressure envelope on the outside of the wall cavity.

This Interpretative Bulletin is issued pursuant to 24 CFR 3280.1© and 3282.113. The Secretary deems that it would be in the public interest to issue this interpretation for public comment in the Federal register or otherwise treat this Interpretative Bulletin as rulemaking.

INTERPRETATIVE BULLETIN F-2-77
HEAT LOSS CERTIFICATE - 3280.510(b)

The temperature shown on the heating certificate relating to maximum furnace operating economy and optimum energy conservation is provided as an advisory recommendation to consumers in selecting an energy efficient mobile home that is suitable for the climatic requirements of the area in which the home is to be installed. However, this recommendation on operating economy and energy conservation is not intended to prohibit manufacturers from temperature of 70° F in the climate zone specified on the heating certificate. Such a prohibition would be inappropriate because variations in equipment certification, temperature, wind velocity, and atmospheric pressure conditions may require larger heating

equipment to maintain an average of 70° F temperature inside of the home. However, regardless of the size of furnace installed, the outdoor winter design temperature (97-½ percent) specified on the heating certificate shall be determined in accordance with the method described in footnote 1 of 3280.510(b). [3280.510© effective October 25, 1994].

INTERPRETATIVE BULLETIN G-2-76
MASTER COLD WATER SHUT-OFF VALVE - 3280.609(b)(1)

The master cold water shut-off full flow valve required to be provided in an accessible location on the main feeder line of the mobile home, or installed in the water supply line adjacent to the mobile home, shall have threaded or solder joints, and provide through flow capability equal to or greater than the minimum required water distribution piping size supplied by the valve.

INTERPRETATIVE BULLETIN G-3-76
ANTI-SIPHON TRAP VENT DEVICE -
MATERIALS - 3280.611(d)(5)

Material for the anti-siphon trap vent device may be any of those materials listed by this section. However, when a spring is used to operate the closing member of the device, it shall be of stainless steel wire type 302.

INTERPRETATIVE BULLETIN G-1-77
PLASTIC DRAIN LINE FITTINGS - 3280.610(g)

Acceptable equivalent sweep for elbow fittings used in drainage systems as described by ASTM-D-2661 or ASTM-D-2665 for ABS and PVC Plastic Waste and Vent Pipe Fittings is as follows:

- (1) 1/4 bend or long sweep 1/4 bend fittings may be used for making horizontal to vertical drain line vent connections in accordance with section 3280.610(g)(2).
- (2) long sweep 1/4 bend fittings may be used for making horizontal to horizontal and vertical to horizontal drain line connections in accordance with section 3280.610(g)(3).

This Interpretative Bulletin is issued pursuant to 24 CFR 3280.1(c) and 3282.113. This Secretary deems that it would not be in the public interest to issue this interpretation for public comment in the Federal Register or otherwise treat this Interpretative Bulletin as rulemaking.

INTERPRETATIVE BULLETIN G-1-78
VENTING REQUIREMENTS FOR SYSTEMS UTILIZING
ANTI-SIPHON TRAP VENT DEVICES - 3280.611(d)

Where anti-siphon trap vent devices are used in a secondary venting system, each plumbing fixture to be protected by an anti-siphon trap vent device must be “individually protected” by the device. Accordingly, wet venting of any secondary vent system using anti-siphon trap vent devices is prohibited. A maximum of two fixtures, each of which is individually protected by an anti-siphon trap vent device, may be drained by a common 1-1/2 inch drain line. Three or more fixtures, each of which is individually protected by an anti-siphon trap vent device, shall be drained by a pipe with a minimum diameter of 2 inches.

INTERPRETATIVE BULLETIN G-2-78
TESTING OF THE WATER SYSTEM - 3280.612(a)

The pressure test of the water piping in the water distribution system required under section 3280.612(a) may be performed without the domestic hot water heater connected to the water piping.

INTERPRETATIVE BULLETIN G-3-78
INSERT FITTINGS IN PLASTIC WATER SUPPLY
SYSTEMS - 3280.609(a)(1), 3280.609(e)(5) AND 3280.609(f)(1)

The minimum size requirements specified in the table in section 3280.609 (f)(1) do not apply to insert fittings in plastic piping since the table only applies to the size of the pipe itself. Insert fittings may be used with plastic water piping which meets those minimum size requirements, since section 3280.609(e)(5), through its reference to a listed standard, recognizes the use of insert fittings in plastic piping:

Section 3280.609(a)(1) governs the size of insert fittings. A plastic water supply systems utilizing insert fittings is deemed to meet the criteria in section 3280.609(a)(1) when it is demonstrated by testing or engineering analysis that the flow rate for the operation of any individual fixture in the system is not reduced below 2 GPW with a system inlet pressure of 20 psi and average faucet pressure of 8 psi.

INTERPRETATION BULLETIN H-1-76
PROVISION OF EXTERIOR FURNACE/AIR
CONDITIONING APPLIANCE - 3280.707(a)(1)

When an exterior furnace and/or air-conditioning appliance is to be field installed, the mobile home manufacture is not required to provide said appliance(s).

INTERPRETATIVE BULLETIN H-3-76
VERTICAL CLEARANCE OVER COOKING TOP - 3280.709(f)

The 24" minimum clearance above the cooking top is measured to the bottom of the combustible cabinet, not the range hood.

INTERPRETATIVE BULLETIN H-2-77
UNDERCUTTING OF BATHROOM DOORS - 3280.715(b)(1) AND (4)

Bathroom doors may be undercut regardless of the type of return air provisions utilized. However, registers or grilles used for the purpose of providing return air through the use of a return duct to the furnace shall not be installed in toilet compartment areas.

This Interpretative Bulletin is issued pursuant to 24 CFR 3280.1(c) and 3282.113. The Secretary deems that it would not be in the public interest to issue this interpretation for public comment in the Federal Register or otherwise treat this Interpretative Bulletin as rulemaking.

INTERPRETATIVE BULLETIN H-1-84
WAIVER OF AIR SUPPLY DUCT
THICKNESS REQUIREMENT
3280.715(a)

The purpose of this Interpretative Bulletin is to issue a Waiver of the thickness requirements for metal air supply ducts set out in the table "Minimum Metal Thickness for Ducts" in 24 CFR 3280.715(a) of the Federal Manufactured Home Construction and Safety Standards. The Department is issuing this Waiver based upon information and comparative test data which demonstrated that a metal air supply duct fabricated from .010" thick galvanized sheet metal provided a performance level equivalent to that required for a metal duct which conformed to the thickness requirement of 24 CFR 3280.715(a) of the Standards.

WAIVER

The Secretary hereby waives the thickness requirements of Section 3280.715(a) for air supply ducts subject to the following:

1. The duct being fabricated according to the shape, crimping and dimpling patterns specified on the duct design submitted, a copy which is attached to this Waiver.
2. The duct size is limited to thenominal 4" height and 15" width that is indicated on the design.
3. The duct is fabricated from .010 inch thick steel sheet certified as complying with the ASTM steel specification A527.
4. The steel sheet shall be galvanized with a zinc coating level of G-60 or greater.
5. The air duct shall be listed as complying with the applicable requirements of Underwriters Laboratories, Inc.'s Standard UL 181-1972 for Factory Made Air Duct Materials except for the collapse test, Section 17.
6. The listing shall specify that the air duct is limited for use as air supply ducts only.

Additional shapes are permitted under this Waiver provided it is determined that:

1. The shapes have identical physical properties, thickness, crimping and dimpling patterns as the Iron Air Duct System.
2. Comparative test data demonstrates those configurations conform to the following tests in the UL 181-1972 Standard:
 - (a) Puncture Test Paragraph 12.1 thru 12.6
 - (b) Static Load Test Paragraph 13.1 thru 13.8
 - (c) Impact Test Paragraph 14.1 thru 14.7
 - (d) Pressure Test Paragraph 16.1 thru 16.5
 - (e) Leakage Test Paragraph 21.1 thru 21.5
3. All of the above conditions from this Waiver of the 4"x15"x0.10 system are met.

INTERPRETATIVE BULLETIN I-1-76 INSTALLATION OF "SNAP-IN" TYPE BOXES 3280.808(n)

Snap-in type integral boxes provided with brackets that securely fasten boxes to walls may, when the listing permits, be secured directly to wall paneling without additional structural reinforcement or bracing, when installed in accordance with the terms of their listing.

**INTERPRETATIVE BULLETIN I-2-76
EXTERIOR LIGHTING OUTLET
REQUIREMENTS - 3280.813(a)**

A wall switch controlled exterior lighting outlet is required at each exterior entrance door to the mobile home in accordance with paragraph 210-26 of the National Electrical Code (NFPA No. 70-1975). [PARAGRAPH 210-70 NFPA - No. 70-1993, effective October 25, 1994]

**INTERPRETATIVE BULLETIN I-1-77
LOCATION AND TYPE OF
OUTDOOR RECEPTACLE OUTLET
3280.801(b), 3280.806(d)(8), AND 3280.81(a)**

The outdoor receptacle outlet required by section 3280.806(d)(8) shall not be installed on the underside of the mobile home.

The outdoor receptacle outlet shall be of a type that is:

- (a) gasket-covered; and
- (b) acceptable for use in wet locations as follows:
 - (I) in a weatherproof enclosure, the integrity of which is not affected when the receptacle is in use (attachment plug cap inserted);or
 - (ii) weatherproof when a self-closing receptacle cover is closed and where the receptacle is not likely to be used with other than portable tools or other portable equipment not usually left connected to the mobile home.

This Interpretative Bulletin is issued pursuant to 24 CFR 3280.1(c) and 3282.113. The Secretary deems that it would not be in the public interest to issue this interpretation for public comment in the Federal Register or otherwise treat this Interpretative Bulletin as rulemaking.

**INTERPRETATIVE BULLETIN I-2-77
EXTERNAL HEATING AND AIR-CONDITIONING
EQUIPMENT - WIRING PROTECTION -**

WAIVER - 3280.808(k)

Outdoor or under-chassis line-voltage wiring exposed to moisture or physical damage which is used to connect external heating or air conditioning equipment to the mobile home shall be protected as required by section 3280.808(k). The use of flexible metal conduit to provide this protection is permitted under the terms of the following waiver:

WAIVER

The Secretary hereby waives the requirement of 3280.808(k) that outdoor or under-chassis line-voltage wiring exposed to moisture or physical damage be protected by a rigid metal conduit if flexible metal conduit, as described in Article 350 of the National Electrical Code is used and if the conductors contained in the conduit are lead covered or otherwise approved for use in wet locations, and if the length of the raceway provided is limited to a maximum of 4 feet. This waiver applies only to wiring used to energize external heating or air-conditioning equipment.

This Interpretative Bulletin is issued pursuant to 24 CFR 3280.1(b) and (c), and 3282.113. The Secretary deems that it would not be in public interest to issue this interpretation for public comment in the Federal Register or otherwise treat this Interpretative Bulletin as rulemaking.

INTERPRETATIVE BULLETIN I-1-80 SUBSTANTIAL BRACE CRITERIA - WAIVER 3280.808(a) REFERENCING ARTICLE 370-13 OF THE NATIONAL ELECTRICAL CODE [NFPA NO. 70-1975]

WAIVER

The Secretary hereby waives the specific requirements of the National Electrical Code [NFPA No. 70-1975], Article 370-13 that a substantial brace if of wood, shall not be less than nominal one inch thickness and if of metal it shall not be less than No. 24 MSG under certain conditions. This waiver only applies if the “substantial brace” assembly, which includes the brace and the fastening mechanisms to attach the brace to the mobile home structure, shall withstand a force of 50 pounds applied perpendicularly to the surface in which the box is installed at the point(s) where the box is attached to the brace. The performance of the “substantial brace” may be verified either by calculation or load test. If verified by load test, the Ultimate Load Test specified in 24 CFR 3280.401(b) shall be utilized. The requirement that if the brace is metal it shall be corrosion-resistant is still applicable for this waiver.

INTERPRETATIVE BULLETIN J-1-76 TRANSPORTATION - SUBPART J OF PART 3280

A. SECTION 3280.903(c)(2) GENERAL REQUIREMENTS FOR DESIGNING THE STRUCTURE TO WITHSTAND TRANSPORTATION, SHOCK AND VIBRATION.

Documented evidence such a service records or other documents certified to by duly authorized personnel of the manufacturer is acceptable for compliance with this section when failures related to chassis damage (e.g., frame or drawbar damage, running gear failure, etc.) And body failure due to transportation loading do not exceed 1% of the total number of units (“Floors”) transported upon that chassis. Latent damage failures (e.g., racked windows and doors, floor misalignment, etc.) resulting from primary or secondary movement, which are not related to improper sitting or leveling of the mobile home or loading in excess of the manufacture’s recommendations during transport of the mobile home, shall be included in determining the 1% maximum failure level. If the manufacturer does not have or cannot provide actual records of latent damage history, the manufacturer shall provide a statement that, to the manufacturer’s knowledge, no latent damage has occurred as a result of transportation.

B. SECTION 3280.903(b) - 3280.904(b)(3) - STRUCTURAL CALCULATION GUIDELINES FOR IN-TRANSIT CONDITIONS IN MOBILE HOMES.

General. The following engineering guidelines are descriptive of methods and design assumptions which may be used for analytical evaluation of in-transit loading conditions. These guidelines have been developed with emphasis on the design of the longitudinal structural components of the mobile home (e.g., main chassis girder beam, the side-wall, rim joist, etc.), as transportation loadings are ordinary critical in the longitudinal direction. However, all elements necessary to the structural integrity of the mobile home during in-transit loading are to be evaluated (e.g., transverse chassis and floor framing members, drawbar, etc.). HUD recognizes the complexity and variety of design assumptions and techniques which may be used in evaluating in-transit loading conditions and provides these guidelines as initial methods for determining compliance with this section. Due to this variation and complexity of assumptions, HUD has undertaken as part of its transportation research study, the development of analytical methods for predicting the dynamic response of the mobile home to in-transit loading.

Design Methods and Assumptions. - Design Loading. The summation of the following loading may be used to determine the adequacy of the chassis in conjunction with the mobile home structure to resist in-transit loading:

- (a) dead load, the vertical load due to the weight of all structural and non-structural components of the mobile home at the time of shipment.
- (b) floor load, a minimum of 3 pounds per sq. ft.
- (c) dynamic loading effect, $(0.25)[(a) + (b)]$.

However, the in-transit design loading need not exceed twice the dead load of the mobile home.

Design Considerations. To determine the adequacy of individual longitudinal structural components to

resist the in-transit design loading, a load distribution based on the relative flexural rigidity and shear stiffness of each component may be utilized.

For the purpose of loading distribution, the sidewall may be considered to be acting as a “deep beam” in conjunction with other load carrying elements in determining the relative stiffness of the integrated structure. Further, by proper precambering of the chassis assembly, additional loading may be distributed to the chassis, and the remaining loading may be distributed to each of the load carrying components by the relative stiffness principle.

In addition, the analysis should include consideration for:

- (1) Location of openings in the sidewall during transport and, when appropriate, provisions for reinforcement of the structure and/or chassis at the opening.
- (2) Sidewall component member sizing and joint-splice analysis (i.e., top plate, etc.), and connections between load carrying elements.

C. SECTION 3280.904(b)(6) - AXLES

Unless substantiated in the design to the satisfaction of the approval agency (DAPIA) by either engineering analysis, load tests or documented evidence of actual transportation experience, there shall be no less than the following minimum number of 6000# rated axles with not less than the mobile home rated tires indicated in Table 1 and Table 2, on each mobile home or floor section of a multiple unit mobile home:

TABLE 1

No. of 6,000 pound rated
axles equipped with 7 x 14.5
Mobile Home 8-ply tires

Length of mobile home ¹	
12 foot wide:	
To 60 ft. maximum	2
Greater than 60	3
14 foot wide:	
To 52 ft. maximum	2
To 76 ft. maximum	3
To 80 ft. maximum	4

TABLE 2

No. of 6,000 pound rated
axles equipped with 8 x 14.5
rated tires

Length of mobile home¹

12 foot wide:

To 65 ft. Maximum	2
Greater than 65 ft. To 80 ft. maximum	3

¹Length of a mobile home is the “length” as defined in 3280.902(b).

Determination of the number of axles required by use of the above tables does not eliminate the requirement for each axle to be capable of withstanding the actual imposed dead load without exceeding the maximum allowable stresses for design axle life as recommended by the axle manufacturer, or the maximum tire load rating in 3280.904(b)(8). If a manufacturer has submitted documented evidence of transportation experience to meet the requirements of 3280.903(c)(2), the minimum number of axles required by the experience record may not be reduced by use of the above tables. (The number of axles must be consistent with and no less than the number and rating of the axles indicated in the experience record.)

D. SECTION 3280.904(b)(8) - TIRES, WHEELS, AND RIMS

Tires shall be sized and fitted to axles in accordance with the gross axle weight rating determined by the mobile home manufacturer.

The Permissible tire loading may be increased by utilizing a service load factor not to exceed 50% of the mobile home tire load limits specified in MH-1 of the Tire and Rim Association Handbook (1975 edition), but the individual permissible tire loading may not exceed 3,000 pounds. For example, the inflation pressure would be 2805 lbs. (1870 lbs.(MH-1 rating) x 1.5 (service load factor) = 2805 lbs.). The tire load limit specified in MH-1 shall be determined by the tire manufacturer in accordance with procedures described in 49 CFR 571.119.

Used tires may also be sized in accordance with the above criteria whenever the tread depth is at least 2/32 of an inch as determined by a tread wear indicator. The determination as to whether a particular used tire is acceptable shall also include a visual inspection of thermal and structural defects (e.g., dry rotting, excessive tire sidewall splitting, etc.).

Wheels and rims shall be sized in accordance with the tire manufacturer’s recommendations as suitable for use with the tires selected.

E. SECTION 3280.904(b)(9) - BRAKE ASSEMBLIES

Unless substantiated in the design to the satisfaction of the approval agency by either engineering analysis or those alternatives listed in 3280.903(c)(1) and (2), there shall be a minimum of two axles equipped with brake assemblies on each mobile home floor or unit.

Whenever tests are used to verify the adequacy of the combined braking performance of the towing vehicle and the mobile home, the combined braking system shall be capable of assuring that the maximum stopping distance from an initial velocity of 20 mph does not exceed 40 feet. The stopping distance shall be measured from the point at which movement of the service brake pedal or control begins.

The towing vehicle and mobile home shall be in the center of a 12' wide lane when the tests begin and the tires shall not deviate from the lane during the tests. The test shall be made on a level surface that is substantially dry, smooth, and free of loose material. The tests shall be made utilizing the actual combinations or running gear equipment to be used by the manufacturer in production.

Regardless of the method of substantiation, any substitution of equipment by the manufacturer shall be approved by the DAPIA, and have a rating no less than the equipment being replaced.

F. SECTION 3280.904(b)(10) - LIGHTS AND ASSOCIATED WIRING

Federal Motor Vehicle Safety Standard No. 108 shall be deemed the applicable Federal standard to be used for location and performance of highway safety electrical lights and associated wiring for determining compliance with this section.

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

AGENCY: Office of the Assistant Secretary for Housing-Federal Housing Commissioner, HUD.

ACTION: Notice of interpretative bulletin.

SUMMARY: HUD published two final rules amending the Federal Manufactured Home Construction and Safety Standards (FMHCSS) on October 25, 1993 (58 FR 54975), and January 14, 1994 (59 FR 2456). Technical corrections for the two rules were published on March 31, 1994 (59 FR 15113). This notice publishes an Interpretative Bulletin that the Department has issued to clarify some aspects of the new standards that have been the subject of questions from the industry and the public.

DATE: Issued April 15, 1994.

FOR FURTHER INFORMATION CONTACT: David C. Nimmer, Director, Office of Manufactured Housing and Regulatory Functions, Department of Housing and Urban Development, 451 Seventh Street SW., ATTN: Mailroom B-133, Washington, DC 20410-8000. Telephones: (voice) (202) 755-7410; (TDD) (202) 708-4594. (These are not toll-free numbers.)

SUPPLEMENTARY INFORMATION: Accordingly, the following Interpretative Bulletin, which includes the Secretary's finding that it should not be subject to notice-and-comment rulemaking, has been issued by the Department:

Interpretative Bulletin to the Standards

Manufactured Home Construction and Safety Standards 24 CFR Part 3280

Under Section 604 of the National Manufactured Housing Construction and Safety Standards Act of 1974, 42 U.S.C. 5403, the Secretary of the U.S. Department of Housing and Urban Development ("HUD") is authorized to issue, amend and revoke by order appropriate Federal manufactured home construction and safety standards. On October 25, 1993, (58 FR 54975) and January 14, 1994, (59 FR 2456), HUD published certain changes to the Federal Manufactured Home Construction and Safety Standards for energy conservation standards and new standards for high wind areas, respectively. The effective date of the energy standards is October 25, 1994, while the wind standards are effective on July 13, 1994.

Since the publication of these two rules, the Department has received a number of questions asking for clarification of certain provisions of the rules. Those who requested the clarifications urged the Department to provide a timely response so that industry designers can move forward to revise plans and specifications well ahead of the effective dates of the new standards. HUD recognizes that it is imperative to respond to these requests for clarification as soon as possible to assist Primary Inspection Agencies ("PIAs"), manufacturers and State Administrative Agencies in understanding the changes to

the manufactured housing standards well in advance of their effective dates.

Based on these requests for clarifications, discussions with manufacturers and PIAs and the fact that many of the changes to the standards concern issues of public safety, the Department has concluded under 24 CFR 3282.113 of the Manufactured Home Procedural and Enforcement Regulations that the immediate issuance of guidance to address these technical questions is in the public interest and necessary for the orderly redesign of manufactured homes to meet these two standards before their effective date. Therefore, due to the need for expeditious resolution of these issues and due to that fact that this is not a change in the position or policy of the Department but merely involves technical clarifications, the Secretary deems it not to be in the public interest to issue these interpretations for public comment in the Federal Register or to otherwise treat this Interpretative Bulletin as rulemaking. The Department is providing this guidance to manufacturers and PIAs so that they can proceed immediately with the redesign of their homes. Where necessary, the Department may provide further assistance in these new standards by letter of clarification or by a new Interpretative Bulletin.

The requested clarifications of the Manufactured Home Construction and Safety Standards have been organized into the following questions and answers. While the majority of the questions relate to the interpretation of the standards, several of the questions relate to the enforcement of the standards.

In addition to those answered below, there are several questions which have been submitted to HUD that require additional technical analysis before a decision can be made. These questions will be addressed in a future Interpretative Bulletin or rulemaking.

Other questions revealed the need for corrections to mistakes within the language of the rules and a few questions raised issues that require additional rulemaking. The editorial corrections were made in a correction document published in the Federal Register on March 31, 1994 (59 FR 15113).

I. The Energy Standards

Questions: 1. The Effective date of the rule is October 25, 1994. Does this mean that every home that enters production that day is to be built under the new regulations?

Answer: Yes.

2. 24 CFR 3280.103(b)(2)-Would the required kitchen/bath fans constitute a means of achieving the required 0.10 ACH if automatic timers are used to control the fans? This is what the Bonneville Power Administration, accepts for whole house ventilation for their Super Good Cents Program.

Answer: No. These fans are for spot ventilation and may not effectively change the air in other parts of the home.

3. 24 CFR 3280.103(b)(2)-Does 0.035 cfm/sq. ft. floor area have to be used to calculate the required

system capacity, or can 0.10 actual house volume/60 min. be used as an alternative?

Answer: Utilize 0.035 cfm/sq. foot floor area. This formula compensates for the decrease in natural ventilation when ventilation fans are in operation.

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.

7. 24 CFR 3280.103(b)(3)-What kind of mechanical ventilation systems do not create pressure differences? Is the presence of a nearby equivalent passive system enough to say that the system is "balanced"?

Answer: It is recognized that in operation, mechanical systems create unbalanced pressures. Please refer to the answer for Question 6. Where the passive portion of a system is evaluated as the functional equivalent of the mechanical portion, the system is balanced. An equivalent passive system is enough to say the system is balanced. However, if the intake and the exhaust are nearby and there is no provision to circulate the incoming air throughout the house, then there is no whole house ventilation.

8. 24 CFR 3280.103(b)(5)-Would a mechanical system, that works in conjunction with the furnace,

and introduces outside air into the home, but does not exhaust inside air, meet the ventilation requirements if bath/kitchen fans can be used to exhaust inside air?

Answer: No. A mechanical system that works in conjunction with the furnace is acceptable; however, bath and kitchen fans are not acceptable for the exhaust.

9. 24 CFR 3280.103(b)(5)-If the answer to the above question is "No", then would adding a separate exhaust fan, in addition to the above system, meet the requirement?

Answer: Yes.

10. 24 CFR 3280.103(b)(5)-Would adding a one-way register (to depressurize the house) meet the requirements?

Answer: Yes; (The one way register should depressurize only in Zones 2 and 3).

11. 24 CFR 3280.103(b)(6)-This section requires a manual control on the ventilation system. 24 CFR 3280.103(b)(5) says the ventilation system may be integral with the heating and cooling equipment. Does this mean that the homeowner must be able to operate the ventilation system independently of the furnace, or can the two share the same controls?

Answer: They can share the same controls and the ventilation system can be designed to operate in conjunction with and simultaneously with the furnace or air conditioner. An automatic control to operate the system independently of the furnace or air conditioner is permitted. However, in all circumstances there must be the capability for the homeowner to operate the system continuously and independently of any other automatic provision.

12. 24 CFR 3280.103(b)(7)-This section says that the ventilation capacity must be substantiated. What types of calculations or tests are acceptable?

Answer: With mechanical ventilation, a fan or fans rated to provide the required cfm is sufficient. Concerning passive systems, rational assumptions and engineering calculations, or tests will be acceptable when based upon recognized principles and practices. For example, ASHRAE Chapter 23 can be used as a resource.

13. 24 CFR 3280.303(g)-Do old, existing tests that are retested for slight material changes have to be submitted to the Department for another review?

Answer: The existing tests do not need to be resubmitted unless:

1. Minor material substitutions were not verified by tests or engineering analysis by a professional

engineer or architect as having equivalent or superior strength to the material being replaced; or

2. No follow-up testing has been conducted; or

3. Tests were not witnessed by a licensed professional engineer or architect; or

4. Higher design loads are required to be used by the new wind standards which are effective on July 13, 1994.

14. 24 CFR 3280.303(g)-How will the Department notify other manufacturers of a recently approved protocol? Will a new test protocol be distributed to everyone or will it be considered the property of the developing manufacturer?

Answer: The Department will not usually notify other manufacturers since new protocols are often of a proprietary nature.

15. 24 CFR 3280.303(g)-How will the Department assure the manufacturer of a prompt response to a protocol review? Will the Technical Exchange Group be able to develop protocols and ask the DTAG to approve and distribute them?

Answer: The Department will make every effort to review test protocols promptly in those cases where manufacturers will not be using recognized testing procedures. We do not anticipate that the Technical Exchange Group will be asked to develop test protocols.

16. 24 CFR 3280.504(c)(1)(I)-Does Section 24 CFR 3280.504(c)(1)(I) allow construction of ventilated roof homes without eaves (e.g. single section homes) but with "low roof vents?" If so, is a 1 inch space required between the top of the insulation and the roof sheathing when there is no designed air passage to that point?

Answer: Where eaves or overhangs are not part of the design, low roof vents can be used. However, a 1-inch minimum air space directly underneath the most outboard point of the vent is needed for a fresh air path for the length of the home to insure that the low roof vents function.

17. 24 CFR 3280.504(c)(2)-Would polystyrene or R-5 fiberglass insulation be considered sheathing, if it is installed over the roof truss top chord on metal roof units, and if it is to be used as a sound deadener? The requirement states ". . . homes constructed with metal roofs and having no sheathing or underlayment installed, are not required to be provided with attic or roof cavity ventilation . . .". Is the above type of roof construction required to be ventilated?

Answer: A rigid polystyrene sheath would be considered a sheathing. Fiberglass batts would not be. The rigid polystyrene sheath would require the roof to be ventilated.

18. 24 CFR 3280.506(a)-"The overall coefficient of heat transmission (U_o) of the manufactured home for the respective zones and an indoor design of 70 F, including internal and external ducts, and excluding infiltration ventilation and condensation control, shall not . . . " Should there be a comma (,) between infiltration and ventilation? If the answer is yes, does this mean to exclude only the passive and/or active 0.10 air changes per hour referred to in 24 CFR 3280.103(b)(2), and/or does this mean the 0.10 ACH "plus" the natural infiltration and exfiltration of 0.25 ACH referred to in 24 CFR 3280.103(b)? If the answer is no, what does this mean?

Answer: A comma (,) should be between infiltration and ventilation, and the 0.10 ACH and the 0.25 ACH are excluded from the calculation.

19. 24 CFR 3280.508-How is duct loss calculated when duct is located (sic) between the floor insulation and the floor (conditioned area) for single wides? We suggest there is none.

Answer: Refer to paragraph 3.2 of the document "Overall U-values and heating, cooling loads Manufactured Homes". The duct losses for this configuration are not included in the calculation. The space where the duct is located is considered conditioned and the floor deck is not included in the calculation.

20. 24 CFR 3280.508-What is the duct loss factor when the duct is located between the floor insulation and the floor for double wides except for the crossover duct? We suggest 2% of calculated transmission (U_o) loss.

Answer: The external ducts are considered to be a component of the homes. The area of the duct exposed to the exterior and the level of insulation installed are summarized with the overall envelope area. Please note that 24 CFR 3280.506 (a) prevails over paragraph 4.4 of the document "Overall U-values and heating, cooling loads Manufactured Homes".

21. 24 CFR 3280.508-Are people loads (one person per bedroom plus one) and appliance loads (1,200 BTUH) ignored when calculating "maximum" heat loss allowed by the U_o ? We assume this is ignored, except when estimating annual energy usage if desirable under 24 CFR 3280.508(f), "Annual Energy Used Based Compliance".

Answer: People loads are not included in the determination of the U_o , when the "Annual Energy Used Based Compliance" method is used (24 CFR 3280.508(b)1). This section says that all heat loss calculations should be consistent with the procedures in the February 1992 document by PNL.

22. 24 CFR 3280.506(a)-24 CFR 3280.506(a) says that internal and external duct losses must be considered. The PNL document does not include duct losses. Will the PNL document be revised to include such losses in the overall U_o heat loss?

Answer: There are no current plans to revise the PNL document. It is subject to change by addition or clarification if there is a need to do so.

23. 24 CFR 3280.508-If external duct losses are to be considered, can the additional area of the cross-over duct be used in the summation of the overall envelope area? If not, it would have to be considered a pure loss.

Answer: The external ducts are considered to be a component of the homes. The area of the duct exposed to the exterior and the level of insulation installed are summarized with the overall envelope area.

24. 24 CFR 3280.508(b)-Blown Insulation:-In appendix B (Page b(I) of the PNL document), the R-value of blown insulation is taken at R-2.5 per inch. In the earlier example (Page 4.4), it is shown to be 3.67 per inch. Which is correct?

Answer: The allowed R-value should be determined from the recognized R-value for the product employed.

25. 24 CFR 3280.508(b)-Insulation in Ceiling: Regarding the examples on Page 54976, is the R-value in the ceiling the total, "nominal" thickness at the peak? Or is the lesser, "effective", or "installed" value of the insulation in the cavity?

Answer: The "as installed" value is to be used.

26. 24 CFR 3280.508(d)-Section 3280.508(d) provides some potential for offering more value to the consumer by considering high energy efficiency heating and cooling equipment. Home manufacturers ordinarily install heating equipment but most cooling equipment is provided and installed by others. Will HUD allow manufacturers to specify on the data plate or elsewhere that the home is designed for minimum SEER (e.g. 12) air conditioning equipment and calculate the credit based on the design even though we do not actually provide the equipment?

Answer: When the home manufacturer does not provide the cooling equipment, the higher energy efficiency credit cannot be used.

27. 24 CFR 3280.510(b)-The requirement states ". . . heating equipment will maintain a 70 degree F temperature inside the home without storm sash or insulating glass in Zones 1 and 2, and with storm sash or insulating glass in Zone 3 . . .". Storm windows may be necessary to meet the significantly lower whole house "U" values required in 24 CFR 3280.506(a) for Zones 1 and 2, as well as Zone 3. For these homes, a certification temperature without storms makes no sense. For heat Zones 1 and 2, may the certification temperature be calculated with storm windows if said home is equipped as such?

Answer: Yes; however, if removable storm windows are provided, the heat loss certification

temperature will be calculated with the storms removed. For permanently installed double or triple glazing, the temperature may be calculated utilizing the window assembly U-value.

28. 24 CFR 3280.806(b)(1). Receptacle outlets within 6 feet of the kitchen sink are now required to be GFCI. Neither section 210-7 of the NEC nor the NEC 1993 Handbook described the location of the receptacle clearly. How is this 6 feet measured? Is it along the wall behind the counter where the sink is located, or a 6-foot diameter circle at the sink corners, etc. * * *?

Answer: It is measured between the receptacle and the nearest point on the sink. It is a point to point measurement. Refer to Figure 210-14 in the 1993 NEC Handbook. 2.

29. 24 CFR 3280.806(b)(1)-NEC 1993, 550-8(d) requires, "Counter tops shall have receptacles located every 6 feet." Is a receptacle required to be 3 feet or 6 feet from the end of the counter top? Does this mean receptacles are to be 6 feet to 12 feet on center?

Answer: According to 550-8(d), the six foot limit is measured between receptacles for the countertops. If the end of the counter is less than six feet from the receptacle, no additional receptacle is required.

30. 24 CFR 3280.808(r)(1). Is a wall with wooden studs and gypsum paneling considered combustible?

Answer: The purpose of paragraph (r) is to codify existing practice and interpretations concerning the maximum allowable gap. The $\frac{1}{8}$ inch gap applies to gypsum paneling as well as plywood paneling.

31. 24 CFR 3280.808(r)(1)-Is the $\frac{1}{8}$ " gap addressing the size of the hole in the wall paneling? Or is it concerning the clearance of the rear of the box and other combustible materials, such as Luan paneling? Or is it for both?

Answer: It addresses the size gap permitted in the wall paneling.

32. 24 CFR 3280.103(b)(2)-For whole House Ventilation: How should manufacturers figure the areas of calculation of additional ventilation of 0.10 air changes per hour. The Air Conditioning Contractors of America's Manual J used the conditioned space to determine the required CFM.

A. Do you include the bath and the kitchen volume in the whole house volume?

Answer: Yes.

B. Do you include the partition's volume that surround the bathroom?

Answer: Yes.

C. Do you include the marriage wall and the endwall volume?

Answer: Yes at the marriage wall; no at the endwall.

D. Which dimension, interior or exterior side of walls, do you use to figure the volume of the house?

Answer: The interior side of wall dimension may be used.

33. 24 CFR 3280.805 (a)(3)(iii)-When is an appliance considered to be an "other continuous duty load" as prescribed in amended 24 CFR 3280.805 (a)(3)(iii) for the purpose of adequately rating the appliance circuit?

Answer: In Article 100 of the NFPA-70-1993 (the National Electrical Code) continuous duty is defined as: "Operation at a substantially constant load for an indefinitely long time." To establish what is a constant load for an indefinitely long time, we must refer to the Article in the National Electrical Code for the specific appliance. If the specific requirements call for a branch circuit rating not less than 125% of the nameplate rating, then it is a continuous duty appliance. Some specific examples are: Article 422-14 (b) for water heaters, Article 424-3(b) for heating equipment, and Articles 440-32 and 440-33 for air conditioning.

II. The Wind Standards

Questions: 1. 24 CFR 3280-The effective date is July 13, 1994. Does this mean that every home that enters into the first stage of production on that date is to be under the new regulations?

Answer: Every home entering the first stage of production as of July 13, 1994 must comply with the new wind safety provisions.

2. 24 CFR 3280-In the preamble, page 2457, a statement is made that the Department expects to publish revised wind standards for the rest of the country "next year." That statement may have been written in 1993. Please indicate when the Department expects to publish final regulations for the rest of the country.

Answer: We plan to publish revised wind safety standards for the rest of the country sometime in 1994.

3. 24 CFR 3280.304-On page 2463, the preamble indicates that the final rule permits the use of the 1991 NDS without exception. Please clarify that this reference standard shall be used in redesigning homes for Zones II and III not later than July 13, 1994, and for Zone I (the rest of the country) the standard shall be enforced not later than October 25, 1994.

Answer: The use of the 1991 NDS will be enforced for designs in all Wind Zones, including existing

Wind Zone I no later than July 13, 1994.

4. 24 CFR 3280.5(f)-A new data plate entry is specified to indicate that a home has not been designed for ocean/coastal areas, within 1,500 feet of the coastline in Wind Zones II or III, unless it is designed under Exposure D, ASCE 7-88. It would seem that the homeowner will read this and be unsure whether or not the home is designed under either Exposure C or D. Recommend that the data plate so indicate in a positive statement where the home has been designed to be placed, under what exposure.

Answer: The language on the data plate is clear and will avoid placement of homes which have not been designed for the higher design requirements of Exposure D from being installed too close to the coastline.

5. 24 CFR 3280.5(g)-The new data plate statement concerning shutters is in conflict with the requirements of sections 24 CFR 3280.403(f), .404(f), and .405(f). That is, the last sentence of the data plate statement strongly recommends that the home be made ready to be equipped with these devices. However, the sections listed above under Subpart E -Testing (page 2474), say that:

(a) For homes in Wind Zones II and III manufacturers shall design exterior walls (make the homes ready) to allow for installation of protective covers over window and door openings, and

(b) If the manufacturer does not provide protective covers, it must provide homeowner instructions for one method of protecting the openings, and

(c) The instructions shall indicate whether devices, sleeves, or anchors for fasteners have been installed or provided by the manufacturer.

Please modify the new data plate statement to track with these new requirements.

Answer: The new data plate requirements are not in conflict with the provisions of 24 CFR 3280.403(f), .404(f) and .405(f).

6. 24 CFR 3280.303(g)-Staples are not addressed in the 1991 NDS, but they are addressed in UM-25D. Can the 1.6 duration factor for wind from the 1991 NDS be applied to staples?

Answer: The 1.6 load duration factor may not be applied to staples; however, a load duration factor of 1.33 may be used in accordance with UM-25-D.

7. 24 CFR 3280.305(c)(1)(ii)-The new requirement for manufactured home wind loads for high wind areas requires that they shall be designed by a professional engineer or architect. This statement conflicts with an answer in the preamble (page 2465) which indicates that the Department will consider a suggestion for future rulemaking that a professional engineer prepare and certify wind load designs and calculations. Please clarify the new requirement.

Answer: The wind resisting aspects of homes to be located in high wind areas must be designed by a Professional Engineer or Architect as specified by this section of the new wind safety requirements. The statement on Page 2465 of the Preamble should have indicated the Department's decision to require a professional engineer or architect to design homes in high wind areas.

8. 24 CFR 3280.305(c)(1)(ii)-Please specify which designs and calculations shall be sealed by a registered professional engineer or architect. In that there is a DAPIA review of all drawings and calculations, it appears that sealing by a P.E. or architect should be greatly limited.

Answer: As a practical matter, almost all aspects of the manufacturers designs are wind resisting elements and are required to be designed by a Registered Professional Engineer or Architect. This would include, but not be limited to, the following:

- a. all structural systems, assemblies, subassemblies or components and their connections or attachments
- b. exterior covering and sheathing
- c. Window and sliding glass door openings and designs for missile protection

9. 24 CFR 3280.305 (c)(1)(ii)-This section permits the manufactured home to be designed either to option (A): Exposure C, ASCE 7-88, or option (B): The wind pressures in the "Table" in the final rule. We have been advised by the engineering community for the conventional truss industry that truss designs in accordance with ASCE 7-88 are prepared using criteria under "main wind-force resisting systems," rather than under "components and cladding." Please confirm that this standard engineering practice is acceptable for manufactured home trusses where either design options (A) or (B) is selected.

Answer: Trusses are to be designed as "Components" and not as "Main Wind-Force Resisting Elements". The only exception to this would be for a spatial truss framework which is designed as part of Main Frame System. Accordingly, roof trusses are to be designed as "Components" under Subparagraph (A) or by using the design pressures specified in the "Table" in (B).

10. 24 CFR 3280.305 (c)(1)(ii)-The "Table" entry for wall studs incorrectly shows the pressures for "Within 3'0" from each corner" on the line above.

Answer: The "Table" entry for wall studs does contain a typographical error in lining up the Design Pressure with the Element for wall studs "Within 3'0" from each corner of the sidewall and end wall".

11. 24 CFR 3280.305 (c)(1)(ii)-Studs are designed for a lateral load (38 PSF etc.) and no uplift load is specified. Does that mean no combined bending and axial tension is necessary for designing studs?

Answer: Wall studs in sidewalls and end walls are to be designed for combined uplift and lateral loads specified in ASCE 7 or by the Table of Design Wind Pressures.

12. 24 CFR 3280.305 (c)(1)(ii)-For designing roof to wall, wall to floor and floor to chassis connections, what uplift load should be used "anchorage for lateral and vertical stability" or "main wind force resisting system"?

Answer: For designing roof to wall, wall to floor and floor to chassis connections, the lateral and uplift design pressure requirements for Components and Cladding are to be used.

13. 24 CFR 3280.305 (c)(1)(ii)-The following concerns the "Table of Design Wind Pressures" ("Table"):

a. Do the footnotes for the "Table", such as no. 6 on shingle exemption, no. 7 the roof sheathing exemption, and no. 8 the exterior coverings exemption, also apply if method (A), using ANSI/ASCE 7-88, is used instead?

b. Note 4 limits the "Table" to 10 degrees (nominal 2/12) minimum roof slope. Does this mean that they do not apply to a bowstring type roof?

c. If a designer follows ANSI/ASCE 7-88 in method (A), can he ignore the prescriptive element of double trusses in the last 3 feet and have trusses designed accordingly?

d. What are the uplift loads on a porch open on three sides? Are they different if the porch is only open on two sides (as on the end of a multi-section unit)? Do either of these porch configurations have the special 3-foot zones of increased wind pressure (or suction) the walls?

e. Do each of the corners (looking at the plan view) of a double section unit with an offset section have the 3-foot zones as far as wall pressures are concerned, or do these zones only apply to the "outside" corners? Or do these zones only apply to the intersections of the end walls and sidewalls?

f. Concerning bay windows, walk-a-bays, bow windows: do these experience the increased uplift on the roof? Do they count as part of the 3-foot roof zone?

Answers: a. The footnotes on exterior coverings do not apply if Method (A) is used. All exterior coverings and fastenings must be completely designed for the design load provisions of ASCE 7-88.

b. Truss configurations such as bow-string designs with slopes less than 10 degrees are not covered by the "Table".

c. Yes.

d. The uplift design pressures for a 3 sided open porch would be the same as for eaves or gables depending on their location (sidewall or end wall). A porch open on two sides at the end of multi-wide section would be designed for gable loads. Both of these configurations would also be required to be designed for the higher pressures in the 3'0" Zones if located within 3'0" of the corners.

e. The 3'0" regions apply to all corners including offset sections and all other conditions cited by the question.

f. Bay windows, walk-a-bays and bow windows are part of the 3'-0" roof zone unless they are significantly offset below the roof or the roof of the unit completely extends over those projections.

14. 24 CFR 3280.305(c)(1)(ii)-In Zones II and III, under what conditions may a manufacturer meet Exposure B, ASCE 7-88? (e.g. when a home is permanently sited and the authority having jurisdiction verifies the Exposure B authenticity)?

Answer: There are no conditions in Wind Zones II and III for which a home can be designed for Exposure B, ANSI/ASCE 7-88.

15. 24 CFR 3280.305(c)(1)(ii)-In Alaska, which counties are in Zone III?

Answer: There are no defined boundaries for Wind Zone III other than the 90 mph isotach in ANSI/ASCE 7-88 and identified in the Basic Wind Zone Map.

16. 24 CFR 3280.305(c)(1)(iii)-There are many questions concerning recessed entries in Zones II and III if the "Table" is applied:

a. Do the corners of a recessed entry have the 3 foot zones of higher cladding loads for walls?

b. Does the soffit of a recessed entry experience a negative suction? If so, what is the value?

c. Does the soffit of a recessed entry experience a positive pressure, acting upward? If so, what is the value? If so, is this upward pressure an additional load on the roof truss supporting the soffit, or is the truss loading still the same without the recessed entry?

Answers: a. The corners of walls at recessed entries within 3'0" of end walls are to be designed for the 3'-0" wall corner design pressures in the "Table". However, recessed entries which are more than 3'-0" from the end wall and bounded on three sides need not be designed for the higher wall corner loads.

b. Soffits of a recessed entry are to be designed as eaves or gables for the design pressures specified in the "Table".

c. Soffits of recessed entries are to be designed for the eave or gable load requirements of the "Table" as positive pressures acting upward. For the recessed entry area, no additional design pressures are required for evaluation of roof trusses, other than the design pressures for eaves and gables as indicated in b. above.

17. 24 CFR 3280.305(c)(2)(ii)-Table of Design Wind pressures-As indicated by Footnote 8, exterior coverings that are secured at 6" o.c. to a 3/8" structural rated sheathing that is fastened to wall framing members at 6" o.c. need not be evaluated for the design wind pressures shown in the "Table". We assume that the 6" o.c. fastening schedule for both structural sheathing and exterior coverings are measured 6" o.c. vertically along the studs. Please confirm this assumption.

Answer: Footnote 8 requires fasteners to attach from the exterior covering to the structural sheathing at 6" o.c. in both vertical and horizontal directions. However, fasteners need only be installed at 6" o.c. from the structural sheathing to wall framing members (plates, studs, jamb studs, headers). For vertical wall and jamb studs the orientation of the 6" o.c. spacing is in the vertical direction.

18. 24 CFR 3280.305(c)(2)(ii)-"Table" of Design Wind pressures-What is the wind uplift value to be used for stud and jamb stud interaction calculations?

Answer: The design uplift forces to be resisted by studs and jamb studs are the combined uplift loads from the "Table" for trusses (including corner loads from doubling of trusses), and any roof projections (eaves, gables, recessed areas, porches).

19. 24 CFR 3280.305(c)(2)(ii)-"Table" of Design Wind pressures-The 6" o.c. fastening requirement for exterior wall coverings, as indicated by footnote no. 8 under the "Table" of Design Wind Pressures on page 2470 of Federal Register, may pose some difficulties in some cases. For example, how can we fasten the 3/8" sheathing through vertical straps positioned at studs? Double penetration of straps will weaken its holding capability. The problem is compounded by the installation of a final exterior covering that must also be fastened based on 6" o.c., somehow staggered to miss the 3/8" sheathing fasteners and the strap fasteners under the sheathing.

Answer: Fasteners may be staggered at vertical straps to facilitate installation of wall and sheathing coverings and to avoid damage to the strapping material.

20. 24 CFR 3280.306(d)-If over-the-roof ties are required, because that may be the only way to resist the load, it is not clear that diagonal ties would not be required at each vertical tie location along the mating line of multi section homes. This requirement needs further clarification.

Answer: Diagonal ties need not be provided at each vertical over-the-roof tie location along the marriage line of multiple section homes, if all design wind forces can be transferred across the mating line

by the over-the-roof ties and site connections between the units specified in the manufacturer's instructions. Additional information on this subject is provided in our response to Question 26.

21. 24 CFR 3280.305(e)(2) -A new prescriptive requirement for steel strapping for brackets to fasten walls to floors or roof trusses, shall have a maximum spacing of 24 inches on center for Wind Zones II and 16 inches on center for Wind Zone III. From a practical standpoint, the fasteners generally must be placed over studs. Where trusses are not aligned over studs, please confirm that stud-to-truss connections do not have to be direct, provided that indirect load transfers are substantiated.

Answer: Trusses in homes designed for Wind Zones II and III must be aligned over studs for direct connection of the 26 gage metal strapping or brackets required by this section. Trusses may not be offset from studs except where they are added to provide reinforcement or as otherwise required by the design.

22. 24 CFR 3280.305(e)(2)-We want to advise you that since nails will be driven mechanically through the 26-gage straps, their rejection may result in severe injuries to the operator. Therefore, we may have to pre-drill holes through straps and 3/8" sheathing and hand drive fasteners, or use a stronger gun and bigger fasteners.

Answer: It would appear that it may be necessary to pre-drill holes or use larger sized guns or thicker fastener gages to penetrate the 26 gage strapping materials.

23. 24 CFR 3280.306(f)-Revised section 24 CFR 3280.306(d) requires manufactured homes designed for Wind Zones II and III have a supplemental vertical tie installed at each diagonal tie location. A written interpretation is needed to confirm the following:

A. The connection of the vertical strap to the home should be designed for the vertical component of the manufacturer's calculated diagonal tie load (which corresponds with its anchorage instructions). The connection to the home is not required to be designed for 3,150 pounds (4725 pounds ultimate). The vertical strap design on "Table" D2 of HUD's Regulatory Impact Analysis (RIA) agrees with this assumption. 10-8 screws per strap calculates to approximately 1,500 pounds per vertical tie.

Answer: Connections of vertical ties to wall framing members need not be designed for the 3,150 working load requirements of the tie itself provided the fastening system and the member to which it is attached are capable of resisting the calculated design load imposed on the vertical tie.

B: The connection of the vertical strap may be located at the I-Beam, provided that the floor-to-frame connection is substantiated. In some designs this may be the preferred location (e.g. 5' o.c. diagonal tie spacing with a 6' patio door at sidewall).

Answer: Vertical ties may be provided under the main chassis beams provided the design has

considered the transfer of all loads assuming the vertical tie to be positioned under the I beam.

24. 24 CFR 3280.306(f)-Since the Department will now require a vertical tie at each diagonal tie for Wind Zones II and III, how does HUD envision that ties will be properly secured to wall members so that the attachment point on the manufactured home is capable of resisting the tie allowable working load of 4,725 pounds?

Answer: Vertical ties can be installed as continuous ties or connected to wall framing members by mechanical fasteners. Additional information on this subject is provided in our response to Question 23.

25. 24 C.F.R. 3280.306(c)(2), (d) and (f)-Taken together 24 CFR 3280.306(c)(2), (d) and (f) could mean that HUD staff anticipates over-the-roof straps at each diagonal tie. If so, what is the purpose of 26-gauge uplift straps and stronger trusses?

Answer: Vertical ties are required to be positioned at each diagonal tie for gross stability against overturning. The ties between the roof and sidewall are required to resist the high localized uplift forces and to prevent roof system failures and separation from the wall system.

26. 24 CFR 3280.306 (f) -Please also confirm that a diagonal tie is not required at each vertical tie, both on the perimeter and along the marriage wall.

Answer: For anchoring systems used with multiple section units, vertical and diagonal ties may not be required at the marriage wall provided all wind forces can be designed to be transferred across the mating line without their use. However, diagonal and vertical ties are mandatory at the perimeter or exterior sidewall.

27. 24 CFR 3280.306 (f)-We would also like permission to fasten a vertical tie at the I-beam, provided that the floor-to-frame connection is substantiated.

Answer: Vertical ties may be provided under the main chassis beams provided the design has considered the transfer of all loads assuming the vertical tie to be positioned under the I beam.

28. 24 CFR 3280.403(f), 404(f) and 405(f): The manufacturer is to specify at least one method of protecting exterior openings, without taking the home out of conformance with the standards. How does the Department envision that a manufacturer might take the home out of conformance with the standards when it designs exterior walls surrounding exterior openings to allow for the installation of shutters or protective covers?

Answer: One example of how a home could be taken out of conformance with the Standards is to reduce the capacity of wall framing members due to excessive fastening patterns or large holes needed to install the shutters or protective covers.

Dated: April 15, 1994.

Nicolas P. Retsinas,

Assistant Secretary for Housing-Federal Housing Commissioner.

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Published July 1, 1994

Interpretative Bulletin for Manufactured Home Construction

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Office of the Assistant Secretary for Housing
-Federal Housing Commissioner

24 CFR Part 3280

Docket No. R-94-1632; FR-3380-N-06

Interpretative Bulletin for Manufactured Home Construction and Safety Standards and Notice of Waiver of Certain Requirements

AGENCY: Office of the Assistant Secretary for Housing-Federal Housing Commissioner, HUD.

ACTION: Notice of interpretative bulletin and waiver.

SUMMARY: HUD published a final rule amending the Federal Manufactured Home Construction and Safety Standards (FMHCSS) on January 14, 1994 (59 FR 2456) to improve the resistance of manufactured homes to wind forces in areas prone to hurricanes. An Interpretative Bulletin was issued on April 15, 1994 and published in the Federal Register on April 21, 1994 to clarify some aspects of the new standards that have been the subject of questions from the industry and the public. This Interpretative Bulletin addresses certain additional questions and announces the issuance of a waiver, pursuant to 24 CFR 3280.1(b), relating to certain exterior wall cladding.

DATES: Issued June 24, 1994.

FOR FURTHER INFORMATION CONTACT: David C. Nimmer, Director, Office of Manufactured Housing and Regulatory Functions, Department of Housing and Urban Development, 451 Seventh Street SW., Attn: Mailroom B-133, Washington, DC 20410-8000. Telephones: (voice) (202) 755-7410; (TDD) (202) 708-4594. (These are not toll-free numbers.)

SUPPLEMENTARY INFORMATION: Accordingly, the following Interpretative Bulletin, which includes the Secretary's determination that it should not be subject to notice-and-comment, has been issued by the Department.

Interpretative Bulletin to the Standards

Manufactured Home Construction and Safety Standards
24 CFR Part 3280

Under Section 604 of the National Manufactured Housing Construction and Safety Standards Act of 1974, 42 U.S.C. 5403, the Secretary of the U.S. Department of Housing and Urban Development ("HUD") is authorized to issue, amend and revoke by order appropriate Federal manufactured home construction and safety standards. On January 14, 1994 (59 FR 2456), HUD published certain changes to the Federal Manufactured Home Construction and Safety Standards for high wind areas. The effective date of the wind standards is July 13, 1994.

Since the publication of this rule, the Department received a number of questions asking for clarification of certain provisions. Those who requested the clarifications urged the Department to provide a timely response so that industry designers can move forward to revise plans and specifications well ahead of the effective date.

HUD recognized that it was imperative to respond to these requests for clarification as soon as possible to assist Primary Inspection Agencies ("PIAs"), manufacturers and State Administrative Agencies in understanding the changes to the manufactured housing standards in advance of the effective date. Therefore, on April 21, 1994, the Department published a series of technical interpretations of the rule in the Federal Register 59 FR 19072.

In that Interpretative Bulletin, the Department indicated that it may issue further Interpretative Bulletins to provide further assistance in the implementation of these new standards. Since the publication of those interpretations, additional requests for clarification of both rules have been received.

In addition, certain questions were raised about 24 CFR 3280.305(c)(1)(ii)(B) and Footnote 8 to the "Table of Design Wind Pressures." The questions related to the requirement that exterior wall cladding materials be fastened at 6" on center ("o.c.") as provided in Footnote 8. The Department has been advised that the impracticability of such a fastening requirement may have a significant negative effect on the manufacturers of certain siding traditionally used in manufactured housing. The use of these specific requirements was not intended to prohibit the utilization of any material, piece of equipment, or system which cannot meet the precise specifications.

24 CFR 3280.1(b) of the Manufactured Home Construction and Safety Standards provides that where any material, piece of equipment, or system which does not meet precise specifications set out in the standard is shown, to the satisfaction of the Secretary, to meet the level of performance of a material, piece of equipment or system which meets the precise specifications, the Secretary may waive the specifications set out in the standard for that material, piece of equipment, or system. The Secretary, in granting such a waiver, may set out any limitations or other requirements with respect to how the material, piece of equipment, or system must be used, including any tests of the material, piece of equipment, or system which the Secretary determines must be carried out before it can be used.

Accordingly, this Interpretative Bulletin, in accordance with 24 CFR 3280.1(b), also announces the waiver of certain requirements of 24 CFR 3280.305(c)(1)(ii)(B) and Footnote 8 to the "Table of Design Wind Pressures" applicable to permeable exterior wall cladding materials which cannot be secured at the 6" o.c. fastening pattern. This Interpretative Bulletin, however, sets out limitations and other requirements with respect to how the waiver applies. Due to the need for expeditious resolution of the issue relating to air permeable exterior wall cladding materials and the need for expeditious resolution and clarification of other issues related to the wind rule, and since these clarifications do not establish a change in the position or policy of the Department but merely involved technical matters, the Secretary deems it not to be in the public interest to issue the announcement of the waiver or the clarifications for public comment in the Federal Register or to otherwise treat this Interpretative Bulletin as rulemaking. The Department is providing this guidance to manufacturers and PIAs so that they can proceed immediately with the redesign of their homes.

I. Waiver of Certain Requirements of 24 CFR 3280.305(c)(1)(ii)(B) and Footnote 8 to the "Table of Design Wind Pressures" Relating to Permeable Exterior Wall Cladding Materials Which Cannot Be Secured at the 6" o.c. Fastening Pattern

The Secretary, through his duly authorized designee, finds that it may be impracticable for certain exterior cladding materials to be fastened at 6" o.c. as provided in Footnote 8 of 24 CFR 3280.305(c)(1)(ii)(B). Accordingly, the Secretary hereby grants waiver of certain requirements of 24 CFR 3280.305(c)(1)(ii)(B) and Footnote 8 to the "Table of Design Wind Pressures" applicable to permeable exterior wall cladding materials which cannot be secured at the required fastening pattern. Because this waiver has been issued, the requirements of 24 CFR 3280.305(c)(1)(ii)(B) and Footnote 8 to the "Table of Design Wind Pressures," to which the waiver relates, may be met either by meeting the specifications set out in the standard or by meeting the following requirements:

Air permeable exterior wall cladding materials which cannot be secured at the 6" o.c. fastening pattern due to the materials' configuration, such as vinyl lap siding, may be alternatively evaluated by testing for the design pressures specified in the "Table of Design Wind Pressures," provided that the following requirements are met:

1. The air permeable siding is intermittently secured through structural rated wall sheathing at least 3/8" thick at a maximum spacing of 16" o.c. to the wall framing;
2. The 3/8" structural rated wall sheathing is secured to wall framing members (plates, studs, jamb studs, headers) at 6" o.c. except that for vertical wall and jamb studs, the 6" o.c. orientation is in the vertical direction;
3. The wall framing members are installed at a maximum spacing no greater than 16" o.c.;
4. The exterior cladding materials are fastened in accordance with the manufacturer's installation

instructions; and

5. For vinyl siding, the siding and fastening strip (nailing hem) is at least .035" in thickness.

Such tests must be conducted in accordance with 24 CFR 3280.401(b) and demonstrate the adequacy of the design to resist the negative design pressures in the "Table of Design Wind Pressures" for wall corners and other areas. The entire exterior wall construction and fastenings including the exterior wall cladding (siding), 3/8" minimum structural rated sheathing, and wall framing members must be tested for the full negative design pressures specified by the "Table of Design Wind Pressures."

While the above requirement does not meet precise specifications set out in 24 CFR 3280.305(c)(1)(ii)(b) and Footnote 8 to the "Table of Design Wind Pressures," the Secretary, through his duly authorized designee, is satisfied that compliance with this requirement will meet the level of performance sought in 24 CFR 3280.305(c)(1)(ii)(b) and Footnote 8 to the "Table of Design Wind Pressures."

II. Additional Clarifications of the Wind Standards

The requested clarifications of the Manufactured Home Construction and Safety Standards have been organized into questions and answers.

Questions: 1. 24 CFR 3280.304-Will the Department accept the application of a 1.6 load duration factor as permitted in the 91 NDS for wind loads in designing connections which use staples?

Answer: No. However, as indicated in our response to Question 6 in the previous Interpretative Bulletin published in the Federal Register on April 21, 1994 [59 FR 19075], a 1.33 factor may be used in accordance with UM-25d. No additional test data or adequate technical substantiation has been provided which changes our prior clarification on this subject.

2. 24 CFR 3280.304 and 3280.306(f)(2)-Does the 1.6 load duration factor permitted by the NDS also apply to the design of interior partitions?

Answer: Yes. 24 CFR 3280.305(f)(2) as amended in the Federal Register on October 25, 1993 [59 FR 54975] indicates that a 1.33 factor may be used to increase the allowable design stress. The 1.6 factor which is permitted under the 1991 National Design Specification for Wood Products would also be acceptable for interior partition members.

3. 24 CFR 3280.305(c)(1)(I)-(a) Can the dead load of the whole roof/ceiling assembly including the trusses be subtracted from the design roof uplift loads to obtain a net uplift for test/design purposes?

(b) If so, can all of the actual dead loads be used including eave portions?

Answer: (a) Yes, the dead load may be deducted for homes designed to be located in high wind areas (Wind Zones II and III). However, the roof/ceiling dead load (including trusses) cannot be deducted from the "net" uplift load for homes designed for Wind Zone I.

(b) Yes, except for Wind Zone I as indicated in the response to 3. (a) above.

4. 24 CFR 3280.305(c)(1)(ii)-(a) Do the design prints, calculations and test reports, etc., relating to shear walls, diaphragms, ridge beams, fastenings and its components and cladding material (roof trusses, wall studs, exterior sheathing, roofing siding material exterior glazing, etc.) need to be sealed (stamped) and/or signed by a registered Professional Engineer or Architect?

(b) Can a Professional Engineer on the staff of a DAPIA, witness component tests in the capacity of a listing agency 24 CFR 3280.2(a)(14), and 24 CFR 3282.360|, provide the professional certification required, and accept the certified design for clients it serves as a DAPIA without violating the conflict of interest provisions of 24 CFR 3282.359 of the Manufactured Housing Procedural and Enforcement Regulations?

Answer: (a) All of the cited documents are required to be certified by a Professional Engineer or Architect. If a Professional Engineer or Architect elects not to seal and/or sign each document, there must be an up-to-date record in the package (e.g. an index or list of all documents) which the Professional Engineer or Architect has prepared and sealed.

(b) Yes, provided a different Professional Engineer on the staff of the DAPIA who did not witness the tests and certify the design accepts the listing for any manufacturer clients it serves as a DAPIA.

5. 24 CFR 3280.305(c)(1)(ii)-(a) Do skylights need to be designed for the same wind design pressure as the roof system? What pressures would apply?

(b) Do the skylights need to be protected similar to exterior windows and sliding glass doors of homes designed to be in Wind Zones II and III?

Answer: (a) Skylights need to be designed to resist the same design pressures as "Exterior roof coverings, sheathing, and fastenings" indicated in the "Table of Design Wind Pressures". The location of the skylight in the roof would determine the specific design pressure requirements. However, it is not necessary to complete certification of skylights to the higher wind pressures until January 17, 1995.

(b) The Department believes that the subject needs further examination before a final judgment is made. The Department will issue further guidance on this question in the future.

6. 24 CFR 3280.305(c)(1)(ii)(a)-Can the wind design pressures for Wind Zones II and III be based in

part on ASCE 7-88 and in part on the "Table of Design Wind Pressures"?

Answer: No. The two alternatives cannot be mixed. One of the two methods must be used to completely design the manufactured home structure and each of its wind resisting parts for the design wind pressures designated by ASCE 7-88 or the "Table".

7. 24 CFR 3280.305(c)(1)(ii)(a)-What specific design wind pressures are required to be used for homes designed for high wind areas with roof slopes less than 10 degrees or greater than 30 degrees?

Answer: The design criteria are those for Overturning, Sliding and Anchoring, Main Wind Force Resisting Systems, and Components and Cladding identified in Chapter 6., "Wind Loads" of ASCE 7-88.

8. 24 CFR 3280.305(c)(1)(ii)(b)-Additional questions regarding Footnote 8 in the "Table of Design Wind Pressures":

(a) Can air permeable exterior wall cladding materials which cannot be secured at the 6" o.c. fastening pattern due to their configuration be alternatively evaluated by testing for the design pressures specified in the "Table"?

(b) If the answer to (a) is yes, can a pressure reduction factor be applied in testing certain air permeable exterior cladding materials, such as vinyl lap siding, for the design pressures specified by the "Table"?

(c) Do the fastening requirements for structural rated sheathing to wall framing members in Footnote 8 of the Table of Design Pressures indicated in our response to Question 17, in the previous Interpretative Bulletin 59 FR 19076], also apply when the material is both a structural sheathing and an exterior covering material?

(d) Can exterior cladding materials, such as vertical steel siding, which are directly secured to wall framing members without a 3/8" rated structural sheathing be evaluated by testing for the design pressures specified in the Table?

Answer: (a) Yes, provided that there is compliance with the requirements of the waiver announced above.

(b) No.

(c) Yes, provided fasteners for any combined 3/8" minimum structural rated sheathing and exterior covering material are installed at 6" o.c. from the sheathing to wall framing members (plates, studs, jamb studs, headers). For vertical wall and jamb studs the orientation of 6" o.c. is in the vertical direction.

(d) Yes, provided the exterior covering and its fastenings are capable of resisting the full positive and

negative design pressures specified in the "Table" for wall corners and other areas when tested in accordance with 24 CFR 3280.401(b) of the Standards.

9. 24 CFR 3280.305(c)(1)(ii)(b)-What uplift loads are required to be used when evaluating the field connection of ridge beams of multi-module homes?

Answer: For designs which are prepared in accordance with the "Table of Design Wind Pressures", the pressures indicated for the entry "Ridge Beams and Other Main Roof Support Beams" are to be used to design the connections (30 PSF Wind Zone II, 36 PSF Wind Zone III).

10. 24 CFR 3280.305(c)(1)(ii)(b)-Do the higher uplift loads indicated in the Table within 3'-0" from the ridge and sidewall need to be applied to roof trusses in conjunction with the normal uplift loads when uplift tested/evaluated?

Answer: No. However, trusses are required to be doubled within 3'-0" from each end of the roof and all roof trusses are to be capable of resisting the design pressures indicated in the Table (39 PSF for Wind Zone II; 47 PSF for Wind Zone III).

11. 24 CFR 3280.305(c)(1)(ii)(b)-(a) Do manufactured home sidewalls including header assemblies in high wind areas need to be calculated/tested for combined horizontal and uplift wind forces?

(b) If yes, what uplift pressures should be applied?

(c) If testing is used to substantiate a manufacturer's design, do the wall assemblies need to be tested under the combined loading conditions?

(d) Can the sidewalls be tested for the horizontal wind load only and calculated for the tensile load independently using accepted engineering design practices?

(e) If sidewalls are tested, can wall stud requirements for openings be evaluated separately by calculations using accepted engineering practices?

(f) Is there a minimum number of wall studs which are required to be utilized in tested assemblies?

(g) Would any testing procedure employed that applies combined loading to a sidewall test assembly require HUD approval in accordance with 24 CFR 3280.303(g)?

Answer: (a) Yes

(b) For sidewall studs not located at openings, the design uplift pressure is 39 PSF for Wind Zone II and 47 PSF for Wind Zone III. For headers and studs at openings, the uplift design pressure is 30 PSF for Wind Zone II and 36 PSF for Wind Zone III.

(c) Yes. (d) No. (e) Yes.

(f) There is no minimum quantity of wall studs which must be utilized in a test assembly for a sidewall. However, there needs to be an adequate number of wall studs in the assembly to measure all wind load effects and the influence of repetitive framing members in resisting the combined lateral and uplift design wind pressures. (g) No. The requirement for obtaining HUD approval of testing procedures pursuant to 24 CFR 3280.303(g) is not effective until October 25, 1994. However, manufacturers and DAPIAs are encouraged to submit proposed testing protocols to the Department for review and evaluation prior to the effective date.

12. For homes with end gables, does the 3'-0" measurement for doubling of roof trusses start at the extreme end of the gable or at the end wall?

Answer: All trusses within 3'-0" of the extreme end of the gable are to be doubled.

13. 24 CFR 3280.306(a)-In designing anchoring or foundation systems, can the dead load of the complete home be deducted to determine the net overturning wind design forces?

Answer: Yes, the dead load of the entire structure may be used to resist wind loading effects in all Wind Zones.

14. 24 CFR 3280.305(c)(1)(ii)(b)-If a roof truss forms or contains an eave at the sidewall, does the overhang or projection have to meet the higher eave load requirements in the "Table of Design Pressures" for Wind Zones II (-51 PSF) and III (-62 PSF)?

Answer: Yes.

15. 24 CFR 3280.305(c)(1)(ii)(b)-(a) Does Footnote 6 of the "Table of Design Pressures" require complete cementing of the underlayment of asphalt roofing shingles to a 3/8" structural rated roof sheathing or is the cement to be applied to all edges, ends, and end laps of the underlayment and other areas indicated in the Asphalt Roofing Manufacturers Association (ARMA) Residential Roofing Manual, Chapter 7, for low slope applications?

(b) If the cement application is limited to edges, ends and end laps of the underlayment, is a 6" minimum wide strip of asphalt cement acceptable for those areas and a 3" minimum wide strip of asphalt cement acceptable for top laps?

Answer: (a) The application of cement for the underlayment need only be applied to edges, ends and end laps of the underlayment. This is in addition to cementing required for the starter strip, eave flashing, and locations 24" from the inside of the exterior wall as indicated in the ARMA Residential Roofing Manual, Chapter 7, for low slope applications.

(b) Yes.

16. 24 CFR 3280.402(c)(2)-Please confirm if the roof trusses required to be uplift tested for high wind areas shall be tested in the inverted position and loads applied to the bottom chords of the roof trusses?

Answer: Roof trusses may be tested for uplift loads either in an inverted or upright position. The Department is in the process of examining research and engineering analysis to determine the proper protocol for testing trusses. Further guidance will be issued on this subject in the future.

17. Questions regarding the effective date of the new wind safety standards as related to the Department's statement in the Interpretative Bulletin published in the Federal Register on April 21, 1994: "Every home entering the first stage of production as of July 13, 1994 must comply with the new wind safety provisions." (59 FR 19075).

(a) Does this mean that every home entering the first stage of production before July 13, 1994 may still comply with the current wind standards?

(b) Please clarify that the first stage of production for an individual manufacturing plant is identified in the approved quality control manual for that facility?

(c) Can manufacturers produce homes to the new wind standards earlier than the effective date of July 13, 1994?

Answer: (a) Homes that enter the first stage before July 13, 1994 may not necessarily be built to the current standards. Based on our review of the National Manufactured Housing Construction and Safety Standards Act of 1974 ("Act") and the Manufactured Home Procedural and Enforcement Regulations ("Regulations"), all homes that are labeled on or after the effective date of the new standards would be required to comply with those standards. Pursuant to 24 CFR 3280.8(c), and 24 CFR 3282.362(c)(2)(I)(c), the label is the certification by the manufacturer that the home "is constructed in conformance with the Federal manufactured home construction and safety standards in effect on the date of manufacture."

The "Date of Manufacture" is the date on which the label is affixed to the manufactured home. The label is to be affixed only at the end of the last stage of production of the manufactured home. Consequently, a manufacturer labeling a home on or after the effective date of the new standards must comply with those standards or be in violation of Section 610(a)(4) of the Act, 42 U.S.C. 5409(a)(4), even if the home entered the first stage of production before the effective date. The Department recognizes that, in one respect, the Regulations are not clear. Because of this lack of clarity, the Department, in this instance only, will take no action to enforce this requirement if it can be shown that homes entered the normal first stage of production before July 13, 1994. In the future, however, the Department will expect compliance with the standards that are in effect on the date the home is labeled.

(b) The Regulations, under 24 CFR 3282.203(c), require the DAPIA to approve the quality assurance manual which includes, among other information, "a station-by-station description of the manufacturing process." Therefore, the normal first station in the production process as identified in the quality control manual would be "the first stage of production."

(c) Yes, provided the manufacturer is completely capable of meeting all requirements of the new standards, uses the new data plate and includes a copy of the new wind zone map with each home so produced. In addition, the Department urges manufacturers to use the time before the effective date of the standards to prepare for producing homes to the new standards so that production will continue without interruption. This includes preparing designs, seeking approval for the designs ordering any necessary materials, testing, etc. For homes that are built to the current standards but sold after July 13, 1994 to be sited in an area designated as Zone II or Zone III in the new rule, the Department recommends that the consumer be informed: (1) That the home has been built to previous standards which have since been amended; and (2) that these new wind standards have been enacted to increase the safety of manufactured homes in high-wind areas.

Authority: 42 U.S.C. 5403 and 42 U.S.C. 3535(d).

Dated: June 24, 1994.

James E. Schoenberger, Associate General Deputy Assistant Secretary for Housing-Federal Housing Commissioner.

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