

**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:

(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.

(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 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 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 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 periodic qualification testing program acceptable to the Department.

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

**§ 3280.402 Test procedure for roof trusses.**

(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.

(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.

(1) As an alternate test procedure, the top chord may be sheathed with  $\frac{1}{4}$  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  $\frac{1}{8}$  inch. The plywood strip shall be nailed with 4d nails or equivalent staples not closer than 8 inches on center along the top

**§ 3280.402**

**24 CFR Ch. XX (4-1-04 Edition)**

chord. The bottom chords of the adjacent trusses may be either:

- (i) Unbraced,
- (ii) Laterally braced together (not cross braced) with 1"×2" stripping not closer than 24 inches on center nailed with only one 6d nail at each truss, or
- (iii) Covered with the material, with connections or methods of attachment, as specified for the completed manufactured home.

(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.

(c) *Nondestructive test procedure*—(1) *Dead load plus live load.* (i) Noting figure A-1, measure and record initial elevation of the truss in test position at no load.

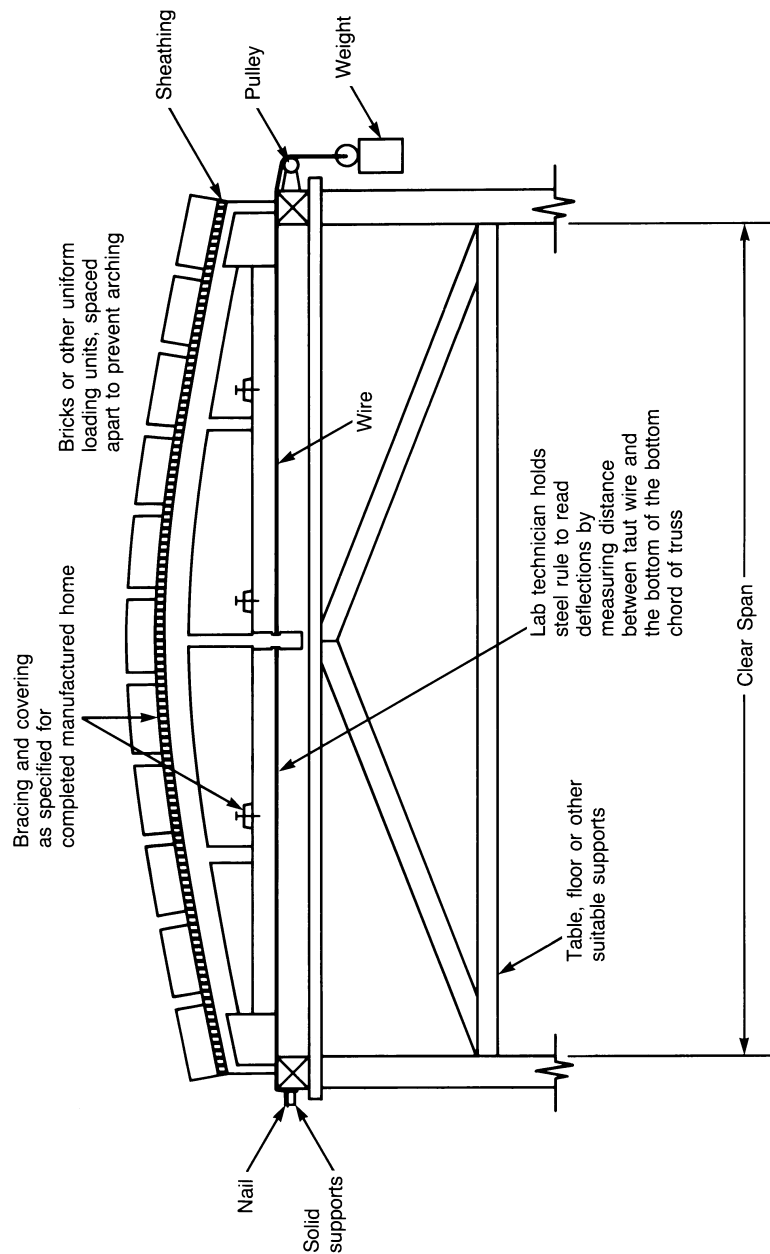


Figure A-1. Test Procedures for Roof Trusses

(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.

(iii) Maintaining the dead load, add live load in approximate  $\frac{1}{4}$  design live load increments. Measure the deflections after each loading increment.

### § 3280.403

### 24 CFR Ch. XX (4-1-04 Edition)

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.

(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.

(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.

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

(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.

(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.

(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.

(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.

(d) *Destructive test procedure.* (1) Destructive tests shall be performed on three trusses to generally evaluate the truss design.

(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.

(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.

(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.

(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).

(e) Trusses qualifying under the non-destructive 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, as amended at 58 FR 55008, Oct. 25, 1993]

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

(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.

(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).

(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).

(d) *Glass.* (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."