the effects of highway movement such that the home is capable of being transported safely and installed as a habitable structure. Structural, plumbing, mechanical, and electrical systems must be designed to function after setup. The home must remain weather protected during the transportation sequence to prevent internal damage.

(b) *Testing or analysis requirements.* Suitability of the transportation system and home structure to withstand the effects of transportation must be permitted to be determined by testing, or engineering analysis, or a combination of the two as required by paragraphs (b)(1) and (2) of this section.

(1) *Road tests.* Tests must be witnessed by an independent registered professional engineer or architect, manufacturer's IPIA or DAPIA, or by a recognized testing organization. Such testing procedures must be part of the manufacturer's approved design.

(2) *Engineering analysis.* Engineering analysis methods based on the principles of mechanics and/or structural engineering may be used to substantiate the adequacy of the transportation system to withstand in-transit loading conditions. As transportation loadings are typically critical in the longitudinal direction, analysis should, in particular, provide emphasis on design of longitudinal structural components of the manufactured home (*e.g.*, main chassis girder beams, sidewalls, and rim joists, etc.). Notwithstanding, all structural elements necessary to the structural integrity of the manufactured home during in-transit loading are also to be evaluated (*e.g.,* transverse chassis members and floor framing members, etc.).

(i)(A) The summation of the design loads in paragraphs (b)(2)(i)(A)(*1*) through (*3*) of this section may be used to determine the adequacy of the chassis in conjunction with the manufactured home structure to resist in-transit loading:

(*1*) Dead load, the vertical load due to the weight of all structural and nonstructural components of the manufactured home at the time of shipment.

(*2*) Floor load, a minimum of 3 pounds per square foot.

(*3*) Dynamic loading factor, (0.25)[(b2iA) + (b2iB)].

(B) However, the in-transit design loading need not exceed twice the dead load of the manufactured home.

(ii) 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 pre-cambering 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 members by the relative stiffness principle.

(iii) The analysis is also to include consideration for:

(A) Location of openings in the sidewall during transport and, when appropriate,

provisions for reinforcement of the structure and/or chassis at the opening.

(B) Sidewall component member sizing and joint-splice analysis (*i.e.*, top and bottom plates, etc.), and connections between load carrying elements.

[86 FR 2523, Jan. 12, 2021]

§ 3280.904 Specific requirements for designing the transportation system.

(a) *General.* The transportation system must be designed and constructed as an integrated unit which is safe and suitable for its specified use. In operation, the transportation system must effectively respond to the control of the towing vehicle tracking and braking, while traveling at applicable highway speeds and in normal highway traffic conditions.

(b) *Specific requirements*—(1) *Drawbar.* The drawbar must be constructed of sufficient strength, rigidity, and durability to safely withstand those dynamic forces experienced during highway transportation. It must be securely fastened to the manufactured home substructure.

(2) *Coupling mechanism.* The coupling mechanism (which is usually of the socket type) must 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 must be equipped with a manually operated mechanism so adapted as to prevent disengagement of the unit while in operation. The coupling must be so designed that it can be disconnected regardless of the angle of the manufactured home to the towing vehicle.

(3) *Chassis.* The chassis, in conjunction with the manufactured home structure, must be constructed to effectively sustain the design loads. The integrated structure must be capable of ensuring the integrity of the complete manufactured home and ensuring against excessive deformation of structural or finish members.

(4) *Running gear assembly*—(i) *Design criteria.* The design load used to size running gear components must be the gross static dead weight minus the static tongue weight supported by the drawbar. Running gear must 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 must be designed to facilitate routine maintenance, inspection, and replacement.

(ii) *Location.* Location of the running gear assembly must 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. Weights shall be checked with the home in a level position ready for transport. The coupling weight must be not less than 12 percent nor more than 25 percent of the gross weight.

(5) *Spring assemblies.* Spring assemblies (springs, hangers, shackles, bushings, and mounting bolts) must be capable of supporting the running gear design loads, without exceeding maximum allowable stresses for design spring assembly life as recommended by the spring assembly manufacturer. The capacity of the spring system must ensure that under maximum operating load conditions, sufficient clearance is maintained between the tire and manufactured home's frame or structure to permit unimpeded wheel movement and for changing tires.

(6) *Axles.* Axles, and their connecting hardware, must be capable of supporting the static running gear design loads, without exceeding maximum allowable design axle loads as recommended by the axle manufacturer. The number and load capacity necessary to provide a safe tow must not be less than those required to support the design load.

(i) *Recycled axles.* Before reuse, all axles, including all component parts, must be reconditioned as required pursuant to a program accepted by a nationally recognized testing agency. The recycling program must be approved, and the axles must be labeled by a nationally recognized testing agency. Recycled axles and their components must utilize compatible components and be of the same size and rating as the original equipment.

(ii) [Reserved].

(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.

(8) *Tires, wheels, and rims.* Tires, wheels, and rims must be selected, sized, and fitted to axles so that static dead load supported by the running gear does not exceed the load capacity of the tires. Tires must not be loaded beyond the load rating marked on the sidewall of the tire or, in the absence of such a marking, the load rating specified in any of the publications of any of the organizations listed in Federal Motor Vehicle Safety Standard (FMVSS) No. 119 in 49 CFR 571.119, S5.1(b). Wheels and rims must be sized in accordance with the tire manufacturer's recommendations as suitable for use with the tires selected.

(i) *Inflation pressure.* The load and cold inflation pressure imposed on the rim or wheel must not exceed the rim and wheel manufacturer's instructions even if the tire has been approved for a

higher load or inflation. Tire cold inflation pressure limitations and the inflation pressure measurement correction for heat must be as specified in 49 CFR 393.75(h).

(ii) *Used tires.* Whenever the tread depth is at least 1⁄16 inch as determined by a tread wear indicator, used tires are permitted to be sized in accordance with 49 CFR 571.119. The determination as to whether a used tire is acceptable must also include a visual inspection for thermal and structural defects (*e.g.*, dry rotting, excessive tire sidewall splitting, etc.). Used tires with such structural defects must not be installed on manufactured homes.

(9) *Brake assemblies*—(i) *Braking axles.* 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 must be determined and documented by engineering analysis. Those alternatives listed in § 3280.903(c) may be accepted in place of such an analysis. Unless substantiated in the design to the satisfaction of the approval agency by either engineering analysis in accordance with § 3280.903(a)(1) or tests in accordance with paragraph (b)(9)(ii) of this section, there must be a minimum of two axles equipped with brake assemblies on each manufactured home transportable section.

(ii) *Stopping distance.* Brakes on the towing vehicle and the manufactured home (a drive-away/tow-away) must be capable of ensuring that the maximum stopping distance from an initial speed of 20 miles per hour does not exceed 35 feet in accordance with 49 CFR 393.52(d) for 2 or fewer vehicles in drive away or tow away operation.

(iii) *Electrical brake wiring.* Brake wiring must be provided for each brake. The brake wire must not be less than the value specified in the brake manufacturer's instructions. Aluminum wire, when used, must be provided with suitable termination that is protected against corrosion.

(10) *Lamps and associated wiring.* Stop lamps, turn signal/lamps, and associated wiring must meet the appropriate sections of FMVSS No. 108 in 49 CFR 571.108, which specify the performance and location of these lamps and their wiring. The manufacturer may meet these requirements by utilizing a temporary light/wiring harness, which has components that meet the FMVSS No. 108. The temporary harness is permitted to be provided by the manufactured home transportation carrier.

[40 FR 58752, Dec. 18, 1975, as amended at 86 FR 2524, Jan. 12, 2021]

Subpart K—Attached Manufactured Homes and Special Construction Considerations

SOURCE: 86 FR 2525, Jan. 12, 2021, unless otherwise noted.

§ 3280.1001 Scope.

This subpart covers the requirements for attached manufactured homes and other related construction associated with manufactured homes not addressed elsewhere within this part.

§ 3280.1002 Definitions.

The following definitions are applicable to this subpart only:

Attached manufactured home. Two or more adjacent manufactured homes that are structurally independent from foundation to roof and with open space on at least two sides, but which have the appearance of a physical connection (*i.e.*, zero lot line).

Fire separation wall. An adjoining wall of a manufactured home that separates attached manufactured homes with a fire separation distance of less than three feet.

§ 3280.1003 Attached manufactured home unit separation.

(a) *Separation requirements.* (1) Attached manufactured homes shall be separated from each other by a fire separation wall of not less than 1-hour fire-resistive rating with exposure from both sides on each attached manufactured home unit when rated based on tests in accordance with ASTM E119–05 (incorporated by reference, see § 3280.4).

(2) Fire-resistance-rated floor/ceiling and wall assemblies shall extend to and be tight against the exterior wall, and wall assemblies shall extend from the foundation to the underside of the roof sheathing.