§ 3285.204 Ground moisture control.

(a) *Vapor retarder.* If the space under the home is to be enclosed with skirting or other materials, a vapor retarder must be installed to cover the ground under the home, unless the home is installed in an arid region with dry soil conditions.

(b) *Vapor retarder material.* A minimum of six mil polyethylene sheeting or its equivalent must be used.

(c) *Proper installation.* (1) The entire area under the home must be covered with the vapor retarder, as noted in § 3285.204(a), except for areas under open porches, decks, and recessed entries. Joints in the vapor retarder must be overlapped at least 12 inches.

(2) The vapor retarder may be placed directly beneath footings, or otherwise installed around or over footings placed at grade, and around anchors or other obstructions.

(3) Any voids or tears in the vapor retarder must be repaired. At least one repair method must be provided in the manufacturer's installation instructions.

Subpart D—Foundations

§ 3285.301 General.

(a) Foundations for manufactured home installations must be designed and constructed in accordance with this subpart and must be based on site conditions, home design features, and the loads the home was designed to withstand, as shown on the home's data plate.

(b) Foundation systems that are not pier and footing type configurations may be used when verified by engineering data and designed in accordance with § 3285.301(d), consistent with the design loads of the MHCSS. Pier and footing specifications that are different than those provided in this subpart, such as block size, metal piers, section width, loads, and spacing, may be used when verified by engineering data that comply with §§ 3285.301(c) and (d) and are capable of resisting all design loads of the MHCSS.

(c) All foundation details, plans, and test data must be designed and certified by a registered professional engineer or registered architect, and must not take the home out of compliance with the MHCSS. (See 3285.2)

(d) Alternative foundation systems or designs are permitted in accordance with either of the following:

(1) Systems or designs must be manufactured and installed in accordance with their listings by a nationally recognized testing agency, based on a nationally recognized testing protocol; or

(2) System designs must be prepared by a professional engineer or a registered architect or tested and certified by a professional engineer or registered architect in accordance with acceptable engineering practice and must be manufactured and installed so as not to take the home out of compliance with the Manufactured Home Construction and Safety Standards (part 3280 of this chapter).

§ 3285.302 Flood hazard areas.

In flood hazard areas, foundations, anchorings, and support systems must be capable of resisting loads associated with design flood and wind events or combined wind and flood events, and homes must be installed on foundation supports that are designed and anchored to prevent floatation, collapse, or lateral movement of the structure. Manufacturer's installation instructions must indicate whether:

(a) The foundation specifications have been designed for flood-resistant considerations, and, if so, the conditions of applicability for velocities, depths, or wave action; or

(b) The foundation specifications are not designed to address flood loads.

§ 3285.303 Piers.

(a) *General.* The piers used must be capable of transmitting the vertical live and dead loads to the footings or foundation.

(b) *Acceptable piers—materials specification.* (1) Piers are permitted to be concrete blocks; pressure-treated wood with a water borne preservative, in accordance with AWPA Standard U1–04 (incorporated by reference, see § 3285.4) for Use Category 4B ground contact applications; or adjustable metal or concrete piers.

(2) Manufactured piers must be listed or labeled for the required vertical load

capacity, and, where required by design, for the appropriate horizontal load capacity.

(c) *Design requirements.* (1) *Load-bearing capacity.* The load bearing capacity for each pier must be designed to include consideration for the dimensions of the home, the design dead and live loads, the spacing of the piers, and the way the piers are used to support the home.

(2) Center beam/mating wall support must be required for multi-section homes and designs must be consistent with Tables 2 and 3 to § 3285.303 and Figures A, B, and C to § 3285.310.

(d) *Pier loads.* (1) Design support configurations for the pier loads, pier spacing, and roof live loads must be in accordance with Tables 1, 2, and 3 to § 3285.303 and the MHCSS. Other pier designs are permitted in accordance with the provisions of this subpart.

(2) Manufactured piers must be rated at least to the loads required to safely support the dead and live loads, as required by § 3285.301, and the installation instructions for those piers must be consistent with Tables 1, 2, and 3 to this section.

TABLE 1 TO § 3285.303—FRAME BLOCKING ONLY/PERIMETER SUPPORT NOT REQUIRED EXCEPT AT OPENINGS

Pier spacing	Roof live load (psf)	Location	Load (lbs.)
4 ft. 0 in.	20	Frame	2,900
	30	Frame	3,300
	40	Frame	3,600
6 ft. 0 in.	20	Frame	4,200
	30	Frame	4,700
	40	Frame	5,200
8 ft. 0 in.	20	Frame	5,500
	30	Frame	6,200
	40	Frame	6,900
10 ft. 0 in.	20	Frame	6,800
	30	Frame	7,600
	40	Frame	8,500

NOTES: 1. See Table to § 3285.312 for cast-in-place footing design by using the noted loads.

2. Table 1 is based on the following design assumptions: maximum 16 ft. nominal section width (15 ft. actual width), 12'' eave, 10'' I-beam size, 300 lbs. pier dead load, 10 psf roof dead load, 6 psf floor dead load, 35 plf wall dead load, and 10 plf chassis dead load.

3. Interpolation for other pier spacing is permitted.

4. The pier spacing and loads shown in the above table do not consider flood or seismic loads and are not intended for use in flood or seismic hazard areas. In those areas, the foundation support system is to be designed by a professional engineer or architect.

5. See Table to § 3285.312 for sizing of footings.

TABLE 2 TO § 3285.303—FRAME PLUS PERIMETER BLOCKING/PERIMETER BLOCKING REQUIRED

Maximum pier spacing	Roof live load(psf)	Location	Load (lbs.)
4 ft. 0 in.	20	Frame	1,400
		Perimeter	1,900
		Mating	3,200
4 ft. 0 in.	30	Frame	1,400
		Perimeter	2,300
		Mating	3,800
4 ft. 0 in.	40	Frame	1,400
		Perimeter	2,600
		Mating	4,400
6 ft. 0 in.	20	Frame	1,900
		Perimeter	2,700
		Mating	4,700
6 ft. 0 in.	30	Frame	1,900
		Perimeter	3,200
		Mating	5,600
6 ft. 0 in.	40	Frame	1,900
		Perimeter	3,700
		Mating	6,500
8 ft. 0 in.	20	Frame	2,400
		Perimeter	3,500
		Mating	6,100
8 ft. 0 in.	30	Frame	2,400
		Perimeter	4,200
		Mating	7,300
8 ft. 0 in.	40	Frame	2,400
		Perimeter	4,800
		Mating	8,500
10 ft. 0 in.	20	Frame	2,900
		Perimeter	4,300
		Mating	7,600
10 ft. 0 in.	30	Frame	2,900
		Perimeter	5,100
		Mating	9,100
10 ft. 0 in.	40	Frame	2,900
		Perimeter	6,000
		Mating	10,600

NOTES: 1. See Table to § 3285.312 for cast-in-place footing design by using the noted loads.

2. Mating wall perimeter piers and footings only required under full height mating walls supporting roof loads. Refer to Figures A and B to § 3285.310.

3. Table 2 is based on the following design assumptions: maximum 16 ft. nominal section width (15 ft. actual width), 12'' eave, 10''

I-beam size, 300 lbs. pier dead load, 10 psf roof dead load, 6 psf floor dead load, 35 plf wall dead load, and 10 plf chassis dead load.

4. Interpolation for other pier spacing is permitted.

5. The pier spacing and loads shown in the above table do not consider flood or seismic loads and are not intended for use in flood or seismic hazard areas. In those areas, the foundation support system is to be designed by a professional engineer or architect.

6. See Table to § 3285.312 for sizing of footings.

TABLE 3 TO § 3285.303—RIDGE BEAM SPAN FOOTING CAPACITY

Mating wall opening (ft)	Roof live load (psf)	Pier and footing load (lbs.)
5	20	1,200
	30	1,600
	40	1,900
10	20	2,300
	30	3,100
	40	3,800
15	20	3,500
	30	4,700
	40	5,800
20	20	4,700
	30	6,200
	40	7,500
25	20	5,800
	30	7,800
	40	9,700
30	20	7,000
	30	9,300
	40	11,600
35	20	8,100
	30	10,900
	40	13,600

NOTES: 1. See Table to § 3285.312 for cast-in-place footing design by using the noted loads.

2. Table 3 is based on the following design assumptions: maximum 16 ft. nominal section width (15 ft. actual width), 10″ I-beam size, 300 lbs. pier dead load, 10 psf roof dead load, 6 psf floor dead load, 35 plf wall dead load, and 10 plf chassis dead load.

3. Loads listed are maximum column loads for each section of the manufactured home.

4. Interpolation for maximum allowable pier and column loads is permitted for mateline openings between those shown in the table.

5. The pier spacing and loads shown in the above table do not consider flood or seismic loads and are not intended for use in flood or seismic hazard areas. In those areas, the foundation support system must be designed by a professional engineer or registered architect.

6. See Table to § 3285.312 for sizing of footings.

§ 3285.304 Pier configuration.

(a) *Concrete blocks.* Installation instructions for concrete block piers must be developed in accordance with the following provisions and must be consistent with Figures A and B to § 3285.306.

(1) Load-bearing (not decorative) concrete blocks must have nominal dimensions of at least 8 inches × 8 inches × 16 inches;

(2) The concrete blocks must be stacked with their hollow cells aligned vertically; and

(3) When piers are constructed of blocks stacked side-by-side, each layer must be at right angles to the preceding one, as shown in Figure B to § 3285.306.

(b) *Caps.* (1) Structural loads must be evenly distributed across capped-hollow block piers, as shown in Figures A and B to § 3285.306.

(2) Caps must be solid concrete or masonry at least 4 inches in nominal thickness, or hardboard lumber at least 2 inches nominal in thickness; or be corrosion-protected minimum one-half inch thick steel; or be of other listed materials.

(3) All caps must be of the same length and width as the piers on which they rest.

(4) When split caps are used on double-stacked blocks, the caps must be installed with the long dimension across the joint in the blocks below.

(c) *Gaps.* Any gaps that occur during installation between the bottom of the main chassis beam and foundation support system must be filled by:

(1) Nominal 4 inch × 6 inch × 1 inch shims to level the home and fill any gaps between the base of the main chassis beam and the top of the pier cap;

(2) Shims must be used in pairs, as shown in Figures A and B to § 3285.306, and must be driven in tightly so that they do not occupy more than one inch of vertical height; and

(3) Hardwood plates no thicker than 2 inches nominal in thickness or 2 inch or 4 inch nominal concrete block must be used to fill in any remaining vertical gaps.