

Chapter E 550

MOBILE HOMES

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E 550.01 Scope. (1) The provisions of this chapter cover the electric conductors and equipment installed within or on mobile homes and also the conductors that connect mobile homes to a supply of electricity.

(a) Wherever the requirements of other chapters of the Wisconsin state electrical code and chapter E 550, the requirements of chapter E 550 shall apply.

(2) A mobile home not intended as a dwelling unit, as for example, equipped for sleeping purposes only, contractor's on-site offices, construction job dormitories, mobile studio dressing rooms, banks, clinics, mobile stores or intended for the display or demonstration of merchandise or machinery, shall not be required to meet the provisions of this chapter pertaining to the number or capacity of circuits required. It shall, however, meet all other applicable requirements of this chapter if provided with an electrical installation intended to be energized from a 115 volt or 115/230 volt AC power supply system.

(3) The provisions of this chapter apply to mobile homes intended for connection to a wiring system nominally rated 115/230 volts, 3-wire AC, with grounded neutral.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.

E 550.02 Definitions. The following definitions apply only to the requirements of this chapter.

(1) **FEEDER:** That part of the electric distribution system from the service entrance equipment to the mobile home.

(2) **MOBILE HOME:** A vehicular, portable structure built on a chassis and designed to be used without a permanent foundation as a dwelling when connected to indicated utilities.

(3) **MOBILE HOME PARK:** The location of 2 or more mobile home spaces.

(4) **PERMANENT MOBILE HOME SPACE:** The location of an individual trailer that is not part of a mobile home park.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.

E 550.03 Service lateral, service entrance conductors and service equipment. (1) **SERVICE LATERAL:** The service lateral shall terminate

in a terminal box if more than one mobile home is served or in the service entrance equipment if a single mobile home is served.

(2) SERVICE ENTRANCE CONDUCTORS. (a) *Feeding mobile home service equipment.* All service entrance conductors and service equipment shall be 3-wire (2 ungrounded conductors and one neutral) with conductor ratings specified as follows:

1. The service entrance conductors serving one mobile home service equipment shall be rated not less than 50 amperes, 3-wire.

2. The service entrance conductors serving 2, 3, or 4 sets of service equipment shall be rated not less than 100 amperes, 3-wire.

3. Where the service entrance conductors serve more than 4 sets of service equipment, apply a minimum demand of 50 amperes for each set and then apply a demand factor of 50% to the total demand to determine the minimum size service entrance conductors.

(b) *Feeding mobile home.* The feeder between the service equipment and the mobile home shall consist of not more than 2 mobile home service cords each rated 50 amperes or permanently installed circuits as permitted by subsection (2) (b) 4.

1. Exception: A mobile home that is factory-equipped with gas or oil-fired central heating equipment and cooking appliances may be provided with a mobile home supply cord rated 40 amperes, minimum.

2. Each mobile home supply cord shall be approved for the purpose and have four conductors, one of which shall be identified by a continuous green color or a continuous green color with a yellow stripe. The attachment plug, connectors and mating receptacles shall be of a 3-pole, 4-wire grounding type approved by the administrative authority. The mobile home power-supply cord shall be permanently attached to the mobile home distribution panel. A suitable clamp or the equivalent shall be provided at the distribution panel to afford strain relief for the cord to prevent strain from being transmitted to the terminals. The power supply cord shall be not more than 26½ feet long.

Note. It is the policy of the administrative authority to approve grounding type attachment plugs, connectors and mating receptacles covered by American Standard C73 Attachment Plugs and Receptacles.

3. Second supply cord. Where the calculated load of the mobile home is in excess of 50 amperes, or where a separately metered appliance is installed in the mobile home, a second 50 ampere mobile home supply cord shall be installed. Where 2 cord supply systems are installed, they shall not be interconnected on either the line side or the load side except that the grounding circuits and grounding means shall be electrically interconnected.

4. Permanent wiring. Permanent wiring may be used between the service equipment and mobile home in the case of a permanent mobile home space, or where the calculated load exceeds 100 amperes, or between the service disconnecting means and receptacle when they are in separate enclosures. The permanent wiring method shall consist of 4 permanently installed conductors in an approved wiring method, one conductor being identified by a continuous green color or a continuous green color with a yellow stripe.

(3) SERVICE EQUIPMENT. The mobile home service equipment shall

be located adjacent to the mobile home and not mounted in or on the mobile home. The service equipment shall consist of disconnecting means, overcurrent protective device and receptacle as specified in section E 550.03 (3) (a).

(a) Each mobile home space shall be provided with a disconnecting means, overcurrent protective device and 3-pole, 4-wire grounding type receptacle, each rated not less than 50 amperes. The receptacle may be omitted where permanent wiring is permitted in subsection (2) (b) 4.

(b) The mobile home grounding conductor shall be bonded to the system neutral conductor within the disconnecting means enclosure. (See section E 550.09). A separate common grounding conductor shall be run from a grounding electrode to the disconnecting means enclosure where it shall be bonded to the system neutral and mobile home grounding conductor. The grounding electrode shall always be a metallic underground water piping system where such a piping system is available.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.

E 550.04 Disconnecting means and branch circuit protective equipment. (1) The branch circuit equipment may be combined with the disconnecting means as a single assembly. Such a combination may be designated as a distribution panel.

(2) Plug fuses and fuseholders shall be tamper-resistant, type "S," enclosed in dead-front fuse panels.

(3) Disconnecting means. (a) Disconnecting means shall be provided in each mobile home and shall be approved service entrance equipment consisting of circuit-breakers 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 mobile home. 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. The disconnecting equipment shall have a rating suitable for the connected load.

(b) Where 2 power supply cords are installed disconnecting means shall be provided for each cord and may be combined in a single equipment but without electrical interconnections other than for grounding purposes.

(c) A distribution panel main circuit-breaker shall be rated 50 ampere 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 panel 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 panel shall be plainly marked with the fuse size. The main circuit breakers or fuses shall be plainly marked "Main."

(4) Branch circuit protective equipment. (a) Branch circuit distribution equipment shall be installed in each mobile home and shall include overcurrent protection for each branch circuit consisting of either circuit breakers or fuses.

(b) Where circuit breakers are provided for branch-circuit protection, 230-volt circuits shall be protected by 2-pole common or companion trip, or handle-tied paired circuit breakers.

(c) The branch-circuit overcurrent devices shall be rated:

1. Not more than the circuit conductors; and
2. Not more than 150% of the rating of a single appliance rated 10 amperes or more; but
3. Not more than the fuse size marked on the air conditioner or other motor-operated appliance.

(5) Electrical nameplates. A metal nameplate on the outside adjacent to the supply cord entrance shall read, "This Mobile Home is Wired for 115/230 Volt, 3-wire, 60 Cycle Supply. Supply Cord 40 (or 50) amp." The voltage marking may read 120/240 Volts instead of 115/230 Volts.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.

E 550.05 Branch circuits. The number of branch circuits required shall be determined in accordance with the following:

(1) **LIGHTING.** Based on 3 watts per square foot times outside dimensions of the mobile home (hitch excluded) divided by 115 volts to determine number of 15 or 20 ampere lighting area circuits, e.g.,

$$\frac{3 \times \text{Length} \times \text{Width}}{115 \times 15 \text{ (or 20)}} = \text{No. of 15 (or 20) ampere circuits.}$$

(2) **PORTABLE APPLIANCES.** There shall be a minimum of two 20 ampere branch circuits for receptacle outlets in the kitchen area, which may supply other receptacle outlets in the dining, laundry, and patio areas. These circuits shall supply only portable appliances.

(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:

(a) Ampere rating of fixed appliances not over 50% of circuit rating if lighting outlets (receptacles, other than kitchen, dining area, and laundry, considered as lighting outlets) are on same circuit;

(b) For fixed appliances on a circuit without lighting outlets, the sum of rated amperes shall not exceed the branch-circuit rating for other than motor loads or 80% of the branch-circuit rating for air conditioning or other motor loads;

(c) The rating of a single portable appliance on a circuit having no other outlets shall not exceed 80% of the circuit rating;

(d) The rating of range branch circuit shall be based on the range demand as specified for ranges in section E 550.11 (2) (e).

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.

E 550.06 Receptacle outlets. (1) All receptacle outlets:

(a) Shall be of grounding type;

(b) Shall be installed according to section E 210.07; and

(c) Except when supplying specific appliances, receptacles shall be parallel blade, 15-ampere, 125-volt, either single or duplex.

(2) There shall be an individual outlet of the grounding type for each cord-connected fixed appliance installed.

(3) Except in the bath and hall areas, receptacle outlets shall be installed at all 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. Except as explained in the following, receptacle outlets are not required for wall spaces occupied by kitchen or wardrobe cabinets.

(a) In addition, a receptacle outlet shall be installed:

1. Over counter tops in the kitchen (at least one on each side of the sink if counter tops are on each side);
2. Adjacent to the refrigerator and free-standing gas-range space;
3. At counter top spaces for built-in vanities;
4. At counter top spaces under wall-mounted cabinets.

(4) Receptacle outlets shall not be installed within or adjacent to a shower or bathtub space.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.

E 550.07 Fixtures and appliances. (1) Water heaters, refrigerators, air conditioning equipment, ranges, electric heaters, washers, dryers and other like appliances shall be of an approved type and shall be connected in an approved manner and securely fastened in position. (See section E 550.09 for provisions on grounding.)

(2) (a) Specifically approved pendant-type fixtures or pendant cords may be installed in mobile homes.

(b) If a lighting fixture is provided over a bathtub or in a shower stall, it shall be of the approved enclosed and gasketed type.

(c) Switches shall not be located inside the tub or shower space.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.

E 550.08 Wiring methods and materials. Except as specifically limited in this section the wiring methods and materials included in the Wisconsin state electrical code shall be used in mobile homes.

(1) Nonmetallic outlet boxes are acceptable only with nonmetallic sheathed cable.

(2) 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.

(3) Metal-clad and nonmetallic cables may be passed through the centers of the wide side of 2 by 4 studs. However, they shall be protected where they pass through 2 by 2 studs or at other studs or frames where the cable or armor would be less than 1½ inches from the inside or outside surface. Steel plates on each side of the cable, or a tube, with not less than No. 16 manufacturer's standard gage wall thickness, are required to protect the cable. These plates or tubes shall be securely held in place.

(4) Where metallic faceplates are used they shall be effectively grounded.

(5) If the range, clothes dryer, or similar appliance is connected by armored cable or flexible conduit, a length of free cable or conduit should be provided to permit moving the appliance. The cable of flexible conduit should be adequately secured to the wall. Clearance space behind a range may provide the required protection when a range is connected by type SE cable. When used, type SE cable shall have an identified and insulated neutral plus an equipment grounding conductor. Nonmetallic cable (type NM) shall not be used to connect a range.

(6) Rigid metal conduit shall be provided with a locknut inside and outside the box, and a conduit bushing shall be used on the inside. Inside ends of the conduit shall be reamed.

(7) Switches shall be rated as follows: (a) For lighting circuits, switches shall have a 10-ampere 125 volt rating; or higher, if needed for the connected load.

(b) For motors or other loads, switches shall have ampere or horsepower ratings or both adequate for loads controlled. (An "AC general use" snap switch may control a motor 2 horsepower or less with full-load current not over 80% of the switch ampere rating.)

(8) At least 4 inches of free conductor shall be left at each outlet box except where conductors are intended to loop without joints.

(9) Under chassis wiring (exposed to weather). (a) When outdoor or under chassis wiring is exposed to moisture and physical damage it shall be protected by rigid metal conduit or liquid-tight flexible metal conduit, except electrical metallic tubing may be used when closely routed against frames and equipment enclosures.

(b) The conductors shall be type NMC, RW, TW, or equivalent.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.

E 550.09 Grounding. Grounding of both electrical and non-electrical metal parts in a mobile home is through connection to a grounding bus in the mobile home distribution panel. The grounding bus is 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 mobile home location. Neither the frame of the mobile home nor the frame of any appliance may be connected to the neutral conductor in the mobile home.

(1) **INSULATED NEUTRAL.** (a) 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 panel and in ranges, clothes dryers, counter-mounted cooking units, and wall-mounted ovens are to be insulated from the equipment enclosure. Bonding screws, straps, or buses in the distribution panel or in appliances are to be removed and discarded.

(b) Connection of ranges and clothes dryers shall be made with 4 conductor cord and 3-pole, 4-wire grounding type plugs, or by armored cable or conductors enclosed in flexible steel conduit.

(2) **EQUIPMENT GROUNDING MEANS.** (a) The green-colored grounding wire in the supply cord or permanent feeder wiring shall be connected to the grounding bus in the distribution panel or disconnecting means.

(b) The chassis shall be grounded. The grounding conductor may be solid or stranded, insulated or bare, and shall be an armored grounding conductor or routed in conduit if No. 8 AWG. The conductor, if No. 6 AWG or larger, may be run without metal covering. The grounding conductor shall be connected between distributing panel grounding terminal and a terminal on the chassis. Grounding terminals shall be of the solderless type and approved as pressure terminal connectors recognized for the wire size employed.

(c) 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 panel.

(d) 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 plug.

(3) **GROUNDING OF NON-CURRENT-CARRYING METAL PARTS.** All major exposed metal parts that may become energized, including the water, gas and waste plumbing, the roof and outer metallic covering, the chassis and metallic circulating air ducts, shall be effectively bonded to the grounding terminals or enclosure of the distribution panel or to the metal chassis. See subsection (2) (b) for bonding of the chassis to the distribution panel grounding terminal.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.

E 550.10 Testing. Dielectric strength test. The wiring of each mobile home shall be subjected to a 1-minute, 900-volt, dielectric strength test (with all switches closed) between live parts (including neutral) and the mobile home ground. Alternatively, the test may be performed at 1,088 volts for 1 second. This test shall be performed after branch circuits are complete and after fixtures or appliances are installed.

(1) **EXCEPTION:** Fixtures or appliances which are approved shall not be required to withstand the dielectric strength test.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.

E 550.11. Calculations. The following method is to be employed in computing the supply cord and distribution panel load for each power supply assembly for each mobile home in lieu of the procedure shown in Wis. Adm. Code chapter E 220 and is based on 3-wire, 115/230 volt supply with 115 volt loads balanced between the two legs of the 3-wire system.

(1) **Lighting and small appliance load.** Lighting watts: Length times width of mobile home (outside dimensions, exclusive of hitch) times 3 watts per square foot; e.g.,

$$\text{Length} \times \text{width} \times 3 = \text{----- lighting watts.}$$

Small appliance watts: Number of circuits times 1,500 watts for each 20-ampere appliance receptacle circuit (see definition of appliance, portable with note); e.g.,

$$\text{Number of circuits} \times 1,500 = \text{----- small appliance watts.}$$

$$\text{Total: Lighting watts plus small appliance} = \text{----- total watts.}$$

First 3,000 total watts at 100 per cent plus remainder at 35 per cent = ----- watts to be divided by 230 volts to obtain current (amperes) per leg.

(2) Total load for determining power supply is the summation of:

(a) Lighting and small appliance load as calculated in subsection E 550.11 (1).

(b) Name plate amperes for motors and heater loads (exhaust fans, air conditioners,* electric, gas or oil heating).**

* Omit smaller of these two, 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.

(c) 25% of current of largest motor in (b).

(d) Total of nameplate amperes for: disposal, dishwasher, water heater, clothes dryer, wall-mounted oven, cooking units.

Where number of these appliances exceeds 3 use 75% of total.

(e) Derive amperes for free standing range (as distinguished from separate ovens and cooking units) by dividing values below by 230 volts.

Name Plate Rating	Use
10,000 w x or less.....	80 per cent of rating
10,001-12,500 w.....	8,000 w
12,501-13,500 w.....	8,400 w
13,501-14,500 w.....	8,800 w
14,501-15,500 w.....	9,200 w
15,501-16,500 w.....	9,600 w
16,501-17,500 w.....	10,000 w

(f) If outlets or circuits are provided for other than factory installed appliances include the anticipated load.

See following example for illustration of application of this calculation.

EXAMPLE

A mobile home is 70 x 10 feet and has two portable appliance circuits, a 1000 watt 230 volt heater, a 200 watt 115 volt exhaust fan, a 400 watt 115 volt dishwasher and a 7000 watt electric range.

Lighting and small appliance load
 Lighting $70 \times 10 \times 3 = 2100$ watts
 Small appliance $1500 \times 2 = 3000$ watts
 5100 watts

1st 3000 watts at 100%..... 3000
 Remainder (5,100 - 3,000 = 2,100) at 25%..... 785
 3785

3785
 ----- = 16 amperes per leg
 230

1000 watt (heater) $\div 230 = 4.4$ amp.
 200 watt (fan) $\div 115 = 1.7$ amp
 400 watt (dishwasher) $\div 115 = 3.5$ amp
 7000 watt (range) $\times .8 \div 230 = 24.$ amp

	Amperes per leg	
	A	B
Lighting and appliances.....	16	16
Heater (230 volt).....	4	4
Fan (115 volt).....	2	..
Dishwasher (115 volt).....	..	4
Range.....	24	24
Totals.....	46	48

Based on the higher current calculated for either leg, use one 50 ampere supply cord.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.