

# Manufactured Buildings, Manufactured Homes, and Mobile Homes

The technical information provided herein is to assist qualified persons in planning and installing electric service to farms and residences. **Qualified person** is defined in Article 100 of the National Electrical Code (2008 edition) *as one who has the skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved.* Qualified persons are encouraged to review the National Fire Protection Association (NFPA) 70E-2004, Standards for Electrical Safety in the Workplace, for electrical safety training requirements. **A person who is not qualified should not attempt the planning and installation of electric service.**

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Note: Any reference to “Code” or “Code Handbook” in the following information refers to the 2008 National Electrical Code and the NEC 2008 Handbook respectively.

## Identifying a Manufactured Building, a Manufactured Home, and a Mobile Home

When performing electrical wiring for a manufactured building, a manufactured home, and a mobile home, it is important to recognize their differences. The problem one may encounter is that agencies often use different terminology when talking about these structures.

For example, in 550.2 of the Code, it makes the comment *“For the purpose of this Code and unless otherwise indicated, the term “mobile home” includes “manufactured homes.”* However, the U.S. Department of Housing and Urban Development (HUD) — which regulates the standards for both of these structures — does just the opposite — it uses the term “manufactured home” for both. And then to make things a little more complicated — people who live in mobile homes want to say they live in a manufactured home — since that is more “politically correct.”

All of these inconsistencies can lead to confusion — and cause one to wonder which structure is being referenced when one hears the term “manufactured building” or “manufactured home” or “mobile home.” This data sheet is going to attempt to remove some of the confusion.

The Code definitions for each structure are below in *italics* — followed by comments to help one understand the kind of structure being talked about:

Manufactured Building — 545.2 of the Code defines a manufactured building as *any building that is of closed construction and is made or assembled in manufacturing facilities on or off the building site for installation, or for assembly and installation on the building site, other than manufactured homes, mobile homes, park trailers, or recreational vehicles.*

- often called a modular home or factory-built home or prefab home
- come from the factory in completed sections including sheet-rocked walls, hardwood floors, kitchen cabinets hung, appliances in place, fully furnished bathrooms — even the siding and the window shutters are pre-hung. At the building site, these house sections are lifted onto the foundation by a crane where they are permanently anchored.
- contractor hooks up water and electricity, adds any decks or patios, builds the garage, and completes the inside finish work
- must conform to the building codes for the locations where they are erected.
- consists of the closed construction type which means that all concealed parts of processes of manufacture cannot be inspected without disassembly, damage, or destruction.
- finished walls are either already coated with a primer allowing the owner to choose the final paint color or may be the finished color.
- can be single- or two-story
- The following comments are from the *Regulation of Factory Built Structures in Illinois*:
  - This type of unit is called a “manufactured housing unit” or “modular dwelling” or “modular home” and is defined as “a building assembly or system of building sub-assemblies, designed for habitation as a dwelling for one or more persons, including the necessary electrical, plumbing, heating, ventilating and other service systems, which is of closed or open construction and which is made or assembled by a manufacturer, on or off the building site, for installation, or assembly and installation, on the building site, with a permanent foundation.” A permanent foundation means a closed perimeter formation consisting of materials such as concrete or concrete block which extends into the ground below the frost line.
  - These types of units may be either panelized (floor, wall and roof panels are assembled at the final site) or sectional (the home is shipped as a box-like configuration).
  - Each modular dwelling unit in Illinois shall bear an Illinois seal (see sample below) unless the unit bears a seal from a state which has a reciprocity agreement with this State — and the approved inspection agency must also place a label of approval on the finished unit and provide a copy of the inspection report of the structure to the manufacturer.
    1. The seal and label shall be placed on the unit before it is shipped from the plant. A code compliance certificate is required for all units manufactured or offered for sale or rent for location in Illinois.
    2. The Illinois seal and the label of the approved inspection agency that inspected the structure shall be placed on the electrical panel box of the modular dwelling unit.

Seal No. **17400**

Compliance Cert. No. \_\_\_\_\_

Manufacturer: \_\_\_\_\_

Date Manufactured: \_\_\_\_\_

Model: \_\_\_\_\_

Manufacturer's Serial No.: \_\_\_\_\_

Department Plan Approval No. \_\_\_\_\_

Design Live Loads:

Roof: \_\_\_\_\_ PSF

Floor: \_\_\_\_\_ PSF

Design Wired Load: \_\_\_\_\_ PSF

Seismic Zone: \_\_\_\_\_

The manufacturer of the factory built structure certifies that this unit complies with the Illinois Manufactured Housing and Mobile Home Safety Act and rules promulgated by the Illinois Department of Public Health.

Manufactured Home — 550.2 of the Code defines a manufactured home as a *structure, transportable, in one or more sections, that in the traveling mode is 8 body-ft or more in width or 40 body-ft in length, or when erected on site, is 320 ft squared or more and that is built on a permanent chassis and designed to be used as a dwelling, with or without a permanent foundation, when connected therein. The term “manufactured home” includes any structure that meets all the provisions of this paragraph except the size requirements and with respect to the manufacturer voluntarily files a certification by the regulatory agency, and except that such term does not include any self-propelled recreational vehicle. Calculations used to determine the number of square feet in a structure are based on the structure’s exterior dimensions, measured at the largest horizontal projections when erected on site. These dimensions include all expandable rooms, cabinets, and other projections containing interior space but do not include bay windows. For the purpose of this “Code” and unless otherwise indicated, the term “mobile home” includes manufactured homes.*

- built in a factory on a non-removable steel chassis
- sections are transported to the building site on their own wheels
- wheels can be removed but the chassis stays in place
- multi-part manufactured units are joined at their destination.
- not always placed on a permanent foundation
- sometimes referred to as a “double wide”
- often called “HUD homes” since the Department of Housing and Urban Development (HUD) establishes the construction standards — rather than to building codes at their final destination
- building inspectors check the work done locally (utility hook up, etc.) but are not required to approve the structure
- See section below entitled *Labels Required for Manufactured Homes and Mobile Homes*

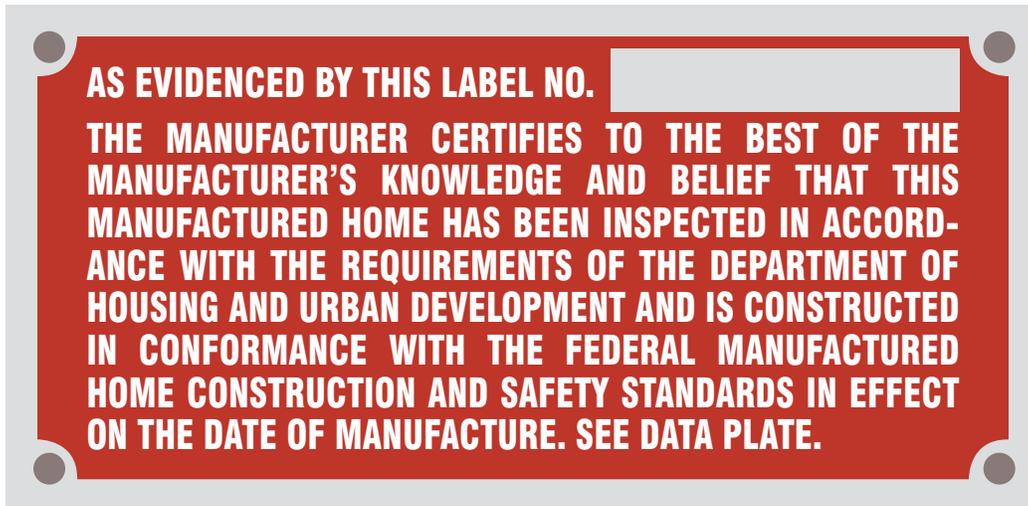
Mobile Home — 550.2 of the Code defines a mobile home as a *factory-assembled structure or structures transportable in one or more sections that are built on a permanent chassis and designed to be used as a dwelling without a permanent foundation where connected to the required facilities and that include the plumbing, heating, air-conditioning, and electrical systems contained therein. For the purpose of this Code and unless otherwise indicated, the term “mobile home” includes manufactured homes.*

- mobile homes are just that — they are structures that are mobile
- distinguishable by their own set of “wheels” — although HUD requires these and the hitch to be removed once at final location
- commonly referred to as “trailers” by the older generation — although this term is not politically correct anymore. Starting to be referred to more and more often as manufactured homes
- not placed on a permanent foundation — rather the perimeter of the mobile home has a skirting
- See section below entitled *Labels Required for Manufactured Homes and Mobile Homes*

#### Labels Required for Manufactured Homes and Mobile Homes

The Certification Label — also know as a HUD tag, HUD label, or HUD seal — is a red metal plate that is affixed to the outside of the manufactured home and a mobile home. It is located near the floor level — at the end opposite the towing hitch. HUD requirements state, “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. The label number shall be etched or stamped with a 3 letter designation which identifies the production inspection primary inspection agency, and which the Sectary 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.” (See sample of Certification Label below.)



The HUD Data Plate — sometimes called the Manufacturer’s Data Plate — is a paper label affixed inside the manufactured and mobile home and is located in a kitchen cabinet, an electrical panel, or a bedroom closet. The Data Plate will contain the following information: (a) the name and address of the manufacturing plant in which the home was manufactured, (b) the serial numbers and model designation, and the date the unit was manufactured, (c) a statement which references that the home was built in accordance to the Manufactured Home Construction and Safety Standards, (d) a list of the certification label number(s), (e) a list of factory-installed equipment, including the manufacturer’s name and the model designation of each appliance, (f) a reference to the Roof Load Zone and Wind Zone Load to which the home was designed, (h) and the name of the agency that approved the design. (See sample on the side.)



## **What does the Code say about electrical wiring requirements?**

The Code requirements for manufactured buildings are covered under Article 545 entitled *Manufactured Buildings*. The Code requirements for both manufactured homes and mobile homes are covered under Article 550 entitled *Mobile Homes, Manufactured Homes, and Mobile Home Parks*.

### **How is electricity supplied to ...**

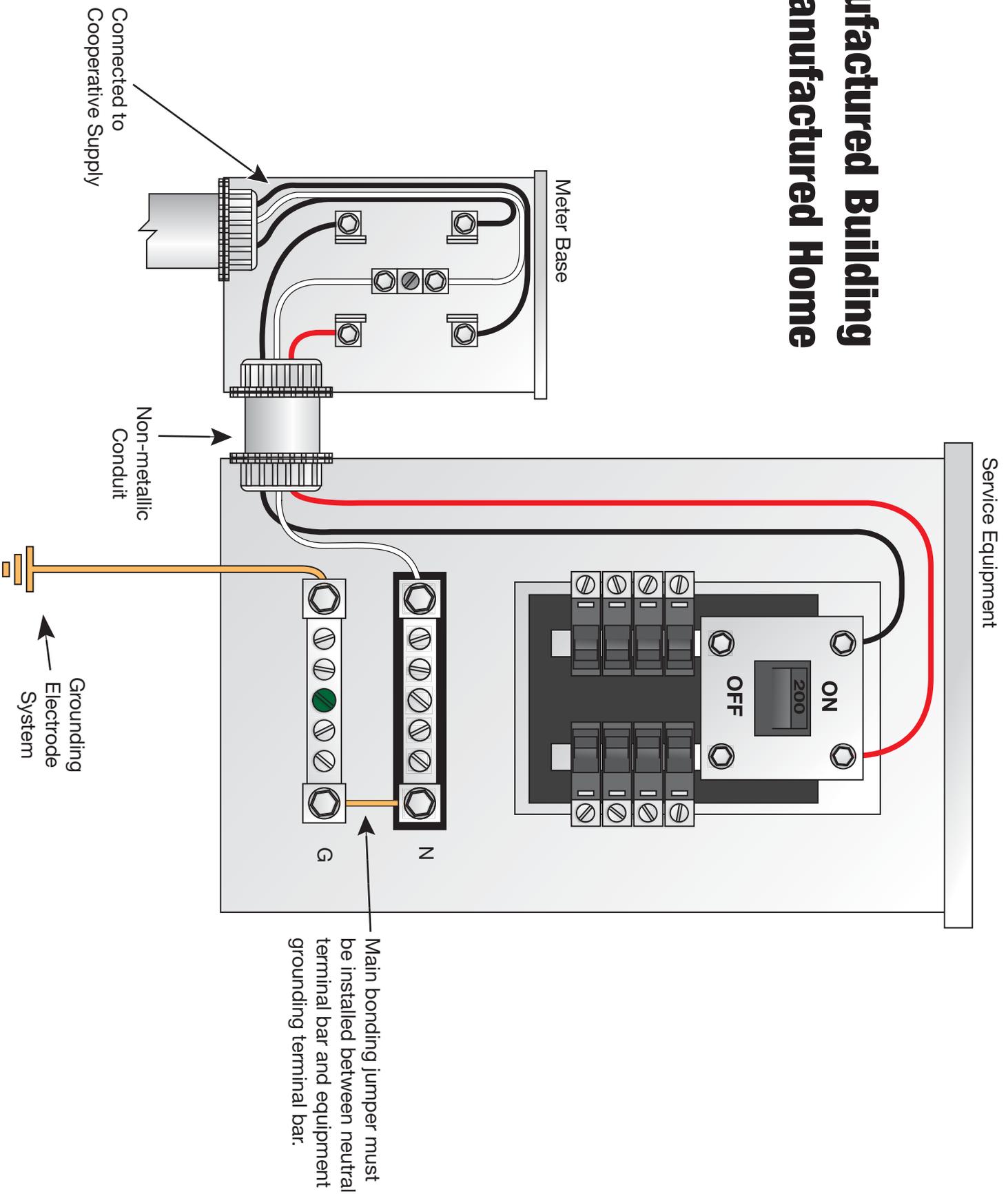
**...a manufactured building?** — Manufactured buildings have the same Service Equipment requirements as a stick-built home. According to 545.7 of the Code (which refers to 230.70 of the Code) the building's service disconnecting means shall be installed at a readily accessible location either outside of the building or inside nearest the point of entrance of the service conductors. Service disconnecting means cannot be installed in bathrooms.

**...a manufactured home?** — Manufacturers are putting Main Breaker Panels — acting as the Service Equipment — in the manufactured home during the manufacturing process. 550.32(B) of the Code will allow this practice if certain conditions are met. The conditions include:

- the manufacturer shall include in its written installation instructions information indicating that the home shall be secured in place by an anchoring system or installed on and secured to a permanent foundation
- installation of the service shall comply with proper Code requirements
- means shall be provided for the connection of a grounding electrode conductor to the service equipment and routing it outside the structure
- bonding and grounding shall comply with proper Code requirements
- the manufacturer shall include in its written installation instructions one method of grounding the service equipment at the installation site — and also state that other methods of grounding are required per Code as found in Article 250
- the minimum size grounding electrode conductor shall be specified in the instructions
- a red warning label shall be mounted on or adjacent to the service equipment. The label shall state the following all in capital letters: "WARNING — DO NOT PROVIDE ELECTRICAL POWER UNTIL THE GROUNDING ELECTRODE(S) IS INSTALLED AND CONNECTED (SEE INSTALLATION INSTRUCTIONS)". These instructions are provided by the manufacturer.

If the manufactured home does not meet these conditions specifically mentioned in 550.32(B) of the Code, the Service Equipment for the manufactured home must be connected as if the home is a mobile home.

# Manufactured Building or Manufactured Home



**...to a mobile home?** — *Note: Even though the Code allows properly rated power cords to supply electricity to a mobile home (because many older mobile homes still exist with power cords), the following discussion pertains to mobile homes with permanently installed wiring methods.*

For proper wiring to a mobile home, the following four items must be considered:

- 1. The Service Equipment** — this is the Main shutoff for the electricity supply to the mobile home; and the point where the electric cooperative's conductors connect to the member's equipment. The kilowatt hour meter is usually located just before the Service Equipment.
- 2. The Distribution Panelboard** inside the mobile home — this is where circuit breakers control the branch circuits for lights, heat, and power circuits of the mobile home. Often referred to as the circuit breaker panel.
- 3. The Feeder Assembly** — this consists of the conductors between the Service Equipment and the Distribution Panelboard
- 4. Other Accessories** — these are provisions for other outside electrical equipment.

- 1. The Service Equipment** (according to 550.32(A) and (C) of the Code):
  - is not allowed to be attached to or installed in a mobile home
  - must be located in sight from and not more than 30 feet away from the mobile home
  - must be grounded to a grounding electrode in agreement with 250.32 of the Code
  - must be rated at not less than 100 amperes at 120/240 volts

To satisfy these requirements for the Service Equipment, the mobile home owner will either install a meter pole or meter pedestal — at a location agreed to by the local cooperative. Depending on which is installed, the electric cooperative will bring electricity via either overhead conductors or underground conductors to this location.

**Note:** The Service Equipment can be located elsewhere on the premises as long as a Disconnecting Means suitable for Use as Service Equipment is located within sight from and not more than 30 feet away from the mobile home — and is rated not less than the Service Equipment.

The reason the Disconnecting Means must be suitable for Use as Service Equipment is because this designation means the neutral terminal bar is not permanently bonded to the metallic case by the factory. Because only at the Service Equipment can the grounded conductor (neutral) be connected to the metallic case — which in turn connects to the grounding electrode conductor that connects to the grounding electrode in contact with the earth — means must be provided at this Disconnecting Means to keep the grounded circuit conductor (neutral) isolated from the case.

A 4-wire feeder must be installed from the Service Equipment to this Disconnecting Means. However, there is an exception: If a 3-wire feeder is already in place — according to the Exception listed under 550.33(A)(2) of the Code, the existing 3-wire feeder will meet Code requirements. This exception is allowed only if none of the following conditions exist. If one of these conditions exist, a 4-wire feeder is still required.

- an equipment grounding conductor has not been run with the feeders from the Service Equipment to the Disconnecting Means

- there are no continuous metallic paths bonded between the grounding system of the Service Equipment and the grounding system of the Disconnecting Means
- ground-fault protection has not been installed on the supply side of the feeder

2. **The Distribution Panelboard inside the Mobile Home** (according to 550.11(A) & 550.16 of the Code)

- must be located in an accessible location; and shall not be located in a bathroom or clothes closet
- must have a main breaker or fuses plainly marked “MAIN”
- shall be rated for the calculated load
- must have an isolated neutral terminal bar. The grounded conductor (neutral) from the Feeder Assembly and all grounded conductors of branch circuits will connect to this isolated neutral terminal bar
- must have a equipment grounding terminal bar bonded to the enclosure. The equipment grounding conductor from the Feeder Assembly system and all equipment grounding conductors from branch circuits will be connected to this grounding terminal bar
- must not have a main bonding jumper installed between the neutral terminal bar and the equipment grounding bar.
- must have a bonding conductor between the equipment grounding bar of the Distribution Panelboard and accessible terminals on the metal chassis of the mobile home. Any metallic piping of the mobile home shall also be bonded to the metal chassis of the mobile home.

3. **The Feeder Assembly** (according to 550.2, 550.10(I), & 550.33, & 250.32(B) of the Code)

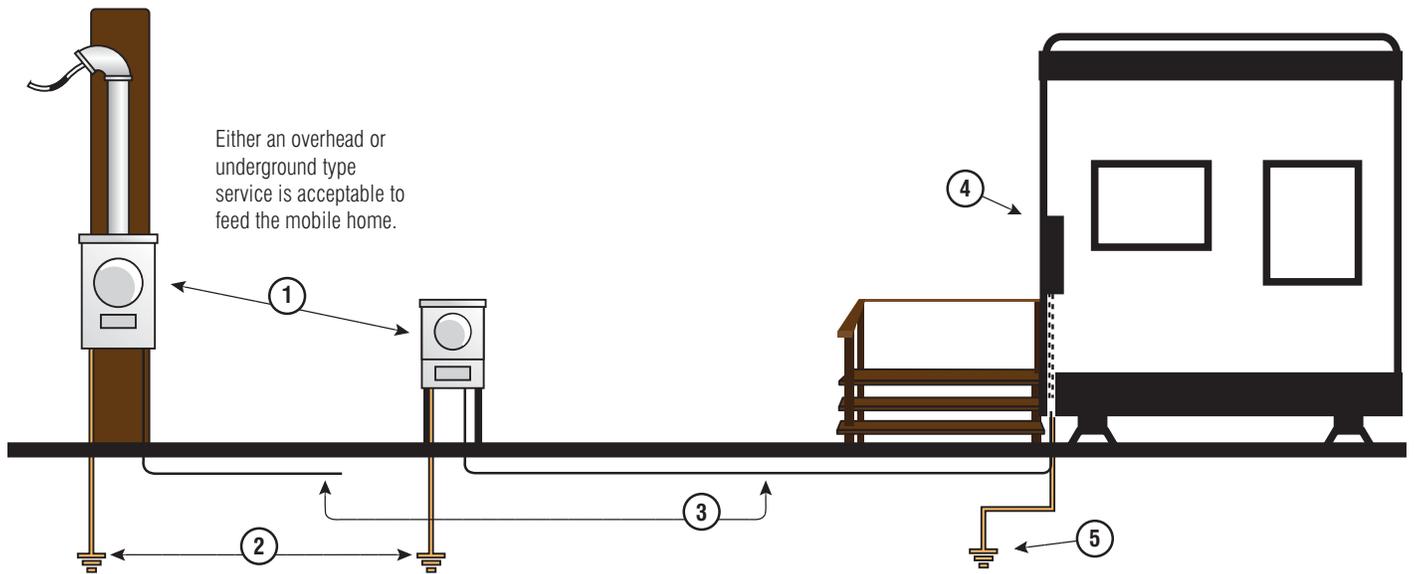
- is defined as the overhead or under-chassis feeder conductors, including the grounding electrode conductor, together with the necessary fittings and equipment designed for the purpose of delivering energy from the source of electrical supply to the Distribution Panelboard within the mobile home
- will consist of 4 insulated, color-coded conductors that shall be identified by the factory or field marking of the conductors in compliance with 310.12 of the Code. Equipment grounding conductors shall not be identified by stripping the insulation.
- is recognized as feeders — which means the mobile home shall its own grounding electrode or grounding electrode system
- shall be rated for not less than the loads being supplied; and not less than 100 amperes
- can be routed overhead from the Service Equipment to the mobile home. The mast at both the Service Equipment location and at the Mobile Home location must contain four continuous, insulated, color-coded conductors — one of which must be an equipment grounding conductor
- can be routed underground from the Service Equipment to the underside of mobile home. With this method, a metal raceway or non-metallic conduit must be installed from the Distribution Panelboard in the mobile home to the underside of the mobile home. This raceway must have provisions for attaching to a suitable junction box or fitting that will attach to the raceway on the underside of the mobile home that

is carrying the feeders from the Service Equipment. *Note: This raceway provides a means to install the feeder conductors to the mobile home Distribution Panelboard without damaging the interior finish. The manufacturer of the mobile home is required to provide written instructions stating the proper feeder conductor sizes for the raceway and the size of the junction box to be used.*

4. **Other Accessories** (according to 550.32(D) & (E) of the Code)

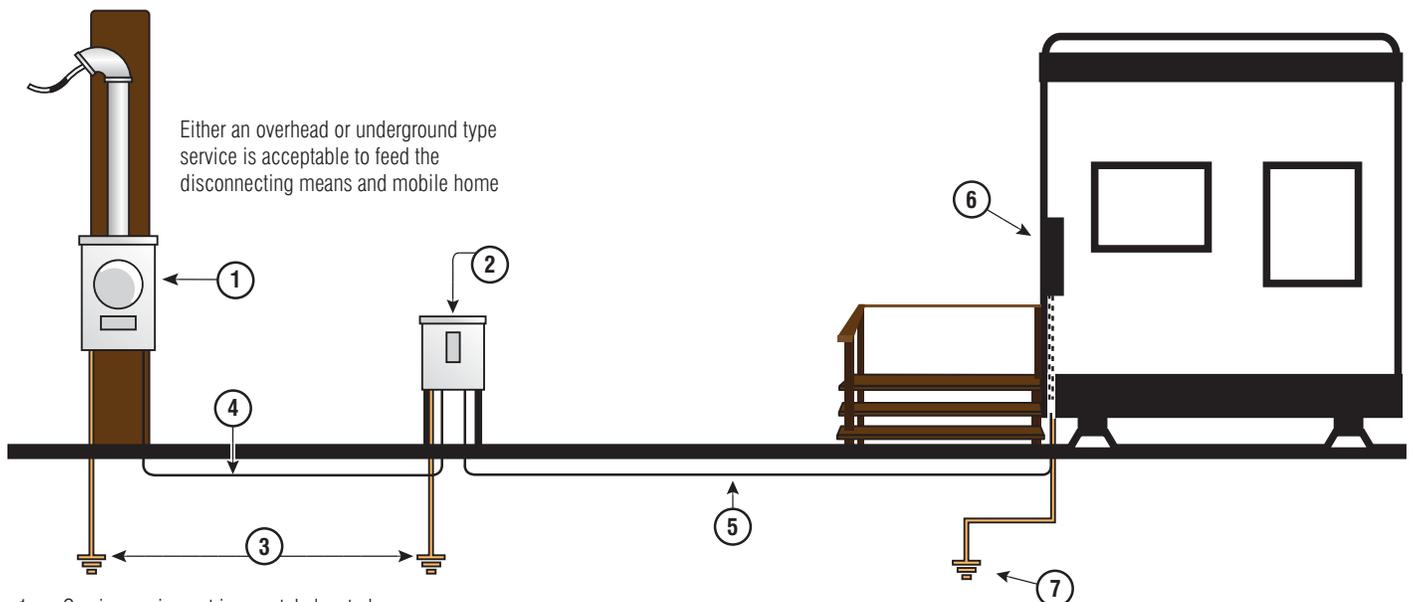
- means for connecting a mobile home accessory building or structure or additional electrical equipment located outside a mobile home by a fixed wiring method shall be provided in either the mobile home Service Equipment or the local external Disconnecting Means allowed in 550.32(A) of the Code
- additional receptacles shall be permitted for connection of electrical equipment located outside the mobile home — and all such 125-volt, single-phase, 15- and 20-ampere receptacles shall be GFCI protected
- all outdoor mobile home disconnecting means shall be installed so the bottom of the enclosure containing the disconnecting means is not less than 2 feet above finished grade or working platform

# Mobile Home with Service Equipment at either the Meter Pole or Pedestal



1. Pole or pedestal service equipment shall be within 30 ft. of the mobile home
2. Service grounding electrode.
3. Feeder assembly, consisting of four insulated conductors.
4. Distribution panel located in mobile home.
5. Mobile home chassis and distribution panel must be grounded.

# Mobile Home with Service Equipment Remotely Located plus a Disconnecting Means



1. Service equipment is remotely located.
2. Disconnecting means shall be within 30 ft. of the mobile home.
3. Both the service equipment and disconnecting means will have a grounding system.
4. Feeder conductors shall have 4 wires.
5. Feeder assembly, consisting of four insulated conductors.
6. Distribution panel located in mobile home.
7. Mobile home chassis and distribution panel must be grounded.