UMC
Science and Technology
GUIDE
Published by the University of Missouri - Columbia Extension Division

Computing Electrical Service Needs for Your Home

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The capacity of electrical service has a great deal to do with occupant satisfaction in a home. An oversized service increases costs, but an undersized service may limit the use of electrical equipment.

Select a panel with an adequate number of fuse or circuit-breaker branch circuit spaces to allow connection of presently planned circuits plus at least six spaces for future use.

Panels with either circuit breakers or fuses are equally acceptable. Statements in this guide are generalizations from the National Electrical Code (NEC). For additional information, you may want to consult an electrician or refer to the current issue of the National Electrical Code. Keep in mind that recommendations in this guide are minimum requirements.

Minimum Size

A 100-ampere, three-wire service is required when (a) there are six or more two-wire branch circuits or (b) the initial computed load is 10 kilowatts or more.

- A 100-ampere, three-wire service is required when (a) there are six or more two-wire branch circuits or (b) the initial computed load is 10 kilowatts or more.
- A 60-ampere service may be installed for smaller loads but is seldom recommended.

Information Needed to Compute Service Capacity

The National Electrical Code (Article 220) gives requirements for calculating loads in residences for one family. The general requirements are:

1. Compute the minimum general load for lighting by multiplying the total floor space in square feet of all floors by three watts. The first section on the calculation form in this guide gives a method to determine the number of circuits needed. These circuits supply receptacle outlets and ceiling outlets except receptacles and outlets in those rooms mentioned in Number 2, below.
2. The kitchen needs at least two 20-ampere circuits. For computation, you may enter these at 1,500 watts each. These circuits may extend into a pantry, breakfast room, dining room, family room, or all of these rooms.
3. The laundry needs one 20-ampere circuit. For computation, you may also enter this circuit at 1,500 watts.
4. Individual circuits are required for the following:

- range (usually about 8,000 watts)
- water heater (usually about 4,500 watts)
- clothes dryer (minimum of 5,000 watts)
- electric heat*
- air conditioning*
- additional circuits (as required for such items as a food freezer, shop, and pump)

*Provide service capacity for the larger of heat or air conditioning. If you use a heat pump, assume that the compressor and the furnace heaters will operate simultaneously.

NOTES

1. *The service:* The conductors and equipment for delivering energy from the electricity supply system to the wiring system of the premises served. (NEC Article 100 definitions)
2. *Service conductors* shall not be smaller than No. 8 copper or No. 6 aluminum. (NEC 230-5 and 230-23 and exception)
3. *Service entrance conductors* to be sized per NEC Tables 310-16 through 310-19 and notes to tables 310-16 through 310-19 note no. 3.
4. *Service entrance* shall be rated 100 amperes (minimum) for loads computed at 10 Kilowatts or more. [NEC 230-41 (a), (b), (1), (2)]
5. *Service disconnecting means* shall have a rating of not less than 100 amperes. [NEC 230-79 (c)]
6. NEC Article 220-30 and Chapter 9 (tables and examples B) list other optional methods for calculating services.

Residential Service Calculations*

General Lighting Circuits

A. _____ ft. x _____ ft. x (3 minimum) = _____ watts
(length) (width) (watts/sq. ft.)

_____ ÷ 115 volts = _____
(total watts) (amperes)

_____ ÷ 15 amperes per circuit = _____
(amperes) (no. of circuits)

Small Appliance Circuits (minimum of two 20-ampere circuits required)

B. _____ circuits x 1500 watts _____ watts

Laundry Circuits (minimum of one 20-ampere circuit required)

C. _____ circuits x 1500 watts _____ watts

Diversity Calculations

D. add watts of lines A, B, and C _____ watts

E. first 3000 watts of line D at 100% 3,000 watts

F. line D minus E _____ watts

G. 35% of line F (line F x .35) _____ watts

H. add lines E and G net computed load _____ total watts

Special Circuits

I. _____ electric ranges	_____ watts	_____ total watts
J. _____ clothes dryers	_____ watts	_____ total watts
K. _____ electric space heating or air conditioning at 100%	_____ watts	_____ total watts
L. _____ water heaters at 100%	_____ watts	_____ total watts
M. _____	_____ watts	_____ total watts
N. _____	_____ watts	_____ total watts
O. _____	_____ watts	_____ total watts
P. _____	_____ watts	_____ total watts

Total Computed Service Load total of lines H through P _____ total watts

Total Computed Service Load _____ ÷ 230 volts = _____ amperes

recommended service cabinet _____ amperes

recommended service entrance conductors—type and size _____ _____

type of service (115 V – 115/230) _____

recommended number of circuits (from the first section) _____

**This method of calculation is based on National Electrical Code Article 220. See it for more information.*

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