

# Examples

*This informative annex is not a part of the requirements of this NFPA document but is included for informational purposes only.*

**Selection of Conductors.** In the following examples, the results are generally expressed in amperes (A). To select conductor sizes, refer to the 0 through 2000 volt (V) ampacity tables of Article 310 and the rules of 310.14 that pertain to these tables.

**Voltage.** For uniform application of Articles 210, 215, and 220, a nominal voltage of 120, 120/240, 240, and 208Y/120 V is used in calculating the ampere load on the conductor.

**Fractions of an Ampere.** Except where the calculations result in a major fraction of an ampere (0.5 or larger), such fractions are permitted to be dropped.

**Power Factor.** Calculations in the following examples are based, for convenience, on the assumption that all loads have the same power factor (PF).

**Ranges.** For the calculation of the range loads in these examples, Column C of Table 220.55 has been used. For optional methods, see Columns A and B of Table 220.55. Except where the calculations result in a major fraction of a kilowatt (0.5 or larger), such fractions are permitted to be dropped.

**SI Units.** For metric conversions,  $0.093 \text{ m}^2 = 1 \text{ ft}^2$  and  $0.3048 \text{ m} = 1 \text{ ft}$ .

In the Informative Annex D examples, loads are assumed to be properly balanced on the system. If loads are not properly balanced, additional feeder capacity may be required. Article 220 provides two methods to calculate feeder and service loads, known in the industry as the “standard” and “optional” calculations. Part III of Article 220 provides the rules for performing the standard calculation, and Part IV provides the rules for performing the optional calculation. In both, it is necessary to use the general requirements in Part I and the requirements in Part II covering branch-circuit load calculations. The service and feeder calculation requirements in Part III apply to all occupancies, while the requirements in Part IV cover dwelling units, multifamily dwellings, schools, and new restaurants. Both Parts III and IV provide requirements on how to calculate loads added to existing buildings and structures.

## Example D1(a) One-Family Dwelling

The dwelling has a floor area of  $1500 \text{ ft}^2$ , exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. Appliances are a 12-kW range and a 5.5-kW, 240-V dryer. Assume range and dryer kW ratings equivalent to kVA ratings in accordance with 220.54 and 220.55.

The general lighting and general-use receptacle load is computed from the outside dimensions of the building, apartment, or other area involved. For a dwelling unit, the computed floor area does not include open porches, garages, or, as stated in the opening paragraph of Example D1(a), “an unfinished cellar not adaptable for future use.” A point to consider regarding this statement is that many of today’s homes with basements or cellars do have space that is suitable for conversion to family rooms, bedrooms, home offices, or other habitable areas. In such instances, the basement or cellar space suitable for conversion needs to be included in the general lighting load calculation. See 220.41 for requirements on how to calculate the lighting and general-use receptacle load for this occupancy.

The two-story dwelling measures  $30 \text{ ft} \times 30 \text{ ft}$  for the first floor and  $30 \text{ ft} \times 20 \text{ ft}$  for the second floor.

First-floor area:  $30 \text{ ft} \times 30 \text{ ft} = 900 \text{ ft}^2$   
Second-floor area:  $30 \text{ ft} \times 20 \text{ ft} = 600 \text{ ft}^2$   
Total area =  $1500 \text{ ft}^2$

**Calculated Load** (see 220.40)

**General Lighting Load**  $1500 \text{ ft}^2$  at  $3 \text{ VA/ft}^2 = 4500 \text{ VA}$

**Minimum Number of Branch Circuits Required** [see 210.11(A)]

**General Lighting Load:**  $4500 \text{ VA} \div 120 \text{ V} = 38 \text{ A}$

This requires three 15-A, 2-wire or two 20-A, 2-wire circuits.  
Small-Appliance Load: Two 2-wire, 20-A circuits [see 210.11(C)(1)]

Laundry Load: One 2-wire, 20-A circuit [see 210.11(C)(2)]

Bathroom Branch Circuit: One 2-wire, 20-A circuit (no additional load calculation is required for this circuit) [see 210.11(C)(3)]