Unit 10—Multifamily Dwelling Calculations

10.1 Multifamily Dwelling Unit Calculations—General

The *NEC* defines a dwelling unit as a single unit, providing complete and independent living facilities for one or more persons, including permanent provisions for living, sleeping, cooking, and sanitation. Figure 10–1

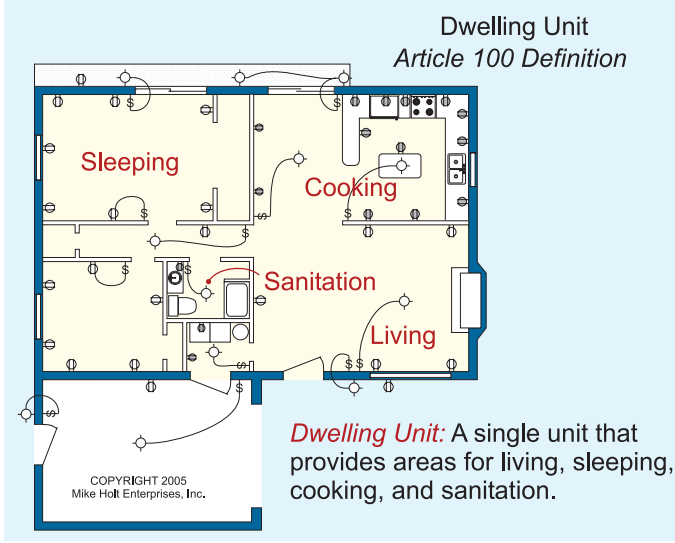
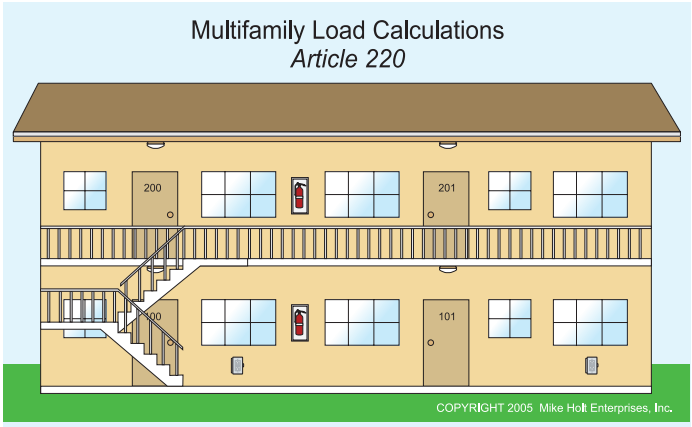


Figure 10–1

A multifamily dwelling is a building that contains three or more dwelling units, Figure 10–2. A two-family dwelling is not considered a multifamily dwelling. Follow these steps to calculate the feeder and service load for a multifamily dwelling:

Step 1: General Lighting and Receptacles, Small-Appliance and Laundry Circuits

The *NEC* recognizes that the general lighting and general-use receptacles, and the small-appliance and laundry circuits will not all be on, or loaded, at the same time. It therefore permits the following demand factors to be applied to these loads:



Multifamily Dwelling: A building with 3 or more dwelling units. Examples: apartment buildings, condominiums, some hotels and motels.

Figure 10–2

Step a: Total Connected Load—Determine the total connected general lighting and receptacle load (3 VA per sq ft), the two small-appliance circuits (1,500 VA each) and the laundry circuit load (1,500 VA) of all dwelling units. The laundry load (1,500 VA) can be omitted if laundry facilities are provided on the premises and are available to all building occupants.

Step b: Demand Factor—Apply the Table 220.42 demand factors to the total connected load (Step a). The first 3,000 VA is calculated at 100% demand, the next 117,000 VA (120,000 – 3,000) is calculated at 35% demand, and the remainder at 25% according to Table 220.42.

Step 2: Air-Conditioning versus Heat

When the air-conditioning and heating loads are not on at the same time (simultaneously), the smaller of the two loads can be omitted.

- *Air-conditioning. The air-conditioning load must be calculated at 100 percent.*
- *Heat. Electric space-heating loads must be calculated at 100 percent.*

Step 3: Appliances

A demand factor of 75 percent is permitted for four or more appliances fastened in place, such as a dishwasher, kitchen waste disposal, trash compactor, water heater, etc. This does not apply to space-heating equipment, clothes dryers, cooking appliances, or air-conditioning equipment.

Step 4: Clothes Dryers

The feeder or service calculated load for household electric clothes dryers located in dwelling units must not be less than 5,000W (or 5,000 VA), or the nameplate rating (whichever is greater) and may be adjusted according to the demand factors listed in Table 220.54.

AUTHOR'S COMMENT: A dryer load is not required if the dwelling unit does not contain an electric dryer. Dryers in common laundry rooms must not have their loads calculated according to this method. This is covered in Unit 11.

Step 5: Cooking Equipment

Household cooking appliances rated over 1¾ kVA can have their feeder and service loads calculated according to the demand factors of Table 220.55 and Notes.

Step 6: Feeder and Service Conductor Size

The conductors are sized according to Table 310.16. Conductors are presumed to be copper unless otherwise stated, and systems are presumed to be single-phase unless otherwise stated.

AUTHOR'S COMMENTS:

- Table 310.15(B)(6) can be used to size the 120/240V feeder conductors to the individual dwelling units of a multifamily dwelling, but Table 310.16 must be used to size service conductors that supply two or more dwelling units.
- Section 110.14(C)(1)(a) states that terminals are rated 60ºC for equipment rated 100A or less unless marked 75ºC. In real life, most terminals are now rated 75ºC, so in this Unit, we assume all terminals are rated 75ºC unless 60ºC is specified. Insulated conductors will be presumed to be 90ºC rated. For exam purposes, read the problem carefully to be certain you know what terminal rating the exam question specifies. If unspecified, use the rules of 110.14(C).