

UNIT 9

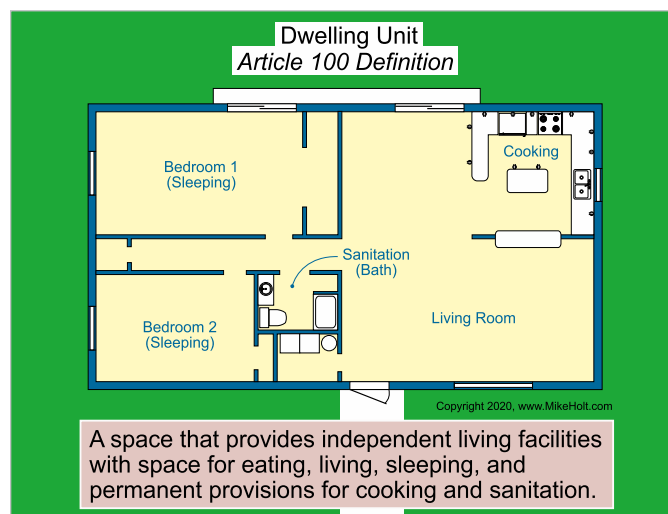
DWELLING UNIT CALCULATIONS

Introduction to Unit 9—Dwelling Unit Calculations

Unit 9 focuses on sizing the feeder or service load for a dwelling unit. The *NEC* defines a dwelling unit as a space that provides living facilities with permanent provisions for living, sleeping, cooking and sanitation. ▶Figure 9-1

The *Code* provides two different load calculation methods—optional and standard; both methods are explained in this unit. Be sure to review the material as many times as needed, paying attention to the examples given, and completing the questions at the end of this unit to further solidify your understanding of these *NEC* requirements.

Sizing the feeder or service load for a dwelling unit isn't simply a matter of adding up the individual loads or the rated current for all the breaker sizes. The *Code* recognizes there's load diversity and that not all loads will be in use simultaneously. Therefore, it provides various "demand factors" which are to be applied in order to calculate the "demand load." This helps ensure the installation of safe, compliant, and adequately sized electrical conductors [90.1]. It's important to be familiar with the requirements of Article 220 so the proper demand factors are correctly applied for a given installation. There are various tables and specific requirements to follow so review and apply each of them one at a time and you'll be well on the road to mastering these calculations.



▶Figure 9-1

9.11 Feeder and Service Conductor Size [Table 310.12]

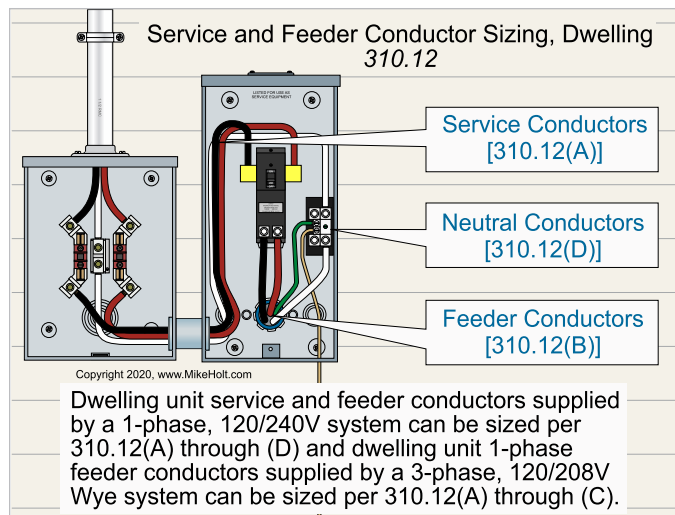
(A) Services. Service conductors supplying the entire load associated with a dwelling unit can be sized in accordance with Table 310.12 where there's no conductor ampacity adjustment or correction as required by 310.14.

Step 1: Add up the demand loads for general-lighting, fixed appliances, dryers, cooking equipment, air-conditioning, heat, and motors. Divide this sum by the nominal system voltage.

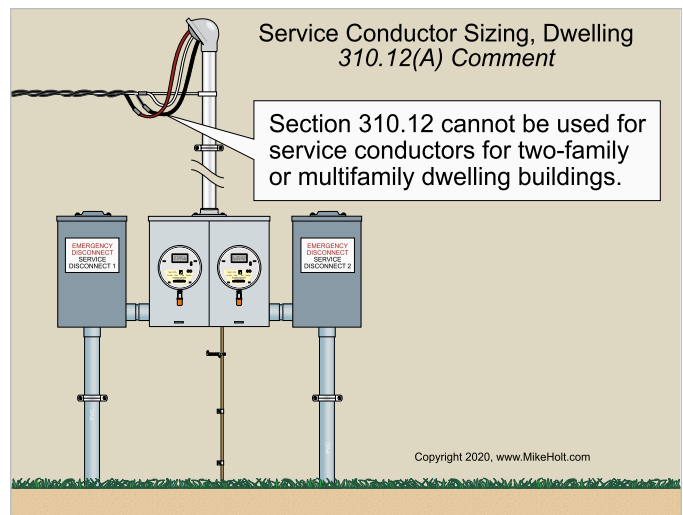
Step 2: Next, size the service disconnect in accordance with the standard size overcurrent protective device contained in 240.6(A).

Step 3: Size the feeder or service conductor ampacity for one-family dwellings and individual dwelling units of two-family and multi-family dwellings in accordance with Table 310.12 where the calculated demand load doesn't exceed 400A.

When the calculated demand load exceeds 400A, the service conductor must be sized in accordance with Table 310.16. ▶Figure 9-20



►Figure 9-20

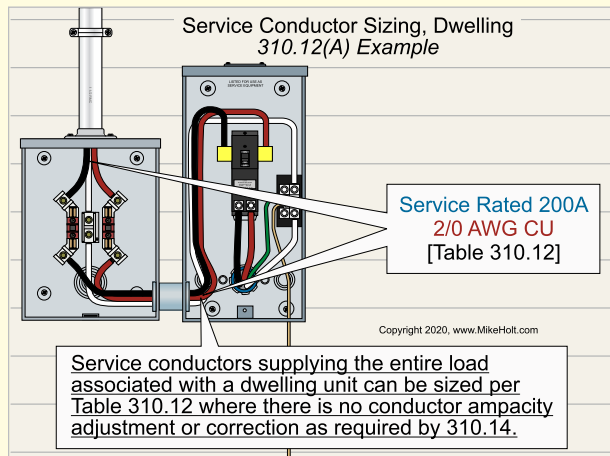


►Figure 9-22

► Service Conductor Size Example

Question: What size service conductors are required if the calculated load for a dwelling unit requires a service disconnect rated 200A? ►Figure 9-21

(a) 1/0 AWG (b) 2/0 AWG (c) 3/0 AWG (d) 4/0 AWG



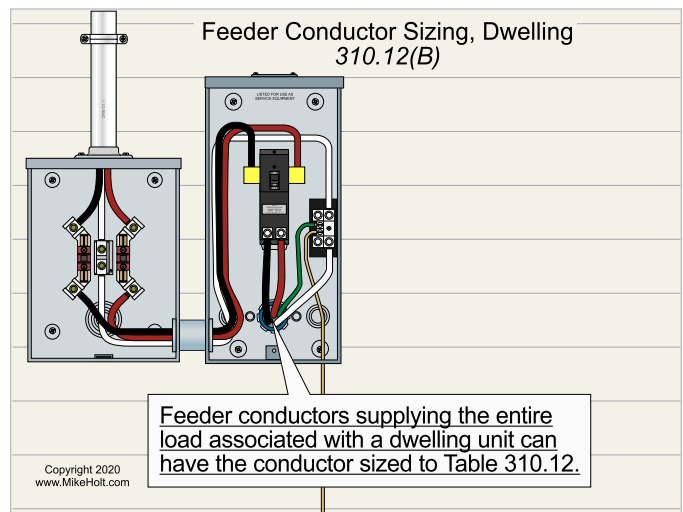
►Figure 9-21

Answer: (b) 2/0 AWG [Table 310.12]

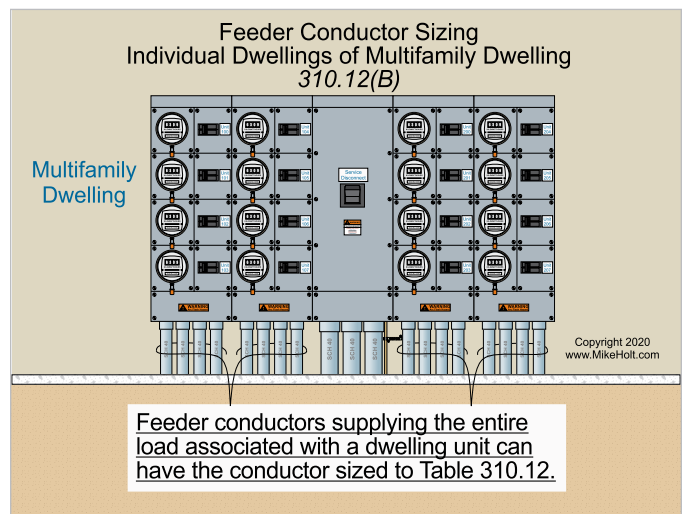
Author's Comment:

- Section 310.12 can't be used for service conductors for two-family or multifamily dwelling buildings. ►Figure 9-22

(B) Feeders. Feeder conductors supplying the entire load associated with a dwelling unit can be sized in accordance with Table 310.12 where there's no conductor ampacity adjustment or correction as required by 310.14. ►Figure 9-23 and ►Figure 9-24



►Figure 9-23



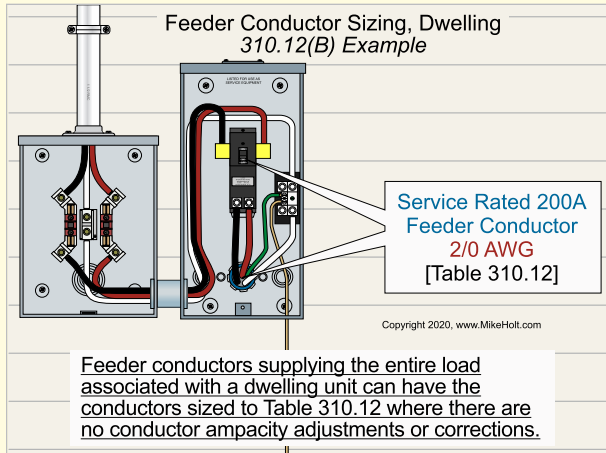
►Figure 9-24

► Feeder Conductor Size Example

Question: What size feeder conductors are required if the calculated load for a dwelling unit requires a service disconnect rated 200A, and the feeder conductors carry the entire load of the dwelling unit?

► **Figure 9-25**

(a) 1/0 AWG (b) 2/0 AWG (c) 3/0 AWG (d) 4/0 AWG

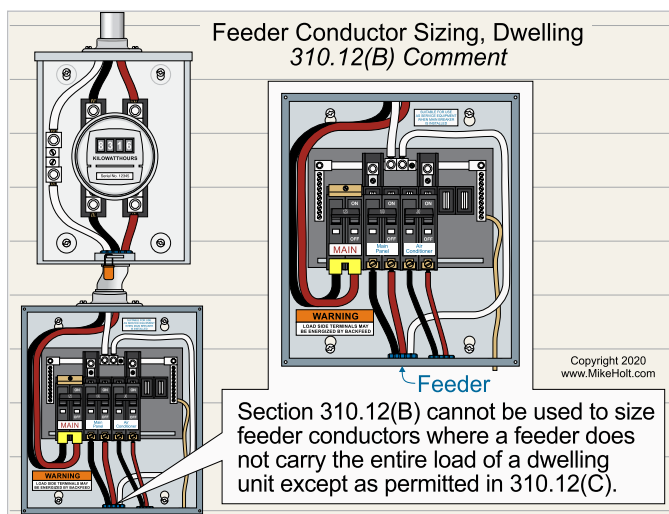


► **Figure 9-25**

Answer: (b) 2/0 AWG [Table 310.12]

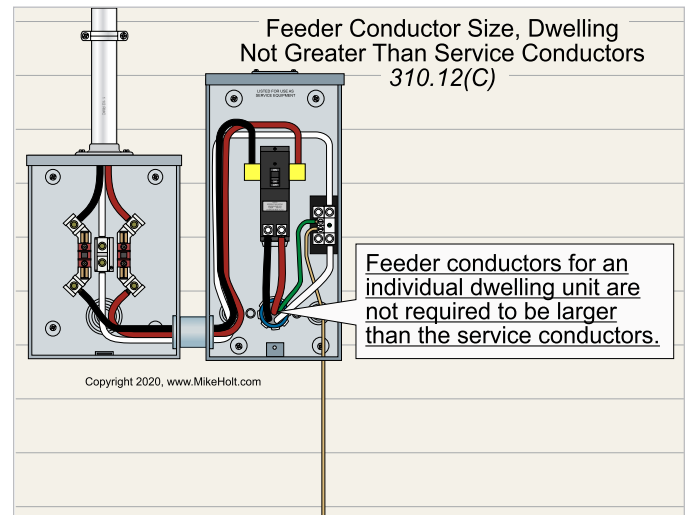
Author's Comment:

- Section 310.12(B) can't be used to size feeder conductors where a feeder doesn't carry the entire load of the dwelling unit, except as permitted in 310.12(C). ► **Figure 9-26**



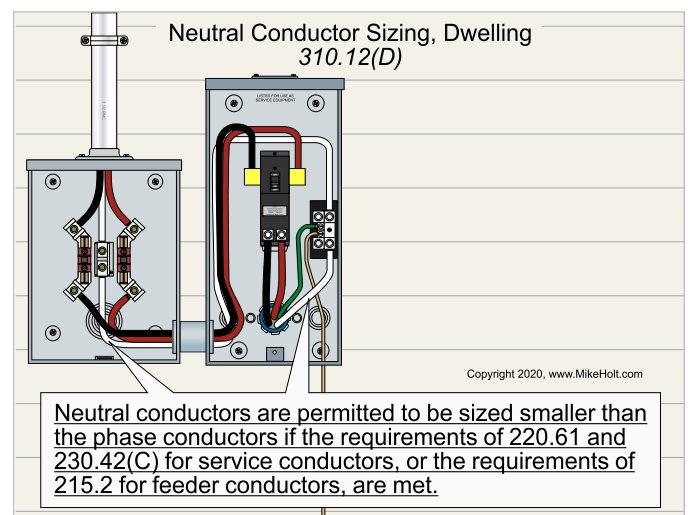
► **Figure 9-26**

(C) Feeder Conductors Not Greater Than Service Conductors. Feeder conductors for an individual dwelling unit aren't required to be larger than the service conductors. ► **Figure 9-27**



► **Figure 9-27**

(D) Neutral Conductors. Neutral conductors are permitted to be sized smaller than the phase conductors if the requirements of 220.61 and 230.42(C) for service conductors, or the requirements of 215.2(A)(2) for feeder conductors, are met. ► **Figure 9-28**



► **Figure 9-28**

Table 310.12 Single-Phase Dwelling Services and Feeders		
Service or Feeder Rating	Copper	Aluminum or Copper-Clad Aluminum
100A	4 AWG	2 AWG
110A	3 AWG	1 AWG
125A	2 AWG	1/0 AWG
150A	1 AWG	2/0 AWG
175A	1/0 AWG	3/0 AWG
200A	2/0 AWG	4/0 AWG
225A	3/0 AWG	250 kcmil
250A	4/0 AWG	300 kcmil
300A	250 kcmil	350 kcmil
350A	350 kcmil	500 kcmil
400A	400 kcmil	600 kcmil