Podcast Notes for Episode 16

- Service Sizing
  - Minimum Sizes
  - Dwelling units

230.23 Size and Ampacity.

230.23(A) General.

- Conductors shall have sufficient ampacity to carry the current for the load as calculated in accordance with Article 220 and shall have adequate mechanical strength.

230.23 Size and Ampacity.

230.23(B) Minimum Size.

- The conductors shall not be smaller than 8 AWG copper or 6 AWG aluminum or copper-clad aluminum.
  - Exception: Conductors supplying only limited loads of a single branch circuit — such as small polyphase power, controlled water heaters, and similar loads — shall not be smaller than 12 AWG hard-drawn copper or equivalent.

230.79 Rating of Service Disconnecting Means.

- The service disconnecting means shall have a rating not less than the calculated load to be carried,...
- In no case shall the rating be lower than specified in 230.79(A), (B), (C), or (D).

230.79(A) One-Circuit Installations.

- For installations to supply only limited loads of a single branch circuit, the service disconnecting means shall have a rating of not less than 15 amperes.

230.79(B) Two-Circuit Installations.

- For installations consisting of not more than two 2-wire branch circuits, the service disconnecting means shall have a rating of not less than 30 amperes.

230.79(C) One-Family Dwellings.

- For a one-family dwelling, the service disconnecting means shall have a rating of not less than 100 amperes, 3-wire.

230.79(D) All Others.

- For all other installations, the service disconnecting means shall have a rating of not less than 60 amperes.

310.12 Single-Phase Dwelling Services and Feeders.

- For one-family dwellings and the individual dwelling units of two-family and multifamily dwellings, service and feeder conductors supplied by a single-phase, 120/240-volt system shall be permitted to be sized in accordance with 310.12(A) through (D).

2017 NEC: 310.15(B)(7)

310.12(A) Services.

- For a service rated 100 amperes through 400 amperes, the service conductors ***supplying the entire load*** associated with a one-family dwelling, or the service conductors ***supplying the entire load associated with an individual dwelling unit*** in a two-family or multifamily dwelling, shall be permitted to have an ampacity **not less than 83 percent of the service rating.** If no adjustment or correction factors are required, Table 310.12 shall be permitted to be applied.

2017 NEC: 310.15(B)(7); Annex D Example 7

Table 310.12

Table 310.12 Single-Phase Dwelling Services and Feeders

Service or Feeder Rating (Amperes)	Conductor (AWG or kcmil)	
	Copper	Aluminum or Copper-Clad Aluminum
100	4	2
110	3	1
125	2	1/0
150	1	2/0
175	1/0	3/0
200	2/0	4/0
225	3/0	250
250	4/0	300
300	250	350
350	350	500
400	400	600

Note: If no adjustment or correction factors are required, this table shall be permitted to be applied.

2017 NEC: 310.15(B)(7); Annex D Example 7

Example 1

- 200 Ampere Service, single family dwelling, single structure, copper conductors
- Use T310.12
- 200A → 2/0 Conductor

2017 NEC: 310.15(B)(7); Annex D Example 7

Example 2

- 400 Ampere Service, single family dwelling, single structure, one meter base that feeds to (2) 200A panels
- Use T 310.12 for the combined service
- 400A → 400kcmil Conductor to meter base
- Use T 310.16 for the individual runs from the meter to the panels as neither panel carries the full load of the house. 200A → 3/0 Conductor

Example 3

- 400 Ampere Service, single family dwelling, single structure, one meter base that feeds to (2) 200A panels
- Parallel service conductor, Aluminum XHHW (2 sets of 2 hots, one Neutral = 5 current carrying conductors)
- Each hot conductor needs to be capable of 200A
- 200A x 83% ÷ 80% $_{T310.15(C)(1)}$ = 208A adjusted.
- XHHW 90°Col 250kcmil good for 230A
- However, a 4/0 the exception at 240.4(B) could easily be used as it is unlikely that your calculated load will be above 396A. That would be cutting it rather close!

Annex D, Example 7

Sizing of Service Conductors for Dwelling(s)

- Service conductors and feeders for certain dwellings are permitted to be sized in accordance with 310.12.
- With No Required Adjustment or Correction Factors. If a 175-ampere service rating is selected, a service conductor is then sized as follows:
- 175 amperes × 0.83 = 145.25 amperes per 310.12.
- If no other adjustments or corrections are required for the installation, then, in accordance with Table 310.16, a 1/0 AWG Cu or a 3/0 AWG Al meets this rating at 75°C (167°F).

Annex D, Example 7

Sizing of Service Conductors for Dwelling(s)

- With Required Temperature Correction Factor.
- If a 175-ampere service rating is selected, a service conductor is then 175 amperes × 0.83 = 145.25 amperes per 310.12.
- If the conductors are installed in an ambient temperature of 38°C (100°F), the conductor ampacity must be multiplied by the appropriate correction factor in Table 310.15(B)(1). In this case, we will use an XHHW-2 conductor, so we use a correction factor of 0.91 to find the minimum conductor ampacity and size:
- 145.25/.91 = 159.6 amperes
- In accordance with Table 310.16, a 2/0 AWG Cu or a 4/0 AWG Al would be required.