

What size copper wire is needed for a secondary distribution box



Overview

Find the right wire gauge for your sub panel. Use our sub panel wire size calculator to ensure safe and code-compliant electrical installs.

Key Takeaways

The appropriate copper wire size for a subpanel depends on the amperage, distance, and load, with common residential feeders ranging from #4 AWG to 3/0 AWG for 100–200A service. Determining Wire Size

The correct copper wire size for a secondary distribution box (subpanel) is determined by several factors:

1. Load and Amperage: Calculate the maximum expected load of the subpanel, including continuous loads (operating 3+ hours) and non-continuous loads. NEC requires sizing conductors for continuous loads at 125% of the load current to prevent overheating (NEC 210.19(A)(1)).
2. Distance and Voltage Drop: Longer feeder runs increase resistance and voltage drop. NEC recommends a maximum 3% voltage drop for branch circuits and 5% for feeders. For example, a 200-foot run to a detached garage may require upsizing the wire to maintain voltage within acceptable limits.
3. Conductor Material: Copper has higher conductivity than aluminum, allowing smaller wire sizes for the same amperage. For example, a 200A service typically requires 3/0 AWG copper for a 100-foot run, while aluminum would require 250 kcmil.
4. NEC Guidelines and Derating:

- Ambient temperature above 86°F (30°C) requires derating according to NEC Table 310.15(B)(2)(a).

- More than three current-carrying conductors in a conduit require additional derating: 4–6 conductors → 80%, 7–9 → 70%, 10–20 → 50% .

Typical Residential Subpanel Wire Sizes

Subpanel Amperage	Copper Wire Size (AWG)	Distance Consideration
100A	#4 AWG	Up to 50 feet
125A	#2 AWG	50–100 feet
150A	#1 AWG	50–100 feet
200A	3/0 AWG	100+ feet

These sizes assume standard 120/240V single-phase service and typical residential loads. Always verify with a load calculation and consider voltage drop for longer runs .

Practical Tips

- Use copper conductors for indoor or short runs; aluminum may be more cost-effective for long outdoor feeders.
- Ensure all connections are rated for the conductor type.
- Use a reliable NEC feeder wire calculator to confirm sizing based on your specific load, distance, and installation conditions . By following these guidelines, you can ensure your secondary distribution box operates safely, efficiently, and in compliance with NEC standards.

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This document discusses rules for sizing transformer secondary conductors according to the National Electrical Code.

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Hence, the suggested wire size for a 100-amp service is #4 AWG for copper and #2 AWG for aluminum, according NEC Table 310

Wire Size Calculator For Subpanels And Feeders – NEC Guidelines ...

Use an accurate NEC feeder wire calculator to simplify sizing for subpanels in detached garages, workshops, or

100 Amp Wire Size — What Wire for 100A Service or Subpanel?

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Transformer Secondary Wire Size Calculator Online

This calculator assists in determining the appropriate wire size needed for the secondary side of a transformer based

Wire Size Calculator

The Wire Size Calculator below will calculate the proper wire size for a circuit based on circuit amps, preferred (or available) wire

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This wire size calculator will calculate the appropriate wire gauge for a circuit based on amps, voltage, distance, and load. This

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