

WIRE SIZE CHART

The smallest conductor that holds voltage drop under 3 percent, for ten loads across seven distances, copper and aluminum.

Two separate things decide a wire size, and mixing them up is the most common mistake on a long run. The first is ampacity: the conductor has to carry the current without overheating, and that is NEC Table 310.16. The second is voltage drop: the conductor has to deliver usable voltage at the far end, and that is what the tables below are about.

On a short run ampacity governs and voltage drop is irrelevant. Past roughly a hundred feet the two swap places, and voltage drop starts demanding a conductor two or three sizes above the one ampacity would accept. Whichever of the two asks for more copper is the one you install.

Three percent is the figure every one of these tables is built on. It is the recommendation in the informational notes to NEC 210.19 and 215.2 for branch circuits and feeders, and it is a note rather than a rule, so no inspector fails a job on it. It is still the right target, because what is on the other end of the wire does not care what the code enforces.

Copper at 240 V, single phase

Load	25 ft	50 ft	75 ft	100 ft	150 ft	200 ft	300 ft
15 A	14 AWG	14 AWG	14 AWG	12 AWG	10 AWG	8 AWG	8 AWG
20 A	14 AWG	14 AWG	12 AWG	10 AWG	8 AWG	8 AWG	6 AWG
30 A	14 AWG	12 AWG	10 AWG	8 AWG	8 AWG	6 AWG	4 AWG
40 A	14 AWG	10 AWG	8 AWG	8 AWG	6 AWG	4 AWG	3 AWG
50 A	12 AWG	10 AWG	8 AWG	6 AWG	4 AWG	4 AWG	2 AWG
60 A	12 AWG	8 AWG	8 AWG	6 AWG	4 AWG	3 AWG	2 AWG
100 A	10 AWG	6 AWG	4 AWG	4 AWG	2 AWG	1 AWG	2/0
125 A	8 AWG	6 AWG	4 AWG	3 AWG	1 AWG	1/0	3/0
150 A	8 AWG	4 AWG	4 AWG	2 AWG	1 AWG	2/0	3/0
200 A	6 AWG	4 AWG	2 AWG	1 AWG	2/0	3/0	250 kcmil

Voltage drop only. This column is the smallest conductor that stays under 3 percent over that one way distance, and it is NOT an ampacity rating. A 20 amp circuit still needs 12 AWG minimum for ampacity no matter what this table says at 25 feet. Install the larger of the two.

Copper at 120 V, single phase

Load	25 ft	50 ft	75 ft	100 ft	150 ft	200 ft	300 ft
15 A	14 AWG	12 AWG	10 AWG	8 AWG	8 AWG	6 AWG	4 AWG
20 A	14 AWG	10 AWG	8 AWG	8 AWG	6 AWG	4 AWG	3 AWG

Load	25 ft	50 ft	75 ft	100 ft	150 ft	200 ft	300 ft
30 A	12 AWG	8 AWG	8 AWG	6 AWG	4 AWG	3 AWG	2 AWG
40 A	10 AWG	8 AWG	6 AWG	4 AWG	3 AWG	2 AWG	1/0
50 A	10 AWG	6 AWG	4 AWG	4 AWG	2 AWG	1 AWG	2/0
60 A	8 AWG	6 AWG	4 AWG	3 AWG	2 AWG	1/0	2/0
100 A	6 AWG	4 AWG	2 AWG	1 AWG	2/0	3/0	250 kcmil
125 A	6 AWG	3 AWG	1 AWG	1/0	3/0	4/0	350 kcmil
150 A	4 AWG	2 AWG	1 AWG	2/0	3/0	250 kcmil	350 kcmil
200 A	4 AWG	1 AWG	2/0	3/0	250 kcmil	350 kcmil	500 kcmil

The same loads at half the voltage need a great deal more copper, because drop is a percentage of the supply and the supply is half as large. This is the whole argument for running a long circuit at 240 V wherever the load allows it.

Aluminum at 240 V, single phase

Load	25 ft	50 ft	75 ft	100 ft	150 ft	200 ft	300 ft
15 A	14 AWG	12 AWG	10 AWG	10 AWG	8 AWG	6 AWG	4 AWG
20 A	14 AWG	12 AWG	10 AWG	8 AWG	6 AWG	6 AWG	4 AWG
30 A	12 AWG	10 AWG	8 AWG	6 AWG	4 AWG	4 AWG	2 AWG
40 A	12 AWG	8 AWG	6 AWG	6 AWG	4 AWG	3 AWG	1 AWG
50 A	10 AWG	8 AWG	6 AWG	4 AWG	3 AWG	2 AWG	1/0
60 A	10 AWG	6 AWG	4 AWG	4 AWG	2 AWG	1 AWG	2/0
100 A	8 AWG	4 AWG	3 AWG	2 AWG	1/0	2/0	4/0
125 A	6 AWG	4 AWG	2 AWG	1 AWG	2/0	3/0	250 kcmil
150 A	6 AWG	3 AWG	2 AWG	1/0	2/0	4/0	350 kcmil
200 A	4 AWG	2 AWG	1/0	2/0	4/0	250 kcmil	500 kcmil

Aluminum carries about 61 percent of copper's conductivity, which is roughly two sizes up for the same drop. It is normal and code compliant for services, feeders and sub panel runs, and it needs terminations rated for it and an antioxidant compound on the connections.

Every figure on this sheet was produced by the same calculator that runs at contractorhandbook.com, free and with no signup.

These are estimating figures for ordering and pricing, not engineering. Nothing here sizes a structural member, checks a load, or replaces local code, a permit, or a manufacturer's installation instructions. Where a rule of thumb is doing the work it is written into the notes under each table rather than hidden.