Smiley Electric

Licensed electrician · Portland, Oregon · Oregon CCB #227116

FREE HOMEOWNER GUIDE

Do I need a subpanel for my garage, ADU, or shop?

What a subpanel is and when you need one

A subpanel is a smaller breaker box fed from your home's main service panel by a single feeder. Instead of running a separate circuit all the way back to the main panel for every light, outlet, and tool, a subpanel gives a garage, shop, or accessory dwelling unit its own local distribution point. That means shorter branch-circuit runs, cleaner wiring, and room to grow.

In Portland-area homes, the usual reasons to add one are simple: a detached structure is too far to feed each circuit individually, a remodel or ADU needs its own set of circuits, a high-demand item like an EV charger, hot tub, or welder needs dedicated capacity, or the main panel is simply full and has no room for more breakers. If your main panel is out of spaces, a subpanel can be a smarter fix than cramming in tandem breakers.

Sizing your subpanel

Subpanel size is measured in amps, and picking the right one is a balance between what you need today and what you are likely to add later. Undersizing is the more common regret, since a subpanel that is maxed out the day it is energized leaves no room for the next tool, heater, or charger.

- ☐ 60 amps: small sheds or detached garages with basic lighting and a few outlets
- ☐ 100 amps: ADUs, or garages and shops with major appliances, HVAC, or an EV charger
- ☐ 125 to 200 amps: high-demand workshops with welders and compressors, or partial home additions

Feeder wire and conduit

The feeder is the set of conductors that carries power from the main panel to the subpanel, and it has to be sized to the subpanel's breaker rating. Undersized feeder wire is one of the most common mistakes we correct on DIY jobs; it overheats and will fail inspection. As a rough guide for the common sizes:

- ☐ 60 amps: #6 AWG copper
- ☐ 100 amps: #3 AWG copper, or #1 AWG aluminum
- ☐ 200 amps: 2/0 AWG aluminum (or the copper equivalent)
- ☐ Underground feeders to a detached structure must be buried roughly 18 to 24 inches deep, in conduit rated for the location

Grounding and neutral separation (the part DIYers get wrong)

A subpanel is wired differently from a main panel, and this is where most homeowner installations go wrong in a way that is genuinely dangerous. In a subpanel, the neutral conductors and the ground conductors must be kept on separate bars and must not touch each other or the metal enclosure. The neutral connects to ground only back at the main service panel, never at the subpanel.

The reason is safety: if the neutral and ground are tied together at a subpanel, normal current can travel on the ground wire and the metal cases of tools and appliances, which can energize surfaces you touch. A detached garage, shop, or ADU also needs its own grounding electrode, typically ground rods driven at the structure, connected to the subpanel's ground bar. This is not a place to guess. Have a licensed electrician handle the grounding and neutral arrangement.

Common mistakes we see

When we are called to fix or re-inspect a subpanel, the same handful of errors come up again and again. Any one of them can fail inspection, and several can void a homeowner's insurance or start a fire.

- [ ] Neutral and ground tied together in the subpanel instead of kept separate
- [ ] Feeder wire undersized for the breaker feeding the subpanel
- [ ] No grounding electrode (ground rods) at a detached structure
- [ ] Shared neutrals on multi-wire circuits without the required handle ties
- [ ] Missing permit, so the work is never inspected and problems stay hidden

Permits, clearances, and inspection in Oregon

Subpanel work in the Portland metro requires an electrical permit and inspection. Inspectors will look for the correct breaker size in the main panel, proper feeder gauge, neutral and ground kept separate in the subpanel, grounding electrodes at detached buildings, clear circuit labeling, and adequate working clearance around the panel. NEC 110.26 requires roughly 30 inches of width, 36 inches of depth in front, and 6.5 feet of headroom, kept clear of plumbing and gas lines.

For the full list of what to prepare, see our Oregon electrical permit checklist. If the subpanel is going in because your main panel is full or aging, it may be worth pricing a panel upgrade at the same time, since the two decisions are related.

Frequently asked questions

What size subpanel do I need for a garage or shop?

A 60-amp subpanel covers a small garage or shed with lighting and outlets. A 100-amp subpanel suits an ADU or a garage with major appliances or an EV charger. High-demand workshops with welders and compressors often want 125 to 200 amps. Sizing for future loads, not just today's, avoids a second upgrade later.

Why must the neutral and ground be separate in a subpanel?

In a subpanel the neutral and ground conductors have to stay on separate bars, connected together only back at the main service panel. If they are tied together at the subpanel, normal current can travel on the ground

wire and the metal cases of tools and appliances, creating a shock hazard. This is a common and dangerous DIY mistake, so have a licensed electrician handle it.

Does a detached garage or ADU need its own ground rods?

Yes. A detached structure fed by a subpanel needs its own grounding electrode, typically ground rods driven at the structure and connected to the subpanel's ground bar. This is one of the items inspectors check, and it is frequently missed on homeowner installations.

Do I need a permit to add a subpanel in Oregon?

Yes. Adding a subpanel requires an electrical permit and an inspection through your local city or county building department. The inspection checks feeder size, grounding, neutral separation, labeling, and working clearances. We handle permits and inspection coordination as part of the job.

Sources

1. Lights, outlets, switches, and service reconnect for residential electrical permits, City of Portland Permitting & Development. https://www.portland.gov/ppd/residential-permitting/residential-electrical-permits/lights-outlets-switches-reconnection
2. Residential Electrical Permits, City of Portland Permitting & Development. https://www.portland.gov/ppd/residential-permitting/residential-electrical-permits
3. Electrical Code Program: Codes and standards, Oregon Building Codes Division. https://www.oregon.gov/bcd/codes-stand/Pages/electrical.aspx

> **Need a licensed electrician in the Portland area?**
> Call Smiley Electric at (503) 484-7556 (Mon–Sat, 7am–5pm) or visit smileyelectric.net/contact. For sparks, smoke, a burning smell or a hot panel, turn off the power if it is safe and call right away.

Reviewed by Joshua Smiley, owner & master electrician, Smiley Electric. Last reviewed November 13, 2026. Online version: smileyelectric.net/help/subpanels-for-garages-adus-and-shops/. General information, not a substitute for an on-site inspection.

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