

Securing Your Home Against Earthquake Damage

The Shelter & Structural Safety chapter lists "Hazard Hunting" as a Tier 1 skill and the shopping list has line items for seismic straps and furniture anchors, but the actual technique has never been written down. FEMA's own data is the reason this matters: falling and shifting objects, not building collapse, is the leading cause of earthquake injury. This guide is how to actually anchor the things in your home.

Everything below depends on finding your studs first

Anchoring hardware, screws, L-brackets, straps, only works if it bites into a wall stud. A screw into drywall or plaster alone will pull straight out under real earthquake force; it isn't a weaker version of a proper anchor, it's decoration that fails when it matters. Studs are typically spaced 16 inches apart, center to center, in most home construction.

To actually use a stud finder: hold it flat against the wall and start it over a spot you're confident is hollow, between where you expect two studs to be, so it calibrates against empty wall rather than a stud. Sweep it horizontally at a slow, steady pace, roughly an inch per second, and keep your other hand off the wall while you do, touching the wall can throw off the reading. When it signals a stud, sweep back over that spot from the other direction to find both edges of it, then mark the midpoint between them as the stud's actual center. If you don't have a stud finder, the knock test works as a backup: tap along the wall and listen for the sound to change from hollow to solid.

Where to start if you can only do one thing

Every item below is worth doing, but they're not equally urgent. Ranked by the actual consequence of skipping it:

1. **The water heater.** A 400+ pound water heater that topples doesn't just make a mess, it can sever its own gas and water connections, creating a fire and flood risk at the same time, in the same moment you're least able to respond to either.
2. **Heavy furniture near beds and exits.** A bookcase or dresser that falls onto a bed, or blocks a doorway, turns a manageable earthquake into a trapped or injured household member.
3. **Everything else on this page:** shelf contents, cabinets, pictures, electronics. Real risks, but lower-consequence than the first two.

Water heater and furnace strapping

Spec	Requirement
Number of straps	At least 2: one in the upper third of the tank, one in the lower third
Lower strap position	At least 4 inches above the water heater's own control panel/gas valve
Strap material	Metal strapping at least 22-gauge steel and 5/8 inch wide, or plumber's tape that fully encircles the tank, not nylon
Anchor hardware	1/4-inch (minimum) lag bolts, at least 1.5 inches of thread penetration into the stud, with a large flat washer between the lag screw and the strap
Gas and water lines	Flexible connectors, not rigid pipe, so the connection can flex slightly with the tank instead of shearing

This isn't just good practice, it's Utah's actual adopted building code (based on the International Residential Code) for exactly this reason: the Wasatch Fault makes water heater strapping a code requirement here, not an optional upgrade. Two straps covers most residential tanks, but the exact cutoff for needing a third strap at mid-height varies by tank size and local jurisdiction; check your specific tank's manufacturer instructions or your local building code rather than assuming two is always enough.

Anchoring furniture: bookcases, dressers, and tall pieces

1. Locate the studs behind where the furniture sits (see above).
2. Use metal L-brackets with screws through the top or back of the piece, or nylon safety straps, either works; what matters is that the hardware reaches a stud, not just the furniture's own backing. Use wood screws long enough to penetrate at least 2 inches into the stud itself, and once installed, pull-test both ends, at the wall and at the furniture, to confirm there's no slack and nothing shifts before trusting the anchor.
3. **Before anchoring through the back of a bookcase**, confirm the back panel is actually solid and securely attached to the sides, top, and bottom. A thin, loosely stapled back panel will tear away from the rest of the piece under load, defeating the anchor.
4. Where two pieces of furniture sit next to each other, connect them to each other in addition to the wall; a linked pair is more stable than two independently anchored pieces.
5. Position anything heavy and unanchored, or anything you haven't gotten to yet, away from beds, sofas, and exit paths, so it can't fall on someone or block the way out.

TVs, electronics, and appliances

- Keep TVs, computers, and microwaves on lower shelves or furniture where practical; lower center of gravity means less energy in a fall.
- A TV needs two separate connections, not one: anchor the furniture itself to a wall stud first, then separately strap the TV to the furniture using the TV's own VESA mount points on the back. Pull-test both connections, at the wall and at the TV, before trusting either one.
- Strap a refrigerator to the wall the same way as a water heater, heavy-gauge strapping into studs, if it isn't already secured by cabinetry on both sides.
- Any gas appliance (range, dryer) should have a flexible connector, not a rigid line, for the same reason as the water heater above.

Keeping shelf and cabinet contents from becoming projectiles

- **Open shelves:** a thin restraint wire, wood dowel, or elastic guardrail across the front of each shelf keeps books and objects from sliding straight off during shaking.
- **Kitchen and bathroom cabinets:** an ordinary childproof latch is built to resist a toddler's grip, not the lateral force of shaking, and some release with the exact same pull motion an earthquake would apply to a swinging door. Use latches specifically sold for earthquake use, push-to-close positive-catch latches or dedicated seismic latches, installed with all the hardware the latch comes with.
- **Pictures and mirrors:** hang with closed hooks rather than open hooks, so the frame can't bounce free during shaking. For smaller or lighter items on shelves, museum putty or earthquake wax holds them in place without permanent hardware.
- **Ceiling fans and pendant lights:** turn off the circuit breaker for the fixture, not just the wall switch, and confirm it's actually dead with a non-contact voltage tester before touching any wiring. Support the fixture with a bracing wire secured to a ceiling joist, and confirm the fixture itself is mounted to a fan-rated electrical box or brace capable of holding at least 50 lbs, not just the drywall around a standard box.

This connects directly to the utility shutoff skill

A strapped water heater with flexible connectors is far less likely to need a gas shutoff in the first place, but knowing how to actually shut off gas, water, and electricity if something does break is a separate skill covered in full in Fire-Starting & Generator Safety. Both matter; this page prevents the damage, that one handles it if prevention wasn't enough.

Sources

- FLASH (Federal Alliance for Safe Homes), securing furniture, appliances, electronics, and belongings before an earthquake: FLASH; FLASH
- Water heater seismic strapping specification (strap placement, lag bolt size, thread penetration): Plumbing & Mechanical
- Utah Residential Code, water heater seismic bracing requirement (adopted 2021 IRC, Section P2801.8): UpCodes; ICC Digital Codes
- Earthquake Country Alliance, "Step 1: Secure Your Space": Earthquake Country Alliance
- Water heater strap material spec: California Seismic Safety Commission
- Stud finder calibration and sweep technique: Bob Vila
- CPSC Anchor It, furniture/TV two-point anchoring and pull-test method: CPSC; FEMA, screw stud-penetration spec: FEMA
- Seismic-rated cabinet latch requirements: FEMA
- Ceiling fan electrical safety and fan-rated box weight requirement: Fine Homebuilding