insight
home inspections

HOME INSIGHTS

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## COURTESY OF COLE ATKINS

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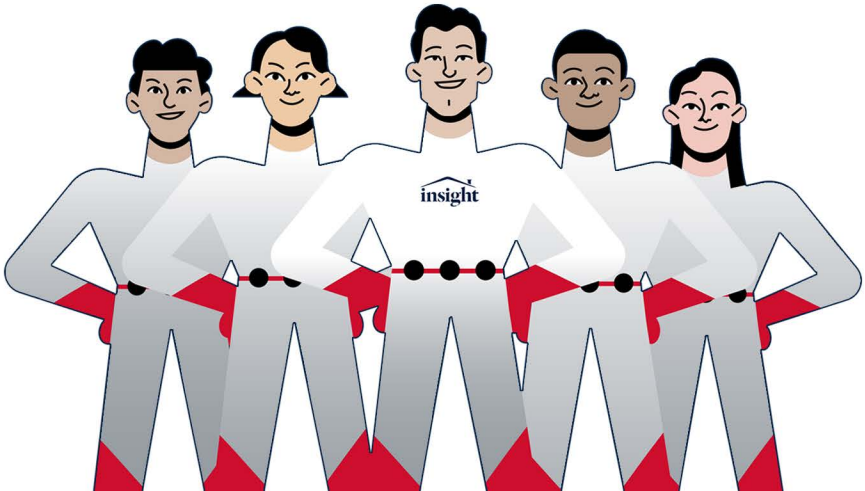

# CONGRATULATIONS

**Welcome to Home Insights, your personalized and customized "homeowner's guide to your home."**

Home Insights is designed to show you how to enhance your comfort, ensure your safety, and maximize your investment.

When we inspected your home, we captured data for lots of components, including your roof, HVAC system, electrical system, plumbing, water heater, and appliances. All of the data we collected during the inspection is included in this document to provide you with a quick reference and information about how to maintain your home.

Because how well you maintain your home has a big impact on your future spending. Better maintenance leads to lower long-term costs and extended life expectancy for all of your major systems and components. We realize you're probably not thinking about selling your home because you just moved in, but somewhere down the road, you'll probably move on to another house. How well you maintain this home over the years has a big impact on how well you maximize your investment when you sell the house. You will be much happier when you sell your house if you've taken good care of the house during your stewardship.

Your plan of action is simple - perform regular maintenance. Change your HVAC filters regularly. Clean your gutters regularly. Check your roof regularly. Check your foundation quarterly. And even if it's a hassle, access your attic and crawl space at least quarterly. Regular maintenance minimizes expensive, longer-term issues.

You should also pay attention, especially to your high value/high-cost systems and components, e.g., roof, HVAC, electrical, plumbing. Systems change and degrade over time, and it's not always obvious when problems start to occur, especially when you're living in the house day to day. But little problems that aren't resolved generally turn into bigger problems or safety issues. Therefore, stay vigilant and don't procrastinate - fix little issues before they can evolve into bigger, expensive problems.

If you need help with any system or component, reach out to your real estate agent, who is well-connected in your local community and can provide good advice. You should also check out our partners, included herein and on our website. You're certainly also welcome to contact us if we can be of service.

Congratulations again and best wishes in your new home!

# CATEGORIES, SYSTEMS, AND COMPONENTS

There are 11 major categories in a home, including 100+ systems and components. The more you know about each system and component, the more likely you'll properly maintain your home's value during your ownership. Our graphic below is a good place to start when considering how to think about your home holistically, understanding, of course, that not every home includes every component. Our homeowner's guide is structured according to the 11 categories.

### EXTERIOR

Driveway, Walks, Siding, Chimneys, Doors, Garage Door, Stairs/Steps, Hose Faucets, Stoop, Porch, Deck/Balcony, Patio, Fence, Retaining Wall, Carport

### ROOF

Roofing, Flashing, Skylights

### WATER CONTROL

Grading, Gutters/Downspouts, Exterior Drains, Window Wells, Sump Pump

### FUEL SERVICES

Fuel Tanks, Fuel Meter

### STRUCTURE

Foundation, Beams, Piers/Posts, Floor Structure, Wall Structure, Roof Structure, Roof Sheathing, Attic, Crawl Space

### INSULATION/VENTILATION

Interior Insulation, Attic Insulation, Crawl Space Insulation, Exhaust Ventilation, Attic Ventilation, Crawl Space Ventilation

### ELECTRICAL

Service, Panel, Sub-Panel, Branch Circuits, Grounding/Bonding, Receptacles, Switches, Fixtures, Smoke Detectors, CO Detectors

### PLUMBING

Service Line, Main Shut-off, Supply Pipes, Drain-Waste-Vents, Toilets, Showers/Tubs, Sinks, Water Heaters, Whirlpool, Sewage Ejector Pump, Fire Sprinkler System

### HVAC

Heating System, Cooling System, Distribution, Thermostats, Humidifiers

### INTERIOR

Floors, Walls, Ceilings, Doors, Stairs/Steps, Cabinets/Drawers, Countertops, Windows, Fireplaces, Fuel-burning Appliances

### APPLIANCES

Range/Ovens, Ovens, Microwaves, Cooktops, Garbage Disposers, Dishwashers, Refrigerators/Freezers, Washer, Dryer

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# QUICK REFERENCE

## PROPERTY

| | |
|---|---|
| DRIVEWAY | Concrete |
| WALKS | Concrete |

## EXTERIOR

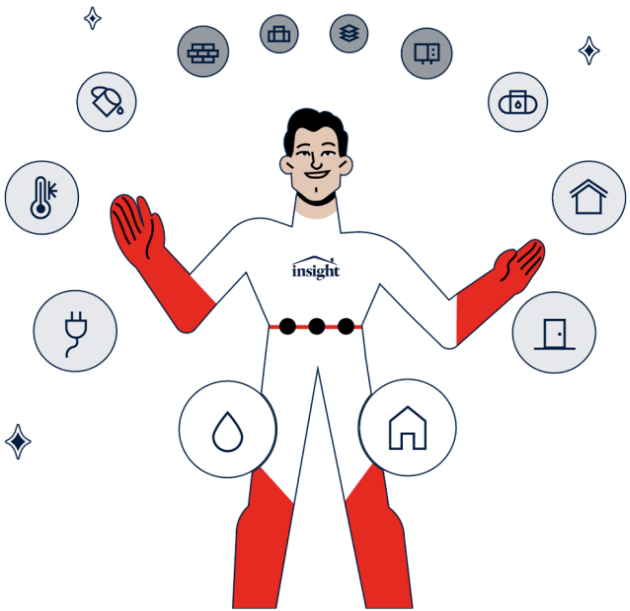
| | |
|---|---|
| WALLS | Vinyl |
| DOORS | Metal, Glass |
| STAIRS/STEPS | Wood, Brick |
| PORCH | Concrete and Brick, Covered |

## ROOFING

| | |
|---|---|
| ROOF COVERING | Fiberglass/Asphalt 3-Tab Shingle |

## WATER CONTROL

| | |
|---|---|
| GUTTERS/DOWNSPOUTS | Aluminum |



# QUICK REFERENCE

## FUEL SERVICES

| | |
|---|---|
| FUEL METER | Left Side |

## STRUCTURE

| | |
|---|---|
| FOUNDATION | Concrete Blocks, Crawl Space |
| BEAMS | Wood |
| PIERS/POSTS | Concrete Blocks |
| FLOOR | I-Joists, Conventional Framing |
| WALLS | Wood Framing |
| ROOF | Dimensional lumber, Truss System |
| ROOF SHEATHING | Oriented Strand Board (OSB) |

## INSULATION AND VENTILATION

| | |
|---|---|
| ATTIC INSULATION | Loose fiberglass, Fiberglass batts |
| EXHAUST VENTILATION | Bathroom Fan |
| ATTIC VENTILATION | Ridge Vent |

## ELECTRICAL

| | |
|---|---|
| SERVICE | Rear, Unable to Determine, Underground, 200 amps incoming |
| ELECTRICAL PANEL | Attached Garage, Circuit Breaker, 200 amps, 120/240 panel voltage |
| BRANCH CIRCUITS | Copper, Stranded Aluminum, Non-metallic Sheathed Cable (Romex) |

# QUICK REFERENCE

## HVAC

| | |
|---|---|
| HEATING SYSTEM | Attached Garage, Heat Pump, Electric, Goodman, 1 year old |
| HEATING SYSTEM | Attic, Heat Pump, Electric, Carrier, 16 years old |
| COOLING SYSTEM | Left Side Exterior, Central Split, Electric, Goodman, 1 year old |
| COOLING SYSTEM | Left Side Exterior, Central Split, Electric, Carrier, 15 years old |

## PLUMBING

| | |
|---|---|
| WATER SERVICE LINE | Crawl Space, PEX, Public Water |
| SUPPLY PIPES | Copper, PEX |
| DRAIN, WASTE, VENTS | PVC, Public Sewer |
| WATER HEATER | Attached Garage, Conventional Tank, Electric, 50 gallons, STATE, 15 years old |

## INTERIOR

| | |
|---|---|
| FLOORS | Carpeting, Laminate |
| WALLS | Drywall |
| CEILINGS | Drywall |
| STAIRS/STEPS | Conventional |
| WINDOWS | Vinyl, Single Hung |
| FUEL-BURNING APPLIANCE | Propane |

## APPLIANCES

| | |
|---|---|
| RANGE/OVEN | Free-Standing, Electric |
| MICROWAVE | Built-In |
| DISHWASHER | Built-In |

# WATER SHUT-OFF

**Know the location of your main water shut-off valve and keep it readily accessible.**

In case of emergency, e.g., overflowing bathtub, leaking pipe, you should know the location of your main shut-off valve.
Mark the valve with a bright-colored ribbon or tag.
Engage a plumber if your main shut-off valve is inoperable or leaks.
Your main water shut-off valve should be readily accessible.
No boxes, no storage, no personal items, trim vegetation.

**Your main water shut-off is in the Hall Closet.**

**Practice your emergency plan annually.**

Test your main shut-off valve annually.
Practicing may help you to save valuable time and reduce water damage.

# ELECTRIC SHUT-OFF

**Know the location of your electricity shut-off and keep it readily accessible.**

Your main circuit breaker controls power to your entire house.
In case of emergency, you should know the location of your main circuit breaker.
Your main circuit breaker should be readily accessible.
No boxes, no storage, no personal items, trim vegetation.

**Your main circuit breaker is in the electrical panel in the Attached Garage.**

Flip the switch on your main breaker to ensure that all power can be turned off quickly.
Engage an electrician if your main circuit breaker is inoperable.


**Practice shutting off the electricity annually.**

Coordinate your test with other occupants.
Turn off all motor-powered devices, e.g., appliances, washer, dryer, fans etc.
Disable any backup power generators.
Flip the main switch to turn off electricity.
After the power is off, test switches and fixtures to ensure all power is off.

# GAS SHUT-OFF

**Know the location of your gas shut-off valve and keep it readily accessible.**

In case of emergency, you should know the location of your main shut-off valve.
**Do not turn off your main gas valve unless there is an emergency.**
Gas leak, strong gas odor, natural disaster, etc.
Your main gas shut-off valve should be readily accessible.
No vegetation, no boxes, no storage.
Engage a plumber if you have any concerns about your main gas shut-off.

**Your main gas shut-off is in the Left Side.**


**Do not turn on your gas shut-off without the assistance of a plumber or the gas company.**

Appliance pilot lights go off when the main gas is turned off.
If appliance valves aren't properly managed, gas may be released into the interior when the gas main is turned on again.
Engage a plumber or the gas company to ensure that gas is turned on properly.

# AIR FILTERS

**Change your air filters regularly!**

**Cleaner Indoor Air**

Air filters collect dust, spores, hair, pet dander, and other particles that get pumped through your HVAC system; changing your air filters regularly helps you to have cleaner, healthier air.

**Better Health and Seasonal Allergy Relief**

Cleaner indoor air can also help improve allergies and asthma. If you suffer from congestion, itchy nose, or breathing issues, try changing your air filters more often.

**Improved HVAC Efficiency**

Changing your air filters helps your HVAC system perform more efficiently; changing your air filter regularly can help your system last longer, require less maintenance, and help to save you money on your energy bill.

SIZE 20x25x1

SIZE 20x25x1

**Filter Types FYI**

Fiberglass filters are a lower cost option, but need to be replaced mothly.
Pleated air filters are usually made of higher quality materials and can last three to six months depending on material, manufacturer, and frequency of use.
Follow instructions included with your filter for detailed guidance.

# AIR FILTERS

**Change your air filters regularly!**

| | |
|---|---|
| SIZE | 12x12x1 |

# EXTERIOR

# Driveway

## Material: Concrete

**You have a concrete driveway.**
One of the best attributes of a concrete driveway is how little maintenance and routine care it needs over its lifetime. But no driveway material is maintenance-free. Your concrete driveway requires maintenance to minimize cracking, corrosion, puddles, or surface depressions.

**Inspect your driveway monthly.**
Your house is in an area which is susceptible to heavy rain, snowing, freezing, and thawing. Cracks are inevitable because of weather conditions; cracks occur because of movement in the base or subsoil during freezing or thawing. Movement also can occur because of design or landscaping which may prevent surface water to drain properly.

**Seal your driveway annually.**
Seal your driveway annually to minimize cracks and deterioration. If you notice drainage issues or standing water that doesn't drain after 24 hours, consider contacting a driveway contractor to evaluate and repair the issue.

**Repair and fill cracks quickly.**
Water penetration can quickly turn even the smallest cracks into large cracks. Most cracks can be filled with a high-quality sealer. If there are larger cracks, clean the cracks and holes before filling and patching. After the compound dries, seal the entire driveway.

**Don't drive on the edges!**
Driveway edges are the weakest part of your driveway because edges receive the least amount of support. You can build up the soil near the edges; topsoil should be about one inch lower than the sides of your driveway to permit water drainage and grass growth. You may notice that weeds and grass want to push through and create cracks; using spot killer typically fixes the situation. If you have other plants, shrubs, or trees, roots may cause issues; in such cases, you may want to remove or relocate the plants or trees.

**Clean up gas and oil spills quickly.**
Keep your eyes open for gasoline or oil spills, which dissolve the surface of your asphalt driveway. If there are leaks or spills, use absorbent materials quickly and clean up the spills completely. You may also want to inspect your vehicle.

**Use rock salt or potassium chloride to melt ice or snow.**
Avoid using salt or de-icing agents that have a chemical base; they're highly corrosive and damage the surface of your driveway.

# Walk

## Material: Concrete

**You have concrete walks.**
One of the best attributes of a concrete walk is how little maintenance and routine care it needs over its lifetime. But no walk material is maintenance-free. Your concrete walk requires maintenance to minimize cracking, corrosion, puddles, or surface depressions.

**Inspect your walk monthly.**
Your house is in an area which is susceptible to heavy rain, snowing, freezing, and thawing. Cracks are inevitable because of weather conditions; cracks occur because of movement in the base or subsoil during freezing or thawing. Movement also can occur because of design or landscaping which may prevent surface water to drain properly.

**Seal your walk annually.**
Seal your walk annually to minimize cracks and deterioration. If you notice drainage issues or standing water that doesn't drain after 24 hours, consider contacting a walk contractor to evaluate and repair the issue.

**Repair and fill cracks quickly.**
Water penetration can quickly turn even the smallest cracks into large cracks. Most cracks can be filled with a high-quality sealer. If there are larger cracks, clean the cracks and holes before filling and patching. After the compound dries, seal the entire walk.

**Clean up gas and oil spills quickly.**
Keep your eyes open for gasoline or oil spills, which dissolve the surface of your asphalt walk. If there are leaks or spills, use absorbent materials quickly and clean up the spills completely. You may also want to inspect your vehicle.

**Use rock salt or potassium chloride to melt ice or snow.**
Avoid using salt or de-icing agents that have a chemical base; they're highly corrosive and damage the surface of your walk.

# Exterior Walls

## Material: Vinyl

**You have vinyl siding.**
Vinyl siding is a durable form of plastic commonly used on the exterior of homes; vinyl is the most popular siding material in the US, installed at nearly double that of any other siding material. Vinyl comes in many colors and styles, even imitating the look of wood and other siding materials; any style from historic to contemporary is possible with vinyl siding. Vinyl is an excellent siding material because it is durable, low maintenance, and simple to obtain; vinyl also is water resistant and insect resistant.

Vinyl siding is unique in that its color is baked-in; nearly every other siding material is coated or painted. Vinyl siding's color is 100% homogeneous, i.e., the surface color runs all the way through the siding, which means that the color can't be mechanically abraded, scratched off, or stripped. If you don't want to paint the exterior of your house, vinyl siding is your dream – vinyl siding never needs painting.

Vinyl siding offers tremendous value, which means that repairs generally are inexpensive. On a materials-only basis, fiber-cement siding can cost two to four times more than vinyl siding. As an example, 24 pieces of 4 1/2-inch by 145-inch ship lap horizontal vinyl siding will cost between $150 to $200; comparably sized fiber-cement siding costs at least twice as much.

Vinyl siding's slippery surface means that dust, cobwebs, and other debris slide off relatively easily when sprayed down with a garden hose. Because there is no paint, you never have to scrape, patch, prime, and paint your house's exterior surface.

Like other types of siding, there are a few disadvantages to vinyl siding. Depending on climate, vinyl siding may begin to show its age after only 10 to 15 years; dark siding especially may fade. Siding planks may split or break due to expansion and contraction caused by temperature changes. Vinyl siding also may be susceptible to water penetration; siding typically is installed over a layer of styrene insulation board, which may trap water vapor within the cavity of the wall. Vinyl siding's effectiveness also depends on proper installation; a poor installation may cause troubles in the long-term, e.g., if siding is nailed too tightly, it will expand, crack, bulge, or warp.

**Clean your siding annually.**
You can add years to the life of your vinyl siding by dedicating a day to clean the exterior of your house. To keep your siding in good shape, hose down and scrub the siding using a mild liquid detergent with a carwash brush that attaches to a hose. Be cautious using a pressure washer; you can easily drive water behind vinyl siding. For best results, lower the pressure, work from the top down, and always direct the spray downward at the siding; never direct the spray upward.

**Inspect your siding monthly.**
Visually inspect vulnerable areas, especially the areas in which siding abuts other materials, e.g., around doors and windows, around gutters, downspouts, and fascia, where siding meets chimney, where siding is near grade, where siding is penetrated by pipes or other materials, etc.

Check the overall appearance of your siding. Discoloration is normal on vinyl siding due to dirt build-up and excessive exposure to

sunlight; there may be damage if one part of your vinyl siding is a different color from the rest of the siding.

Check for warped, loose, or broken panels, which need to be replaced to protect your house from water damage and further disintegration of your vinyl siding.

Check the interior ceilings and walls for water stains. Although siding damage may not be readily apparent on the outside of your house, you may find mold build-up or cracks in your interior walls resulting from cracks in vinyl siding.

**Check for dried or deteriorated caulking.**
Apply caulk to holes and cracks where water may penetrate the exterior of the house. Caulk as required at inside and outside corners, around window and doorframes, between badly fitting pieces of siding, where pipes and other protrusions pass through the siding, and where siding meets the foundation.

For most jobs, use latex-silicone or acrylic-silicone; do not use cheap latex-only caulk (shrinks) or pure silicone (loosens). High-quality “silicone II” generally works wells and lasts a long time. For larger gaps (more than 3/8”), use aerosol foam.

**Trim vegetation from exterior.**
No bush, tree branches, or shrubbery should touch siding. Foliage conducts moisture that can find its way into cracks and tiny openings. Trim vegetation to comfortably walk between your house and any plant materials.

**Check for breaks in the siding.**
Older vinyl products may become brittle over time, resulting in breaks or cracks; heavy winds or rain may also cause breaks in your vinyl siding. Rocks can also bang up against a wall from lawnmowers or weed whackers. Cracks or breaks in the siding ruin the integrity of your house; such damages to siding may cause interior water leaks, particularly if you wash your siding with a garden hose or a power washer.

**Know when to engage a professional.**
Lots of us like to tackle a challenge with a hearty DIY approach. Most of us can resolve minor or uncomplicated issues. But not all of us have special skills or tools to fix a more significant problem, e.g., damaged siding. Regrettably, if vinyl siding has cracked or broken panels, the entire siding plank must be replaced. If a section of your vinyl siding is damaged, engage a siding specialist.

# Exterior Doors

## Material: Metal


**You have a metal exterior door.**
Owners enjoy metal doors because they're strong, durable, insulating, and offer high security. Depending on the gauge (thickness), metal doors generally are stronger than wood or fiberglass doors, plus metal won't crack or warp. When properly maintained, metal doors are exceptionally durable; metal exterior doors also minimize drafts and deliver exceptional insulation to help you to maximize energy efficiency.

Like any type of door, metal doors also have some disadvantages, including a higher propensity to suffer from scratches or dents vs. wood or fiberglass doors; scratches on steel doors can lead to rust. Metal exterior doors also conduct temperatures at a higher rate than wood or fiberglass – on very cold or hot days, a metal door can feel uncomfortably cold or hot. If metal exterior door is exposed to direct sunlight, the door should be painted a light, bright color; otherwise, a dark color may absorb heat and damage the door.

**Inspect weatherproofing regularly.**
Doors which open to the exterior must close tightly to seal out weather. Watch carefully as you open and close a door to see if it is leaking anywhere. On a windy day, you can hold your hand or a piece of plastic food wrap near to a closed exterior door to reveal any air movement. Make sure weather-stripping is installed properly and in good condition; weather-stripping can dramatically enhance the energy efficiency of your exterior door.

You can also seal small gaps around the door's structure, including siding, trim, or drywall with caulk; if there are larger gaps, use non-expanding spray foam. You should also check the threshold structure at the bottom of the door, which can deteriorate over time due to weather and usage.

**Clean your door.**
Several times a year, take some time to thoroughly clean your exterior doors on both sides – spring cleaning is the perfect opportunity. Choose a gentle cleaner, such as diluted dish soap or baby shampoo; you can wipe wrought iron doors clean with a mixture of Murphy's oil soap and water. Avoid using abrasive tools, as they can scratch your door, leave marks, or peel protective coatings – lint-free cloths or sponges are ideal. At the risk of stating the obvious, don't use a power washer or garden hose to rinse the door, as doing so can cause water to enter your home through the seams. Use a household glass cleaner or a vinegar and water solution on glass panels and wipe with paper coffee filters for a streak-free finish. Clean spills immediately to avoid staining the door.

**Inspect your door regularly.**
Because you use most exterior doors regularly, you'll generally notice when a door starts behaving badly. However, because you use your doors regularly, you may not notice minor changes in the door's operation over time. Therefore, you should routinely inspect the door for any damage, either to the door, weather stripping, or other components like hardware.

Here's what you should look for when inspecting your doors:

- Cracks in the frame or glass – metal doors aren't likely to have cracks in the actual door, but surrounding components might. If you see cracks in the glass, order and install a replacement panel.
- Faded, cracked, chipped or peeling finish – refinish the door to refresh the look of your door.
- Moisture or fog between glass panels –fog or moisture indicates that the insulated seal between the glass is no longer intact and requires replacement.
- Splits or signs of moisture damage in the frame – replace the frame if you find these issues and look for the source of the

moisture damage.

- Damage to the weather strip, which may include cracks, gaps, or discoloration – replace weather stripping if you notice this issue or if the stripping doesn't bounce back.
- Missing pieces, tears, and gaps in the sweep (the part at the bottom that seals gaps between the bottom of the door and the threshold. – If the sweep is in bad shape, replace the sweep.
- Damaged door stop or wedge – Install a replacement.

**Tighten hardware regularly.**
Because you use most exterior doors regularly, you'll generally notice when a door starts behaving badly. Moving parts that rub against each other can become worn, parts that are exposed to rain and snow can deteriorate, screws can loosen, and hardware can wear out. Many exterior door problems can be mitigated by ensuring that door hardware is properly maintained. Tighten screws regularly on your door handle or latch, door hinges, and lockset. You can silence squeaky hardware by coating it with silicone spray or light penetrating oil, e.g., WD-40.

**Paint or seal doors as required.**
Metal doors do not need to be painted. However, if your door has been painted, exterior paint issues generally result from daily exposure to weather, and you'll need to continue to maintain the paint (or remove the paint altogether). After wiping the door clean with a solvent such as acetone or mineral spirits, paint all exterior surfaces and door panel edges with quality exterior paint with good sun-blocking resistance.

Exterior doors need to about every five years, depending on the door's position or location; a door under an awning or porch may need less attention vs. a door that is exposed to direct sunlight and weather. Take care when you paint an exterior door, as paint layers can cause moving parts to stick or create uneven seals; you may need to scrape or sand existing paint before applying a new coat.

**Diagnose door problems.**
If you have a loose door that is leaking air, tighten the hardware and check the weatherstripping. If your door rattles or is difficult to close, you may be able to adjust the latch or move the lockset. If there is a large gap at the top or bottom, you can add a piece of wood and paint it to match the door. If you have problems with a door's fit, examine the issue carefully; the frame may have slightly shifted, which may require minor adjustments to the door. If a door binds at the lock, you can typically fix the issue by slightly readjusting the location of the hinges; a door which binds at the top requires an adjustment of the top hinge and a door which binds at the bottom requires an adjustment of the bottom hinge. If a door binds at the hinges or frame, you can typically sand or plane the surfaces to accommodate the door's fit.

**Engage a door specialist as required.**
Although exterior metal doors are durable and long-lasting if maintained properly, doors occasionally need to be replaced; owners may also want to replace a door during a home improvement makeover. Replacing a door is straightforward, particularly if you have a knack for DIY and the fortitude to search the internet for how-to videos. Otherwise, engage a door specialist for door replacement or more serious issues.

# Garage Door and Opener

## Type: Sectional Panel

**You have a sectional panel garage door.**
Sectional garage doors are the most popular garage door design on the market. A sectional garage door uses vertical tracks on the side of the garage and horizontal tracks on the ceiling of the garage to lift and close the door. Sectional doors also allow for insulation to keep the inside of your garage warm in the winter and cool in the summer. Sectional doors typically are built with automatic garage door openers for quiet and smooth operation.

**Maintain your garage door.**
Keep your ears open for straining, squeaking, popping, or scraping.

- Perform a visual check of your garage door system – Search for any form of rust or fraying cables. If you discover rust, wire-brush and spray the rusted areas with a rust preventative. If there is extensive deterioration, engage a garage door technician to assess the damage.
- Lubricate springs, bearings, and hinges – Lubrication reduces friction of moving parts and quietens the door. Always use wet, rust-protective oil-based lubricant product, e.g., RP7, WD-40, or Inox.
- Clear tracks of debris – Use a soft cloth to remove oil, grease, and dirt from tracks. Use a dry lubricant to lubricate the garage door tracks, e.g., silicon spray, graphite. Unobstructed garage door tracks permit smooth opening and closing.
- Inspect and tighten hardware – Check the roller track, roller and roller brackets.

**Maintain your garage door opener.**

- Wipe the electric eye sensors to remove cobwebs, dust, or debris.
- Adjust your sensors to ensure that the beam from the sending sensor is received by the receiving sensor; sensors should be mounted 4? to 6? above the floor on each side of the garage door frame. The lights on the sensors are green when they're properly mated.
- Lubricate the chain or drive screw with spray-on white lithium grease.

**Test your garage door opener auto-reverse regularly.**
Your garage door auto reverse mechanism is an important safety component; improperly operating automatic reversing mechanisms on garage door openers have caused many injuries and even deaths. The weight and pressure involved in closing a garage door can cause serious injury to someone in the path of the door, especially children.

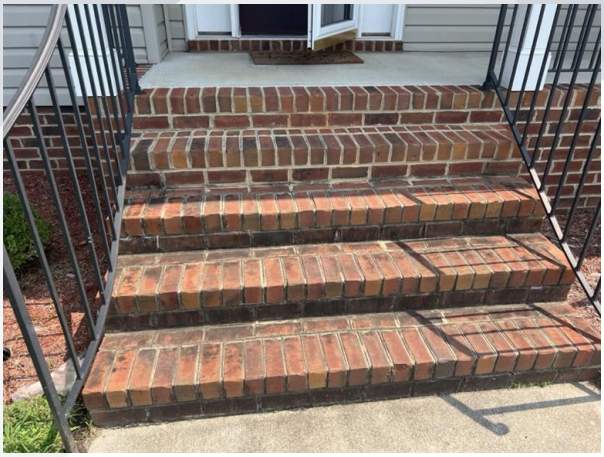
- Place a small (1.5" high) block on the floor under your door; if the door doesn't reverse within two seconds after striking the block, the door requires too much force to reverse. Disconnect the door opener until the auto-reverse is repaired; check your owner's manual for guidance on how to adjust the force of auto-reverse or engage a garage door technician.
- Some pre-1982 garage door openers may have been manufactured with other safety features which may stop the door, but not every garage door opener has an automatic reversing mechanism. Replace garage door openers manufactured before 1982.

**Engage a garage door technician as required.**
Garage doors can be dangerous – engage a professional for certain tasks.

- Re-tensioning a garage door spring
- Tightening a garage door opener chain
- Examining a garage door opener motor gear drive
- Adjusting the force setting of the garage door opener electric motor

# Exterior Stairs/Steps

## Material: Brick



**You have brick exterior stairs/steps.**
With any set of stairs and steps, you have one objective – to ensure that stairs and steps are safe. As a minimum first step, you need to properly maintain bricks and mitigate any deterioration or damage. Because stairs and steps are inherently hazardous, you also need to take other measures to ensure safety, including surface maintenance and proper handrails.

The majority of stairway falls results from a loss of balance, typically from slips or trips. Slips happen where there is too little friction or traction between footwear and step surfaces, e.g., wet or oily surfaces, occasional spills, weather hazards, loose or unanchored rugs or mats, and surfaces that don't have the same type of traction in all areas. Trips and falls occur when someone's foot strikes an object causing a loss of balance, e.g., clutter, uneven steps, uneven walking surfaces; trips also can occur from obstructed views or poor lighting. Another common contributing factor to trips and falls on stairs and steps is broken or damaged handrails.

**Minimize slipping hazards.**
To reduce the risk of slipping, keep stairs and step surfaces clean. Clean up spills, wet spots, mildew, or any debris (e.g., leaves, sticks) immediately. Scrub stains using a mild detergent mixed with water. Use a wire brush to remove stains. Test the brush and detergent in an obscure area to test for damage to the bricks before using it in a highly visible area. Wash away the detergent completely after cleaning.

Clean your brick stairs and steps regularly. Don't spray directly into the joints, which can disrupt the sand. Be careful using a power washer as it may remove sand from in between the joints of the bricks; if power-washing deteriorates sand, fill the joints with polymeric sand after the surface dries.

You may also consider adding non-slippery surfaces on the whole steps or at least on the leading edges, e.g., slip-resistant sealant, rubber, or metal.

**Minimize tripping hazards.**
To reduce the risk of tripping, keep stairs and steps free from trip hazards, e.g., broken or deteriorated bricks, loose mortar. Make sure that nothing is sticking out the surfaces of stairs, handrails, or bannisters (e.g., nails, splinters) that could cause a fall.

Exterior stairways also need to be visible in the dark; you should use angular lighting and color contrast to improve depth perception, as well as matte finishes on the treads to avoid glare. You can easily add solar lighting to enhance lighting on stairs and steps.

**Test your handrails regularly.**
The prime function of any handrail is for holding as support while going up or down stairs. Handrails must be "graspable," i.e., you should be able to grasp the rail quickly, easily, and firmly if you start losing your balance. You should be able to run your hand smoothly along the entire length without having to adjust your grip. There should also be appropriate horizontal and vertical clearances to prevent the risk of young children falling through and to not facilitate climbing. You should also remind people to grasp the handrail while ascending or descending stairs.

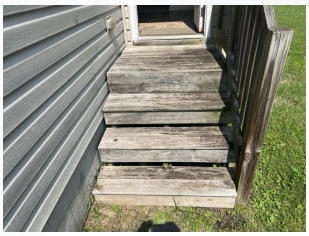
**Remove weeds and growth between bricks.**
Weeds and moss growth in between bricks is an on-going problem for many homeowners; weeds and growth are unsightly and reduce your home's curb appeal. Remove the weeds and fill gaps with polymeric sand, a blend of properly graded fine sand and a

binder compound (polymer) that is specially formulated for filling in the joints between bricks. Polymeric sand hardens when moistened, which helps hold pavers in place and prevents weeds from growing between pavers. Do not use cheap polymeric sand. Do not use regular sand.

**Seal bricks every two or three years.**
Sealing protects bricks from environmental factors and minimizes stains. Use a sealant designed for bricks; apply sealant evenly according to the product's directions. No matter how often you seal, you may need to replace a few pavers. It's pretty easy to replace a new brick without damaging the other bricks; otherwise, engage a mason to perform the repairs.

**Pay attention to common red flags!**
Steps and stairs may settle, shift, or deteriorate. You should inspect your exterior stairs and steps regularly and pay attention to the following common safety risks:

- Cracked or settled steps, gaps between steps and house.
- Loose steps, missing steps, damaged steps, deteriorated steps.
- Uneven or excessive riser height (distance from top to bottom of step).
- Inconsistent or inadequate tread runs (distance from front and rear edges of step).
- Loose rail, missing rail, damaged rail, deteriorated rail.
- Loose balusters, missing balusters, damaged balusters, deteriorated balusters.



# Exterior Stairs/Steps

## Material: Wood

**You have wood exterior stairs/steps.**
With any set of stairs and steps, you have one objective – to ensure that stairs and steps are safe. As a minimum first step, you need to properly maintain the stairs and steps and mitigate any deterioration or damage. Because stairs and steps are inherently hazardous, you also need to take other measures to ensure safety, including surface maintenance and proper handrails.

The majority of stairway falls results from a loss of balance, typically from slips or trips. Slips happen where there is too little friction or traction between footwear and step surfaces, e.g., wet or oily surfaces, occasional spills, weather hazards, loose or unanchored rugs or mats, and surfaces that don't have the same type of traction in all areas. Trips and falls occur when someone's foot strikes an object causing a loss of balance, e.g., clutter, uneven steps, uneven walking surfaces; trips also can occur from obstructed views or poor lighting. Another common contributing factor to trips and falls on stairs and steps is broken or damaged handrails.

**Minimize slipping hazards.**
To reduce the risk of slipping, keep stairs and step surfaces clean. Clean up spills, wet spots, mildew, or any debris (e.g., leaves, sticks) immediately. Scrub stains using a mild detergent mixed with water. Use a wire brush to remove stains. Test the brush and detergent in an obscure area to test for damage to the bricks before using it in a highly visible area. Wash away the detergent completely after cleaning.

To minimize slipping on ice or snow, use rock salt or potassium chloride to melt ice or snow. Avoid using salt or de-icing agents that have a chemical base; they're highly corrosive and damage the surface of your stairs. You may also consider adding non-slippery surfaces on the whole steps or at least on the leading edges, e.g., slip-resistant sealant, rubber, or metal.

**Minimize tripping hazards.**
To reduce the risk of tripping, keep stairs and steps free from trip hazards, e.g., broken or deteriorated steps. Make sure that nothing is sticking out the surfaces of stairs, handrails, or bannisters (e.g., nails, splinters) that could cause a fall.

Exterior stairways also need to be visible in the dark; you should use angular lighting and color contrast to improve depth perception, as well as matte finishes on the treads to avoid glare. You can easily add solar lighting to enhance lighting on stairs and steps.

**Test your handrails regularly.**
The prime function of any handrail is for holding as support while going up or down stairs. Handrails must be "graspable," i.e., you should be able to grasp the rail quickly, easily, and firmly if you start losing your balance. You should be able to run your hand smoothly along the entire length without having to adjust your grip. There should also be appropriate horizontal and vertical clearances to prevent the risk of young children falling through and to not facilitate climbing. You should also remind people to grasp the handrail while ascending or descending stairs.

**Beware insects and pests.**
There are many insects that feed on, live in, or otherwise make use of wood – carpenter ants, carpenter bees, termites. You should also be aware of other pests, e.g., woodpeckers, nesting bats, and frequently examine the exterior for signs of attack to stop small problems before they become large problems.

**Seal surfaces every two or three years.**

Sealing stairs and steps from environmental factors and minimizes stains. Use a sealant designed for the materials; apply sealant evenly according to the product's directions.

**Pay attention to common red flags!**
Steps and stairs may settle, shift, or deteriorate. You should inspect your exterior stairs and steps regularly and pay attention to the following common safety risks:

- Cracked or settled steps, gaps between steps and house.
- Loose steps, missing steps, damaged steps, deteriorated steps.
- Uneven or excessive riser height (distance from top to bottom of step).
- Inconsistent or inadequate tread runs (distance from front and rear edges of step).
- Loose rail, missing rail, damaged rail, deteriorated rail.
- Loose balusters, missing balusters, damaged balusters, deteriorated balusters.

# Hose Faucets

Exterior faucets (or hose bibs or spigots) are outdoor taps that permit you to run water from the inside of your house to the outside. You can use exterior faucets to attach your garden hose for many different jobs outside. Exterior hose faucets require maintenance as winter approaches or if faucets are leaking.

**Winterize your exterior faucets before the season's first freeze.**
In colder climates, winter seeks to destroy your water pipes. The best way to minimize damage from cold weather on household plumbing is to protect pipes against freezing. Water expands when it freezes. Expanding water may rupture pipes, which can cause thousands of dollars of damage if water soaks walls, ceilings, and floors; frozen pipes may also start to leak or burst during thawing.

Therefore, it's critical to winterize your exterior faucets before each winter:

- Close interior shut-off valves
- Detach garden hoses
- Open and drain faucets
- Leave the faucets open

In the spring, simply reverse the process, i.e., close the faucets and open the interior shut-off valves.

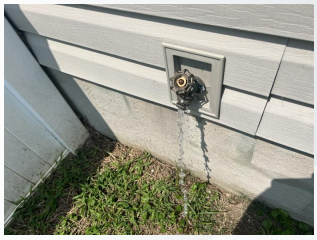
**What about freeze-proof hose faucets?**
Your house may have "freeze-proof" spigots designed to shut off water inside the foundation wall, which is accomplished because the spigot is longer than the washer seats at the end of the hose bib. Frost-proof spigots come in different lengths, depending on the width of your foundation wall or point of connection inside. When the spigots are off, water drains out, minimizing the potential for freezing pipes. However, there is no guarantee that such faucets won't freeze in extreme cold, particularly if the interior where the piping connects inside is not heated. Therefore, it's best to detach hoses, close interior valves, and drain the faucets.

**Add insulated covers to your hose faucets**
Installing covers can also help to prevent outdoor faucets from rupturing because of freezing temperatures. If there's no indoor shut-off valve, it is very important to carefully insulate the spigot from the outdoors.

Faucet covers are either square or dome-shaped shells made of rigid thermal foam with flexible gaskets that fit over outdoor faucets, or they're flexible bags made of thick fabric stuffed with insulation. Faucet covers trap heat that radiates through the interior pipes to the outdoor spigot; the insulated cover prevents heat from escaping and minimizes the risk of water freezing, expanding, and rupturing the spigot. Frost-free spigots should be covered as well—although they are resistant to freezing, they are not completely frost-proof in the coldest weather. There are rubber gaskets and washers inside the frost-free spigots that benefit from extra protection from the cold.

Vendors market exterior faucet covers as "garden faucet insulation cover" or "insulated faucet socks." For best results, seal the covers tightly to maximize thermal protection.

**Check faucets for leaks.**
When you're walking your exterior to review exterior walls, foundation, and grading, you should also stay aware of potential faucet leaks. Check spigots for leaks and drips. If you find any problems, it is important to repair or replace the fixture before the first freeze. Dripping water indicates a spigot with a leaky washer or cartridge, which can block up and freeze in the spigot or in the source pipe.



# Porch

## Material: Concrete and Brick

**You have a concrete and brick porch.**
People love porches for lots of reasons. An impressive front entry is a critical aspect of curb appeal; real estate agents often mention the importance of the front entry in photo listings and buyer visits. A porch also provides great protection for your door, hardware, trim, lighting, and interior; your guests will appreciate a porch on rainy days. Best of all, a porch is a perfect meeting place for neighbors, friends, and family – it's like an outdoor room, a special place to unwind and watch the rest of the world whirl by!

In addition to enjoying your porch, you have two objectives: maintain your porch and make sure it's safe. You need to properly maintain bricks and concrete and mitigate any deterioration or damage. You also need to take other measures to ensure safety, including surface maintenance and proper handrails, if required.

**Minimize slipping hazards.**
Keep stairs and step surfaces clean. Clean up spills, wet spots, mildew, or any debris (e.g., leaves, sticks) immediately. Scrub stains using a mild detergent mixed with water. Use a wire brush to remove stains. Test the brush and detergent in an obscure area to test for damage to the bricks before using it in a highly visible area. Wash away the detergent completely after cleaning. Clean your porch regularly, including surface, stairs, and steps. You may also consider adding non-slippery surfaces on steps or at least on the leading edges, e.g., slip-resistant sealant, rubber, or metal.

**Minimize tripping hazards.**
To reduce the risk of tripping, keep surface, stairs, and steps free from trip hazards, e.g., deteriorated surfaces, damaged steps. Make sure that nothing is sticking out the surfaces of stairs, handrails, or bannisters (e.g., nails, splinters) that could cause a fall.

Exterior stairways also need to be visible in the dark; you should use angular lighting and color contrast to improve depth perception, as well as matte finishes on the treads to avoid glare. You can easily add solar lighting to enhance lighting on stairs and steps.

**Test your handrails and guardrails regularly.**
If your porch requires handrails or guardrails, you should test the rails regularly. The prime function of any rail is for holding as support while going up or down stairs. Rails must be "graspable," i.e., you should be able to grasp the rail quickly, easily, and firmly if you start losing your balance. You should be able to run your hand smoothly along the entire length without having to adjust your grip. There should also be appropriate horizontal and vertical clearances to prevent the risk of young children falling through and to not facilitate climbing. You should also remind people to grasp the rail while ascending or descending stairs.

**Seal surfaces every two or three years.**
Sealing protects surfaces from environmental factors and minimizes stains. Use a sealant designed for concrete; apply sealant evenly according to the product's directions. If there is other damage, consider engaging a mason to perform the repairs.

**Pay attention to common red flags!**
Your porch structure, surface, steps, or stairs may settle, shift, or deteriorate. You should inspect your porch regularly and pay attention to the following common safety risks:

- Cracked or settled slab and steps, gaps between porch and house, portions undermined.
- Loose bricks, missing bricks, damaged bricks, deteriorated bricks.
- Loose steps, missing steps, damaged steps, deteriorated steps.

- Leaning posts or columns, damaged or deteriorated posts or columns.
- Missing or damaged flashing where the porch attaches to the house.
- Damaged or deteriorated roof structure.
- Uneven or excessive riser height (distance from top to bottom of step).
- Inconsistent or inadequate tread runs (distance from front and rear edges of step).
- Loose rail, missing rail, damaged rail, deteriorated rail.
- Loose balusters, missing balusters, damaged balusters, deteriorated balusters.
- The ledger board isn't properly bolted to the building.
- Damaged or deteriorated post base or piers.
- Support posts which are inadequately attached to the structure.

# ROOF

# Roof

## Material: Fiberglass/Asphalt 3-Tab Shingle

**You have a fiberglass/asphalt shingle roof covering.**
Your roof covering is among the largest and most expensive investments in your home. Because replacement may be costly, your primary objective is to focus on maintenance to maximize the life of your roof covering.

Fiberglass is a popular roofing shingle. Fiberglass shingles are made of a woven fiberglass base mat, covered with a waterproof asphalt coating, and topped with ceramic granules that shield the shingles from harmful UV rays. Because of the composition of the fiberglass mat, less asphalt is needed to give the shingles their durability and strength, making them a lighter and more environmentally friendly option than traditional organic-mat asphalt shingles. Fiberglass roofing is a tough and very resilient material that is non-porous, doesn't change shape, and won't dry out. Depending on installation, climate, and position of your home, asphalt shingle roof coverings should last 20 to 30 years – how well you maintain your roof covering also can materially the life of the roof covering.

**Pay attention to your roof covering.**
Inspect your roof covering regularly for abrasion, damaged shingles, and missing shingles, particularly after high winds, heavy rainstorms, or hailstorms.

Do not climb on your roof to examine the roof covering! Climbing on your roof may damage or abrade the covering and it's a significant safety risk. Invest in a pair of high-resolution binoculars, which can give you almost as good a view as if you were walking the roof. You can also get a close-up view of your roof covering from adjacent windows or an extended ladder at various points along the eaves. If you tinker with tech, consider investing in a drone and a high-resolution video camera attachment; a drone may be superior to walking a roof because a drone can typically access places that can't be walked because of location or pitch.

**Repair damage quickly.**
Granule loss and gradual deterioration are part of normal roof wear. However, if shingles are inordinately worn, damaged or missing, fix them quickly; otherwise, water penetration into your roof structure could cause bigger challenges. Single shingles are simple and inexpensive to replace; depending on the location and pitch of the roof, you may be able to replace the shingles if you have the skills. However, for the majority of roof covering challenges, you should engage a professional roofer.

**Replace sealant as required.**
Replace the roof sealant as needed. Inspect every area of the roof with sealant and identify signs of cracking or wear and tear. You may need to remove old sealant completely and apply new sealant. As mentioned earlier, it's not a good idea to walk the roof to find missing or damaged sealant. Engage a professional roofer.

**Inspect for rust and corrosion.**
If your roof has any metallic parts, check regularly for rust and corrosion. If you notice rust developing, use a wire brush to remove the rust, prime the area, and paint the metal.

**Trim overhanging branches.**

Branches hanging too closely to, or directly above your roof, need to be trimmed. Falling leaves or branches may collect on the roof, retain moisture, and start to rot your covering, making it weaker. Without quick action, debris may abrade the covering and permit water penetration, resulting in damage to the entire roof structure.

**Clean your gutters.**
It may seem strange to refer to gutters when discussing maintenance of roof coverings, but gutters that clog up can cause damage to your roof. Water accumulating in gutters can penetrate under your roofing structure. Keeping your gutters clean and in good repair helps them to serve their intended purpose while minimizing dangers to your roof.

**Maintain your chimney.**
It may also seem strange to refer to chimney when discussing maintenance of roof coverings, but poorly maintained chimneys can have an adverse impact on roofing. If you notice cracked or missing mortar on/in your chimney, replace the mortar, which holds masonry in place. Damaged mortar may permit masonry to fall onto your roof covering.

**Engage a roofer to inspect your roof every couple of years.**
As often as you may inspect your roof covering, you may not notice something that a more experienced specialist would discover. Engage a roofer every couple of years to identify existing problems and potential problems. The roofer will look for biological growth such as blue algae and plant debris as well as damaged shingles, chimney problems, or gutter issues.

**Understand common repairs.**
If your roof inspection identifies problem spots that require repair, initiate repairs immediately. Minor roof repairs performed in a thorough and timely manner will minimize more expensive and serious repairs. Examples of common roof repairs include installation of valley flashing due to corrosion and replacing flashing around the roof vent, chimney, and other installations. Gutters and downspouts might require caulking, patching or the application of roofing cement to prevent sagging and remedy corrosion. Broken, missing or buckled asphalt shingles are also common repair issues.

# Flashing

Flashing is protective metal designed to prevent water from penetrating your house's structure. Flashing is used to seam different sections of a roof together, e.g., roof to exterior wall, roof to chimney, etc. Flashing also is installed in places in which something from the interior, e.g., stove pipe, skylights, etc. Flashing metal is very thin and is available in different materials: aluminum, copper, lead, PVC, galvanized steel.

Without properly installed flashing, water may penetrate your exterior to the structure, roof sheathing and underlayment, chimney, and other parts of your house. Some issues require professional intervention, but if you're patient and willing to invest in a DIY project, you may be able to fix the issue yourself. Flashing is simple to repair if you know what you're doing, but when it's been installed improperly, or you don't know how to do the work, engage a roofing expert.

**Inspect your flashing.**
While you're inspecting your roof covering, pay particular attention to the areas which require flashing. Check your flashing to see if it's loose or has any holes or leaks – normal wear and tear, hailstorms, and high wind may cause flashing to deteriorate or displaced. If you check your flashing regularly, you'll notice issues that require repair, and you can often spot the problem before significant damage occurs.

If there's a leak around a chimney or at the corners of your roofing, it's often because of flashing issues. If you notice any leaks in your house, enter your attic to see if you can identify the exact location of water penetration. If you think there's an active leak, consider engaging Insight Inspections to visit and evaluate the area using infrared, which identifies temperature differentials, e.g., cold water on warm surfaces.

**Repair loose or missing flashing.**
It's common for flashing to become loose or even removed from your home over time. Anchor screws or nails may become loose and pull out, or metal may wear away from around the edge of the cavity or structure at which the flashing was initially installed. If flashing is loose or missing, it is unable to properly protect your home's structure.

If flashing is loose, use screws made of the same metal as the flashing and screw them into the framing underneath to lock the flashing into place. Cover each screw head using roofing cement, to keep water from getting into your home.

Even though flashing is designed to be weather-resistant, corrosion or wear may cause small holes to appear. You may not have to completely replace the flashing – you may be able to fill the hole. Wipe away sharp edges and corrosion using a stiff-bristled brush, cut a piece of flashing that's several inches larger than the hole, and use roof cement to secure the piece on top of the hole. Add another coating of roof cement around the outside edges of the patch to form a water-tight barrier.

**Re-caulk chimney flashing.**
Flashing is integrated into chimney mortar to form a waterproof barrier. Over time, the mortar may crack and crumble and need to be updated to continue providing protection. You can remove cracked mortar using a chisel and apply a new layer of mortar caulk. Be careful to cover the flashing entirely and fill in the chimney gap completely between the brick or stone.

**Repair leaking seams.**
If flashing was initially installed properly, you can repair a leaking seam using roofing cement in most instances. Push the seam down, secure in place with screws if required, and apply roofing cement around the edges of the flashing for a watertight seal.

# WATER CONTROL

# Grading

The purpose of grading your yard is to direct water and runoff to a different location. Although some grading is designed to reduce wet areas in your yard, which harbor breeding grounds for mosquitoes, the vast majority of grading is focused on ensuring that your lawn slopes away from the house so that water doesn't pool next to your foundation and penetrate into the structure. It takes a few years for soil and grading to settle after new home construction.

Grading is an important issue because if it is not done properly, runoff may be directed toward your foundation. If you have water leaking into your basement, it's likely from improper run-off, e.g., damaged or deteriorated downspouts, improper downspout extensions, poorly located downspouts, improper grading. Most water penetration issues into foundations are caused by improper drainage or water run-off.

**Add downspout extensions.**
Your downspouts run down the side or corner of a house and stop just above the ground; a downspout elbow may have been added so that water doesn't stream alongside your foundation. However, it's important to move water further away from your house. Adding downspout extensions is the easiest, fastest, and least expensive way to move water away from your house. Downspout extensions are flexible plastic tubes that attach to the end of a downspout and will direct water another 4' from your house.

**Check your slope.**
Grading should be sloped down and away from your foundation by about 6" for the first 10' (which translates to a slope of about 5%). To find the slope away from your foundation, collect the following supplies:

- 12' of string
- 2 wooden or metal stakes
- String level (designed to fit on a piece of string)
- Tape measure

Using the above supplies, take the following steps to check your slope:

- Tie one end of the string on the first stake, insert the stake next to your foundation, and slide the string to the bottom of the stake so that the string rests at ground level
- Tie the other end of the string the second stake, measure 10' away from the foundation, and insert the stake into the ground.
- Place the string level on the middle of the string between the stakes and adjust the string up or down on the second stake to make the string exactly level.
- Measure the distance from the ground to the string on the second stake – if the measurement is at least 6", your slope should sufficiently direct water away from your foundation.

Make sure to check your slope in numerous areas around your foundation!

**Regrade your slope as required.**
If your slope is less than 6" from foundation to 10' away from your foundation, you should regrade by adding fill or topsoil near the foundation and tamping it down. Make sure to check your regrading frequently for the few months after regarding, and particularly after heavy rains.

**Plant grass or install sod in bare spots.**
Grass slows water run-off and helps soil to absorb water. If there are bare spots around your foundation or in parts of your lawn,

plant grass or install sod.

**Walk the exterior after heavy rains.**
Walk the exterior after heavy rains to make sure the grade is properly draining water away from your house. Watch carefully for standing water at or near exterior walls; standing water can cause soil to shift and permit the walls to shift.

- Separation of soil or cracking soil – if soil separates from the foundation or cracks, there may be improper settling of soil against the wall and permit water penetration into the structure; fill in open spaces.
- Water pooling at or near your foundation – depressions in the ground around your foundation can lead to pooling and permit water penetration into the structure; fill in open spaces.

**Caution with landscaping barriers.**
Installing barriers (retaining walls, landscaping timbers, vertical plastic edging, stones) may damage your attempts to control water because barriers don't just hold flowers and mulch – barriers block drainage. If you add landscape timbers or edging, make sure downspouts extend beyond the barriers.

**Aerate your lawn.**
Aerating is a common practice that helps keep your lawn in its best condition. Aeration creates holes in the lawn to introduce air and nutrients and it breaks up compacted soil. Aeration also has another benefit – it promotes yard drainage. Rather than pooling on the lawn, water trickles down through thousands of holes.

**Add a French drain.**
Surface water that moves across a lawn can be difficult to control, especially if it's originating from off of your property. Adding a French drain is a low-cost way of managing surface water; a French drain is a trench filled with permeable materials, e.g., gravel on a perforated PVC pipe. Water flows through the gravel and into the PVC pipe, which shifts the water away from your house or other areas that may require better drainage.

**Add a yard drain.**
For stubborn wet areas in your yard, consider adding a yard drain. Yard drains are built directly into the ground, at places where flooding has previously been identified. Acting much like shower or bathtub drains, yard drains are passive channels for any water that comes their way. Yard drains move the water through hidden pipes to a termination point such as a dry well.

**Engage a landscape professional.**
If your DIY project doesn't deliver the planned results or if you want the help of a professional, consider engaging a landscape professional. Landscape planners, architects, and designers will help you to help identify and plan how a yard will be used, work with you to control and manage water run-off, identify plantings most appropriate for installation, and provide recommendations for hardscaping options, including material considerations.








# Gutters/Downspouts

## Material: Aluminum

**You have aluminum gutters.**
Your gutters are responsible for water management. During storms, gutters channel water flow from your roof through the downspouts and direct the water to areas outside the home. Too much water falling too close to your home can erode the soil around it, compromise the home's foundation and permit water penetration into the basement or crawl space.

Your gutters protect the foundation of your home, prevent erosion, protect your landscaping, and prevent basement flooding. Gutters prevent staining to the exterior of your home, mitigate paint damage, and stop mold and mildew growth.

Gutter systems consist of two parts: i) gutters that run horizontally along the roof edge to collect runoff and ii) downspouts that carry the collected water to grade level. Gutters should slope down toward the downspout at the rate of 1/16-inch per foot or 1/4-inch per 5 to 10 feet. A smaller angle won't permit water to move properly; a larger angle will cause water to move at too great a speed, resulting in overflow over end caps and corners.

Aluminum is the most popular choice for gutters. It won't sag, it's light and easy to handle, and it won't rust, although it can corrode from long term exposure to moisture and salt. Aluminum gutters should last for 20 years or longer. Aluminum gutters may leak around the joints compared to some other types, e.g., steel. Most aluminum gutters come with an enamel coating that gradually wears away; to keep your gutters looking good, you'll need to paint them at some point.

Regardless of type of gutter, proper maintenance helps to protect your foundation; you can also extend the life of your roof.

**Inspect gutters and downspouts regularly.**
Check gutters for any signs of rust, cracks, or holes. Check for nails or bolts that have become loose. Check for leaking joints and check for any loose, missing or bent gutter hangers. Check the connections between gutters and downspouts. Check to make sure that downspouts remain properly attached to the house. You can mark problem areas with masking tape so you can go back to them quickly if you want to make repairs.

The easiest way to check gutters is from adjacent windows. You can also inspect gutters from a ladder placed safely at the eaves. You can even place a ladder at the eaves and insert a garden hose in the gutters and downspouts to test the system. If you don't have a ladder or ready access to water or don't relish the thought of climbing a ladder with a water hose, just wait for a heavy rainstorm. Put on your raincoat and galoshes and walk the exterior to watch for any overflow issues.

**Clean gutters as required.**
Gutters and downspouts can get clogged with leaves and debris that hinder the proper operation of the system, so keeping them clean and flowing freely is essential. Gutter clogging is especially likely at certain times of the year, such as in the spring when trees are casting seeds, and in the autumn when leaves are falling.

If gutters need to be cleared, observe common-sense safety precautions, and enlist a ladder spotter when using a ladder to reach the gutter system. Always maintain three-point contact and don't over-reach; move the ladder instead. Wear footwear with gripping treads to prevent slipping; wear gloves to protect hands and arms from sharp debris, as well as from animals and insects that may be hiding in the gutters.

Place a garden hose in the gutters and downspouts to flush them out, making sure that the water is directed away from the home via the downspouts.







# FUEL SERVICES

# Fuel Meter

**Your fuel meter measures the amount of gas that you use.**
The utility company installs your fuel meter between the incoming gas lines and the point of distribution at the house. The fuel meter typically is the property of the utility, i.e., the utility is required to properly maintain the meter.

You can contact your local utility company for information about reading your meter. If you're content with monthly information, your utility bills probably have all the information you need. Verify that your bills are based on actual (not estimated) meter readings. Pay attention to reading dates because time periods may vary between readings.

Fuel is commonly measured by cubic feet. You're billed by thousands of cubic feet (MCF), hundreds of cubic feet (CCF) or therms, which are approximately the same as 100 cubic feet. A meter is driven by the force of the moving gas in the pipe, i.e., the meter spins faster as gas flow increases.

**Pay attention to your meter.**
Check to make sure your meter is functioning properly, e.g., make sure the dials rotate or digital counter continues to increment.

**Keep your meter clear of obstructions.**
Overgrown shrubs, brush, ice and snow can damage the supply lines and meter, as well as making it difficult for technicians to replace, repair, or read natural gas meters.

**Inspect for rust corrosion, sounds, sulfite smells.**
Although most fuel meters are the property of the associated utility, you should monitor the area and contact the utility for maintenance and repair. It is common for the meter and supply lines to deteriorate from exposure to the elements; if you notice rust or corrosion accumulating along the meter and upstream line(s), contact the utility for maintenance and/or repair. Additionally, if any protective coating becomes damaged or deteriorated, you should evaluate and repair the area, if required. Frequently the areas downstream of the meter are under the homeowner's purview; maintenance should be provided by a licensed professional to avoid inadvertently damaging the lines.

Natural gas usually does not have a strong nor immediately recognizable odor. However, the utility typically includes additives which produce an unpleasant odor to warn of a potential leak. If you notice a sulfur or "rotten egg" smell around any gas supply (it doesn't have to be yours!), immediately contact the utility.

# STRUCTURE

# Foundation

## Material: Concrete Blocks

**You have a concrete block foundation.**
A house's foundation is the load-bearing portion of the structure, built below ground, whether a basement, crawl space, or slab on grade. At a minimum, any foundation must do three things well:

- Support the structure that rests on the foundation
- Keep out groundwater
- Act as a barrier to water and soil vapor

Prior to the 1970s, nearly every house was built with a masonry foundation. After poured concrete, concrete block foundations remain a popular foundation construction option; approximately ¼ of new construction uses concrete block foundations. Builders prefer block walls because wooden structures aren't required for construction and there are many construction workers with masonry experience who can install a concrete block foundation.

Blocks rest on concrete footings that have been poured deep and wide enough to accommodate the load of the blocks and the building. Concrete block foundations are typically built using concrete blocks that are 8" x 16". Blocks are light, strong, well-insulated filled blocks insulate the house well. When steel reinforcement is used, steel adds strength to the structure. Because block walls can handle substantial weight on top of a foundation, it is preferred by engineers and architects.

There are a few disadvantages of concrete block foundations. If builders take short-cuts and don't fill every block with mortar, the integrity of the foundation may be compromised. Over time, mortar that is used to adhere blocks together may crumble and disintegrate, permitting leaks into the interior; blocks must be regularly sealed to minimize leaks.

**Examine your foundation regularly.**
Your foundation is your home's backbone upon which the structure is placed. Although a foundation review certainly involves examining the foundation walls, many foundation issues manifest in ways that occur elsewhere in the house, e.g., floors, doors, and windows.

- Check your interior foundation walls – Look for cracks on the interior of your basement or crawl space walls. Basement and foundation walls built of concrete block are more likely to have horizontal cracks and cracks that form stair-step like patterns; these patterns would show along mortar lines and are a common sign of settlement.
- Walk the exterior perimeter of your home – Look for cracks in the visible parts of the foundation exterior. Check foundation walls by sighting down from one end to the other; foundation walls and exterior walls should be flush and level, i.e., pay attention to areas that bulge or lean. Watch carefully for standing water at or near the exterior walls; standing water can cause soil to shift and permit the walls to shift. Walk the exterior after heavy rains to make sure the grade (slope of soil) is properly draining water away from the house. Look for any shifting, ground sinking, or other movements, especially around chimneys and patios; although most chimneys are built on a separate foundation that is not connected to the house, chimneys are at a greater risk for settlement and separation from the home.
- Walk the interior perimeter of your home – Check the interior walls of your home for cracks in drywall or plaster extending from corners of doors or windows, which may indicate issues with the foundation; cracks would be more likely in the upper

levels of your house. Look for any bulging or leaning walls and floors; shifted walls and uneven floors indicate a shifting foundation. Floors also may slope if the foundation shifts; use a ball or round object to see if rolls when placed on the floor.

- Pay attention to windows and doors – Windows and doors should open and close without difficulty. Before walls may show signs of foundation issues, windows and doors likely will be difficult to open or close; if windows or doors are jammed shut or can't be easily opened, the foundation may have shifted.
- Check your pipes – Leaking from pipes is one of the leading causes of foundation problems. If there has been a leaking pipe for an extended period, consider engaging a structural engineer to assess the potential effects on your foundation.

**Evaluate your water control techniques.**
If you have water leaking into your basement, it's likely from improper run-off, e.g., damaged or deteriorated downspouts, improper downspout extensions, poorly located downspouts, improper grading. Most water penetration issues into foundations are caused by improper drainage or water run-off. See grading for more details.

**Repair cracks.**
Although masonry can deform elastically over long periods of time to accommodate small amounts of movement, larger movements normally cause cracking, referred to as masonry cracking. Cracks may appear along the mortar joints or through the masonry units.

Most masonry wall cracks are caused by thermal or moisture expansion. Cracking can also result from a variety of other issues, including differential settlement, drying from shrinkage (particularly in concrete block), improper support over openings, the effects of freeze-thaw cycles, corrosion of iron and steel wall reinforcements, differential movement between building materials, or expansion of soils.

Foundation cracks are active or inactive. Active cracks expand in length, width, and depth over time; Inactive cracks are static and don't change. Although most cracks may occur during initial settlement over the first few years of construction, ongoing thermal or moisture expansion may continue to cause cracks in the foundation.

You can seal cracks which are 1/8" or smaller, including hairline cracks, with mortar or concrete paint or a flexible sealant. If a credit card can fit into a crack, it's larger than 1/8". You should seal the crack to avoid moisture, soil smells, or radon gas. Fill the crack with caulk that is compatible with concrete. After you fill the crack, monitor the crack, and engage a structural engineer if the crack continues to expand.

**Add waterproofing.**
If enhanced water control techniques and sealing are ineffective against water penetration into the foundation, consider adding waterproofing to the foundation walls. Waterproofing may be straightforward, i.e., sealing or coating the interior walls with a masonry waterproof product. Or waterproofing may be complicated, i.e., engaging a contractor to add an interior drainage system or remove soil from the exterior wall to add drains or sealant.

# Foundation

## Type: Crawl Space

**You have a crawl space foundation.**
Every house is built on a foundation, but not every house is built on the same type of foundation. Foundation type is based on several factors, such as house design, geographic location, climate, and soil and moisture conditions. The three major foundation types are crawlspace, basement, or slab-on-grade.

Foundations that create a crawlspace consist of short foundation walls that stand on footings or small structures that, essentially, act as miniature basements. Most crawl space foundation walls are short, creating a space that you have to crawl through; other crawl space foundations may reach 4' high, providing enough room for storage, HVAC systems, or other equipment.

Typically, crawlspaces are unheated spaces and may be ventilated with small vents that penetrate the foundation walls to promote a small amount of airflow through the crawlspace. Crawlspace foundations are less expensive than full basements because they require less excavation and less foundation wall material and labor to build. Crawl spaces also used if soil is tough to dig excavate.

A crawl space is arguably one of the most durable foundations in areas with high groundwater levels. Your crawl space provides effective protection against water and loose soil while providing better airflow underneath your home during hot months.

Good ventilation during the summer months is a different issue during cold months, making it slightly more difficult to heat your home. If a crawl space isn't properly insulated and sealed, it's possible for stagnant water and moisture to become trapped in a crawl space and cause mold-related health issues.

**Keep out moisture.**
Moisture control is essential for a safe and clean crawl space. The ground beneath and around your home contains moisture which generally evaporate back into the atmosphere. However, moisture can collect into visible water droplets. If water accumulates near wood, it causes mold and mildew to grow and may affect the integrity of the structure. Your primary mission with respect to your crawl space is to keep out moisture! See foundation, gutters, and grading for information.

**Keep out pests.**
Check to make sure potential entry points for rodents are blocked. Watch out for small cracks and seams, which may be large enough for mice and roaches. Check your crawl space regularly; termites are attracted to wood and water.

**Inspect and clean your crawl space.**
Inspect your crawl space regularly. Regular cleaning also helps to keep your crawl space dry. If the crawl space has already been attacked by moisture-caused mold, consider engaging a professional cleaning service to help to fix the problem. If you have a pool of water in the crawl space, you should consider installing a perimeter drain. If you have exposed dirt floors, consider sealing the floors with a moisture retardant like polyethylene.

**Ventilate your crawl space.**
Make sure your crawl space has enough ventilation. Vents and vapor barriers are excellent solutions for allowing crawl spaces to vent while keeping out pests. See crawl space ventilation for more info.

**Insulate your crawl space.**
Make sure your crawl space is insulated properly. Proper insulation regulates the temperature in the crawl space and helps to

insulate the rest of the home. During summer and winter, uninsulated crawl spaces make HVAC systems worker harder to fight warm or cold air from escaping from beneath the floor. See crawl space insulation for more info.

**Engage a crawl space specialist.**
If you identify perplexing issues during your regular review of your crawl space, consider engaging a crawl space specialist.

# INSULATION/VENTILATION

# Attic Insulation

## Material: Loose Fiberglass

**You have loose fiberglass insulation in your attic.**
Fiberglass is the most popular type of insulation. It's inexpensive and easily installed in exposed attic ceilings. It's defensible against humid environments and it's highly durable. Fiberglass can protect your home for many years.

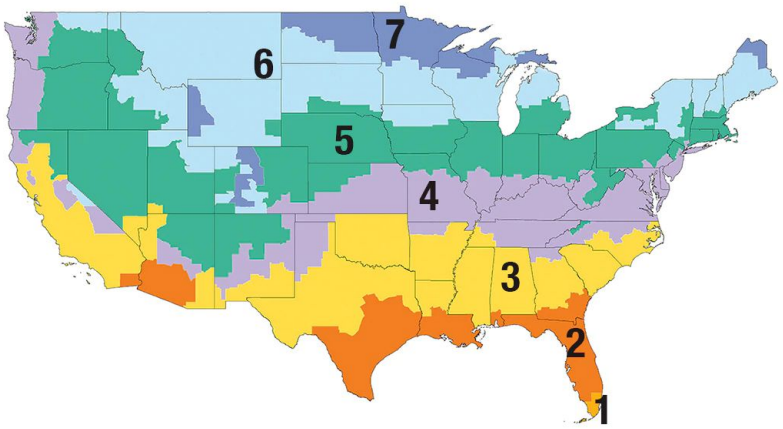
The purpose of insulation is to provide resistance to heat flow, which comes in three different flavors:

- Conduction – the way heat moves through materials (like a spoon in a hot cup of cocoa conducts heat through its handle to your hand)
- Convection – the way heat circulates through liquids and gases; it's why lighter, warmer air rises, and cooler, denser air sinks inside your home
- Radiant heat – travels in a straight line and heats anything solid in its path that absorbs its energy

Most common insulation materials work by slowing conductive heat flow and convective heat flow. Properly insulating your home will decrease this heat flow by providing an effective resistance to the flow of heat.

Insulation quality is measured in R-values per inch of thickness. An R-value indicates how well a type of insulation can keep heat from leaving or entering your home. Insulation R-values vary based on type, thickness, and density of insulation; a higher R-value translates to better climate control and better energy efficiency for your home. Your home doesn't necessarily need the highest R-value insulation; your R-value depends on your local climate.

**REGIONAL R-VALUES**



| Zone | Attics | WALLS | | Floors | Crawlspaces |
|---|---|---|---|---|---|
| | | 2x4 | 2x6 | | |
| 1 | R30 to R49 | R13 to R15 | R19 to R21 | R13 | R13 |
| 2 | R30 to R60 | R13 to R15 | R19 to R21 | R13 | R13 to R19 |
| 3 | R30 to R60 | R13 to R15 | R19 to R21 | R25 | R19 to R25 |
| 4 | R38 to R60 | R13 to R15 | R19 to R21 | R25 to R30 | R25 to R30 |
| 5 | R49 to R60 | R13 to R15 | R19 to R21 | R25 to R30 | R25 to R30 |
| 6 | R49 to R60 | R13 to R15 | R19 to R21 | R25 to R30 | R25 to R30 |
| 7 | R49 to R60 | R13 to R15 | R19 to R21 | R25 to R30 | R25 to R30 |

**Calculate your attic insulation's R-value.**
Your blown fiberglass insulation has an R-value of about 2.5. To calculate total R-value, multiply your insulation's R-value by the number of inches installed. For example, if your insulation is 10" thick, your total R-value is about R25. If attic insulation's total R-value isn't sufficient vs. total R-value recommended for your climate zone, add some insulation.

**Check your insulation for water stains and infestations.**
You should check your insulation regularly for water stains, particularly after heavy rains. You should also check insulation for rodent droppings or other types of pest infestations.

**Replace insulation as required.**
Most insulation materials can be effective for decades. Abrasions, water penetration, and pests can degrade insulation materials, rendering insulation less effective. If you don't replace your home's insulation, you may find that your home requires more energy to heat or cool.

**Consider a home energy audit.**
A home energy audit is an inspection survey in which the energy efficiency of your house is evaluated by a person using professional equipment (e.g., blower doors, infrared cameras). The objectives of an energy audit are to evaluate energy efficiency and to propose the best ways to improve energy efficiency in heating and cooling your house. An energy audit may help you to lower energy bills, enhance comfort, and increase the lifespan of your HVAC equipment. Some energy companies subsidize energy audits or provide credits for homeowners who have completed energy audits; check with your local energy company for more information.

# Attic Insulation

## Material: Fiberglass Batts

**You have fiberglass batts insulation in your attic.**
Fiberglass is the most popular type of insulation. It's inexpensive and easily installed in exposed attic ceilings. It's defensible against humid environments and it's highly durable. Fiberglass can protect your home for many years.

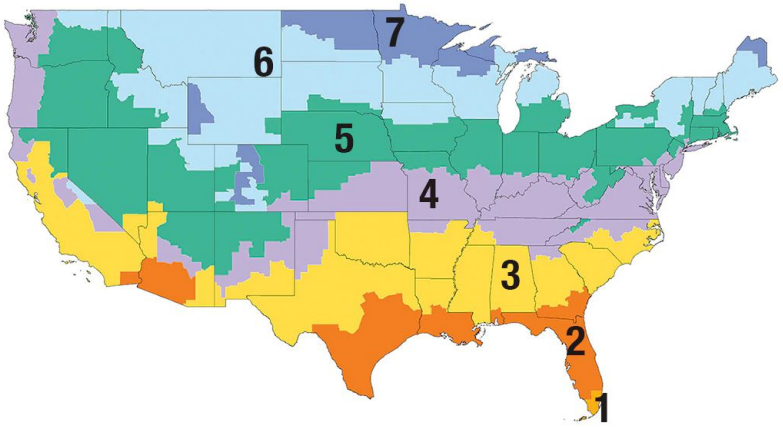
The purpose of insulation is to provide resistance to heat flow, which comes in three different flavors:

- Conduction – the way heat moves through materials (like a spoon in a hot cup of cocoa conducts heat through its handle to your hand)
- Convection – the way heat circulates through liquids and gases; it's why lighter, warmer air rises, and cooler, denser air sinks inside your home
- Radiant heat – travels in a straight line and heats anything solid in its path that absorbs its energy

Most common insulation materials work by slowing conductive heat flow and convective heat flow. Properly insulating your home will decrease this heat flow by providing an effective resistance to the flow of heat.

Insulation quality is measured in R-values per inch of thickness. An R-value indicates how well a type of insulation can keep heat from leaving or entering your home. Insulation R-values vary based on type, thickness, and density of insulation; a higher R-value translates to better climate control and better energy efficiency for your home. Your home doesn't necessarily need the highest R-value insulation; your R-value depends on your local climate.

**REGIONAL R-VALUES**



| Zone | Attics | WALLS | | Floors | Crawlspaces |
|---|---|---|---|---|---|
| | | 2x4 | 2x6 | | |
| 1 | R30 to R49 | R13 to R15 | R19 to R21 | R13 | R13 |
| 2 | R30 to R60 | R13 to R15 | R19 to R21 | R13 | R13 to R19 |
| 3 | R30 to R60 | R13 to R15 | R19 to R21 | R25 | R19 to R25 |
| 4 | R38 to R60 | R13 to R15 | R19 to R21 | R25 to R30 | R25 to R30 |
| 5 | R49 to R60 | R13 to R15 | R19 to R21 | R25 to R30 | R25 to R30 |
| 6 | R49 to R60 | R13 to R15 | R19 to R21 | R25 to R30 | R25 to R30 |
| 7 | R49 to R60 | R13 to R15 | R19 to R21 | R25 to R30 | R25 to R30 |

**Calculate your attic insulation's R-value.**
Your fiberglass batt insulation has an R-value of about 3.4. To calculate total R-value, multiply your insulation's R-value by the number of inches installed. For example, if your insulation is 10" thick, your total R-value is about R34. If attic insulation's total R-value isn't sufficient vs. total R-value recommended for your climate zone, add some insulation.

**Check your insulation for water stains and infestations.**
You should check your insulation regularly for water stains, particularly after heavy rains. You should also check insulation for rodent droppings or other types of pest infestations.

**Replace insulation as required.**
Most insulation materials can be effective for decades. Abrasions, water penetration, and pests can degrade insulation materials, rendering insulation less effective. If you don't replace your home's insulation, you may find that your home requires more energy to heat or cool.

**Consider a home energy audit.**
A home energy audit is an inspection survey in which the energy efficiency of your house is evaluated by a person using professional equipment (e.g., blower doors, infrared cameras). The objectives of an energy audit are to evaluate energy efficiency and to propose the best ways to improve energy efficiency in heating and cooling your house. An energy audit may help you to lower energy bills, enhance comfort, and increase the lifespan of your HVAC equipment. Some energy companies subsidize energy audits or provide credits for homeowners who have completed energy audits; check with your local energy company for more information.

# Attic Ventilation

## Type: Ridge Vent

It's important to ventilate your attic because hot air rises and heads towards your attic space. Hot air contains moisture and if permitted to remain in your attic space, moisture from hot air can lead to mildew and eventually mold, which can degrade your attic structure and roof sheathing and have an adverse impact on your health. Roof ventilation systems help to minimize stagnant hot air in your attic space, extend the life of your roof, and enhance your energy efficiency.

Attic vents remove stagnant air from your attic space (exhaust) or bring fresh air into your home (intake). Because hot air rises, exhaust vents are generally placed near the top of your roof line. Intake vents are generally placed lower on your roof line because cooler air enters under hot air and helps to push the hot air out of the attic space. When attic ventilation is properly designed and maintained, the exhaust-intake cycle should help to control temperature and moisture in your attic.

If your attic ventilation system is not working well, one or more of the following issues may require your attention:

- Heightened moisture levels in your attic space
- Poor air quality in lower floors because of stagnant air in your attic (summer)
- HVAC systems forced to work harder to cool your upper floors
- Ice dams (winter)
- Roof sheathing deterioration

There are different types of attic vents, most of which are described below.

**Ridge Vents**
Ridge vents are the most common type of exhaust vent. Because ridge vents are at your roof's highest point, the vents are in prime position to permit the hottest air to escape your attic space. Ridge vents are installed across the peak of a roof and span your entire roof line, which means they generally have enough surface area for exhausting large amounts of hot air. When used in combination with intake vents near the bottom of your roof line, e.g., soffit vents, ridge vents deliver excellent vertical ventilation, which takes advantage of gravity and the natural flow of cool and hot air. Cold air comes up through the bottom and exits through the top. Vertical venting is superior to other types of ventilation, e.g., horizontal or cross-venting.

Ridge vents are installed at the top of your roof line and covered with a ridge cap shingle which is bent over the vent and nailed on. This special type of shingle is more robust and pliable than a normal asphalt shingle and is designed to match the roof.

**Off-Ridge Vents**
Off ridge vents are exhaust vents which are typically installed when a roof's ridge line is small, which can occur with complex roofs and houses that don't have a long, continuous ridge line. Off ridge vents are installed about 1' below the ridge line and are usually 4' long and comprised of galvanized steel. Adding one or more off-ridge vents can help to provide ventilation to certain areas.

Off ridge vents are not as effective as full ridge vents because they're smaller and aren't installed at the roof's peak. Because they're small, off-ridge vents have difficulty exhausting a large amount of hot air; their location restricts the ability to vent the hottest air, which rises to the top of the roof.

**Box Vents**
Box vents, also referred to as louver vents, are exhaust vents which are similar to off-ridge vents but are more common. Like off ridge vents, box vents are installed below the roof's peak. Most box vents measure 18" x 18", but there are many sizes available to

match complicated roof lines with lots of different sections.

Their small size is mostly a drawback, but does offer some versatility when compared to a ridge vent. Because they don't need to run across the entire peak of the roof, box vents can be installed strategically in smaller areas that need air vented but cannot utilize a ridge vent.

**Powered Vents**
Powered vents are electric-propelled fans that help to exhaust air out of your attic space. Powered vents work like a box fan placed in a window on a hot summer day. Powered vents are useful for complicated roof structures but are only effective if the vents have enough power to properly exhaust air from the attic space; some powered vents may circulate air vs. expelling air. Powered vents have to be hard-wired to your electrical system and consume energy.

**Solar Powered Attic Vents**
Solar powered attic vents are similar to powered vents except that solar-powered attic vents are powered by the sun and require no hard-wired electricity.

**Roof Turbines**
Roof turbine vents consist of aluminum blades inside an aluminum or covering; the blades rotate when pushed by wind from outside the house to pull and exhaust air from inside the attic. Roof turbines need at least 5 MPH of wind to activate and spin the interior blades, i.e., they're not effective on calm days. Even on windy days, roof turbines may not be very effective, particularly because they're often smaller than a box vent or off-ridge vent.

**Cupola Vents**
Cupola vents are one of the least common types of roof vents because of their cost and complexity; cupola vents were originally developed to allow air into a barn's loft to keep stored hay dry. Cupola vents operate as an exhaust and intake vent; one of the main reasons to use a cupola vent is to allow extra light into an area under the vent.

**Soffit Vents**
Soffit ventilation is the most popular form of roof intake venting; most new construction includes soffit vents. Soffits are intake vents that are installed directly on your eaves (roof overhang), directly under your roof line. Soffit vents have small perforations that permit cool air to flow into your attic space, where it helps push hot air out of your home through the exhaust vent. Continuous soffit vents are longer and often wrap around the entire eaves of a home; individual soffit vents made of aluminum, spaced approximately 6' apart.

**Gable Vents**
Gable vents utilize horizontal or cross-ventilation to help keep air circulating through the attic space. The basic premise is that air flows in on one side of the attic, then out through the other. A gable vent is used with a gable style roof because a vent can be placed on each side of the home. Gable vents are not as effective on complex roof structures because a cross breeze can be impeded by rafter beams, peaks, valleys, dormers, and other parts of the roof.

**Fascia Vents**
Fascia vents, or over-fascia vents, are intake vents that are designed primarily for roofs that don't have sufficiently sized eaves to fit soffit vents. A fascia vent is placed at the top of the fascia board and gutter directly underneath the starter row of shingles. The basic premise behind fascia vents is to allow air intake where the wind hits the roof, opposed to a soffit vent with relies on air rising.

**Drip Edge Vents**
With drip edge and fascia vents, the air intake is designed to hit the roof head-on, then pull cool air up the interior roof wall towards any exhaust vent at the roof's peak. Drip edge vents differ from fascia vents because of where they're installed. The drip edge is a roofing material that goes directly underneath the first row of shingles and is designed to help drain water into the gutters. It is generally made of a malleable metal. A drip edge vent incorporates intake into the roofing material, with small holes drilled into the drip edge or attached to the drip edge as an add-on.

**Make sure your attic is well-insulated.**
Your insulation is the most important factor in how well your attic retains heat in the winter. The best attic ventilation system will be rendered ineffective if your attic insulation isn't properly installed and maintained. See the insulation section to learn more about your attic insulation.

**Don't close vents in the winter.**
The loss of heat in your attic is only marginally affected by your vents, i.e., insulation is the most critical element of attic energy efficiency. Whether you keep your vents open or closed during the winter will have a negligible effect on your power bill; however, closing your vents may create condensation. Attic air vents should be kept open year-round.

# ELECTRICAL

# Electrical Panel

## Type: Circuit Breaker

**You have a circuit breaker electrical panel.**
Your electrical system begins with the power company's incoming service wires that enter your home and connect to your electrical panel. From the main service panel, current is divided into individual branch circuits, each of which is controlled by a separate circuit breaker; branch circuits start at your main service panel and distribute electricity throughout the house.

Circuit breakers protect electrical circuits by preventing overloads that can cause fires – circuit breakers interrupt the flow of electricity with switching mechanisms that are tripped by an unsafe power surge. Circuit breakers use permit electrical current to pass from a bottom to an upper terminal across a strip. If the current reaches an unsafe level, the magnetic force of the solenoid or strip becomes strong enough to trigger a metal lever in the switch mechanism, which breaks the current; other types have metal strips which can bend, triggering the switch and breaking the connection. To restore power, flip the switch back on, which reconnects the circuit.

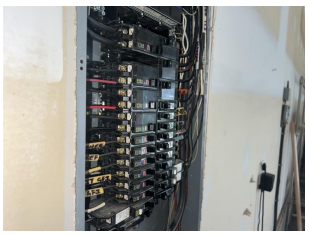
Circuit breakers have other applications, such as ground fault circuit interrupters or GFCI, which prevents electric shock. A GFCI circuit breaks the circuit in an outlet if the current gets unbalanced. GFCIs are useful in kitchens or bathrooms, where electrocution is a risk from the use of electrical appliances near water. To restore power, touch the reset button.

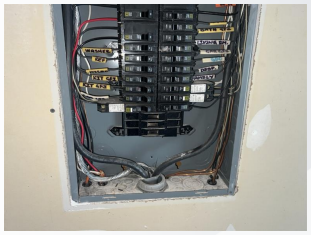
**Test your main breaker shut-off.**
Don't wait for the stress of an emergency to figure out how to turn off power to your house. When you occupy your home, test your main breaker to ensure that all power can be turned off with one or just a few switch flips. Make sure to coordinate your test with other occupants.

**Test your branch circuits to make sure your panel labels are properly marked.**
When you occupy your home, don't assume your electrical panels are labeled accurately. When you have a few hours and can enlist the help of family or friends, turn off all breakers and test the various outlets and zones for power.

You can turn on lights and test plugs with a powered device, e.g., nightlight. Or you can purchase an inexpensive plug-in outlet/receptacle tester which displays LED lights and provides instant feedback for common wiring problems, e.g., open ground, open neutral, open hot, etc. An even simpler type of tester is a non-contact voltage tester, which doesn't even need to be inserted into an outlet or to touch bare wire connections; merely bringing the sensor close to a power-carrying wire or device will cause the tool to light up or make an audible noise to indicate the presence of power.





# Branch Circuits

## Material: Copper

**Your house has copper electrical branch circuits.**
Your electrical system begins with the power company's incoming service wires that enter your home and connect to your electrical panel. From the main service panel, current is divided into individual branch circuits, each of which is controlled by a separate circuit breaker; branch circuits start at your main service panel and feed electricity throughout the house.

Your main circuit breaker, typically at the top of your main panel, controls power to your entire house. Under your main circuit breaker, there are two columns of circuit breakers which represent the start of individual branch circuits that operate electricity to different areas of your home. Most branch circuits are 120-volt circuits that supply power to standard outlets and fixtures in various rooms. There are also dedicated appliance circuits which can be 120- or 240-volt circuits and serve appliances such as electric ranges, dishwashers, refrigerators, garbage disposers, air-conditioners, and clothes dryers; generally, any appliance that has a motor requires a dedicated circuit.

**Test your main breaker shut-off.**
Don't wait for the stress of an emergency to figure out how to turn off power to your house. When you occupy your home, test your main breaker to ensure that all power can be turned off with one or just a few switch flips. Make sure to coordinate your test with other occupants.

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You can turn on lights and test plugs with a powered device, e.g., nightlight. Or you can purchase an inexpensive plug-in outlet/receptacle tester which displays LED lights and provides instant feedback for common wiring problems, e.g., open ground, open neutral, open hot, etc. An even simpler type of tester is a non-contact voltage tester, which doesn't even need to be inserted into an outlet or to touch bare wire connections; merely bringing the sensor close to a power-carrying wire or device will cause the tool to light up or make an audible noise to indicate the presence of power.

If you're especially anal retentive, you can use a marker to write the breaker number on the back of all face plates while you're testing branch circuits.

# Branch Circuits

## Material: Stranded Aluminum

**Your house has stranded aluminum electrical branch circuits.**
Your electrical system begins with the power company's incoming service wires that enter your home and connect to your electrical panel. From the main service panel, current is divided into individual branch circuits, each of which is controlled by a separate circuit breaker; branch circuits start at your main service panel and feed electricity throughout the house.

Your main circuit breaker, typically at the top of your main panel, controls power to your entire house. Under your main circuit breaker, there are two columns of circuit breakers which represent the start of individual branch circuits that operate electricity to different areas of your home. Most branch circuits are 120-volt circuits that supply power to standard outlets and fixtures in various rooms. There are also dedicated appliance circuits which can be 120- or 240-volt circuits and serve appliances such as electric ranges, dishwashers, refrigerators, garbage disposers, air-conditioners, and clothes dryers; generally, any appliance that has a motor requires a dedicated circuit.

Stranded aluminum wiring has been used for decades and it has never been discontinued or recalled. Do not confuse stranded aluminum wire used for 240-volt circuits with single strand aluminum used for 15 and 20 amp, 120-volt circuits. Stranded aluminum wire is not subject to the same loose connection problems as single strand and anti-occident paste can be used at terminations to reduce risks from oxidation and corrosion.

**Test your main breaker shut-off.**
Don't wait for the stress of an emergency to figure out how to turn off power to your house. When you occupy your home, test your main breaker to ensure that all power can be turned off with one or just a few switch flips. Make sure to coordinate your test with other occupants.

**Test your branch circuits to make sure your panel labels are properly marked.**
When you occupy your home, don't assume your electrical panels are labeled accurately. When you have a few hours and can enlist the help of family or friends, turn off all breakers and test the various outlets and zones for power.

You can turn on lights and test plugs with a powered device, e.g., nightlight. Or you can purchase an inexpensive plug-in outlet/receptacle tester which displays LED lights and provides instant feedback for common wiring problems, e.g., open ground, open neutral, open hot, etc. An even simpler type of tester is a non-contact voltage tester, which doesn't even need to be inserted into an outlet or to touch bare wire connections; merely bringing the sensor close to a power-carrying wire or device will cause the tool to light up or make an audible noise to indicate the presence of power.

If you're especially anal retentive, you can use a marker to write the breaker number on the back of all face plates while you're testing branch circuits.

# Branch Circuits

## Type: Non-metallic Sheathed Cable (Romex)

**You have one or more types of electrical branch circuits in your home (See Quick Reference Section)**
Your electrical system begins with the power company's incoming service wires that enter your home and connect to your electrical panel. From the main service panel, current is divided into individual branch circuits, each of which is controlled by a separate circuit breaker; branch circuits start at your main service panel and distribute electricity throughout the house.

You can usually get a good look at your cables and wires at your service panel. Most homes built after 1945 have been wired with nonmetallic, which has two or three insulated wires plus a bare ground wire encased in sheathing. An older home may have armored BX cable, which has flexible metal armor or sheathing but no ground wire; the sheathing is the grounding path.

Certain types of wires are typical of certain time periods; time periods are approximate, allowing for regional differences and gradual phase out/phase in.

**WIRE TYPE BY TIME PERIOD**

| Wire Type | Date of Use |
|---|---|
| Knob-and-tube | 1920 to 1950 |
| Cloth-sheathed two- or three-wire cavbles with no ground wire | 1945 to early |
| Cloth-sheathed cable with an integral wire | Early 1960s to 1970s |
| Cloth-sheathed aluminum cable with integral ground | 1964 to 1978 |
| Plastic-sheathed aluminum cable with integral ground | 1974 to 1978 |
| Plastic-sheathed copper cable with integral ground | 1974 to Present |

The most common distribution wiring is non-metallic sheathed cable, also referred to as NM or Romex. Non-metallic sheathed cable has a paper, cloth, or plastic (PVC) sheathing (jacket or covering).

In some areas, household branch circuit wiring is run in rigid conduit or electrical metallic tubing (EMT). The metal covering may act as the ground wire. EMT isn't conduit, having thinner walls than conduit. Conduit and EMT are good quality, but more expensive to install than NM cable.

Armored cable (AC) has a flexible metal sheathing. It is often referred to as BX, which is a popular brand name. Armored cable is suitable for dry locations only. The metal covering may act as the ground wire (equipment grounding conductor). AC was often used with furnaces, boilers and water heaters.

Insulation refers to the material wrapped around the individual wires. Insulation is designed to separate the wires within the cable. Older wires used rubber insulation, e.g. knob and tube; modern wire uses plastic insulation.

Sheathing forms around the cable, wrapping around insulated black, white, or red wires (and an uninsulated ground wire, if present). Sheathing is designed to provide physical protection for the wires and their insulation. Older wires used cloth or paper sheathing; modern wire uses plastic sheathing.

Modern wires have typically two or three conductors (black, white, red). After the mid-1960s, wires also included an uninsulated ground wire. Two-conductor-plus-ground cables are used for most normal household circuits; three-conductor-plus-ground cables

are typically used for 240-volt appliances and multi-wire branch circuits, including split receptacles.

Knob-and-tube wires are single-wire cables. Homes built from 1880 to the 1950s often still have knob and tube electrical wiring, in which electrical wires anchored by ceramic insulating knobs pass through ceramic tubes placed inside holes drilled into the wooden joists of the house. Knob and tube wiring is not inherently dangerous; dangers arise from age, improper modifications, and situations in which insulation envelops the wires. It has no ground wire and thus cannot service any three-pronged appliances. While it is considered obsolete, there is no code that requires its complete removal; however, different jurisdictions may have different requirements. If you have knob and tube wiring, you should engage an electrician with experience evaluating knob and tube wiring.

# Smoke Detectors

People die every day from house fires because their smoke detectors didn't sound an alarm during a fire. Detectors usually fail because of dead batteries (or removed to prevent false alarms), the detector is past its useful life, or the detector is located where occupants can't hear the alarm. Because your life and your family's safety depend on being quick alerted to a fire, the most important safety task in your home is to ensure that your smoke detectors are properly installed and well-maintained.

**Know your smoke alarm infrastructure.**
Check to determine if your detectors are hardwired. Rotate the detector body to release it from its base and pull it away from the wall or ceiling. If you see wires, it's a hardwired detector, which is more dependable because it's connected to your home's electrical system. When an alarm sounds, a hardwired detector won't not stop until turned off. And in case of power interruptions, hardwired detectors have battery backups for continuous operation.

Check to determine if your detectors are interconnected. Hardwired interconnected smoke detectors all sound simultaneously, even if just one detector senses a fire. You can tell if your detectors are interconnected by counting the number of wires in the detector's electrical box – interconnected hardwired detectors connect to three wires inside the electrical box. Starting in 1989, building codes required all hardwired smoke detectors to interconnect. If you have a pre-1989 home with hardwired detectors, your detectors likely aren't interconnected.

**Replace outdated smoke detectors.**
After you move in, you should check all of your smoke detectors. Understanding if detectors are hardwired and/or interconnected is important for when you have to replace smoke detectors. Most manufacturers recommend replacing smoke detectors at least every 10 years; check the back of a detector to verify date of manufacture.

Don't replace a hardwired detector with a battery-powered detector. Battery-powered smoke alarms depend only on batteries.

Hardwired and battery-powered wireless interconnected detectors communicate with one another via radio frequency signals (not Wi-Fi). You can retrofit your existing hardwired non-interconnected detectors with wireless interconnected units and even add new wireless detectors to build a safer fire detection system, all without running any new wires.

If your home already has hardwired interconnected detectors and you want to add more battery-powered detectors, replace one of the hardwired interconnected detectors with a bridge unit. Then install battery-powered wireless interconnected detectors. If you have any non-interconnected battery-powered detectors, replace them with the newer battery-powered wireless interconnected style.

**Add smoke detectors if necessary.**
Occupants have just minutes to escape in a typical home fire. Because smoke in one area may not reach a smoke alarm in another, the National Fire Protection Association (NFPA) recommends placement of at least one smoke alarm on every level of the home (including basements), in every bedroom, and outside each sleeping area. The NFPA also recommends interconnection of alarms to provide better whole-home protection than stand-alone alarms.

There are two types of smoke alarms – ionization and photoelectric. An ionization smoke alarm is generally more responsive to flaming fires, and a photoelectric smoke alarm is generally more responsive to smoldering fires. For best protection, both types of alarms or combination ionization-photoelectric alarms, also known as dual sensor smoke alarms, are recommended.

**Test your smoke detectors regularly.**

Pushing the test button helps to ensure that your alarms have a reliable power source. Refer to your user's manual for full instructions and a description of your detector's test sequence, which varies by model, but usually is a loud alarm sound followed by a warning. Wear ear protection and press the test button until you hear the test sequence. If the sound is weak or nonexistent, replace the batteries or the detector.

Whether hardwired or battery-powered, smoke detectors should beep intermittently if a detector senses that the battery's power has decayed. Many modern smoke detectors are voice-powered and issue verbal alerts as batteries weaken. Wi-Fi-enabled detectors and smart device apps allow you to monitor your home from anywhere. You can detector status, receive alarm notifications, and shut off a false alarm using an app.

Remember that pushing a test button only helps you to evaluate power, not whether the detector detects smoke. To fully test your detector's ability to detect smoke, you can test your alarms with a UL-certified liquid smoke detector tester ("canned smoke"). Don't test your alarms with real smoke or flames.

**Recycle your old detectors.**
Don't throw your old smoke detectors in the trash. Check with your local recycling organization to see if it will accept your old detectors. Many will accept photoelectric detectors but not ionization detectors because they contain radioactive material.

**Establish and practice an emergency escape plan.**
Smoke detectors are important for alerting you and your family about a fire. But without a fire escape plan, even the best smoke detectors can be rendered ineffective. Your ability to get out of your home during a fire depends on advance warning from smoke alarms AND advance planning. Make sure everyone in the home understands the sound of the smoke alarm and knows how to respond.

- Walk through your home and inspect all possible exits and escape routes. If you have children, consider drawing a floor plan of your home, marking two ways out of each room, including windows and doors. You should test your plan at least quarterly, particularly if you have children.
- Check to make sure escape routes are clear, and doors and windows can be opened easily. Ensure that everyone knows to close doors during fires; a closed door may slow the spread of smoke, heat and fire.
- Check to see if your street number is clearly visible from the road. If not, paint it on the curb or install house numbers to ensure that responding emergency personnel can find your home.
- If there are infants, older adults, or family members with mobility limitations, make sure that someone is assigned to assist them in the fire drill and in the event of an emergency – assign a backup person.
- Tell guests or visitors to your home about your family's fire escape plan. When staying overnight at other people's homes, ask about their escape plan. If they don't have a plan in place, offer to help them make one. This is especially important when children are permitted to attend "sleepovers" at friends' homes.
- If windows or doors have security bars, make sure that bars have emergency release devices for opening immediately in an emergency. Emergency releases won't compromise security but will increase your chances of safely escaping.
- Select an outside meeting place (e.g., neighbor's house, light post, mailbox, stop sign) a safe distance in front of your home where everyone can meet after they've escaped. Make sure to mark the location of the meeting place on your escape plan.
- When you're outside, stay outside. Under no circumstances should you ever go back into a burning building. If someone is missing, inform the fire department dispatcher when you call. Firefighters have the skills and equipment to perform rescues.

# CO Detectors

Carbon monoxide (CO) is a colorless, odorless, and tasteless gas that is poisonous to humans. CO is referred to as a "silent killer" because you can't tell when it is present although it can be dangerous and deadly. A CO detector is a safety device that can alert you about a CO leak and help to save you from a potentially life-threatening situation, e.g., carbon monoxide poisoning.

CO alarms detect carbon monoxide gas and provide early warning. In the event of a carbon monoxide leak, it's critical that you reach fresh air as soon as possible. Every second counts and CO detectors can provide you and your family the advanced warning necessary to escape your home during an emergency.

**Understand the threat of carbon monoxide.**
Carbon monoxide is produced by any fuel-burning device. Three main sources are your home's furnace, dryer vent in a drying machine, and fireplace or chimney. It's important to regularly inspect and service these sources to help prevent a CO leak that could lead to carbon monoxide poisoning.

**Ensure that CO detectors are installed.**
It is important to have CO alarms on every level of your house so all family members can hear the detectors and be alerted to an emergency. You should also have carbon monoxide detectors in every bedroom, outside each sleeping area, and common rooms for extra safety while you and your family are sleeping. Carbon monoxide detectors can be placed anywhere in the room. Contrary to popular belief that CO is heavier than air, CO alarms can be placed on the wall or the ceiling and will be just as effective. Note: Many late-model smoke detectors also monitor carbon monoxide – check your detectors to determine if they're dual purpose.

**Understand how CO detectors communicate.**
Different CO alarms operate and communicate differently. Alarms have different beep patterns to communicate whether there is an emergency or simply a need to replace the battery or the device itself. Refer to your alarm's user manual for your specific model.

**Test your CO detectors regularly.**
Test your detectors regularly to ensure they're functioning properly. Refer to your alarm's user manual for proper test procedures. If the alarm doesn't test properly, install fresh batteries, make sure batteries are installed correctly, be sure the alarm is clean and dust-free, and then test the detector again. If it still does not test properly, replace the CO alarm as soon as possible.

Like smoke detectors, pushing the test button only tests the power source. To fully test your CO detectors, use CO detector tester spray. You can purchase CO spray online or at most home improvement stores. Canned CO is a non-flammable aerosol; inhalation of canned CO or contact with the spray isn't dangerous if used as directed. Follow the manufacturer's instructions for proper use of the CO test spray. You'll need to spray enough so that your detector will be able to detect the CO in the canned test spray. If your detector is working, it will sound the alarm within 15 minutes.

**Replace your CO detectors.**
If your carbon monoxide detector has replaceable batteries, change the batteries at least semi-annually. Carbon monoxide detectors have a lifetime of 5 to 7 years – check the manufacturer date to determine if you need to replace a detector.

# HVAC

# Heating System

## Type: Heat Pump


**Your heating system is a heat pump powered with electricity.** A heat pump, as part of a central heating and cooling system, uses external air to heat a home in winter and cool a home in summer. Your heat pump acts as a heater when it's cold outside and an air conditioner when it's hot outside; because heat pumps serve both purposes, they're considered very versatile.

In addition to its flexibility, heat pumps are energy efficient. A heat pump transports air constantly, moving warm air from one place to another, to where it's needed or not needed, depending on the season. In winter, the heat pump extracts heat from the outdoor air and distributes warm air inside your home. In summer, the heat pump extracts warm air from inside your home, creating a cooler indoor environment. Heat pumps distribute heating (and cooling) via air blowing across evaporator coils linked to an outdoor pump that extracts or absorbs heat from the outdoors. Although heat pumps can be energy efficient, they're generally suitable only for relatively mild climates; heat pumps are less effective in very hot and very cold weather.

Your heating system is the largest energy expense in your home; on average, operating a heat pump heating system accounts for almost 50% of your total energy bill. Maintaining your heat pump to operate as efficiently as possible can help to reduce your heating expenditures.

Your heating system represents one of the highest cost systems in your home; replacing your heat pump heating system can cost between $5,000 to $10,000, depending on quality, capacity, efficiency, installation complexity, and tax credits and rebates. Therefore, proper maintenance not only helps to reduce your monthly heating expenditures but also will significantly extend the life of the heating system and delay the need for an expensive system replacement.

**Set your thermostat properly.**
Try to set your thermostat at one temperature; constant adjustments can cause higher utility costs, especially in winter. If you're using the thermostat as a setback type, limit setbacks to twice a day, e.g., when you're at work and when you're sleeping.

During the heating season, try not to set the thermostat below 65F. During summer, try not to set the thermostat below 70F, which may cause higher utility costs and permit the indoor coil to freeze and cause condensation in the house.

**Replace your air filters regularly.**
Check your air filters monthly. Changing air filters is important because dirty air filters impede airflow – the heat pump won't operate efficiently, which increases operating costs and degrades the equipment more quickly. Cheap filters provide basic protection and should be changed more frequently, e.g., 30 to 60 days. More expensive air filters offer improved air quality, which can help people who have allergies or asthma; such filters may last three months or longer depending on the quality of the filter and your furnace. Check your system recommendations and filter packaging for filter info.

**Check your exterior equipment regularly, especially during winter.**
Check your outdoor equipment, especially during cold weather. Watch for signs of excessive ice or snow build-up on or around the condensing unit, particularly after bad weather. If ice or snow cover the unit, turn the thermostat off or to emergency heat. Brush off snow or ice or pour warm water over the unit to melt the snow and ice. Do NOT pour hot water on the unit and do NOT use sharp

objects to pick or knock the ice off the coils of the heat pump, which could be damaged. After the unit is clear of snow and ice turn the thermostat back to normal heating. If the unit ices up again, call an HVAC contractor for service.

Don't permit the outdoor unit to reside under a leaking gutter. In winter, water may drip onto the top of the unit and freeze solid, which will restrict the air flow and cause the unit to stop working. Outdoor equipment should be elevated 4" to 8" above ground level to keep coils clear of snow and ice and to allow for proper drainage; make sure your unit hasn't settled to less than 4" above ground.

**Weatherproof your home.**
You may question why weather-proofing your home has a relationship with maintaining your heating system. The answer is that any weakness in the structural shell of your home permits cold air to penetrate inside and warm air to leak outside. Sealing your home helps to reduce the amount of heat needed to keep your house warm.

To identify sources of heating loss, qualified HVAC contractors can provide a home energy audit to determine where your home's weaknesses exist; in many states, home energy audits are free or subsidized by your power company.

Using specialized equipment and infrared cameras, a heating professional can also determine where your home may be leaking heat and help you to determine the best places to make improvements. Projects are DIY and inexpensive – weather-stripping windows and doors, sealing and insulating duct work, or adding insulation to your attic.

**Listen to your heating system.**
Many heating system issues occur gradually and only develop into serious problems over time. Listening to your heating system while you're next to the heat pump may help to identify issues before they develop into costly repairs.

At least every couple of months, stand next to your heat pump while the system generates heat and just…listen. Do you hear any unusual noises? Rattles, scraping, griding, sparking, loud humming, intermittent noises. Loud humming usually indicates an electrical problem. If anything sounds unusual, engage an HVAC contractor to assess the issue.

**Check and clean your fans regularly.**
Keep your fans clear and working properly. Closing or blocking a fan can cause the heat pump to work harder, resulting in a shorter lifespan. With a damp cloth, clean the grills and wipe around the fan's entrance as far as you can reach. On occasion, take the cover off your fans and use a vacuum cleaner to remove dust or hire a professional cleaning company.

**Consider a service agreement.**
Rather than paying for ad hoc visits and repairs, consider a service contract for your HVAC system. There are three broad categories of service contracts:

- Labor costs for annual or semi-annual planned maintenance visits
- Labor costs for maintenance visits and unplanned repairs
- Labor costs for maintenance visits, unplanned repairs, and costs of selected equipment.

Coverage varies within categories, e.g., contracts for HVAC equipment. Coverage and exclusions also vary among HVAC vendors. Do your research and check customer reviews before signing a service agreement.

There are three main reasons to buy a service contract:

- To perform preventive maintenance
- To be at the top of the list for emergency visits if your system stops working
- To help offset costs of repairs (if repair costs are included)

Getting a service contract may not always protect you. Heat pumps often have trouble when the weather is extreme, and companies may lack sufficient staff to handle demand and sometimes can't keep pace, even for priority customers.


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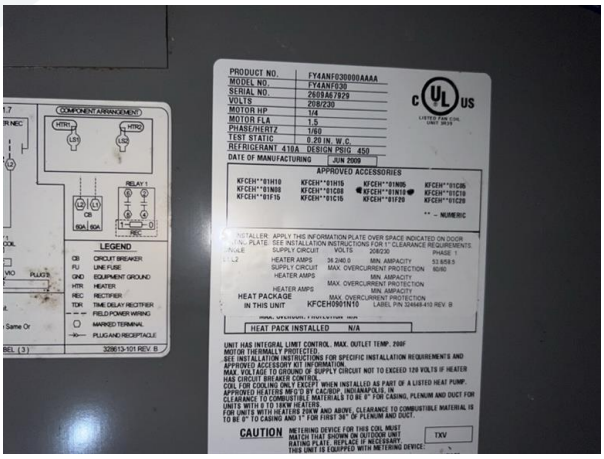
# Heating System

## Type: Heat Pump

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**Check your exterior equipment regularly, especially during winter.**
Check your outdoor equipment, especially during cold weather. Watch for signs of excessive ice or snow build-up on or around the condensing unit, particularly after bad weather. If ice or snow cover the unit, turn the thermostat off or to emergency heat. Brush off snow or ice or pour warm water over the unit to melt the snow and ice. Do NOT pour hot water on the unit and do NOT use sharp

objects to pick or knock the ice off the coils of the heat pump, which could be damaged. After the unit is clear of snow and ice turn the thermostat back to normal heating. If the unit ices up again, call an HVAC contractor for service.

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You may question why weather-proofing your home has a relationship with maintaining your heating system. The answer is that any weakness in the structural shell of your home permits cold air to penetrate inside and warm air to leak outside. Sealing your home helps to reduce the amount of heat needed to keep your house warm.

To identify sources of heating loss, qualified HVAC contractors can provide a home energy audit to determine where your home's weaknesses exist; in many states, home energy audits are free or subsidized by your power company.

Using specialized equipment and infrared cameras, a heating professional can also determine where your home may be leaking heat and help you to determine the best places to make improvements. Projects are DIY and inexpensive – weather-stripping windows and doors, sealing and insulating duct work, or adding insulation to your attic.

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Many heating system issues occur gradually and only develop into serious problems over time. Listening to your heating system while you're next to the heat pump may help to identify issues before they develop into costly repairs.

At least every couple of months, stand next to your heat pump while the system generates heat and just…listen. Do you hear any unusual noises? Rattles, scraping, griding, sparking, loud humming, intermittent noises. Loud humming usually indicates an electrical problem. If anything sounds unusual, engage an HVAC contractor to assess the issue.

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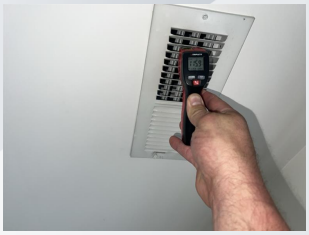

# Cooling System

## Type: Central Split


**You have a central split HVAC system.**
A central split system is one of the most common whole house HVAC systems in the US. The basic setup consists of an exterior condenser unit connected to an interior air handler; many central split systems, such as split system heat pumps, generate air condition and heat using the same equipment.

An HVAC central split system generally is installed in homes that have space for large indoor cabinets. The split system model holds the condenser and compressor in an outdoor cabinet; an indoor cabinet holds the evaporator coil, and an air handler sends air through ductwork. A copper tube (line set) that connects indoor and outdoor components moves cold air to the house.


Central air conditioners circulate cool air through a system of supply and return ducts. Supply ducts and registers (i.e., openings in the walls, floors, or ceilings covered by grills) carry cooled air from the air conditioner to the home. This cooled air becomes warmer as it circulates through the home; then it flows back to the central air conditioner through return ducts and registers.

Air conditioners also dehumidify the air to improve comfort. However, in extremely humid climates, when outdoor temperatures are moderate, or in cases where the air conditioner is oversized, the air may not reach a low enough humidity to achieve a comfortable level. In those instances, homeowners may reduce the thermostat setting or use a dehumidifier.

Maintaining your HVAC central split system to operate as efficiently as possible can help to reduce your energy costs. Your HVAC system is the largest energy expense in your home and may account for 40% to 50% of your total energy bill.

Your HVAC system also represents one of the highest cost systems in your home; replacing your HVAC system can cost between $5,000 to $10,000, depending on quality, capacity, efficiency, installation complexity, and tax credits and rebates. Proper maintenance not only helps to reduce your monthly energy expenditures but also will significantly extend the life of the HVAC system and delay the need for an expensive system replacement.

**Set your thermostat properly.**
Set the fan to auto mode; do not use the system fan to provide air circulation – use circulating fans in individual rooms.

Try to set your thermostat at one temperature; constant adjustments can cause higher utility costs, especially in extreme weather. If you're using the thermostat as a setback type, limit setbacks to twice a day, e.g., when you're at work and when you're sleeping.

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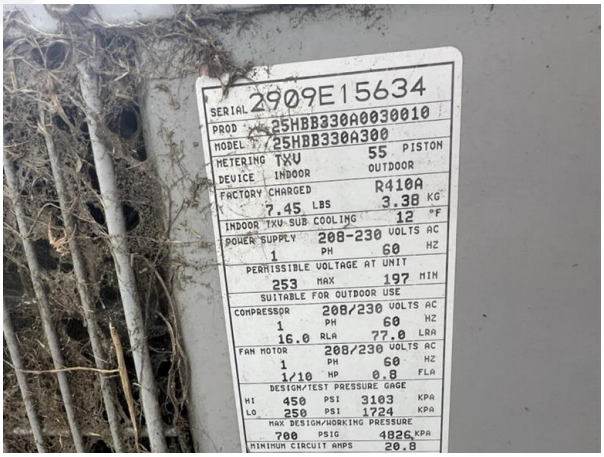
# Cooling System

## Type: Central Split




**You have a central split HVAC system.**
A central split system is one of the most common whole house HVAC systems in the US. The basic setup consists of an exterior condenser unit connected to an interior air handler; many central split systems, such as split system heat pumps, generate air condition and heat using the same equipment.

An HVAC central split system generally is installed in homes that have space for large indoor cabinets. The split system model holds the condenser and compressor in an outdoor cabinet; an indoor cabinet holds the evaporator coil, and an air handler sends air through ductwork. A copper tube (line set) that connects indoor and outdoor components moves cold air to the house.

Central air conditioners circulate cool air through a system of supply and return ducts. Supply ducts and registers (i.e., openings in the walls, floors, or ceilings covered by grills) carry cooled air from the air conditioner to the home. This cooled air becomes warmer as it circulates through the home; then it flows back to the central air conditioner through return ducts and registers.

Air conditioners also dehumidify the air to improve comfort. However, in extremely humid climates, when outdoor temperatures are moderate, or in cases where the air conditioner is oversized, the air may not reach a low enough humidity to achieve a comfortable level. In those instances, homeowners may reduce the thermostat setting or use a dehumidifier.

Maintaining your HVAC central split system to operate as efficiently as possible can help to reduce your energy costs. Your HVAC system is the largest energy expense in your home and may account for 40% to 50% of your total energy bill.

Your HVAC system also represents one of the highest cost systems in your home; replacing your HVAC system can cost between $5,000 to $10,000, depending on quality, capacity, efficiency, installation complexity, and tax credits and rebates. Proper maintenance not only helps to reduce your monthly energy expenditures but also will significantly extend the life of the HVAC system and delay the need for an expensive system replacement.

**Set your thermostat properly.**
Set the fan to auto mode; do not use the system fan to provide air circulation – use circulating fans in individual rooms.

Try to set your thermostat at one temperature; constant adjustments can cause higher utility costs, especially in extreme weather. If you're using the thermostat as a setback type, limit setbacks to twice a day, e.g., when you're at work and when you're sleeping.

During the heating season, try not to set the thermostat below 65F. During summer, try not to set the thermostat below 70F, which may cause higher utility costs and permit the indoor coil to freeze and cause condensation in the house.

**Replace your air filters regularly.**
Check your air filters monthly. Changing air filters is important because dirty air filters impede airflow – the system won't operate efficiently, which increases operating costs and degrades the equipment more quickly. Cheap filters provide basic protection and should be changed more frequently, e.g., 30 to 60 days. More expensive air filters offer improved air quality, which can help people

who have allergies or asthma; such filters may last three months or longer depending on the quality of the filter and your furnace. Check your system recommendations and filter packaging for filter info.

**Check your exterior equipment regularly, especially during winter.**
Check your outdoor equipment, especially during cold weather. Watch for signs of excessive ice or snow build-up on or around the equipment, particularly after bad weather. If ice or snow cover the unit, turn the thermostat off or to emergency heat. Brush off snow or ice or pour warm water over the unit to melt the snow and ice. Do NOT pour hot water on the unit and do NOT use sharp objects to pick or knock the ice off the coils of the condensing unit, which could be damaged. After the unit is clear of snow and ice turn the thermostat back to normal heating. If the unit ices up again, call an HVAC contractor for service.

Don't permit the outdoor unit to reside under a leaking gutter. In winter, water may drip onto the top of the unit and freeze solid, which will restrict the air flow and cause the unit to stop working. Exterior equipment should be elevated 4" to 8" above ground level to keep coils clear of snow and ice and to allow for proper drainage; make sure your equipment hasn't settled to less than 4" above ground.

**Weatherproof your home.**
You may question why weather-proofing your home has a relationship with maintaining your HVAC system. The answer is that any weakness in the structural shell of your home permits external air to penetrate inside and interior air to leak outside. Sealing your home helps to reduce the amount of heating or cooling needed to keep your house comfortable.

To identify sources of energy loss, qualified HVAC contractors can provide a home energy audit to determine where your home's weaknesses exist; in many states, home energy audits are free or subsidized by your power company.

Using specialized equipment and infrared cameras, an HVAC professional can also determine where your home may be leaking energy and help you to determine the best places to make improvements. Projects are DIY and inexpensive – weather-stripping windows and doors, sealing and insulating duct work, or adding insulation to your attic.

**Listen to your HVAC system.**
Many HVAC system issues occur gradually and only develop into serious problems over time. Listening to your system while you're next to the equipment may help to identify issues before they develop into costly repairs.

At least every couple of months, stand next to your system while it is operating and just…listen. Do you hear any unusual noises? Rattles, scraping, griding, sparking, loud humming, intermittent noises. Loud humming usually indicates an electrical problem. If anything sounds unusual, engage an HVAC contractor to assess the issue.

**Check and clean your fans regularly.**
Keep your fans clear and working properly. Closing or blocking a fan can cause the equipment to work harder, resulting in a shorter lifespan. With a damp cloth, clean the grills and wipe around the fan's entrance as far as you can reach. On occasion, take the cover off your fans and use a vacuum cleaner to remove dust or hire a professional cleaning company.

# Distribution

## Type: Ductwork

**Your HVAC system distributes heating (and/or cooling) via ductwork.**
Your home's ductwork plays a critical role in your HVAC system – your ductwork distributes airflow from your furnace or air conditioning systems to rooms. The average home loses about 10% to 30% of conditioned air because of duct leaks. With routine duct maintenance, you'll optimize your duct system, save energy, and extend the useful life of ductwork.

**Seal air leaks in your ducts.**
Check your visible ductwork occasionally. Ducts may degrade or become damaged over time. Joints and seals may become loose, vibrations from the HVAC system can dislodge ductwork, dust and other debris may be blown into the ducts, and accidents may damage or deform the ductwork.

When air is lost because of duct leaks, energy used to heat or cool your house is wasted. If ducts are contained inside your home, the lost energy might be contained within your home, but it might be released into wall cavities and crawl spaces, not living areas whose temperature you want to regulate. If some ductwork is outside, make sure that insulation is secure and tight to help air passing through the ducts maintain temperature until the air reaches living areas.

**Keep vents and return vents unobstructed.**
Be sure that vents and return vents are unobstructed. Placing a piece of furniture or another fixture in front of your vents disrupts airflow and can prevent air from circulating through rooms. When blockage is substantial, it can have repercussions throughout the ductwork design, changing pressure in the system, and accelerating HVAC fan motor burnout.

Obstructions inside ductwork can also damage your HVAC system. For example, a dislodged air filter that's been sucked into the ductwork may blow through and eventually reach the central HVAC system and interfere with its operation or even present a fire risk.

**Don't close vents in rooms to decrease HVAC costs.**
While it may seem intuitive that less conditioned air going into the rooms means a lower energy bill, it just means that more air at the outdoor temperature is being brought in to be treated through the return vents. Additionally, if the vents are closed, the same issues with pressure drop occur as with vents blocked by furniture or by obstructions within the ducts. If you want to control your heating and cooling on a room-by-room basis, ask an HVAC contractor about a zoning system for your home.

**Consider UV light.**
Consider installing ultraviolet (UV) light in your ductwork. UV lights use ultraviolet radiation to sterilize air, destroying bacteria, as well as mold and fungal spores. UV light can help prevent buildups of mold and fungal colonies inside the ducts, where humidity is often difficult to control.

**Consider testing your ducts.**
An HVAC professional can take readings of air pressure within the ducts during system operation and analyze how much air you're losing and how well the system is balanced. An HVAC specialist also can also offer recommendations on how to improve the ductwork design in your home.

**Think before engaging a professional to clean your ductwork.**
Cleaning the air ducts in your home's HVAC system may not be as good an idea as it seems. Unlike dryer duct cleaning, which should be regularly checked and cleaned, ductwork generally is OK with minimal maintenance. The US EPA explicitly "does not

recommend that air ducts be cleaned except on an as-needed basis because of the continuing uncertainty about the benefits of duct cleaning under most circumstances. Duct cleaning has never been shown to prevent health problems. Neither do studies conclusively demonstrate that particle (e.g., dust) levels in homes increase because of dirty air ducts. This is because much of the dirt in air ducts adheres to duct surfaces and does not necessarily enter the living space."

Duct cleaning isn't a bad idea, it's just unnecessary in most cases. In special cases, duct cleaning can be useful, e.g., ducts are filthy or have been infested with mice or other vermin. Or if you see evidence of significant visible mold growth in the ducts or on the mechanical components of the HVAC system, you may consider cleaning the duct system. But cleaning normally dusty ducts provides no real value.

If you are intent on cleaning ducts, select a qualified contractor because duct cleaning is easy to do incorrectly. In fact, hiring the wrong contractor can do more harm than good. Hire a professional who is trained and certified by the National Air Duct Cleaning Association (NADCA). NADCA members need to have at least one certified Air Systems Cleaning Specialist (ASCS) on staff and are responsible to clean and restore a customer's HVAC system accordance with the association's standards and guidelines.

# PLUMBING

# Water Service Line

## Type: Public

## Material: PEX

**You have public water service delivered to the house via a PEX water service line.**
Water is provided to your house by the public water utility. Water service lines connect underground main lines to underground water service lines to your house for potable water, i.e., drinking, washing, plumbing, etc. Water service lines may also be used to supply water for other applications, e.g., irrigation, fire suppression systems. Water service lines generally are installed at the time of construction.

The water company's distribution main connects to your property's water service line near the edge of your property at which a valve, referred to as a curb stop, permits service personnel to regulate water flow from the main to your house; the water flow meter also generally is located at the curb stop.

The water service line on your property travels underground, typically buried two to four feet, from the curb stop and terminates at a main water shut-off valve on the interior or exterior of your house.

PEX piping (cross-linked polyethylene) is a plastic water supply line suitable for underground and above ground applications. PEX tubing costs about 1/3 the cost of copper, fittings are faster to install, and PEX doesn't corrode from acidic water. PEX is like a thick, strong hose which withstands chemical damage, high temperature, and high pressure.

**Know the location of your main water shut-off valve and keep it readily accessible.**
In case of emergency, e.g., overflowing bathtub, leaking pipe, know the location of your main shut-off valve. Mark the valve with a bright-colored ribbon or tag. Engage a plumber if your main shut-off valve is inoperable or leaks.

Your main water shut-off valve also should be readily accessible, e.g., no personal items, trim vegetation.

**Keep your curb stop accessible.**
Curb stop valves permit the water company and authorized contractors to regulate water to your house. Although curb stops generally are located near the edge of your property in the public right of way, you're responsible for your property's curb stop. Curb stops must be operable and accessible to the water company to turn water on and off. Keep your curb stop area free of landscaping and debris in case urgent repairs require water to be turned off.

**Check your service entry line regularly.**
Your service entry line is designed to last for decades. However, connections may degrade over time. You should check your service entry line regularly for corrosion or leaks. Engage a plumber if your service entry line connection requires attention.

**Test your water annually.**
If you have any concerns about your water quality, please contact your water company, which typically offers free water testing services.

**Call 811 before you dig.**
With underground service lines, watch when you're digging. Digging around underground feeders is a disaster waiting to happen! Before you dig anywhere in your yard, 811, the "Before You Dig" hotline. The service will connect you to a local operator who will contact the utility companies with lines in your area. The companies will mark your lines within a few days and usually at no cost to you.

**Know when to call the water company or a plumber.**
If you think there is a problem with service supplying your home, contact your water company. The water company is responsible for water service up to the edge of your property, typically at the curb stop.

If you think you there is a problem with your plumbing, contact a plumber. You're responsible for the underground water service lines on your property.

# Main Shut-off

All water that is piped into your home from an outside source arrives at the main shutoff valve. The shutoff valve is used to shut off the supply of water into your house. If you have a plumbing emergency, or if plumbing maintenance is required, it is critical for you to know how to turn off the water to your house.

**Clearly label your water shut-off valve with a bright-colored ribbon or tag.**
Make sure that everyone in your house can easily identify the valve.

See your Water Shut-off page for a photo and location data for your water shut-off.

**Make sure to keep your water shut-off valve readily accessible.**
In unfinished spaces, boxes and personal items may start to block your access to the water shut-off valve. In finished spaces, furniture or other items may be placed in front of the access panel to the shut-off. Don't let that happen - you need an open, safe path for quick access to the shut-off valve because every second matters to minimize water damage in case of an emergency. Keep boxes, personal items, and furniture away from your water shut-off valve.

**Test your main shut-off valve annually.**
Be sure to turn the main valve off and on at least annually. Most valves turn to the right to stop the flow of water. Any time you shut off the water and allow the pipes to drain, unscrew the aerators (small screens) on the ends of any affected fixtures (e.g., faucets) before you turn the water back on. Removing the aerators will prevent loosened particles of scale from clogging the aerators.

**Gate valve vs. ball valve.**
Main shutoff valves are normally one of two types: gate valve or ball valve.

A gate valve utilizes an internal gate that moves up and down a stem, which is connected to a handle which screws the gate up or down, opening and closing the gate. Although a gate valve is long-lasting, it can get stuck in place if it isn't used occasionally. When you've closed and opened a gate valve, it may start to leak a bit around the valve stem, which is held in place with a packing nut. You can tighten the nut just enough to stop the leak; be careful to not over-tighten the nut or the valve may become difficult to turn. Gate valves needs periodic checking and turning to ensure proper opening and closing. Gate valves are commonly found in older construction.

A ball valve utilizes a sphere with a hole in it to control flow. When the handle is parallel to the pipe, the hole is open for water to flow. When the handle is turned (i.e., at a right angle to the pipe), the sphere also is turned, i.e., the hole is perpendicular to the valve and the flow of water is stopped. Ball valves can almost always be operated after years of disuse and don't typically freeze in position. Newer construction or plumbing with copper or plastic main water pipes generally use ball valves instead.

**Understand and test auxiliary water shut-off valves.**
Water flows through the main shutoff valve to your supply pipes that route water to various plumbing fixtures in the house. Most water fixtures, e.g., exterior faucets, washing machine, kitchen sink, dishwasher, sinks, toilets, feature an auxiliary shutoff valve, which means you can stop the flow of water to individual fixtures or specific areas of your house during a repair or emergency and still supply water to the rest of your home. Auxiliary shutoff valves are generally located close to the fixture that the water pipe serves—under your sinks, beneath your toilet tanks, and near your washing machine. You should test your auxiliary water shut-off valves annually.

**Engage a plumber if valves aren't operable.**
If valves are stuck in place, don't exert extreme force to try to open the valves. Engage a plumber to evaluate and assess repairs.

# Supply Pipes

## Material: Copper

**You have copper supply pipes in your house.**
There are two main types of plumbing inside your house: water supply pipes and drain-waste-vent pipes. Your water supply pipes operate under water pressure, i.e., water is "pushed" through your pipes so that when you turn on water at the sink or shower, water under pressure flows out of the fixtures. Your drain-waste-vent pipes operate via gravity, i.e., water from your sink drain or a toilet flush runs downhill.

Your main supply pipe connects to your main water supply at or near the point at which water enters your house. Your main supply pipe typically branches into a system of pipes for cold water and another set that routes through your water heater to produce hot water; hot and cold-water pipes often parallel each other when routed throughout your house. Your water supply pipes distribute water from your main supply pipe to fixtures throughout your home, including sinks, showers, bathtubs, toilets, and outdoor hose connectors.

Copper pipe is mostly used for hot and cold-water supply piping. For many years, copper was the gold-standard for water supply pipes, as galvanized steel fell out of favor. Copper plumbing pipes can last for up to 50 years, but as it ages, copper thins out, eventually leading to pinhole leaks. More recently, various forms of plastic piping have replaced copper because of the price of copper and longer labor needed to install; however, copper pipes and fittings are still widely available.

**Check your pipes regularly.**
Checking on your pipes is about looking for obvious signs of water damage around your home – discoloration, water stains on ceilings or walls, warping. Of course, you should also pay attention to any exposed pipes, e.g., under your sinks. Look for any signs of corrosion or leaking connections.

**Use safe drain cleaners.**
Clogged pipes happen. Don't use chemical drainers like Drano or Liquid-Plumr; high acidity levels can be harsh on old metal pipes and even hasten their deterioration. For minor clogs, use a homemade baking soda and vinegar mix or a store-bought enzyme treatment on all your sinks and showers about once a month. Rinse thoroughly with hot water. This will keep your pipes relatively clean and help prevent buildup.

If you have a serious clog, engage an experienced plumber. Plenty of people snake their own drains (and in general, it's never a bad idea to learn how to detach and clean your P-trap yourself), but an improperly sized snake or auger can permanently damage your pipes. Hydro-jetting, which sends a powerful stream of water through your pipes, may be another alternative but that's also a job for a professional plumber.

**Be mindful of what you're pouring down your drains.**
Do not pour grease or oils down your drains, e.g., cooking grease, body oils. Use filters and screens over your drains to prevent particles from passing through and sticking to the inside of the pipe. When you're washing dishes, place food waste in the trash or a compost bin. Food particles can easily clog drains when flushed down the sink plug hole. Avoid flushing any waste other than toilet tissue down your toilet. Feminine hygiene products or cotton wool swabs can cause clogs in your pipes, restricting water flow and backing up water in your toilet bowl.

**Investigate low water pressure.**
If your water pressure is weaker than usual, it may be a sign there could be some buildup inside the pipes or a leak in the system. Look carefully for evidence of leaks and engage a plumber as required.

**Seal holes and cracks.**
You can seal small leaks and cracks in your water pipes by patching up the drip. You can use plumber's putty or tape, just follow application instructions.

**Protect your pipes in harsh weather.**
Frozen pipes are common in winter, especially when your pipes are old and have begun to deteriorate. Freezing can create pressure inside the pipe, resulting in a pipe burst and severe flooding. Run your hot water regularly; you can defrost frozen pipes by running hot water continuously from the tap to help warm them up. Keep your heating on; keeping your indoor temperature above 50F keeps your pipes warm and prevents them from freezing. You can also open cabinets around hidden pipes to protect them from freezing.

**Soften your water.**
High mineral content may shorten the lifespan of your water pipes. Minerals build up in the pipes over time, increasing the likelihood of clogging; minerals can also corrode pipe joints and fillings. Consider investing in a whole-house water softener system to break down the minerals. Combined with a reverse-osmosis system, you can get the purest water possible to all areas of your house, including the laundry room. To check whether you have hard water, read your municipality's water report, which is required to be filed annually; you can search for yours on the EPA database. If the density is listed as having over 140 parts per million, you have hard water.

**Invest in a leak detection system.**
There are numerous smart water shutoff systems which automatically turn off water if irregularities or leaks are detected; such water systems measure water pressure, water flow rate, and temperature. Smart water shutoffs are accessible via Wi-Fi and monitor your plumbing system 24x7.

# Supply Pipes

## Material: PEX

**You have PEX supply pipes in your house.**
There are two main types of plumbing inside your house: water supply pipes and drain-waste-vent pipes. Your water supply pipes operate under water pressure, i.e., water is "pushed" through your pipes so that when you turn on water at the sink or shower, water under pressure flows out of the fixtures. Your drain-waste-vent pipes operate via gravity, i.e., water from your sink drain or a toilet flush runs downhill.

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# Drain, Waste, Vents

## Type: Public Sewer

**Your plumbing system disposes waste to a public sewer system.**

All homes dispose of waste and water to either a public sewer line or a private septic system. Both types of systems are designed to handle and treat "blackwater" (wastewater from toilets) and "graywater" from sinks, showers, dishwashers, and laundry machines. Private septic and public sewer systems work in similar ways, utilizing micro-organisms to filter out bacteria, viruses, and other disease-causing pathogens before releasing cleansed water back into the environment. Sewer lines connect to public sewer systems, which are generally available in urban and suburban areas; septic systems are generally the only option available for homes located in rural or low-density areas.

Most people prefer to be on a sewer system, as the local government is responsible for maintaining the system. In a sewer system, your waste is routed to a centralized treatment facility, which is designed to withstand heavy loads and can better accommodate periods of heavy precipitation or storm surges that might overwhelm smaller septic systems. Unlike septic systems, most public sewer systems require regular waste service fees.

**Test your sewer line.**

Even though your house is connected to the public sewer system, you're responsible for sewer piping on your property. Watch for signs of a pending sewer drain clog and fix them before they become full-blown stoppages. You can test the effectiveness of your sewer line by emptying all sinks and tubs at the same time and watching if a floor drains back up or if it takes a long time for all the drains to empty.

**Snake your sewer pipes.**

If you suffer periodic sewage stoppages or backups into your home, your sewer line likely is impaired; sewer lines may be penetrated by tree roots. Engage a plumber to snake the line annually to prevent backups into your home.

**Inspect vent pipes.**

Your plumbing system drain lines are connected to pipes that ventilate sewer gases. Plumbing vent pipes are important because they prevent gas and odor from building up in your home; they also control air pressure and the entire plumbing system. If your plumbing vents become clogged, it impacts your entire plumbing system.

Vent pipes usually exit through the top of your roof. You will likely have several vent pipes, one for each main soil stack and other secondary pipes. Vent pipes may become blocked with debris or snow and ice and the drain system in your house will not work as effectively. If your roof is accessible, visually inspect vent pipes extending through your roof for signs of blockage. If your roof isn't accessible, use binoculars to inspect the pipes. Or engage a plumber for an annual check-up, including vent pipes.

**Slow or gurgling drains.**

Slow and sluggish sink drains are common. The pop-up may have collected hair and debris or soap and other bioproducts may have accumulated in the drain pipes.

- Clear out debris – Insert a plastic Zip-it tool into the drain to grab hair and debris; Zip-it is thin enough to fit in a drain with a pop-up.
- Remove and clean the pop-up – The pop-up may also collect debris and build-up. You can remove and clean the pop-up. Most pop-ups are held in place with a nut attached to the drain just under the sink. To remove the pop-up, reach behind the drain pipe under the sink to find the pop-up nut. After removing the nut, the pop-up can be pulled out, cleaned and reinstalled.

- Clean with homemade mix – Clean drain pipes after you remove the debris. Don't use chemical drain cleaners, which are dangerous, poisonous and bad for the environment. Pour boiling water into the drain. Then pour 1 cup of white distilled vinegar and ½ cup of baking soda. Wait 10 minutes then pour boiling water into the drain again. Flush with hot tap water.
- Use a plunger – You can also use a on a slow sink drain. Plunging can loosen and dislodge hair and debris that is collected in the pipe. Cover the sink overflow with tape before plunging; covering the overflow helps to create a seal.

**Strong sewer smells from drains.**
Sewer smells are unpleasant and also unsafe – methane in sewer gas is toxic, combustible and can lead to carbon monoxide poisoning. Don't ignore sewer smells or expect the smells to dissipate without action.

- Clean out bio accumulation – Body oils, conditioner, shampoo, soap, and shaving cream wash down the drain along with natural debris, e.g., skin cells, hair and often accumulate in the pipes under your shower. As bio accumulation increases, it may release a sewage smell from bacteria and decomposing debris; bacteria are sticky and cling to your pipes and are difficult to remove without specialized products. Sewage odor may become noticeable in the entire bathroom, not just in the shower or bathtub. To eliminate the odor, you have to unclog debris that is feeding bacteria in the drain.

Remove the shower drain. Boil between five to 10 quarts of water, allow the water cool to about 150F and then slowly pour the water down the shower drain. Follow the water with 1 cup of white distilled vinegar, then ½ cup of baking soda. After two hours, pour a gallon of hot water into the drain, then push a drain brush through the drain to clear out any remaining debris.

- Restore your P-trap – A P-trap is a U-shaped pipe designed to trap and hold water; when it works correctly, a P-trap holds enough water to prevent gases and odors from the sewer to creep up your drain.

Water could have evaporated from the P-trap. Turn on your water for a few minutes to refill the P-trap; water should be enough to refill the P-trap and stop sewage gases from leaking into your bathroom. If the smell persists, try pouring a quart of water into every drain in your home, including sinks and toilets.

If you use your drain frequently and still notice a sewage smell, your P-trap may be leaking, preventing it from holding water. If the odor remains after running water through all drains, you probably have an old or leaky P-trap. Engage a plumber to resolve the issue.

**Strong sewer smells from toilets.**

- Broken or loose seal – Sometimes a toilet leaks from its wax ring, which seals the toilet drain and prevents water leakage. If the toilet bowl is loose, it can damage the wax ring, leading to sewage seeping out and producing bad smells. Your toilet could also be broken, cracked or otherwise damaged. Your toilet also may have cracked around the bolts that fasten it to the floor or from using a drain snake too aggressively. If there is a broken or loose seal, try adding caulk around the base and bolt holes securing the toilet to the ground. If your toilet bowl is wobbly or loose, the wax ring may have broken or cracked; you can reset the toilet with a new toilet ring.
- Clogged vent pipe – Your toilet's vent is designed to get rid of odors. If a clog prevents gases from venting, the gas can't escape and reenters the drainpipes, which may result in an unpleasant odor from sinks or toilets. Engage a plumber to resolve the issue.

**Gurgling toilets.**
Toilet gurgling may not seem like a serious problem, but it could be a sign that your plumbing isn't functioning properly.

- Tank equipment – The toilet's float-fill-flapper system flushes and refills the thank with clean water; components may wear and malfunction after repeated use. Problematic toilet hardware can cause gurgling sounds and reduce the utility efficiency of your home. Replace the flush valve and check to see if gurgling persists.
- Reverse suction – Reverse suction occurs when the water in your toilet's built-in P-trap is pulled out of the bowl and back into your plumbing system. Reverse suction may be due to a lack of proper venting. Without the right vents, other appliances like washers and dishwashers can create backflow that will pull air from your toilet, resulting in a gurgle. Clogs are a common source of venting issues. Most plumbing vents open to the outside of your home; animals and debris can clog your vents. Engage a plumber to resolve the issue.
- Clogs – Gurgling can emanate from air escaping a blocked pipe; roots, sediment, minerals, debris, and non-flushable items

are common sources of clogs. Obstructions can occur in any part of your sewer line. A plunger may clear minimal blockage near your toilet bowl; large or remote clogs sometimes require snaking. You can rent a plumber's toilet snake from your local hardware store but be careful because mistakes clearing clogs could exacerbate the situation. Engage a plumber to resolve the issue.

# Water Heater

## Type: Conventional Tank

## Fuel: Electric

## Capacity: 50 gallons


**You have an electric-powered conventional tank water heater.**

Conventional water heaters, also known as tank water heaters, are the most common type of hot water systems used in homes. Conventional water heaters consist of a large, insulated tank in which water is stored. Cold water is heated by the unit to an established temperature and stored in the insulated tank until you're ready to use the hot water. As you use hot water, or when the water drops below the temperature, the unit starts again and reheats the water so that you always have a ready supply of hot water.

Despite being continually in use, conventional hot water systems generally are the most cost-effective over the long term. Because electric water heaters don't produce exhaust, they're incredibly efficient but they also require an enormous amount of power; the larger the tank, the more power it requires to heat and recover.

Conventional water heaters also are essentially maintenance-free. Although most manufacturers recommend having them routinely checked to optimize their performance and drained every six months to prevent build-up of sediments and minerals, many conventional units operate for a decade or more without any maintenance.

There are some disadvantages to conventional water heaters. They're typically large units and take up a lot of space. Because hot water heaters continually maintain hot water, they also continually demand power and generally, electricity is a more expensive water source than gas. Therefore, electric water heaters are expensive to operate, even with their high efficiency ratings. According to energy experts, 10% to 15% of an average home's energy consumption is spent heating water.

It's also important to ensure that you have the right capacity of tank to suit your hot water demand requirements. Some tanks can take up to an hour to reheat, meaning that a large family with a small tank would likely run out of water occasionally. Conversely, an individual living alone would probably never need all the hot water in a large tank and would be continually paying for unused hot water.

Recovery times with electric water heaters are long. Once the tank has been used, it takes an electric water heater much longer to recover than a gas-powered water heater. And, of course, if electricity fails, you won't have access to hot water with an electric water heater.

Most water heaters last 10 to 15 years without much maintenance. But there's a big difference between 10 and 15 years. You can extend the life of your water heater and maintain your heater's efficiency and safety with just a few minutes of maintenance annually.

**Check your water heater temperature setting.**

Set your water heater to 120 F. Higher temperatures increase sediment buildup and the risk of scalding injuries.

If there are no instructions on the water heater for how to set the temperature and you don't have an owner's manual, you can check the water temperature with a cooking thermometer.

- Run hot water at the tap closest to the water heater for at least three minutes.
- Fill a glass with water and check the hot temperature.
- If the water temperature is greater than 120F, adjust the settings, wait three hours, and check again.
- Repeat until you get 120F water.

**Test your TPRV upon occupancy and annually.**
TPRV = Temporary pressure relief valve. Your TPRV releases excessive tank pressure if for any reason your water reaches an unsafe level. This valve opens automatically if the pressure inside the tank gets too high; otherwise the water heater could explode. The pressure relief valve is usually located on the top or side of the water heater.

To test the TPRV, place a bucket below the discharge pipe on your water heater tank and gently lift the lever on the pressure-relief valve. If the valve doesn't release water when you lift the lever, replace the valve. Replacement is simple: Turn off the water, drain the tank, unscrew the discharge pipe and then unscrew the old valve. Wrap the threads of the new valve with plumbing tape and screw the valve back in.

**Drain sediment upon occupancy and annually.**
Drain the tank to flush out sediments that have settled to the bottom of the tank. Sediment buildup shortens the life of your water heater and adds to your energy bill by reducing its efficiency. Draining two or three gallons of water is usually enough to flush out sediments, but always let the water flow until you no longer see particles in the bucket. Open the drain valve slowly and let the water run until it's clear and free of sediments. Be careful, the water is hot.

**Check regularly for water leaks.**
Water leaks usually are caused by leaking valves and plumbing connections, but they can also be related to tank problems. Leaking water can cause significant damage to a home, so it is important to fix the leak as soon as possible. Leaks from water heater tanks may be caused from loose heating elements or tank corrosion. If your tank leaks, engage a plumber to evaluate and resolve the issue.

**When you have no hot water.**
A water heater that produces no hot water may not be getting power, have a tripped limit switch, or a failed heating element. Check the water heater's circuit breaker or fuse in the electrical panel to make sure power is available. If the breaker has tripped, switch it off and back on again; if the fuse is bad, replace the fuse.

If power isn't the issue, try to reset the high-temperature limit on the heater. Turn off power (turn off the breaker or remove the fuse) to the water heater's circuit in the electrical panel. Remove the access panel for the upper heating element on the water heater. Remove the insulation and the plastic safety guard, being careful not to touch any wires or electrical terminals. Press the red button – the high-temperature cutoff reset button – located above the upper thermostat. Replace the safety guard, insulation, and access panel. Turn power back on. If that doesn't solve the problem, engage a plumber.

**When you don't have enough hot water.**
If your water heater produces hot water, just not enough of it, your unit could be too small for your household's hot water demand. If the demand is too great for your heater capacity, try to limit the length of showers, add more efficient showerheads, and conduct dishwashing and laundry to different times of the day. Otherwise, consider replacing your water heater.

If your water heater suddenly produces less hot water, one or both of its heating elements may have failed. A constant supply of lukewarm water during a shower indicates a defective upper heating element. Hot water that runs out quickly during a shower indicates a defective lower heating element. Engage a plumber to evaluate and resolve the issue.

**When you have colored or stinky water.**
If your water comes out of the faucet with a brown, yellow, or red tint to it, there could be corrosion inside your water heater tank or in the pipes in your home. If your water comes out smelling like rotten eggs, there could be bacteria in the hot water heater tank. You may need to replace the anode rod in the tank. Or you may need to replace the water heater. Engage a plumber to evaluate

and resolve the issue.

**When you have a noisy water heater.**
You may notice noises coming from your water heater. The noise could be like a low rumbling or popping noise or a high-pitched whine. Excessive buildup of sediment in the bottom of the tank may cause the bottom of the tank to overheat, boiling the water. Try to drain the sediment. If that doesn't help, engage a plumber to evaluate and resolve the issue.

# INTERIOR

# Windows

## Material: Vinyl

**You have vinyl windows.**
Vinyl is a popular window material. Vinyl is made from a plastic material called polyvinyl chloride (PVC), which is durable and recyclable. Vinyl windows don't need painting, staining, or refinishing. Fully welded sashes and frames add strength and durability. Vinyl is energy efficient, helping to keep heat in during winter and out during summer.

Like other window materials, vinyl windows have some disadvantages. Vinyl windows contract and expand during hot and cold weather, causing issues in structural integrity, air infiltration, and problems opening and closing the window. Warping can also damage glass seals in double panes, which may cloud windows or lead to mold growth. Vinyl also isn't as strong as wood or fiberglass, so more vinyl is required to the carry the glass, which means the glass space on a window will be slightly smaller.

Well-maintained vinyl windows can last 20 to 40 years.

**Clean interior vinyl frames regularly.**
Vinyl frames can become discolored if not cleaned properly or regularly. Use a gentle solution of soapy water; don't use acid cleaners, strong solvents, or abrasive materials, which may damage the vinyl.

**Clean exterior vinyl frames occasionally.**
Keep your exterior vinyl window frame, clean occasionally, e.g., a few times annually. Use a soft cloth on your windows and use gentle soap and water; avoid harsh abrasives, acid cleaners, or acidic solvents. Don't pressure-wash the windows; pressure-washing can damage or discolor the seal on vinyl.

**Keep tracks clean.**
One of the most important ways to keep your vinyl windows working correctly is by keeping tracks clean. Dirt and dust build up in the tracks over time, which places added stress on windows and may cause hinges, weatherstripping, locks, and rollers to wear out sooner. In more serious cases, tracks may permit into your house. Clean your window tracks when you clean your window glass. Wipe tracks with soapy water until they're clean; wipe with a wet cloth until all soap residue is gone.

**Lubricate hardware.**
Another important way to keep your vinyl window working correctly is to lubricate the hardware. Lubricate hardware if it doesn't operate as smoothly as it should. This includes the hinge and any other moving pieces. Clean off dust and dirt, wipe down hardware with soapy water, and rinse off soap residue. Use silicone-based lubricants for hinges, rollers, and metal tilt latches. Don't use citrus cleaners, vinegar, abrasive solutions, or ammonia.

**Recaulk framing as required.**
Caulking protects the edges of your window frame from moisture. Regularly inspect exterior caulking around the outer edges of the window frame. Trim loose or cracked caulking that you find and seal gaps with high-quality exterior caulk. Do not use caulk intended for interior applications.

**Check for damage.**
While you're cleaning windows and frames, look for damage, including water leaks through window frame joinery, water damage beneath leaking window frame, water leaks through glazing, water leaks through trims attached to PVC windows, bowing or bending of vinyl frame or sash members, poor tolerances (parts that don't fit very well), poor serviceability, e.g., off-balance sash, and insulated glass seal failure. Engage a window contractor for serious window issues.

# Windows

## Type: Single Hung

- Single Hung – Bottom window panel (lower sash) moves up and down, and the upper sash remains stationary. When you open the window, the upper sash is covered on the inside. Single-hung windows predate double-hung windows and may be preferred for an authentic look, particularly on historic homes. Single hung windows may be preferred because they're less susceptible to air infiltration, or leakage because the upper sash is fixed and can't shake loose like a moving sash. Window seals tend to degrade over time and a single hung sash can be resealed. However, if the upper sash of a single-hung window breaks, a glazier must come in and repair the window.
- Double Hung – Bottom window panel (lower sash) and the upper window panel (upper sash) moves up and down. Double hung windows are one of the most prevalent types of windows installed in houses constructed over the last 25 years. In older styles, sashes are counterbalanced by weights hidden in wall pockets behind the case moldings; in modern double-hung windows, sashes are counterbalanced by springs hidden in side tracks, which makes double-hung windows easy to open and close. Tracks are vertical, so they generally don't fill up with dirt. Over time, counterbalance springs can wear out or sash cords can break; double-hung windows also require occasional maintenance to keep them operating smoothly.

- Arched – Rounded tops that add an architectural design. Most arched windows don't open and are often installed above standard windows that provide ventilation; some arched windows like a casement window.
- Awning – Tilt out and are ideal for climates with a lot of rain; the window creates a water-resistant awning when it is open. Windows can be left open during rain because the glass serves as an awning that prevents water from entering. Awning windows aren't as effective scooping in fresh air and, like casement windows, mechanical cranks are subject to wear and have a high failure rate.
- Bay – Protrude from an exterior wall and create a small shelf in the home; bay windows are comprised of flat windows set into an angled frame that are built out of the home. Typically used as a visual centerpiece in large living rooms or family rooms; often look out on an attractive view or a landscaped setting, such as a front yard. Also offer shelf space for growing plants or displaying decorative items. Large surface area may be an energy dissipation challenge.
- Bow – Comprised of custom curved windows that create a circular area along the outside of the home. Typically used as a visual centerpiece in large living rooms or family rooms; often look out on an attractive view or a landscaped setting, such as a front yard. Also offer shelf space for growing plants or displaying decorative items. Large surface area may be an energy dissipation challenge.
- Casement – Swing out to the side or up to open. This allows the window to be constructed of solid glass and offers a less obstructed view overall. Casement windows are common, second only to double-hung windows in their prevalence. Casement windows have a slightly more modern style than double-hung windows, and when properly positioned, they can be useful for catching and directing cooling breezes into the home. Casement windows are considered better than double-hung windows at keeping out drafts since the window seal is generally quite tight. When fully extended, casement windows may be broken off by strong winds. Mechanical cranking mechanisms are subject to wear and have a high failure rate. Casement windows do not qualify as egress windows unless they are quite large.

- Egress – Designed for safety, i.e., provide an escape route if an emergency, e.g., fire, prevents you from exiting through a door; typically installed in the basement.
- Fixed – Provide view or light where ventilation or egress is not a need, e.g., picture window. Permanently sealed with better energy savings than other window types. May create too much energy gain in warm, sunny climates; provide no means of admitting fresh air.
- Garden – Essentially mini bay windows that are intended for plants; they're window greenhouses that protrude from the inside of your home.
- Glass Block – Designed to provide light and privacy, considered accents and added to a section of the home to increase light flow, typically frosted or adorned with a patterned design; thick blocks are typically made from semi-opaque glass that permits light but still block views. Ideal for bathrooms, basements, and other private spaces; can also be installed in foundation walls to introduce light into basements. Some styles include ventilating panels built into the unit; durable with good insulating properties. On south-facing walls, glass block may heat up indoor spaces.
- Hopper – Open from the top and usually crank open to tip down; make efficient use of compact spaces, which is why they're

commonly found in basements or bathroom.

- Jalousie – Split into many different slats of metal or glass; windows open like a set of blinds, i.e., crank the lever and the slats tilt to the side, which creates a series of gaps through which air can flow.
- Picture – Can't be opened, no breaks or visible frames to provide an unobstructed view. Permits ample natural light while showcasing the view outside; designed without panes or other details to obstruct views but do not open to let in light but not air.
- Round Circle – Round, half round, elliptical, or oval; different shapes that add architectural interest, particularly historical decor, e.g., Victorian or Gothic.
- Slider – Two sections that are usually made from single windows; one of the sections slides horizontally on top of the other to open or close. Popular in mid-century modern homes styles in new construction during the 1950s and 1960s). Good choice when you need to constantly open and close windows, no cranks or mechanisms and durable. Tracks can fill with dirt and debris, requiring frequent cleaning.
- Storm – Exterior windows that install in the same frame as the underlying window; add a layer of blocking out drafts and energy loss. Also useful for areas with inclement weather, popular in coastal areas.
- Transom – Decorative accent window types which break up space or add a unique design focal point, typically semicircle but also can be square or rectangular.

**How to extend the lifespan of your windows.**

The average lifespan of residential windows is 15 to 20 years but estimates vary by material:

- Aluminum – 20 to 30 years
- Fiberglass – 20 to 40 years
- Insulated (double pane) – 10 to 20 years
- Skylights – 10 to 20 years
- Vinyl – 20 to 40 years
- Wood – 30+ years

Lifespan is dramatically affected by maintenance and window location.

- Pressure washing insulated windows while cleaning the exterior walls of a home can break the seal between the glass and frame. Pressure washing releases invisible, inert gas between the panes, eliminates the insulation rating of the window, and permits condensation between panes to gradually cloud the window. Do not pressure wash insulated windows!
- Thermal flexing hot/cold cycles of double-pane windows in direct sun shortens their life and eventually they'll lose their gas and become clouded.
- Landscape sprinklers that spray on a window will reduce its life, especially wood windows. Heavy condensation also is detrimental to windows. Direct sprinklers away from your house!
- Poor installation or structural settlement will cause windows to be difficult to operate; stress on the window frame will also shorten its life.
- Quality of operating mechanisms and how often they're used will affect the life of the window.
- Exposure to sun and rain also affects lifespan. Windows in direct sun for most of the day and with minimal roof overhang protection will have a shorter life; skylights are an extreme example.

**When to think about replacement windows.**

Well-maintained windows may last beyond 20 years but eventually, you need to consider replacement; the following are issues that may impact or accelerate your decision.

- High energy bills – Your energy costs keep going up even though you may have completed other repairs, e.g., insulation in walls and attic.
- Drafts – You notice chilly breezes in your house during the winter, which can sneak through even the tiniest cracks in window glass or window framing.
- Cold glass – Single-pane windows always feel cold to the touch but if you have double-paned windows, they should feel only moderately cold when the temperature outside is very cold.
- Difficult opening or closing – Wood windows stuck to the frame by layers of paint. Settling of the foundation causing frames to twist, preventing the window sash from moving. Casement window hinges and latches rusted. Any of these might necessitate a full replacement rather than repair.

- Paint and repairs impossible – When your windows reach the point where paint is alligatored, cracked, peeling, and the wood is rotting and falling apart, it's more cost-effective to replace the windows.
- Financial windfall – If you have extra funds that you can allocate for home remodeling, e.g., bonus, inheritance, home equity loan, it may make sense to replace windows.

**How to buy replacement windows.**

The replacement window market is competitive, i.e., you likely won't have difficulty finding introductions to multiple vendors. As with many areas of home improvement, salespeople can be misleading about how much energy efficiency and utility expenses you can save by replacing your windows, not every company is totally honest with its estimates. Shop around, do your homework, and check out the following bits of advice:

- Take your time – You've heard the adage that "fools rush in where angels fear to tread." Don't rush into a decision on replacement windows. Unless you've waited for your windows to completely deteriorate, you have time to plan. Search the Internet for options and designs and to learn the pros and cons of each material and type. Check out online reviews of prospective vendors, including local and regional vendors. If you're replacing more than a few windows, devise a plan to finance the project.
- Select window material carefully – You may hear that wood wears and rots but vinyl lasts for decades. Hmm, that's not always the case. Vinyl is durable but it's also subject to damage and fading from sunlight. Aluminum windows also are durable but they have lower energy efficiency ratings. Do your research, compare window materials, and select the material that meets your needs, budget, and expected remaining time in the house.
- Know your windows – Take an inventory of your windows and know the condition of each. Know how many windows that need to be replaced. Don't invite a sales rep to tell you which windows need to be replaced; honest salespeople may be tempted to add a few more windows to the estimate.
- Secure multiple estimates – Obtaining multiple estimates is painful because it takes more time. It's a lot easier to connect with one vendor and then convince yourself that you're optimizing your selection. Do not work with one vendor – you need to assess the various service and cost options; you also need to inform each vendor that you're securing at least five bids. Replacement window estimates are easy to obtain; few companies charge for estimates and salespeople will flex and bend to accommodate your schedule.
- Consider off-brand windows – Instruct the salesperson to help you to explore an entire range of window manufacturers, not just the expensive name-brands on which the salesperson receives higher commissions.
- Consider inexpensive windows – Instruct the salesperson to also help you to explore an entire range of fees with low-cost replacement windows. With competition between replacement window manufacturers, it's possible to find cheap replacement windows that satisfy your requirements, especially if you don't plan to stay in the house for more than five to 10 years.
- Wait a few weeks – After you receive estimates and winnow your selection to a few vendors, don't immediately act on any estimate. Waiting may help you to negotiate a lower price. And before you sign any agreement or sales contract, ask for the vendor's "best and final," e.g., "I want to work with you but I have another option that is slightly better." Replacement window vendors expect you to negotiate.

# APPLIANCES

# Range/Oven

## Fuel: Electric

**You have an electric range/oven.**
Like everything else in your house, maintenance helps to keep your appliances in tip-top shape and extends the life of the appliance.

**Read the owner's manual.**
Check the owner's manual for information on how to operate and maintain the appliance. If the manual isn't available, check public sources to try to find more information about your appliance. If your appliance isn't working properly, your manual should include a trouble-shooting guide to help diagnose the issue.

**Take care when baking.**
The best way to keep your oven clean is to not let it get dirty in the first place. For example, if you are baking a casserole or pie, place a larger baking sheet underneath the container. A baking sheet or tin foil will catch anything that may leak out or boil over. If you do notice spills when you're finished baking, wipe down the inside of the oven after it cools off. Spills are much easier to clean when they are fresh. Never place aluminum foil or a baking sheet on the bottom of the oven on top of the vents, which could block the heat and damage the burners.

**Clean your oven regularly.**
Despite your best care, ovens eventually get dirty. Clean your oven regularly, depending on how much you use the appliance. Otherwise, clean your oven at least semi-annually. Leaving burned food to continue to re-burn with every use will eventually make your oven work less efficiently. Lots of burned food may even affect the taste of any cooked meal.

Don't forget to clean your racks. It's easy to focus on the bottom and sides of your oven. And, for good reason – that is usually where all the food is but it's not the only place. Be sure to clean the racks while you're cleaning the rest of the oven.

**Check your burners regularly.**
If you see any debris, deformities or spots that glow brighter than the rest of the burner, replace the burner. A burner in poor condition may spark and produce flames if it shorts out, which may result in damage to the appliance. Stop using your oven and replace the burner/element.

**Use the self-cleaning feature.**
Most ovens have a self-cleaning feature, but very few people are familiar with how it works – self-cleaning produces very high heat, which effectively burns away any unclean areas. Self-cleaning takes a while and your oven will get extra hot – therefore, don't start a self-cleaning cycle if you want to use the oven in the next hour or two and never start a self-cleaning feature and then leave the house. In fact, because your oven produces extreme heat, pay attention to the cycle. If you have a digital display, the oven may indicate the status of completion. When the self-cleaning cycle is complete and the oven cools off, wipe down the inside of the oven, which should look close to brand new.

**Inspect door gaskets.**
Door gaskets are rubber or cloth ribbons attached to the door and frame to help seal in the heat. Over time, gaskets may deteriorate, allowing heat to seep through, and resulting in your oven not heating appropriately. Regularly inspect your oven's

gasket and replace it if necessary.

# Garbage Disposer

Your garbage disposer is under your kitchen sink between the sink's drain and trap. Your garbage disposer shreds food into pieces small enough to pass through plumbing; food scraps represent 10% to 20% of household waste. About 50% of homes in the US have garbage disposals.

A high-quality garbage disposal will love grinding for about 10-12 years, depending on what you put in it and how well you take care of it. Estimated life also is dependent on the quality of the unit itself. A good 2/3 HP or 3/4 HP, with lots of stainless steel is optimal.

**Operate the garbage disposal every couple of days.**
Even if you don't have to grind any food scraps up, should run the appliance with cold water to keep the blades from rusting from lack of use. This also gives any food that might have stuck to the sides of the appliance from a previous use another chance to wash out.

**Grind the right types of food.**
Soft food can dull your garbage disposer blades and even worse, clog your drain. Therefore, don't put soft food in your garbage disposal: asparagus, artichoke leaves, banana skins, celery, chicken bones, coffee filters, cooked rice, eggshells, grease, green onion tops, onion skins, potato peels, shrimp shells, tea bags. Some items (bones) damage the appliance, plug the drain piping (banana peels), or load up the local wastewater utility.

**Use cold water to grind food scraps.**
Using cold water to grind helps to extend the life of your garbage disposal, while preventing plumbing and drain mishaps. Grind food scraps with cold water. Grease and oil solidify and more easily grind up before reaching your little P-trap. Don't grind food waste with hot water. Grease and oil liquefy, accumulate, and clog your drain (or your little P-trap).

**Use hot water to clean your disposer.**
Use hot water when you're cleaning the disposal. Mix equal parts white vinegar and baking soda and flush with boiling water. A sink full of hot water and dish-washing soap also are fine for cleaning the disposal. You can also pour warm water and lemon slices into your garbage disposer; wedges are high in citric acid, which boasts anti-bacterial properties, and their peels will scrub the disposer.

**Use ice cubes and rock salt to seriously clean your disposer.**
Fill the disposer with ice cubes and a cup of rock salt, operate the disposer for a minute for the natural abrasives to scrape away any debris inside the disposer. Pour a cup of vinegar and a half-cup of baking soda into the disposal to kill bacteria, then scrub the flaps with a brush.

**Use cold water to unclog your disposer.**
Use cold water to unclog your disposer. Do not use hot water to unclog a garbage disposer; the heat will melt fats and make unclogging the garbage disposer even more difficult to accomplish. Do not use bleach or commercial drain cleaner to unclog; chemicals might fly up and out when you turn on the disposer.

**If the disposer stops, push the reset button.**
If your garbage disposer isn't working, check the reset button on the appliance. Make sure the disposal switch is OFF and then

climb under your kitchen sink, look up and push the red reset button. Sometimes the reset button doesn't restart the disposer. But pushing the button is easy and should always be your first course of action if the disposal stops working for no apparent reason.

**Power off the disposer before working on the disposer.**
Unplug the unit or cut power to the kitchen at the circuit breaker or fuse box before taking any action while you're working around the appliance – it has sharp blades. And never use your fingers to pull out any clogs. Avoid injury from the sharp blades by using pliers or tongs to remove any scraps that have not been finely ground up.

# Dishwasher

Maintain your dishwasher's efficiency and extend its life with proper maintenance.

**Read the owner's manual.**
Check the owner's manual for information on how to operate and maintain the appliance. Search online if the printed manual isn't available; most manufacturers maintain owner's manuals on their respective websites. If your appliance isn't working properly, your manual should include a trouble-shooting guide to help diagnose the issue.

**Clean the filter regularly.**
Your dishwasher probably has a filter, in which case food and debris may become trapped in the filter and impair cleaning. If your dishwasher has a filter, it's probably in a cylindrical canister at the floor of the dishwasher below the spray arm; you may have to remove a covering to reveal the filter. Remove the filter and gently clean the filter with soap and warm water.

**Minimize buildup with white vinegar.**
White vinegar is an excellent DIY cleaning solution for household maintenance. You can use vinegar to clean out your dishwasher to remove any stuck food particles or residual detergent left behind. Place a dishwasher-safe container on the center of the top or bottom rack and pour a cup of vinegar into it, then operate the dishwasher on a hot water cycle. The vinegar will disinfect the dishwasher and break down any residue.

**Load your dishes properly.**
Properly loading your dishwasher can make a difference in your dishwasher's cleaning ability. You're your owner's manual to select the right cycle for the items you are cleaning, e.g., heavy cycles are for pots and pans, and lighter cycles are for more fragile items. If there is a lot of grease on your plates and dishes, dump the grease before placing in the dishwasher out to prevent a clogged drain. Don't overload your dishwasher by putting all your dishes, pots, and pans in every corner of the appliance. Be strategic and load the dishwasher correctly by putting items in the right places.

**Clean the seals.**
Dishwashers have seals around the door rim to prevent the machine from leaking during operation. Wipe the rubber seals and the door with a damp cloth to prevent soil and grime from building up.

**Clean the spray arm.**
Wipe the spray arm with a damp towel. Consider removing the spray arm every six months to clear any blockages with a toothpick. Refer to your owner's manual for detailed instructions on how to remove and clean your spray arm.

**Use your dishwasher.**
Running your dishwasher at least weekly keeps the motor seals working properly.

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# AUTUMN MAINTENANCE CHECKLIST

## PROPERTY

- [ ] Store or cover your outdoor furniture
- [ ] Winterize your mower and gas grill
- [ ] Place your snow shovel in the garage
- [ ] Aerate and fertilize your lawn
- [ ] Rake your lawn

## EXTERIOR

- [ ] Check exterior door weatherproofing
- [ ] Repair missing caulk on windows/frames
- [ ] Check walks and driveway
- [ ] Check stairs and railings on porches/decks

## ROOFING

- [ ] Inspect your roof
- [ ] Trim vegetation away from roof

## STRUCTURE

- [ ] Check your chimneys for cracks
- [ ] Clean your chimney before first fire
- [ ] Check foundation for cracks
- [ ] Check humidity in attic and crawl spaces

## WATER CONTROL

- [ ] Clean your gutters and spouts
- [ ] Direct downspout extenders away from house
- [ ] Clean your window wells
- [ ] Clear exterior drains
- [ ] Redirect settled grading away from house

## INTERIOR

- [ ] Remove window screens
- [ ] Deep clean your kitchen
- [ ] Clean your wood stove
- [ ] Test your fire extinguisher

## INSULATION AND VENTILATION

- [ ] Open and clean attic vents
- [ ] Check attic for proper insulation
- [ ] Check crawl space for proper insulation
- [ ] Clean your clothes dryer vent
- [ ] Keep your humidifier humming
- [ ] Change the direction of your ceiling fans

## ELECTRICAL

- [ ] Test exterior outlets
- [ ] Check generator or backup power systems
- [ ] Test AFCI/GFCI outlets and breakers
- [ ] Test and change batteries in smoke detectors
- [ ] Replace smoke detectors 10+ years old
- [ ] Install or test carbon monoxide detectors

## HVAC

- [ ] Change air filters
- [ ] Remove or cover window AC units
- [ ] Hire a contractor for a HVAC system checkup

## PLUMBING

- [ ] Remove, drain, and store hoses
- [ ] Winterize exterior spigots
- [ ] Winterize your sprinkler system
- [ ] Check toilets and fixtures for leaks
- [ ] Get your septic tank cleaned (bi-annually)

## FUEL

- [ ] Check your fuel tanks for odors and leaks
- [ ] Make sure to schedule fuel delivery

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# WINTER MAINTENANCE CHECKLIST

## PROPERTY

- [ ] Check outdoor lighting
- [ ] Test your snow blower
- [ ] Stock up on emergency supplies
- [ ] Winterize sprinkler and pool

## EXTERIOR

- [ ] Seal cracks around window frames
- [ ] Add weather-stripping around door frames
- [ ] Fill any open gaps with spray foam insulation
- [ ] Install storm windows and doors

## ROOFING

- [ ] Prevent ice dams from forming
- [ ] Clear snow and ice from roof

## STRUCTURE

- [ ] Test your chimney damper
- [ ] Check fireplace and chimneys for cracks
- [ ] Check humidity in attic and crawl spaces
- [ ] Seal unused fireplaces

## WATER CONTROL

- [ ] Clean your gutters and spouts
- [ ] Direct downspout extenders away from house
- [ ] Clean your window wells and drains
- [ ] Test your sump pump for proper operation
- [ ] Redirect settled grading away from house

## INTERIOR

- [ ] Remove screens and install storm windows
- [ ] Check for air leaks on a windy day
- [ ] Inspect window locking hardware

## INSULATION AND VENTILATION

- [ ] Test your dehumidifier
- [ ] Check attic for proper insulation
- [ ] Check crawl space for proper insulation
- [ ] Clean your clothes dryer vent
- [ ] Keep your humidifier humming
- [ ] Reverse ceiling fans to direct heat downwards

## ELECTRICAL

- [ ] Test your backup generator
- [ ] Test and change batteries in smoke detectors
- [ ] Replace smoke detectors 10+ years old
- [ ] Safely display holiday lighting

## HVAC

- [ ] Change air filters
- [ ] Keep the heat on to prevent frozen pipes
- [ ] Keep everything away from your radiators
- [ ] Keep leaves and snow from HVAC equipment

## PLUMBING

- [ ] Test your sump pump
- [ ] Check and flush your water heater
- [ ] Add an insulating blanket to your water heater
- [ ] Insulate pipes near near or on the exterior
- [ ] Turn off and drain water from exterior faucets

## FUEL

- [ ] Check your fuel supply
- [ ] Check your fuel tanks for odors and leaks

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# SPRING MAINTENANCE CHECKLIST

## PROPERTY

- [ ] Tune up your mower and trimmer
- [ ] Treat your lawn with fertilizer and pest control
- [ ] Power wash and seal your deck and patio
- [ ] Remove your outdoor furniture from storage
- [ ] Check lawn sprinklers and irrigation systems

## EXTERIOR

- [ ] Repair missing caulk on windows/frames
- [ ] Repair cracks in drives and walks
- [ ] Prime and paint areas with peeling paint
- [ ] Remove debris from yard

## ROOFING

- [ ] Inspect your roof
- [ ] Check for cracked flashing and caulk seals

## STRUCTURE

- [ ] Check your chimneys for cracks
- [ ] Check foundation for cracks
- [ ] Check humidity in attic and crawl spaces
- [ ] Check for signs of termites and other pests

## WATER CONTROL

- [ ] Clean your gutters and spouts
- [ ] Direct downspout extenders away from house
- [ ] Clean your window wells and drains
- [ ] Test your sump pump for proper operation
- [ ] Redirect settled grading away from house

## INTERIOR

- [ ] Remove storms windows and install screens
- [ ] Clean and lubricate your window channels
- [ ] Clean glass on windows and doors
- [ ] Reverse ceiling fans to direct heat upward

## INSULATION AND VENTILATION

- [ ] Test your dehumidifier
- [ ] Check attic for proper insulation
- [ ] Check crawl space for proper insulation
- [ ] Clean your clothes dryer vent
- [ ] Keep your humidifier humming
- [ ] Reverse ceiling fans to direct heat upwards

## ELECTRICAL

- [ ] Test exterior outlets
- [ ] Test AFCI/GFCI outlets and breakers
- [ ] Test and change batteries in smoke detectors
- [ ] Replace smoke detectors 10+ years old
- [ ] Check your landscaping lighting
- [ ] Consider updating your home security system

## HVAC

- [ ] Change air filters
- [ ] Install window AC units and ensure proper seal
- [ ] Hire a contractor for a HVAC system checkup

## PLUMBING

- [ ] Check all fixtures for leaks
- [ ] Check tile joints, grout, and caulk
- [ ] Check faucets and valves for leaks or damage
- [ ] Check toilets and fixtures for leaks
- [ ] Open and operate exterior hose faucets

## FUEL

- [ ] Check your fuel tanks for odors and leaks

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# SUMMER MAINTENANCE CHECKLIST 

## PROPERTY

- [ ] Trim shrubs and plants from HVAC units
- [ ] Check property for ants, termites, bees
- [ ] Seal your driveway
- [ ] Power wash driveway and sidewalks
- [ ] Inspect outdoor play equipment

## EXTERIOR

- [ ] Repair missing caulk on windows/frames
- [ ] Check the house for deteriorated siding
- [ ] Prime and paint areas with peeling paint
- [ ] Check deck for nail pops or loose treads

## ROOFING

- [ ] Inspect your roof
- [ ] Check for cracked flashing and caulk seals

## STRUCTURE

- [ ] Seal your garage floor
- [ ] Check humidity in attic and crawl spaces
- [ ] Check for signs of termites and other pests
- [ ] Remove gas and oil cans from the garage

## WATER CONTROL

- [ ] Clean your gutters and spouts
- [ ] Direct downspout extenders away from house
- [ ] Clean your window wells and drains
- [ ] Test your sump pump for proper operation
- [ ] Redirect settled grading away from house

## INTERIOR

- [ ] Search for signs of mildew
- [ ] Clean glass on windows, doors and frames
- [ ] Change your icemaker filter

## INSULATION AND VENTILATION

- [ ] Clean and test your dehumidifier
- [ ] Check attic for proper insulation
- [ ] Check crawl space for proper insulation
- [ ] Clean your clothes dryer vent
- [ ] Keep your humidifier humming
- [ ] Check vents for birds and pests

## ELECTRICAL

- [ ] Check wiring and cables for wear and tear
- [ ] Test AFCI/GFCI outlets and breakers
- [ ] Test and change batteries in smoke detectors
- [ ] Replace smoke detectors 10+ years old

## HVAC

- [ ] Change air filters

## PLUMBING

- [ ] Test your drinking water
- [ ] Check all fixtures for leaks
- [ ] Check tile joints, grout, and caulk
- [ ] Check faucets and valves for leaks or damage
- [ ] Check toilets and fixtures for leaks

## FUEL

- [ ] Check your fuel tanks for odors and leaks

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# LIFE EXPECTANCIES
## (ESTIMATED YEARS)

### ROOFING

| | |
|---|---|
| Fiberglass/asphalt 3-tab | 15-20 |
| Fiberglass architectural | 25-35 |
| Cedar shake/shingle | 10-30 |
| Slate, metal or clay/concrete tiles | 50+ |
| Single ply modified bitumen | 15-20 |
| EPDM/TPO/PVC | 20-25 |

### EXTERIOR WALLS

| | |
|---|---|
| Aluminum | 50+ |
| Vinyl | 35+ |
| Hardboard/composite | 20-30 |
| Stucco, brick, veneers | Lifetime |
| Cement composite | 50+ |

### WINDOWS

| | |
|---|---|
| Wood | 50-75 |
| Vinyl | 25+ |
| Aluminum/steel | 40-50 |

### GUTTERS/DOWNSPOUTS

| | |
|---|---|
| Aluminum | 30+ |
| Galvanized metal or PVC | 15-25 |
| Copper | 50-75 |

### FUEL SERVICES

| | |
|---|---|
| Interior tank | 50-75 |
| Exterior tank | 25-50 |

### WELL

| | |
|---|---|
| Pump | 15-25 |
| Tank | 15-25 |

### SEPTIC

| | |
|---|---|
| Tank (steel) | 20-25 |
| Tank (concrete) | 30-50 |
| Leach field | 30-50 |

### DECK

| | |
|---|---|
| Wood | 15-25 |
| Composites | 25-35 |

Estimated life expectancies are affected by material type and quality, installation quality, exposure to elements and, most importantly, regular maintenance.

### INTERIOR

| | |
|---|---|
| Plaster wall/ceiling | Lifetime |
| Drywall wall/ceiling | Lifetime |
| Cement board wall | Lifetime |
| Wood flooring | Lifetime |
| Laminate flooring | 15-25 |
| Linoleum flooring | 10-15 |
| Carpet flooring | 6-10 |
| Granite/marble | 100+ |

### HVAC

| | |
|---|---|
| Hot air furnace (oil/gas) | 15-25 |
| Boiler | 35-50 |
| Heat pump | 10-15 |
| Baseboard (electric) | 15-25 |
| Radiant in-floor (electric) | 15-25 |
| Central split system cooling | 10-15 |
| Evaporative cooler | 10-15 |
| Circulator pump | 20-30 |
| Circulator fan | 15-20 |
| Humidifier | 8-10 |

### PLUMBING

| | |
|---|---|
| Water service (public) | 50+ |
| Supply pipes | 50+ |
| Drain lines | 25+ |
| Water heater | 10-20 |
| Fixtures (builder grade) | 15-20 |
| Fixtures (higher quality) | 25-50 |

### ELECTRICAL

| | |
|---|---|
| Service entrance cable | 25-40 |
| Electrical panel | Lifetime |
| Electrical wiring | 60+ |

### APPLIANCES

| | |
|---|---|
| Refrigerator | 10-20 |
| Dishwasher | 5-10 |
| Range/cooktop | 10-20 |
| Garbage disposer | 8-10 |
| Washer | 8-10 |
| Dryer | 10-15 |