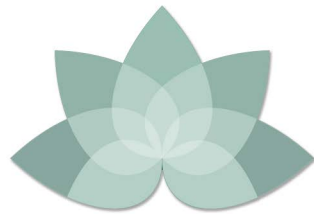


Homeowners Guide

to Managing and Maintaining Your Home



Green Lifestyles Collection

learn • understand • advocate



Homeowners Guide
to Managing and Maintaining Your Home
publish date: June 30, 2013

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Homeowners Guide to Managing and Maintaining Your Home

CHAPTER | 1



Introduction

- » Why You Should Maintain Your Home
- » What Is Green Building?
 - » Environmental benefits
 - » Economic benefits
 - » Social benefits
- » Protecting Your Health and the Health of Your Family

Why You Should Maintain Your Home

Buying a home is the biggest investment that most American families will make. Smart homeowners know that maintaining that home in good shape protects their investment and enhances their enjoyment of their home by providing a healthy, safe environment. It is easier to prevent the development of unsafe, unhealthy conditions and structural damage than to pay medical or repair bills or both.

Home maintenance, however, can cover a wide range of activities. They can be categorized into interior and exterior tasks or by home systems, such as plumbing, heating & cooling, electrical, and landscaping/grounds maintenance. Certain maintenance tasks should be performed monthly, seasonally, or annually. How do you know what to do when? First review the basics in this guide that are conveniently categorized by seasons.

Why should you do regular home maintenance?

- To maintain the value of the property.
- A well-maintained home usually sells more readily and usually brings a higher price.
- A well-maintained house is more comfortable.
- Regular care minimizes unexpected repair work and expense.
- Regular small repairs keep costs from becoming larger.
- A lender's agreement usually requires the owner to maintain the property to protect the lender's financial interest.

The information provided herein is guided by the fundamental green building principles of durability, sustainability, energy efficiency, water and resource management, and healthy indoor air quality. Properly maintaining your home increases its durability, contributing to the longevity and value of your property. Incorporating green building techniques improves the comfort and health of your family while saving money and environmental resources. You may not be aware that practicing a regularly scheduled home maintenance program is one of the important tenets of Green Building.

*September
October
November*



*December
January
February*



*March
April
May*



*June
July
August*





What Is Green Building?

Green building is the practice of creating, retrofitting and maintaining structures using processes that are healthy, environmentally responsible and resource-efficient throughout a building's life from site selection to design, construction, operation, maintenance, renovation and deconstruction. This practice enhances and complements the classical building design concerns of economy, utility, durability and comfort. Green construction methods can be integrated into buildings at any stage; however, the most significant benefits can be obtained if the design and construction team takes an integrated approach from the earliest stages of a building project.

Throughout the planning process, green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by:

- Using energy, water and other resources efficiently
- Protecting occupant health and improving employee productivity and family comfort
- Reducing waste, pollution and environmental degradation
- Minimizing maintenance issues and costs
- Creating durable structures built to last

For example, green buildings may:

- Incorporate sustainable materials in their construction (e.g., reused, recycled-content, or made from renewable resources).
- Create healthy indoor environments with minimal pollutants (e.g., reduced product emissions and good ventilation).
- Include water reduction strategies inside and out (e.g., low flow fixtures, native plants in landscaping, rain barrels).

The built environment has a vast impact on the natural environment, human health, and the economy. By adopting green building strategies, both economic and environmental performance can be maximized.

Potential benefits of green building can include:

Environmental benefits

- Enhance and protect biodiversity and ecosystems
- Improve air and water quality
- Reduce waste streams
- Conserve and restore natural resources

Economic benefits

- Reduce operating costs
- Create, expand and shape markets for green products and services
- Improve occupant productivity
- Optimize life-cycle economic performance

Social benefits

- Enhance occupant comfort and health
- Heighten aesthetic qualities
- Minimize strain on local infrastructure
- Improve overall quality of life

Protecting Your Health and the Health of Your Family

The scope of Green Building encompasses much more than reducing energy costs, conserving natural resources or being a good neighbor in our communities. Green Building offers us ways to address one of the most important health issues we face today. According to the EPA, pollutant levels of indoor environments can be 2 to 5 times — and occasionally more than 100 times — higher than outdoor levels. Most of an individual's exposure to air pollutants comes through inhalation of indoor air.

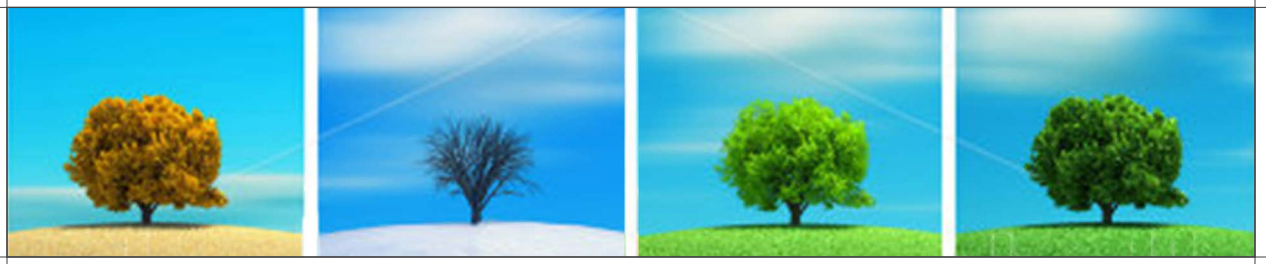
For children, indoor environmental quality issues are even more urgent. Compared with adults, children are at greater risk of exposure to and possible illness from environmental hazards because of their greater sensitivity during development and growth. In addition to upper respiratory infections and asthma, continuous exposure to pollutants can cause symptoms such as nausea, dizziness, headaches, lethargy, inattentiveness, and irritation of the eyes, nose and throat. Continuous exposure to hazardous substances can also lead to learning disabilities, cancers, and illnesses caused by damage to the nervous system. It is estimated that 7 million children and adolescents suffer from asthma and contribute 14.7 million days of absence in schools each year. In fact, asthma is the leading chronic illness and chief cause of absenteeism among school-aged children.

If you believed all toxic and hazardous materials come with warning labels, you'd be wrong. Have you ever noticed the smell of your daughter's freshly painted bedroom or the new carpet in your son's bedroom? That odor is what is referred to as "off gassing", the release of volatile organic compounds (VOCs). A later section in this Homeowner Guide is devoted to asthma, mold, and ways we can effectively improve the indoor air quality in our homes.

Homeowners Guide

to Managing and Maintaining Your Home

CHAPTER | 2



Home Maintenance By Season

- » Regular Maintenance is the Key
- » Seasonal Home Maintenance
- » 10 Ways to Save on Your Energy Bill
- » Blower Door Test
- » Fall
- » Winter
- » Spring
- » Summer

Regular Maintenance is the Key

Inspecting your home on a regular basis and following good maintenance practices are the best way to protect your investment in your home. Whether you take care of a few tasks at a time or several all at once, it is important to get into the habit of doing them. Establish a routine for yourself, and you will find the work is easy to accomplish and not very time-consuming. A regular schedule of seasonal maintenance can put a stop to the most common — and costly — problems, before they occur. If necessary, use a camera to take pictures of anything you might want to share with an expert for advice or to monitor or remind you of a situation later.

By following the information noted here, you will learn about protecting your investment and how to help keep your home a safe and healthy place to live.

If you do not feel comfortable performing some of the home maintenance tasks listed in this guide, or do not have the necessary equipment, for example a ladder, you may want to consider hiring a qualified handyperson to help you.

Seasonal Home Maintenance

Most home maintenance activities are seasonal. Fall is the time to get your home ready for the coming winter, which can be the most grueling season for your home. During winter months, it is important to follow routine maintenance procedures, by checking your home carefully for any problems that may arise and taking corrective action as soon as possible. Spring is the time to assess winter damage, start repairs and prepare for warmer months. Over the summer, there are a number of indoor and outdoor maintenance tasks to look after, such as repairing walkways and steps, painting and checking your chimney and roof.

While most maintenance is seasonal, there are some things you should do on a frequent basis year-round:

- Make sure air vents indoors and outdoors (intake, exhaust and forced air) are not blocked by snow or debris.
- Check and clean range hood filters on a monthly basis.
- Test ground fault circuit interrupter(s) on electrical outlets monthly by pushing the test button, which should then cause the reset button to pop up.
- If there are young children in the house, make sure electrical outlets are equipped with safety plugs.
- Regularly check the house for safety hazards, such as a loose handrail, lifting or buckling flooring, inoperative smoke detectors, and so on.

Timing of the seasons varies not only from one area of the country to another, but also from year to year in a given area. Although the months for each season have been identified, the maintenance schedule presented here is a general guide for you to follow. The actual timing is left for you to decide as appropriate to your specific climate zone.

10 Ways to Save on Your Energy Bills

Before we get into inspections and maintenance procedures, here's a listing on 10 ways you can easily save money on your energy bills.

1. During the heating season, keep the draperies and shades on your south-facing windows open during the day to allow sunlight to enter your home and closed at night to reduce the chill you may feel from cold windows. During the cooling season, keep the window coverings closed during the day to prevent solar gain.
2. Set your thermostat as low as is comfortable in the winter. For each degree you raise your thermostat setting, your fuel bill climbs 3 percent. So dress accordingly and consider slipping into a sweater before you crank up the temperature. Extra blankets or a comforter at night.
3. Clean or replace filters on furnaces once a month or as needed. Clean warm-air registers, baseboard heaters, and radiators as needed. Make sure they're not blocked by furniture, carpeting, or drapes. Simple tasks like these could improve your systems' energy efficiency by 10 percent.
4. Use kitchen, bath, and other ventilating fans wisely. In just 1 hour, these fans can pull out a houseful of warmed air. Turn fans off as soon as they have done the job. If you have ceiling fans, turn the fan on low, and in the opposite direction if possible, to recirculate the air, remembering that warm air rises and cold air sinks. Try to keep the humidity level between 30 percent and 60 percent.
5. Use heat-generating appliances (e.g. washers, dryers, ovens) during the morning or evening when it's cooler. This reduces the load on your air conditioner in the summer and helps heat the house in the winter.
6. Consider installing double-pane windows with protective coating that reflects heat back into your home during winter. If such a retrofit is not in your budget, cover your windows with clear plastic film. At a typical cost of \$4 to \$6 per window, the film creates an insulating air pocket between the plastic and the window, reducing heat loss through windows by between 25 percent and 50 percent.
7. Caulk and weather strip around exterior seams, cracks and openings. Pay extra attention around windows and at points where various exterior materials like wood, brick and vinyl siding meet. And on the inside, caulking and weather-stripping around windows and door frames will cut down on drafts.
8. Lower the temperature on your water heater to 120° to reduce water heating costs.
9. Run your clothes and dishwashers only when you have a full load. Use the cold water setting of your clothes washer when possible.
10. Take short showers instead of baths. They use less water so your water heater won't have to work so hard.



Blower Door Test

You can save 5%-30% on your energy bill by making upgrades following a home energy assessment. A professional energy auditor may use a blower door to determine how airtight your home is and to help find leaks. Often, energy efficiency programs such as the DOE/EPA Energy Star Program, require a blower door test (usually performed in less than an hour) to confirm the tightness of the home.



These are some reasons for establishing the proper building tightness:

- Reducing energy consumption due to air leakage.
- Avoiding moisture condensation problems.
- Avoiding uncomfortable drafts caused by cold air leaking in from the outdoors.
- To make sure that the home's air quality is not too contaminated by indoor air pollution.

Many real estate services across the country, such as the Multiple Listing Service (MLS), are investigating, drafting and implementing guidelines that identify a home's energy efficiency. This will apply to existing homes as well as new homes and may likely have an impact on marketability.

How They Work

A blower door is a powerful fan that mounts into the frame of an exterior door. The fan pulls air out of the house, lowering the air pressure inside. The higher outside air pressure then flows in through all unsealed cracks and openings. The auditors may use a smoke pencil to detect air leaks. These tests determine the air infiltration rate of a building.

Blower doors consist of a frame and flexible panel that fit in a doorway, a variable-speed fan, a pressure gauge to measure the pressure differences inside and outside the home, and an airflow manometer and hoses for measuring airflow.

There are two types of blower doors: calibrated and uncalibrated. It is important that auditors use a calibrated door. This type of blower door has several gauges that measure the amount of air pulled out of the house by the fan. Uncalibrated blower doors can only locate leaks in homes. They provide no method for determining the overall tightness of a building. The calibrated blower door's data allow the auditor to quantify the amount of air leakage and the effectiveness of any air-sealing job.

Preparing for a Blower Door Test

Take the following steps to prepare your home for a blower door test:

- Close windows and open interior doors.
- Turn down the thermostats on heaters and water heaters.
- Cover ashes in wood stoves and fireplaces with damp newspapers.
- Shut fireplace dampers, fireplace doors, and wood stove air intakes.



Exterior

- Keep walkways, paths and the driveway clear of leaves and debris.
- Seal and, if needed, patch blacktop drive first.
- Winterize landscaping, for example prepare gardens and, if necessary, protect young trees or bushes for winter.
- Don't prune trees or shrubs until late winter. You may be tempted to get out the pruning shears after the leaves fall, when you can first see the underlying structure of the plant. Wait to prune until late winter for most plants, when they've been long dormant and just before spring growth begins.
- Check, tighten and adjust fences, gates and doors
- Put away unused lawn furniture, hoses, planters, grills and other outdoor items.
- Mow your leaves instead of raking them. The trick is to cut the leaves, while dry, into dime-sized pieces that will fall among the grass blades, where they will decompose and nourish your lawn over the winter.
- Prepare to stow your mower. As the mower sits through the winter, fuel remaining in its engine will decompose, "varnishing" the carburetor and causing difficulty when you try to start the engine in the spring.
- If you live in a cold climate, buy and store salt, sand, a snow shovel and snow blower.
- If your home had lots of icicles last winter — or worse, ice dams, which can cause melted water to back up and flow into your house — take steps to prevent potential damage this year.
- Ensure that the ground around your home slopes away from the foundation wall so that water does not leak into your basement.
- Clean leaves from gutters and roof and test downspouts to ensure proper drainage from the roof. Check the soffit for stains, which can be a sign of a leak. The soffit, also known as the eaves, is the overhanging lower edge of the roof.

- Drain and store outdoor hoses. Close interior valve to outdoor hose connection and drain the hose bibb (exterior faucet), unless your house has frost-proof hose bibbs.
- Drain outdoor irrigation pumps and irrigation system.
- Cover outside of air-conditioning units and shut off power.
- Fill oil or propane tanks.
- Have well water tested for quality. It is recommended that you test for bacteria every six months.
- If you have a septic tank, measure the sludge and scum to determine if the tank needs to be emptied before the spring. Tanks should be pumped out at least once every three years.

Interior

- Create and store an emergency survival kit for bad weather. Include batteries, candles, water and canned or packaged food that won't spoil.
- Weatherize the house (including the attic and basement) for cool and cold weather with, as needed, insulation, weather stripping, caulk, plaster, or replacement windows.
- Ensure all doors to the outside shut tightly, and check other doors for ease of use. Replace door weatherstripping if required.
- Ensure windows and skylights close tightly and repair or replace weatherstripping, as needed.
- Change screens to storm windows and remove and clean window air-conditioning units.
- Remove interior insect screens from windows to allow air from the heating system to keep condensation off window glass and to allow more free solar energy into your home.
- Check smoke, carbon monoxide and security alarms, and replace batteries.
- If your ceiling fan has a reverse switch, use it to run the fan's blades in a clockwise direction after you turn on your heat. Energy Star says the fan will produce an updraft and push down into the room heated air from the ceiling (remember, hot air rises).
- If you have a fireplace or wood stove, inspect and clean the hearth and stock up on firewood. Hire a chimney sweep if you haven't had the chimney flue cleaned in a while or if you regularly use your fireplace or wood stove.
- Have furnace or heating system serviced by a qualified service company every two years for a gas furnace, and every year for an oil furnace, or as recommended by the manufacturer.
- If you have central air conditioning, make sure the drain pan under the cooling coil mounted in the furnace plenum is draining properly and is clean.
- Lubricate circulating pump on hot water heating system.
- Bleed air from hot water radiators.
- Disconnect the power to the furnace and examine the forced-air furnace fan belt, if installed, for wear, looseness or noise. Clean fan blades of any dirt buildup.
- Vacuum electric baseboard heaters to remove dust.

- ### Notes:

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.



Exterior

- Keep a blanket, shovel, sand and first aid kit in your car.
- Keep paths and driveways clear of snow and ice.
- Keep snow clear of gas meters, gas appliance vents, exhaust vents and basement windows.
- Monitor outdoor vents, gas meters and chimneys for ice and snow buildup. Consult with an appropriate contractor or your gas utility for information on how to safely deal with any ice problems you may discover.
- Check electrical cords, plugs and outlets for all indoor and outdoor seasonal lights to ensure fire safety. If worn, or if plugs or cords feel warm to the touch, replace immediately.
- Check for proper lighting inside and outside the house.
- Check any holiday lights inside and outside the house and make sure they are in good working order.

Interior

- Stock up on canned goods and household items, including light bulbs and batteries. Buy compact fluorescent light bulbs (CFLs). They're more energy efficient and last longer.
- Home safety check: trip hazards, loose carpet, loose steps, concrete, hanging wires, slippery surfaces, holes, splinters, etc.
- Check fire escape routes, door and window locks and hardware, and lighting around outside of house. Ensure your family has good security habits.
- Vacuum fire and smoke detectors, as dust or spider webs can prevent them from functioning.
- Check pressure gauge on all fire extinguishers. Recharge or replace if necessary.
- Examine windows and doors for ice accumulation or cold air leaks. If found, make a note to repair or replace in the spring.

- Examine attic for frost accumulation. Check roof for ice dams or icicles. Also check to see there is excessive frost or staining of the underside of the roof.
- Make sure space heaters work properly, and never leave them on unattended or placed too close to furniture or draperies.
- Check and clean or replace furnace air filters each month during the heating season. Ventilation system, such as heat recovery ventilator filters should be checked every two months.
- Vacuum radiator grilles on back of refrigerators and freezers, and empty and clean drip trays.
- Vacuum bathroom fan grille.
- Clean humidifier two or three times during the winter season.
- Monitor your home for excessive moisture levels. For example, condensation on your windows, which can cause significant damage over time and pose serious health problems. Take corrective action if necessary.
- Check all faucets for signs of dripping and change washers as needed. Faucets requiring frequent replacement of washers may be in need of repair.
- After consulting your hot water tank owner's manual, drain off a dishpan full of water from the clean-out valve at the bottom of your hot water tank to control sediment and maintain efficiency.
- Check the basement floor drain to ensure the trap contains water. Refill with water if necessary.
- If you have a plumbing fixture that is not used frequently, such as a laundry tub or spare bathroom sink, tub or shower stall, run some water briefly to keep water in the trap.
- Clean drains in dishwasher, sinks, bathtubs and shower stalls.
- Test plumbing shut-off valves to ensure they are working and to prevent them from seizing.

Notes:



Exterior

- Clear all drainage ditches and culverts of debris.
- Undertake spring landscape maintenance and, if necessary, fertilize young trees.
- Repair and paint fences as necessary. Allow wood fences to dry adequately before tackling this task.
- Re-level any exterior steps or decks that moved as a result of frost or settling.
- Examine the foundation walls for cracks, leaks or signs of moisture, and repair as required.
- Check for and seal off any holes in exterior cladding that could be an entry point for small pests, such as bats and squirrels.
- Check gutters and downspouts for loose joints and secure attachment to your home, clear any obstructions, and ensure water flows away from your foundation.
- Have well water tested for quality. It is recommended that you test for bacteria every six months.

Interior

- After consulting your hot water tank owner's manual, carefully test the temperature and pressure relief valve to ensure it is not stuck. Caution: This test may release hot water that can cause burns.
- Have fireplace or wood stove and chimney cleaned and serviced as needed.
- Switch on power to air conditioning and check system. Have it serviced every two or three years.
- Check and clean or replace furnace air filters each month during the heating season. Ventilation system, such as heat recovery ventilator filters should be checked every two months.
- Clean or replace air-conditioning filter, if applicable.
- Turn OFF gas furnace and fireplace pilot lights where possible.

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*June
July
August*

Summer



Exterior

- Repair driveway and walkways as needed.
- Repair any damaged steps.
- Remove any plants that contact — and roots that penetrate — the siding or brick.
- Inspect electrical service lines for secure attachment where they enter your house, and make sure there is no water leakage into the house along the electrical conduit. Check for overhanging tree branches that may need to be removed.
- Check exterior wood siding and trim for signs of deterioration. Clean, replace or refinish as needed.
- From the ground, check the general condition of the roof and note any sagging that could indicate structural problems requiring further investigation from inside the attic. Note the condition of shingles for possible repair or replacement, and examine roof flashings, such as at chimney and roof joints, for any signs of cracking or leakage.
- Check the chimney cap and the caulking between the cap and the chimney.
- Check for and replace damaged caulking and weatherstripping around mechanical and electrical services, windows and doorways, including the doorway between the garage and the house.
- Inspect window putty on outside of glass panes of older houses, and replace if needed.
- Sand and touch up paint on windows and doors.

Interior

- Monitor basement humidity and avoid relative humidity levels above 60 per cent. Use a dehumidifier to maintain relative humidity below 60 per cent.
- Clean or replace air-conditioning filter, and clean or replace ventilation system filters if necessary.
- Vacuum bathroom fan grille.

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Homeowners Guide

to Managing and Maintaining Your Home

CHAPTER | 3



Home Maintenance by Category

- » Exterior Grounds Maintenance
- » Exterior Home Maintenance
- » Interior Home Maintenance

Exterior Grounds Maintenance

Water Management

Most water runoff problems are the result of impervious (nonporous) surfaces that allow pollutants and debris to make their way into natural fresh water systems. A good goal for a homeowner is to attempt to hold all rainwater on the site allowing it to slowly soak into the soil rather than rapidly runoff. This goal can be achieved by the use of various strategies such as pervious (porous) paving, direct rainwater collection and reuse, rain gardens, bioswales, etc.

Water Runoff

All surface water runoff should be retained on the property to the greatest extent possible. This can be accomplished through rainwater harvesting (rain barrels, cistern, etc.), pervious surfaces, rain gardens, bioretention cells, etc. The goal is to prevent erosion and to eliminate sediment and pollutant transfer from the property to adjacent properties, storm drains or streams.

Surface Drainage

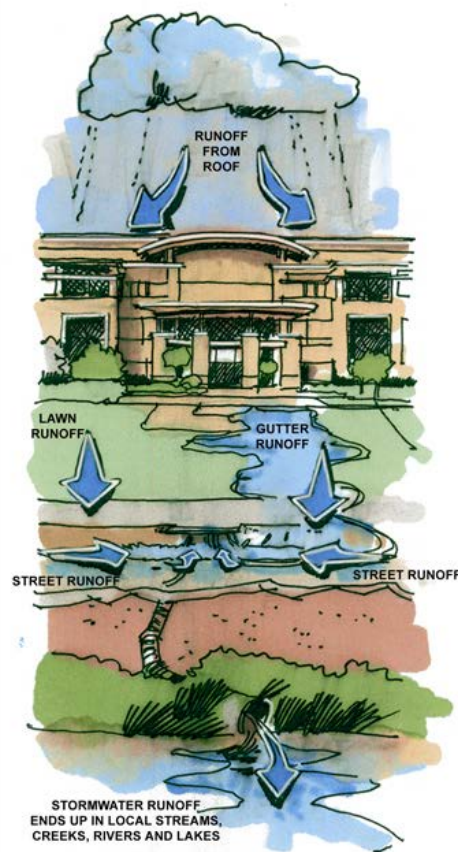
Surface drainage and roof runoff are the most problematic in terms of runoff of contaminants and debris. Strategies such as pervious paving, rainwater collection and reuse, rain gardens or bioswales should be used in an attempt to retain all rainwater on the site.

Subsurface Drainage

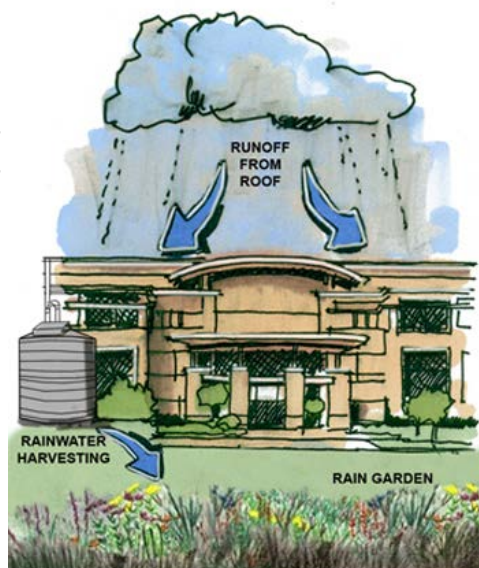
Subsurface drainage, such as that from foundation drains, can be routed to a sump pump or to surface drainage if the lot grade allows. Either option should result in the drained water being retained on the property to the greatest extent possible by utilizing strategies as mentioned previously under Water Management.

Rain Gardens and Bioswales

A rain garden is an area in the natural runoff plane into which stormwater is directed and allowed to soak into the soil. Rain gardens are usually planted with native grasses and water-friendly perennial plants that help maintain a healthy soil profile. A general rule of thumb is that the size (area) of the rain garden should be equal to at least 10% of the roof area being drained. The goal of a rain garden is to retain all of the runoff water on the site.



Gray Infrastructure Runoff



Green Infrastructure Absorption

A bioswale differs from a rain garden in that it is designed to capture some of the runoff water, but usually has an outlet for overflow. Bioswales are also planted with native grasses and plants similar to a rain garden and generally follow the natural drainage path of the site.

Sump Pump Drainage

Sump pump drainage should be directed to an area of the property where it can be allowed to slowly soak into the soil as mentioned previously under Water Management.

Exterior Grading

All water should be directed away from the home and other outbuildings at a minimum slope of 6 inches per 10 feet to minimize potential water damage to structures. Most local building codes address minimum requirements for final grading. It is recommended that landscaping topsoil and mulch be held 8 inches below the top of the foundation to prevent eventual buildup over brick or other siding surfaces — an all too frequent reason for leaking basements.

Landscaping and Hard Surfaces

Trees, Shrubs and Windbreaks

Preventive trimming of large trees in close proximity to buildings will reduce the potential of fallen tree damage to the buildings during windstorm events. Late winter is the best time to perform tree trimming because they are in a dormant phase with cold temperatures and are less subject to insect damage and diseases. Trimming of shrubs may be desirable for reasons of appearance, but less trimming improves the wildlife utilization of the shrubs. Properly constructed windbreaks include two or more varieties of deciduous and coniferous trees and shrubs of different heights and densities. Over time, some of the varieties may die and require replacement. Staggering the timing of replacement over several years will prevent a major loss of a single variety at one time within the windbreak. In general, use trees and shrubs that are native to your area, as they are more tolerant to the climate and resistant to disease, requiring less irrigation and pesticides.



Turf and Groundcover

Many homeowners prefer turf grass lawns, and they often use fertilizers, herbicides, and pesticides to improve the visual quality of the lawn. The problem with using these products is that they have the potential to run off with stormwater during rain events and allow them to enter our streams, rivers, and lakes. Minimal use of these products is recommended. Greater use of natural prairie grasses and flowering plants will improve soil quality, eliminate the need for chemicals and provide better wildlife habitat.

Driveways and Walks

Driveways and walks are significant contributors to pollutant runoff into storm drains and streams. In new construction, install pervious surfaces using pervious asphalt, concrete, pervious pavers or gravel.

Concrete driveways and walks usually have expansion joints to minimize cracking. However, cracking is a natural characteristic of concrete that cannot be eliminated.

Snow and ice can damage horizontal concrete surfaces. Remove snow and ice promptly to protect your concrete. If you cannot remove a thin layer of ice, sprinkle sand or cat litter on the ice for traction. Do not use salt or chemicals to melt the ice. Salt and chemicals can damage your concrete and kill nearby grass, trees and shrubs.

Sidewalks

Sidewalks are essentially public spaces that the homeowner must maintain. Replacing sections of sidewalks that can present trip hazards is essential in contributing to a safe neighborhood. Winter snow removal is also required in most localities. Concrete sidewalks are also impervious surfaces. When replacing sidewalks, consider pervious paving options if allowed under local codes.

Patios

Concrete patios are impervious and have the potential to direct rainwater runoff toward the buildings if settling has occurred near the foundation. Properly constructed concrete patios should be slightly sloped away from the building. Concrete patios often pull away from the building over time. A quality polyurethane sealant should be used to seal the crack next to the building. Brick or stone patios are more pervious, but can still pose potential drainage problems if the grade has settled near the foundation.

Decks

Decks are most commonly constructed of one of three different types of materials: pressure treated lumber, composite (synthetic) lumber or naturally decay resistant lumber species (cedar, redwood, cypress). Each material has advantages and disadvantages pursuant to its use. Pressure treated lumber is less expensive, but the treatment materials can present environmental risks and can present corrosion problems with fasteners and metal structural anchors. In Midwest climates, all wood decks need to be sealed periodically to resist detrimental weathering. Composite lumber is less subject to warping, bowing or cupping.

As cedar weathers, it will turn a distinctive driftwood gray color. Redwood darkens to a natural hue as it weathers. Composite decking, due to the fact it is synthetic, requires less maintenance and can be purchased with a wood grain embossed in the surface.

Your wood decking will expand and contract with the elements. This will cause nails to pull away from the boards and could cause some boards to warp. Reset any pulled nails and re-nail any warped boards with a finishing hammer. Do not use a regular hammer. The head of a regular carpenter's hammer will dent the wood around the nail.

There should be gaps between the deck boards so that water can drain from the deck. These gaps, however, can collect dirt, leaves and other debris. The obstructions can then soak up water and cause the wood to decay. Places where deck boards rest on joists underneath the deck are particularly prone to collecting obstructions. Your deck will last longer if you clean between the deck boards with a pressure washer once a year.

Outbuildings

Outbuildings are subject to the same durability issues as a home. Outbuildings should be constructed a minimum of 8 inches above the existing grade. Grading around outbuildings should provide a slope away from the building of 1:3 per horizontal foot for a minimum 6 feet. Outbuildings that are built close to other buildings can direct water run-off toward the home or other buildings. Downspouts or water catchment systems should be utilized to control water run-off. All penetrations through the building envelope of outbuildings should be properly flashed.

Retaining Walls

Retaining walls should be constructed so that they slope back slightly (3-5 degrees) and should be tied into the subgrade behind them. Also, retaining walls should be well drained to prevent soil saturation behind them and to reduce the effects of freeze/thaw action.

Gardens: Flowers, Vegetables and Herbs

Gardens are highly desirable for their aesthetic and nutritional qualities. Gardens are, however, subject to predation from insects, animals and diseases. Many homeowners use chemicals to deal with these problems. Although these products are very effective, they can be problematic when absorbed by the vegetables and herbs we consume and when allowed to runoff into our natural freshwater systems. There are many non-toxic options for dealing with garden predation problems. Many of these options are also less expensive than their chemical counterparts. It is preferable to use non-toxic natural methods whenever possible and practical.

Gardens also produce large amounts of waste and plant debris. It is beneficial and cost-effective to re-use such plant waste on the property as mulch or through composting rather than disposing of them offsite.

Notes:

Exterior Home Maintenance

Your home's exterior shelters you and your home from the sun, wind and rain. These forces of nature can be quite destructive. Your roof, gutters, siding, windows and doors are your home's first line of defense. Protect your home by inspecting and maintaining it's exterior regularly.

If you discover and repair exterior problems early, you can avoid much larger problems later on. This Homeowners Guide focuses on inspection and preventative maintenance. There are many good home repair books at your local library or book store. If you discover a problem, consult one of these books or call a home repair professional.

Foundations

Your foundation supports your home and keeps it from shifting. You should inspect your foundation twice a year to ensure it lasts for the life of your home.

The type of foundation you have depends on your home's design and your particular soil conditions. In areas where flooding or weak soil is a problem, houses are often built on piers or pilings. In some areas, pressure-treated wood foundations are used. The most common foundation, however, is a poured concrete or masonry block perimeter enclosing a crawl space, full cellar or basement.

Foundation Cracks

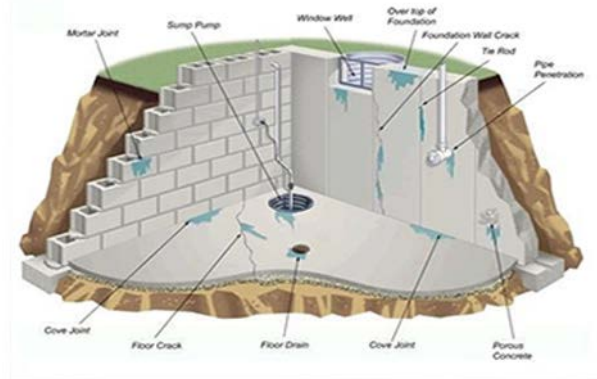
Begin your inspection by looking for cracks along the foundation's outside wall. Heaving soil, settling soil and lateral pressure against the foundation put stress upon your foundation. These stresses can cause foundation cracks. Normal curing of concrete and mortar joints can also cause cracks. Most cracks are normal and are structurally insignificant. Cracks wider than 1/16 inch should be investigated, possibly with the assistance of an engineer or qualified inspector, to determine whether the cracks are a cause for concern.

Wet soil can contribute to the forces acting upon your foundation. Heavy wet soil can increase the lateral pressure against the foundation. Uneven soil moisture can cause uneven heaving or settling. It is important to maintain your gutters and downspouts and direct downspout flow away from the foundation.

Next, check the slope of the ground around your foundation. The ground should slope away from your home so rain water will flow away from, not toward the foundation.

Back filled soil along the house can settle over time. This can create a depression that will collect water near the foundation. Correct any depressions by raising the grade with topsoil (not sand or gravel) so that the ground slopes a minimum 1:3 per horizontal foot for a minimum 6 feet away from the foundation.

Settling along the foundation can also cause concrete patios and walkways to break and direct water towards your home. Often a new layer of concrete can be added to reverse the slope.



Moisture

You should watch for condensation, basement leaks and crawl space moisture. These problems can cause wood structural members such as posts, beams and joists to decay.

Condensation

Condensation is caused when warm, moist air comes in contact with a colder surface such as a window, exposed pipe or bare concrete basement wall. It can look as if the window, pipe or wall is leaking. Condensation can be worse in new homes as water from concrete walls evaporate as part of the normal curing process. Proper ventilation can control condensation.

Basement Leaks

There are a variety of ways to repair basement leaks, depending on the reason for the leak and its seriousness. Most leaks, however, can be solved by redirecting surface water away from the home by regrading around the foundation and directing downspout water away from the foundation. The top of final grade should be held down 8 inches from the top of the foundation and slope a minimum 1:3 per horizontal foot for a minimum 6 feet away from the foundation. If this does not work, get several opinions and proposals from professional contractors so that you can make an informed decision on how to proceed.

Crawl Space Moisture

Soil under a crawl space can draw water into the space through capillary attraction. This moisture can cause beams, floor joists, subfloors and even roof sheathing to decay.

Inspect all crawl spaces with a flashlight. If it is necessary to go into the crawl space to view the entire area, wear a face mask. You can stir up insecticides and other chemicals that settled on the ground. Look for a moisture barrier. All bare soil should be covered with a moisture barrier of 6-mil polyethylene plastic. The plastic should go up the foundation walls to a point higher than the outside grade line and be weighted down with bricks, gravel, soil or other non-organic material.

Next, look for standing water. There should never be standing water under your home. If there is, consult a professional contractor for drainage options.

Finally, inspect the foundation vents. Foundation vents help control moisture in the crawl space. Make sure the vents are open and not blocked by soil, leaves or other debris. If the crawl space smells musty, you need more ventilation.

Insects

Insects are another threat you should watch for as part of your foundation maintenance. Insects can damage wood structural members and indicate moisture is present that could lead to wood decay.

If you live in an area where termites, carpenter ants or insect infestations are known to be a problem or you see signs of insect infestation, call a licensed pest control contractor. Controlling insects requires specialized training to know where to look, what to look for and what action to take. It is not a do-it-yourself task.

Roofing

Roof Inspection and Maintenance Tips

It's easy to ignore your roof unless it begins to leak. Then the roof demands immediate attention. If you inspect your roof periodically, however, you can correct minor problems before they cause major damage. There are many types of roofing materials used on homes today, each with its own unique characteristics with regard to style, material and repair required.

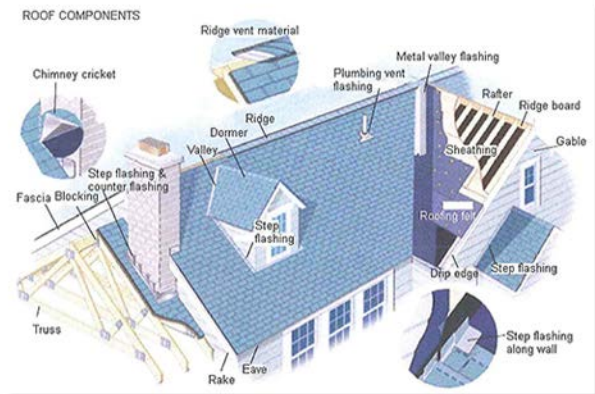
Do not go up on your roof unless you feel comfortable working from heights, know how to safely use an extension ladder and have the necessary tools and equipment. If you have a slate or tile roof, do not go on your roof for any reason. These roofs are easily damaged. Slate and tile shingles can be broken by the weight of a person. Call a professional contractor to perform roof maintenance if you are uncomfortable with heights, don't like handling extension ladders, have a slate or tile roof, or have a steeply pitched roof.

Asphalt Shingles

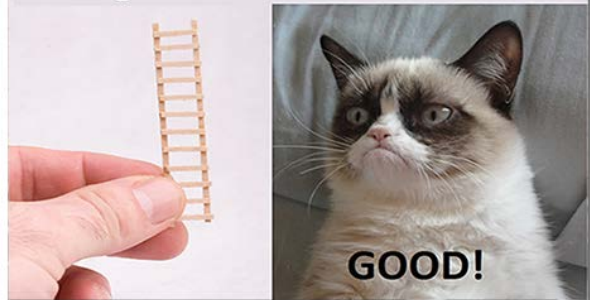
The most common roofing material is asphalt shingles. These shingles are made of organic or fiberglass material impregnated with asphalt. Colored mineral granules are embedded on the surface of the shingles. Many asphalt shingles are notched at regular intervals to form tabs. This creates the appearance of smaller shingles. Depending on the quality and grade of shingle installed, asphalt shingles can last for 15 to 40 years. Asphalt shingles are popular because they are inexpensive, wear well and are easy to install as well as being attractive in appearance.

During the roof inspection, you should look for shingles that are cracked, torn or curled. In addition, look for bald spots and accumulation of granules in the gutters. If you find damage, arrange to have the roof repaired as soon as possible. If the damage is extensive, it may be time to replace the entire roof.

When repairing the roof, use shingles that remain from the original roof installation or try to purchase new shingles that are the same brand, color and size.



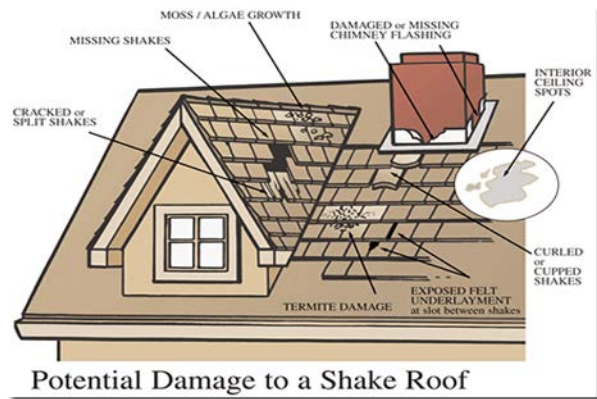
I get the feeling I ordered the wrong size extension ladder!



Wood Shingles or Shakes

Wood-shingled roofs were the roof of choice on homes built until the early 20th century. They typically consisted of cedar sawn shingles or cedar split shakes. Wood shingles have a service life of 20-40 years, but are also much more expensive to purchase and install than asphalt shingles.

It is critical that wood shingled roofs be allowed to dry out thoroughly following rain events. On heavily shaded sites, the north side of wood shingled roofs may not dry completely, and this situation can foster the growth of moss on the roof. This condition can be remedied by placing a base copper wire along the length of the north side of the roof just below the ridgeline. Rainwater washing over the wire creates a chemical that kills the moss and better allows the wood shingles to dry. If you are considering a wood shingle or shake roof, check first with your local authorities as some prohibit wood shingled or shake roofs due to a potential fire liability.



Slate Shingles

Slate shingles are a natural, long lasting roofing material. They can last for 30 to 100 years, or longer. Although slate shingles are extremely durable, they are brittle and expensive to replace. If you notice a buildup of moss or debris on the shingles, you can have a professional contractor rinse your roof with a pressure washer. Look for any shingles that may be damaged or broken. If you have any problems with your roof, contact a professional roofing contractor that is experienced with slate roofs.



Metal Roofing

Metal roofs come in a variety of materials and shapes. Aluminum, steel and copper are common metal roofings for homes. Aluminum does not rust and is coated in a variety of colors. Steel is also color coated for style and corrosion protection. Since copper does not rust, copper roofs are not coated. This allows the distinctive color of the copper to add to the character of the home. Metal roofing can be formed into shingles, tiles and sheets.

If properly maintained, a metal roof should last 40 years or longer. When inspecting a metal



roof, look for rust spots. If rust appears, you can preserve your roof by having a professional roofing contractor scrape the corrosion off and paint the roof with special paint or compounds. Re-paint the roof as needed to preserve its life.

Inspect a metal sheet roof by looking for cracks or open joints at the soldered seams. As the metal sheets expand and contract, stress is placed on these joints. The stress can break the seal and cause leaks. Have any problems repaired by a professional roofer.

When inspecting metal shingles or tiles, look for loose, missing or damaged shingles or tiles. Have any problems repaired by a professional roofer.

Membrane Roofing

Single-ply membrane roofing is a relatively new material for flat or low sloped roofs. A single sheet of thin rubber or resilient plastic is glued or fastened to the roof's surface. A layer of stones may be added for extra protection.

During your inspection, look for cuts, gaps, blisters, wrinkles and open seams in the protective coating. Look along joints, near roof mounted structures and along the roof perimeter. All leaks, cuts, blisters and other problem areas should be sealed or patched and sealed by a roofing contractor familiar with the material. Your membrane roof should last 15 to 25 years.



Built-Up Roofing

Built-up or "tar-and-gravel" roofs are found on flat or low-sloping roofs. Layers of roofing felt are covered with alternating layers of roofing tar to form a continuous sealed surface. The top layer is often covered with rock or crushed gravel to protect the roof from the sun, wind and rain. This roof is given its name because it is "built-up" into several layers.

Built-up roofs should be inspected regularly. During the inspection, look for patched areas, cracking, blistering, surface erosion, alligatoring and wrinkling. Look for cracks at roof joints, near roof mounted structures and the flanged metal strip along the roof perimeter. All leaks, cracks, blisters and other problem areas should be sealed or patched and sealed.



Do not step on any blisters when walking on your roof. Blisters are usually caused by air or water vapor trapped between layers of roofing felt. A person's weight on a blister can crack the roofing felt.

Built-up roofs should last 10 to 20 years, depending on the sun's intensity. Erosion of the gravel, dry felt and blistering are signs that your roof is due to be replaced

Roll Roofing

Another material used on flat or low sloped roofs is mineral felt or roll roofing. The material comes in rolls of roofing felt that has been impregnated with asphalt. Colored mineral granules may be embedded on the surface of the material. One or two layers of the roofing is applied over the roof's surface. Joints are sealed or the entire surface is coated with tar.



Mineral felt or roll roofs should be inspected regularly. During the inspection, look for patched areas, cracking, blistering, surface erosion, alligatoring and wrinkling. Look for cracks at roof joints, near roof mounted structures and the flanged metal strip along the roof perimeter. All leaks, cracks, blisters and other problem areas should be sealed or patched and sealed.

Do not step on any blisters when walking on your roof. Blisters are usually caused by air or water vapor trapped between layers of roofing felt. A person's weight on a blister can crack the roofing felt.

Record the location of any cracked or patched areas on a work sheet and then look inside your home for leaks around the areas noted on the work sheet.

Roll roofs should last 10 years or so, depending on the sun's intensity in your area. Erosion of the surface, dry felt and blistering are signs that your roof is due to be replaced.

Ceramic Tile

Tile roofs are high quality, no-maintenance roofs. A tile roof should last 20 to 50 years or longer. It is not uncommon for tile roof manufacturers to guarantee their products for 40 or 50 years.



Again, if you notice a buildup of moss or debris on your roof tiles, you can have a professional contractor rinse your roof with a pressure washer. Look for any tiles that may be damaged or broken. One precaution, do not walk on a tile roof for any reason. The weight of a person can break the tiles. Broken tiles may allow water to leak into your home. Call a professional roofer if it is necessary to go up on your tile roof for any reason.

Flashings

Flashing protects your roof from leaks around protrusions and roof joints. These are your roof's vulnerable points. Flashing is the sheet metal or other durable material that protects these joints from water penetration.

Flashing seals roof valleys, roof and plumbing vents, around chimneys, along eaves and anywhere water can seep through open joints into the roof sheathing. The flashing's edges are sometimes sealed with caulk or roof cement. Flashing is a key to keeping your roof watertight.



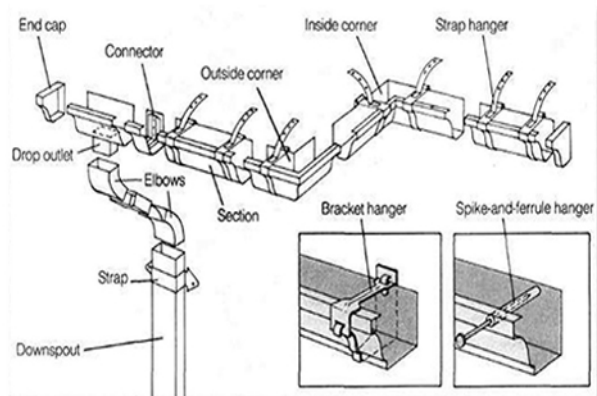
Roof leaks are common along flashed areas. If you ever have a leaking roof, be sure to remember to inspect your flashing. You do not want to replace your entire roof when you can stop the leak by re-caulking a dried out flashing seam. With proper maintenance, you can guard against flashing leaks.

Inspect your roof flashing during the roof inspection. Once again, if you have a pitched roof, use binoculars to perform a visual inspection. Inspect those areas listed above where flashing is likely. Have a professional roofing contractor repair any problems.

During the inspection, look for any flashing that has buckled or pulled away from the joints it is supposed to protect. Next, look for holes and rust spots along the flashing surface. Small holes and rust patches can be patched or sealed. You should have the flashing replaced if you find large holes or extensive corrosion. Also look for loose nails and exposed nail heads. They should be re-nailed and covered with caulk or roofing cement. Finally, examine the flashing seams for dried or cracked roofing cement. Re-seal as necessary.

Gutters and Downspout Systems

Gutters and downspouts collect water from the roof and carry it away from the house. This prevents topsoil erosion around concrete footings, basement flooding, siding and woodwork decay, paint failure, wall damage and other problems. Uneven soil moisture caused by water runoff can even cause serious foundation problems. Gutters and downspouts that leak or that are clogged with debris cannot perform their vital task. Therefore, it is important that you inspect, clean and maintain your gutters and downspouts regularly.



When inspecting your roof with binoculars, check your gutters for any loose spikes or support straps and have repaired as necessary. Gutters should slope gently towards the downspouts. Reset gutters that sag or slope improperly. Inspect seams, corner joints and downspout joints for proper fit. These joints should be repaired or sealed with caulk if they allow water to leak.

Gutters collect leaves, sticks, seed pods, mineral granules from roofing products and other debris. They should be cleaned in the fall after most of the leaves have fallen and again in the spring after the trees have bloomed. If you have low gutters and know how to safely use extension ladders, you may feel comfortable performing this task yourself. If you have a multistory home, don't like working from heights or don't like handling extension ladders, you may want to hire a contractor to clean your gutters.

During the gutter cleaning, the wood boards behind the gutters should be inspected for dry rot. Probe the boards with a knife or thin screwdriver for soft spots. Any decay should be repaired.

Plastic or metal screens can be installed over your gutters to keep them free from debris. These screens can be effective but the screens themselves must be cleaned. You must also continue to inspect your gutters and downspouts and clean as necessary.

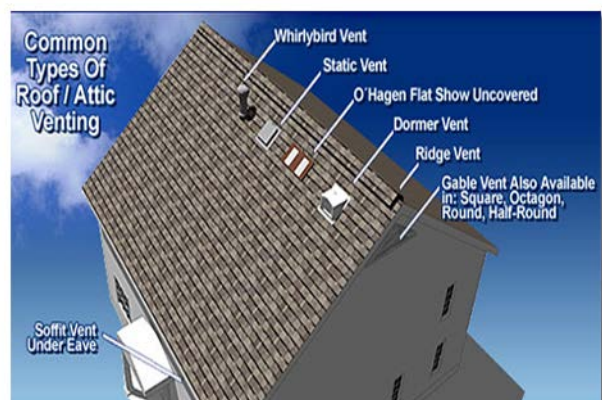
You should also inspect your downspouts. Repair or replace any disconnected downspouts. Check for corrosion, clogged sections, improper connections, loose straps and missing sections. Repair any problems. Leaking joints need to be completely dried and sealed with a polyurethane or butyl sealant. Make sure the downspouts direct water away from your home. There are many ways to modify the downspouts to direct water away from your home. If your downspouts don't connect to a perimeter drain along the foundation wall footer, downspout extensions should be installed to extend a minimum of four feet from the foundation and terminate on a splash block or gravel drain.

During the winter months, if ice damming occurs and persists, it is advisable to remove the damming before it allows water to infiltrate the structure. This process is dangerous, and great care should be taken to assure safety during the ice dam removal. To help prevent ice dams, a snow roof rake with a long handle and blade can be used to remove snow from the roof. If, or when, you replace your roofing (shingles, metal, etc.), inquire with your roofing contractor about having an ice guard installed under the roofing material at the eaves.



Attic Vents

Attic vents should be inspected annually to assure that they are free of obstructions that can restrict airflow. Insufficient attic ventilation can result in over-heated attics which, in turn, increases energy bills. In addition to vents installed near the top of the roof and/or ridge, vents installed in the soffits allow good cross ventilation through the attic space.



Fascia and Soffit

Soffit and Fascia are two components that will beautify and protect your home's eaves. However, most homeowners have no idea what a fascia or a soffit is, yet together they are two very important components of every house. The fascia covers the rafters and protects the internal structures of your roof, while the soffit covers the area from the bottom of the fascia to the outside wall of your home. Soffits protect the roof structure from the elements as well as provide a vented outlet that allows hot summer air and moisture to safely exhaust to the outside, lowering your heating and cooling expenses all year round.



From the ground, it may appear that the soffit and fascia boards just need a new coat of paint. But once you get up close and probe the wood, it may become obvious that they're beyond repair and need to be replaced. Replacing soffits and fascia are not, typically, an easy task for the homeowner. Gutters and downspouts may need to be removed, with extreme care given when reinstalling to ensure there is proper slope and drainage.

There are many types of materials used to construct the fascia and soffit assembly, and many homes have aluminum-wrapped fascia and aluminum soffits. Although wrapped fascia can reduce exterior maintenance, the potential exists for premature deterioration if the fascia is not tightly fastened and sealed at the joints. Aluminum soffits are also prone to damage during wind storms. Aluminum soffit and fascia should be inspected annually and repaired to eliminate water infiltration, which, if not repaired, can lead to rapid deterioration as moisture trapped behind aluminum fascia cannot dry out.

Chimneys

Your chimney should be cleaned and inspected each year after the burning season ends. This reduces the risk of fire and increases chimney efficiency. A hot fire can ignite obstructions such as bird nests, leaves and thick deposits of soot and tar and turn your chimney into a torch. Such obstructions will also restrict the chimney's draft and reduce your fireplace or wood stove's efficiency.



If you have a masonry chimney, inspect the chimney in the same manner as brick, block and stone siding. If you ever notice that the chimney appears to be "pulling away from the house," is leaning, has bulging sections or has large cracks, have the condition examined by a contractor. It may indicate structural problems. Whether the chimney runs through the interior of the house, or along an exterior wall, check the attic or basement spaces for any visual signs of masonry problems.



Sophia's Harbor: the home illustrated above was designed by Studio4 LLC and built by MJES Rookwood LLC for a Homearama showcase of custom homes event.

Exterior Wall Cladding

Your home is protected from the sun, wind, and rain by an exterior skin of masonry, wood or manufactured siding. This siding should last the life of your home if properly maintained. However, even the most durable sidings can fail if the home owner does not follow through with a regular maintenance program. This section discusses siding materials and how you can maintain those materials.

Brick, Block and Stone Masonry

Brick, concrete block and stone are used as sidings on veneer walls and are also built into masonry walls. Veneer walls are standard wood frame walls with a brick, block or stone facing for weather protection. The wood frame provides the structural support. Masonry walls, on the other hand, use the brick, block or stone as both the structural support and the weather protection.

A white powdery substance that can form on the surface of masonry work is known as efflorescence. It is caused by moisture bringing salts to the surface. Efflorescence is common in new masonry work and can be washed off. If the condition persists, it may be a sign that water is penetrating the wall through cracks, faulty mortar joints or defective caulking or flashing around wall joints or openings. Have the problem investigated and repaired.

Inspect any brick, block or stone walls, including your masonry chimney, twice each year. Look for chipped, cracked, loose, deteriorating and missing material. Any such problems should be repaired to keep water out of masonry material and from causing future damage.

You should also check the mortar joints for weak or crumbling mortar. Use an old screwdriver to test the mortar by scratching along the mortar joints. The mortar should be firm. If it crumbles easily, is cracked or has fallen out, have the mortar joints repaired or water will enter the joints and cause additional damage.

If you ever notice bulging sections or large cracks in either a veneer or masonry wall, have the condition checked by a professional contractor. It may indicate structural problems.

Stucco

Traditional stucco is a centuries-old material which consists of aggregate, a binder, and water, and is a hard, dense, thick, non-insulating material. It is applied over wire lath fastened to wood sheathing. Color is added to the final coat or the stucco is painted after it dries. Stucco is a durable, relatively maintenance-free siding. Elastomeric paint can be applied over the stucco to make it even more durable and easier to maintain. Elastomeric paint is a rubberized paint that protects and preserves the stucco.

You should inspect your stucco siding at least once and preferably twice a year. Early spring is a good time for the first inspection. You will be able to spot any winter damage. In addition, shrubs around your home will not yet have leafed, enabling you to easily view your siding. During this inspection, look for hairline cracks in the stucco, vertical cracks running from the roof line or door or window openings, and bulges or holes in the stucco. Defects in the stucco can be repaired yourself or by a qualified plaster contractor.

Synthetic Stucco

Exterior insulation and finishing system (EIFS) is a type of building exterior wall cladding system that provides exterior walls with an insulated finished surface and waterproofing in an integrated composite material system.

Although often called “synthetic stucco”, EIFS is not stucco. EIFS is a lightweight synthetic wall cladding that includes foam plastic insulation and thin synthetic coatings. EIFS are proprietary systems of a particular EIFS producer and consist of specific components. EIFS are not generic products made from common separate materials.

It’s important to note that to function properly, EIFS needs to be architecturally designed and installed as a system. The successful performance of EIFS cladding is dependent upon the proper design and construction of the adjacent materials and systems of the structure. The specification, design, and construction of all EIFS must comply with local building codes and standards, applicable compliance reports and the individual manufacturer’s system requirements. All installations and repairs must be done by a qualified EIFS contractor.

Wood

Wood siding is found on many homes. Wood shingles, shakes, boards and panels come in a variety of shapes, styles, sizes, patterns and species. Yet, the various wood sidings are more alike than they are different. Wood siding is susceptible to water and insect damage. The first line of defense is paint or stain. The second line of defense is regular inspection and maintenance and periodic cleaning as discussed below.

During the wood siding inspection, you should check for the following:

- **Paint:** Protect your wood siding by inspecting for paint problems twice a year and repainting every 2 to 5 years, depending on the type of paint and the climate zone where your home is located. Peeling or blistering paint is usually caused by warm, moist vapor from the house flowing through the walls, reaching the cold sheathing and condensing. Just a few drops of water between the siding and the film of paint will cause paint to blister and peel. The defective areas should be properly prepared and repainted. If you observe other paint problems, such as worn, flaking, wrinkling or “alligatoring” paint, properly prepare and repaint the defective area.

- **Stain:** Stain also protects wood siding from moisture and insects. However, as the stain fades, so does its weather and insect protection properties. Re-stain your siding every five to seven years, or as necessary, to restore color and preserve your siding.
- **Ground Clearance:** Untreated wood must not be in contact with the ground. Moisture from the soil can cause decay and insects can gain entry to your siding. Examine along the base of your home to make sure you have at least eight inches of clearance between the ground and any wood siding or wood trim. If necessary, re-grade your soil away from any wood.
- **Dry Rot and Termite Damage:** Dry rot is a fungus that causes wood to crumble. Termites destroy wood by chewing out its interior. Probe the edges of the wood siding with a knife or thin screw driver and look for soft, spongy spots. Pay particular attention to any part of the siding that was close to the ground or in contact with the ground. In addition, check for visible evidence of termites. Look for their translucent one-half-inch-long wings or the mud tubes they sometimes build. If you find evidence of dry rot or termites, consult a licensed termite inspector or pest control professional.
- **Holes and Split, Warped or Loose Siding:** Simple surface problems such as holes in the wood, split or cracked boards, warped or buckled boards and loose siding should be repaired as soon as they appear. Water will work its way through these defects into the interior wall where rotting can take place undetected. Severely damaged board siding must be replaced. Determine the cause of any serious damage before replacing siding. If moisture is causing the problem, find the source by checking for deteriorating roofing, leaking gutters or downspouts and poor drainage. Consult a professional contractor.

Fiber Cement

Fiber cement siding is a very durable siding option with a long service life if properly maintained. Like most building products, fiber cement siding needs to be allowed to dry following wetting events. If fiber cement siding is consistently wet for long periods of time, it will deteriorate. Fiber cement siding cannot be buried in the ground. Please refer to manufacturer's installation literature.

Aluminum, Steel and Vinyl

These are the manufactured sidings. They are generally made to resemble beveled horizontal wood board siding although other styles are available. Aluminum and steel siding usually have baked enamel paint finishes. The coloring in vinyl siding is embedded in the material. The siding can be smooth or can be embossed with a wood-grain texture to resemble painted wood boards. These manufactured sidings are insect and water resistant. However, some maintenance is still required.

Aluminum and steel siding can show scratches and can dent if struck by a baseball or other object. Touch up scratches with paint. If dents are obvious, there are ways to remove them. Over time the color may fade and need to be repainted. In many areas, local building codes require that aluminum and steel siding be grounded at each corner of the building.

Vinyl will not dent like aluminum. If hit, it flexes to absorb the shock and returns to its original shape. However, vinyl siding can crack. You should replace any cracked sections.

You should inspect all manufactured siding for loose or damaged sections and open seams and joints. Repair or replace the siding when necessary.

Windows

General Inspection and Maintenance

Windows provide essential daylighting and ventilation functions in homes. Windows are also the most problematic elements of the building envelope in terms of energy loss and air leakage. Operable windows should be inspected on an annual basis. Such inspections should include:

- Observe the interior and exterior of the window. Look for signs of water leakage or condensation damage. Exterior water leakage must be addressed immediately. Determine the source of the leak. Insure functioning overhang, effective flashing, or sealant replacement. Interior condensation damage on wood windows can be merely cosmetic, or can be structural. Cosmetic damage can usually be repaired by properly refinishing the interior of the window sash and frame. Structural damage may require sash replacement or entire window replacement. If structural damage is apparent, contact a qualified window installer to discuss options. It is important to address interior humidity levels to minimize future condensation damage.
- Check the latching hardware and hinges for proper operation. Replace any damaged hardware. Make sure windows latch tightly against weather-stripping.
- Inspect all weather-stripping. Look for damaged or loose weather-stripping. Also, occasionally the weather-stripping can shrink, leaving gaps for potential air and/or water leaks. Re-install loose weather-stripping and replace any that is damaged or shrunken.
- Clean exterior and interior of window glass semi-annually in the spring and autumn.
- Drapes and shades can help reduce glare, fading, overheating and nighttime heat loss. Insulated drapes or movable insulation panels can further reduce heat loss during nighttime hours. Drapes and shades have the potential for increasing condensation on windows by partially isolating the window from normal interior convective airflows. This allows the window surface to become cooler and more prone to condensation. Also, lowering the temperature between the shade and the window raises the relative humidity, which also increases the condensation potential. Drapes and shades that contact the floor and are enclosed in a valance at the top are much less likely to contribute to the condensation problem and will further reduce heat loss through the window on cold nights.
- Movable solid insulation panels are very effective at reducing nighttime heat loss through windows, but the panels must be properly fitted and weather-stripped in order to completely isolate the window from the interior space.
- Drapes, shades and movable insulation panels should be closed in the evening when daylighting is no longer effective. Likewise, they should be opened as soon as daylighting is effective in the morning.

Glazing Replacement

- Many energy efficient houses utilize different glazing types on different facades of the structure. In the event that a sash or its glazing need to be replaced, it is important to replace the unit with the same or an equally performing glazing material. Proper record keeping will allow you to identify the proper glazing for the window needing repair.

Double Hung Windows

Double hung windows were designed to facilitate natural ventilation by providing a way to exhaust hot air through the top sash and draw in cool air through the lower sash. Homes with double hung windows should employ them for natural ventilation.

Storm Windows

Traditional wood storm windows that are installed and removed seasonally need to be annually inspected for paint and screen damage. If repaired and stored properly, wood storm windows should be serviceable for decades.

Metal combination storm windows are relatively maintenance free. Damaged screens or broken glass panes should be repaired.

Basement /Egress Windows

Basement and egress windows are unique in that they are often installed below the surface grade and are, therefore, subject to potential water leakage problems. All basement and egress windows should be installed with a drainage system that has the ability to drain rainwater from below the window during severe weather events. Egress windows need to have a minimum area of 5.7 sq. ft. They must have a minimum clear opening width of 20", and the maximum sill height above the floor is 44". Egress wells must have a minimum area of 9 sq. ft. Wells that are deeper than 44" must have an integral escape ladder.

Skylights

Fixed glass skylights are problematic in northern climates because of building movement, high levels of annual rainfall and the potential for interior condensation. Skylights should be checked annually (spring) for flashing or glazing problems. Skylights in northern climates can also experience condensation problems that can lead to cosmetic and structural deterioration.

Doors

Exterior Doors

Exterior doors are essential for access to, and egress from, homes. Doors are also an essential element of the security function of a home. Because of their constant usage, doors are very prone to wear and damage. Wear and damage reduce the door's effectiveness at controlling air leakage and providing security. Doors should be inspected semiannually in the spring and autumn. There are various door types that may require different inspections.

Exterior Swing Doors

Swing doors are the most common and most used type of exterior door. Because of their frequent use, problems or malfunctions are often apparent soon after they develop. The most frequent problems involve improper latching, dragging or difficulty closing, noticeable drafts and water leaks.

Water leaks are the primary concern. There are many possible reasons for water leaks with doors. Most often these involve poor flashing or a failed sealant. If you cannot easily identify the source of the leak and repair it, you should consult an experienced carpenter to diagnose and repair the problem.

Most of the homes are constructed with wood framing. Wood is a natural material that is subject to movement during its initial drying process as well as during seasonal variations in humidity. This movement can affect the latching and closing of a door. Repairing these conditions may involve shimming or possibly the removal and reinstallation of the door. Such repairs may best be done by an experienced carpentry contractor.

If a door closes properly but does not latch, an adjustment of the strike plate may be required. Some strike plates are made to be adjustable. Others may require an experienced carpenter to repair.

To keep the lock mechanism operating properly, an annual application of graphite powder or fluid, commonly found at home improvement stores, into the keyway of the lock mechanism will keep the lock working properly. Never apply oils or other liquid lubricants to lock mechanisms.

Inspect all of the door weather-stripping. Look for loose, missing or shrunk weather-stripping and repair or replace as necessary.

Inspect the threshold and door bottom weather-stripping. Some door thresholds are adjustable to correct the effects of wear. Look for the evidence of light between the door and the threshold. If the threshold is adjustable, adjust until light is no longer visible and the door closes properly. If there is visible light below the door and the threshold is not adjustable, you will need to replace the door bottom weather-strip. The replacement process varies by door brand, but most styles of door bottom weather-stripping are available from building supply retailers.

Exterior Swinging Patio Doors

Swinging patio doors are subject to the same inspections as outlined under Exterior Swing Doors.

Exterior French Swinging Doors

Exterior French swinging doors are constructed as two opposing swinging doors. As such, they are subject to the same problems as outlined under Exterior Swing Doors.

Exterior Sliding Doors

Sliding exterior doors are subject to the same problems as outlined under Exterior Swing Doors, but sliding exterior doors have the potential for problems that are unique to this type of door.

Because sliding exterior doors slide in a track, debris from foot traffic and wind-blown debris can build up in the bottom track of the door causing the door to drag and cause excess wear on the door bottom weather-stripping. Regularly vacuum the door bottom tracks to remove debris.

Most sliding exterior doors have the ability to be adjusted for height and freedom of travel. If you have difficulty operating the door, adjustment may remedy the situation.

Sliding exterior doors may also be subject to difficult operation due to settling or sagging of the door header. If you have difficulty operating the door, and have attempted to adjust the door without success, you should contact a qualified carpenter to assess and repair the problem.

Storm Doors

Storm doors are installed to provide an additional barrier to weather events. Storm doors should be inspected annually to assure that the latch is securely pulling the door against the weather-stripping. The latch should be adjusted to assure a tight seal against the weather-stripping. Damaged weather-stripping should be replaced.

Overhead Garage Doors

You can prevent many garage door problems with regular maintenance. Periodically clean the tracks, hinges and rollers and lubricate them with penetrating oil or silicone spray. Lubricate the locks with graphite powder. The screws that fasten the hardware to the door will loosen over time as the door settles or as wood doors shrink as they age. Tighten the garage door screws every 12 months.

Inspect the springs regularly. Replace any springs that develop bulges or are unevenly spaced. Inspect the tracks for proper alignment, crimps in the track and other damage. If the door binds or drags, it is likely the tracks are poorly aligned or need lubrication. Keep wood doors sealed and painted, particularly along the bottom edge, to prevent swelling and moisture damage.

Garage Door Opener

An improperly adjusted garage door opener can cause a serious accident. Your openers have an automatic return switch so that the doors will reverse automatically if they meet an obstacle. Test your garage door openers by blocking the door with your hands while the door is closing. If the door does not reverse when it encounters your hands, adjust the automatic reverse adjustment screws.

How far the doors open and close is controlled by height adjustment nuts. If your doors do not open or close properly, you can reset the adjustment nuts.

If the drive unit works but the door won't open, the belt connecting the pulley with the motor may need adjusting.

See your owner's manual for more information on how to make these adjustments and other repairs.

Door Hardware

Periodic lubrication of exterior door hardware is required. Locking and latching hardware should only be lubricated with graphite (never oil). All exterior door hinges should be lubricated with a light machine oil (3-in-1, etc.).

Caulking

Caulking is used to seal joints, gaps and seams in exterior walls. Without caulking, cool air, water and insects could enter your home through these openings. All caulking compounds dry out over time. Check for cracked, loose or missing caulking as part of your spring and autumn maintenance inspections. Typically, your home should be re-caulked every five years or less. Caulking around some areas may deteriorate sooner. Repair deteriorated caulking as soon as it appears.

Where to Inspect. You will find caulking where different surfaces meet. These surfaces include the roof where one flashing meets another flashing, where flashing and a roof or dormer surface meet and where a chimney, flue, plumbing or electrical pipe, attic fan or skylight protrudes through the roof surface.

Caulking is found on exterior walls where siding and trim meet at corners, around window and door frames, between badly fitting pieces of siding, where pipes, framing members and other protrusions pass through siding, and where siding meets the foundation, patio, deck or any other different part of your home.



Ronald McDonald House: the home illustrated above was designed by Studio4 LLC and built by MJES Rookwood LLC for a Ronald McDonald House charity event.

Interior Home Maintenance

Many materials are used inside your home to cover your ceilings, walls and floors. These materials should be cleaned and maintained regularly. In addition, you should inspect for structural problems. Although structural problems are rare, it is important to determine the cause and make repairs before the problem grows worse. This section discusses interior inspection and maintenance.

Walls

Your home has two types of walls, bearing walls that are part of your home's structural frame and non-bearing walls. Generally, you may alter non-bearing walls as you like without fear of structural damage. Bearing walls, however, be must altered carefully to avoid reducing their structural capacity. For safety, consult a professional contractor before altering any wall.

Walls in modern homes are usually made of gypsum wallboard. They should last as long as your home with little maintenance. Sometimes normal shrinking will cause minor cracks or cause nails to pop from the wallboard. The framing boards and the wallboard shrink away from the nail, leaving the nail sticking out beyond the surface of the wallboard. Popped nails do not alter the strength of the wall and should be left alone until you redecorate the room.

When redecorating, fill any cracks, repair any scuffs or dents, and reset and respackle any popped nails. Repaint or redecorate the wall surface.

Inspection

- Although you see them every day, you should actually inspect your walls once a year. Look and feel along the walls for cracks and bowing, sagging or leaning walls.
- Minor, straight, generally parallel cracks are common. Cracks at angles to each other, jagged cracks and open cracks, however, require your attention. If cracking is extensive, additional cracks develop, cracks change in size from season to season or cracks grow longer or wider, you should call a professional inspector, engineer or contractor to inspect for structural problems.

- Minor sagging or softening of the wall material may indicate a water leak that should be repaired behind or above the damaged area. Bowed, sagging or leaning walls may indicate structural problems that should be inspected by a professional inspector, engineer or contractor.
- Inspect wall coverings for signs of fraying, tearing and pulling away from the wall. Repairing minor problems in time will preserve the look and the life of your wall coverings.

Maintenance

- The proper way to maintain your walls is to keep them free of spots and fingerprints. Clean anything on your walls that might result in a permanent stain as soon as possible.
- When your walls become dirty, spot clean just the dirty areas whenever you can get away with it. If spot cleaning is not enough, proceed with a full washing. Wash from the top of the wall down, wiping off runs of cleaning solution as you go, before the runs have a chance to cause streaks. Before washing any wall, however, wash a test area first to be sure that you will not damage the surface.

Ceilings

There are a wide variety of ceiling styles and covering materials. Your ceilings may be flat and level, detailed with coves, trays or other designs or pitched to follow the roof line (vaulted or cathedral ceilings). Wood beams may be exposed or all structural components may be covered by the ceiling materials.

The most common ceiling covering may be gypsum board, also known as sheet rock or plaster board. Other coverings include plaster, wood, tin, interlocking acoustical tiles and suspended ceilings. Whatever the style or materials, your ceilings should require little maintenance.

Inspection

- Inspect your ceilings once a year when you inspect your walls. Look for cracks, sags and bows. Minor ceiling cracks and nail pops, like minor wall cracks and nail pops, are normal and can be covered when you redecorate the room. More substantial cracks require more attention as set out in the wall inspection discussion above. A sagging or bowed ceiling indicates the ceiling material may be pulling away from its structural supports and should be inspected by a professional.
- The roof above rooms with exposed wood ceilings or beams should be inspected regularly. Even small leaks can cause permanent water stains or wood damage. If you ever see signs of leaks in these rooms, have the problem repaired as soon as possible.

Maintenance

- Clean cobwebs along your ceilings periodically with a broom or vacuum attachment. Other than that, your ceilings should require little attention.
- You generally should not need to wash your ceilings. Even if a ceiling is dirty, the dirt will not be noticed if the ceiling is uniformly dirty. Mold on bathroom walls and cooking grease on kitchen ceilings can be cleaned with household cleaners.
- You can repaint most ceilings to hide dirt, cover paint damage or redecorate the room. However ceilings are difficult to paint. Because ceilings receive less wear and tear than walls, they are generally repainted less frequently.

Floors

Carpeting

- You can extend the life of your carpets with proper care. The single most important thing you can do to maintain your carpets is frequent, thorough vacuuming. In addition, clean up spills immediately by blotting the spill. Never rub your carpets. A little ice water or an ice cube applied to a fresh spill will often loosen the stain enough to blot it up easily and reduce staining.
- Use mats, runners or throw rugs to protect your carpets from dirt and excessive wear in high traffic areas. They are easy to clean and can be replaced when necessary.
- If deep cleaning is needed, you should hire a professional who uses the extraction method of deep cleaning or the rotary method followed by extraction. If you want to do the job yourself, extraction devices are available for rent at many retail stores.

Wood Floors

- Modern wood floors are coated with a polyurethane coating to protect the wood. Do not sand or use commercial refinishers on the floor. Instead, have wood floors refinished by a flooring contractor. Although the job is simple, special tools are required. This is not a do-it-yourself job. You should be able to walk on the floor 24 hours after refinishing. Under normal wear and tear, your floor should be able to go 5 years between refinishings.
- Normal maintenance of your wood floor should include regular vacuuming or dry mopping to remove surface dust and dirt. Water can be used to clean your wood floors but be careful not to flood the floor. Excess water can damage the wood. Protect the finish on the floors by attaching furniture rests to the bottom of your furniture legs.

Resilient Flooring

- Resilient floors are a popular floor covering. The most common resilient floors are vinyl, polyurethane, linoleum and rubber. Resilient flooring comes in two forms, sheets and tiles. Sheets are popular in areas where the floor may get wet, such as kitchens, bathrooms, laundry rooms and entry ways, because it usually requires few if any seams. Although tiles have seams, they are easy to install.
- Follow the manufacturer's care recommendations. Most resilient floors should be finished with Acrylic High-Gloss Floor Finish. Before applying finish for the first time, seal the floor with a penetrating sealer (not a surface sealer). You should seal the floor after stripping it for the first time if you do not know whether it has been sealed before. Strip and refinish the floor as needed to keep the floor looking like new.
- You do not need to finish no-wax floors with acrylic finish if you sweep, vacuum, damp-mop and wash the floor regularly. However, dirt and grime will wear down the floor's finish. If you know you will have problems keeping the floor clean at all times, you may want to finish the no-wax floor. A sealer is not necessary on no-wax floors.
- Because bathroom floors are exposed to a lot of moisture, it is difficult to maintain a finished floor. Just seal the floor and keep it clean.
- True linoleum is usually found in older homes on floors and countertops. It should be sealed with a wood sealer and finished with wax, not acrylic finish.

Tile Floors (Walls & Countertops)

- A silicone grout seal is applied to tile surfaces to protect the grout between the tiles from staining. Grout seal should be re-applied every year to renew the protection. To apply, simply sponge grout seal over the entire surface, wipe off the excess and allow to dry for two hours. Grout seal can be purchased at any tile supply house.
- Clean ceramic tile by wiping with a damp cloth or an occasional wet mop. If necessary, a more thorough cleaning with detergent or ceramic tile cleaner will remove grime. Staining agents should be mopped up promptly. Under normal conditions, some staining is likely to occur. Often stains can be bleached out with household bleach.

Windows

Windows come in a variety of shapes, sizes, designs and materials. Double hung, casement, awning and sliding windows open by different methods. Fixed windows let in light but can not be opened. Skylights can be fixed or they can be opened manually or by an electric motor. Windows can be made of wood, vinyl, steel, aluminum, vinyl-clad wood, aluminum-clad wood or vinyl-clad aluminum.

A typical window contains glass, framing around the glass called the sash, framing around the window opening and molding around the frame. Windows may be a single pane of glass or may contain two or more layers of glass with air space between the layers for insulation. A coating on “low-E” glass reflects radiant heat back into your home during the winter and reflects heat from the sun’s rays away from your home during the summer.

Inspection

- Inspect your windows once each year. Begin by opening and closing the windows. If the windows stick, it may be that moisture is swelling wood windows. Allow the wood to dry during the summer, inspect for decay and re-seal. Sticking windows can also be caused by excessive layers of paint between the frame and sash. Use a putty knife or a “window zipper” to cut through the paint. Cleaning the window’s track with a brush and lubricating the inside of the track with petroleum jelly or silicone spray can also solve window sticking problems.
- Wood windows should be inspected inside and out for paint and decay problems in the same manner as wood siding and wood trim.

Maintenance

- Clean the tracks on windows that open with a brush or vacuum attachment. Lubricate the inside of the track with petroleum jelly or silicone spray, removing any excess. Casement windows that are operated by a crank and gear mechanism should be maintained by occasionally cleaning and lubricating the window mechanism.
- Look for broken glass panes, bent sashes, loose, broken or missing hardware and torn or damaged window screens. Inspect locks and latch handles for proper operation and secure fit. Check seals, caulking and weather stripping to ensure cool outside air cannot enter your home from around a window. Make any necessary repairs.

- ## Cabinets and Countertops

Wipe your countertops clean with a damp cloth. If necessary, a more thorough cleaning with detergent or household cleaner will remove grime. As with your tile floors, silicon grout seal is applied to protect tile countertops. If you have tile countertops or back splashes, re-apply grout seal once each year (see the tile floor discussion at [this link](#)). Staining agents should be cleaned up promptly. Protect your countertops from hot pots, pans, baking dishes and irons with pot rests. Never cut anything directly on the countertop because the knife may dent or nick the surface.

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Homeowners Guide

to Managing and Maintaining Your Home

CHAPTER | 4



Home Maintenance by System

- » HVAC
- » Plumbing
- » Electrical and Lighting
- » Appliances

Heating, Ventilating and Air Conditioning (HVAC) Systems

Your home's heating and cooling system should give you many years of service with proper maintenance. Preventive maintenance will lower your energy costs, prevent costly repairs and prolong the life of your system. Regular maintenance will ensure that your system is ready to heat and cool your home when needed.

There are a variety of systems for heating, ventilating and cooling your home. For specific information on how to maintain the system in your home, see the manufacturers' appliance manuals for the equipment in your home. If you are missing one or more original appliance manuals, contact the appliance manufacturer and ask for a replacement manual.

Professional Maintenance

Most heating and cooling systems should be serviced once a year by a professional heating or cooling contractor. The professional contractor has the tools, instruments and training necessary to maintain your system for dependable, trouble-free operation. The contractor should inspect your system, complete necessary maintenance tasks and adjust the entire system for optimal performance.

The contractor that installed your system would be the most logical and qualified to maintain your system. You also can look for heating and cooling contractors in the yellow pages of your local telephone book. You may want to consider purchasing a service contract for your system.

Thermostats

Thermostats signal a demand for heat at preset minimum temperatures. It is this signal that controls the rest of the heating system. When the air reaches the desired temperature, the thermostat turns the heating system off. Thermostats control cooling systems in the same manner at preset maximum temperatures.

Clock thermostats and multiple-setback thermostats can be adjusted to maintain different temperatures at different times of the day to conserve energy. You can set the units for lower temperatures during the work day if the house is empty and at night when you sleep.

Thermostats should be cleaned and, if necessary, adjusted once a year. Dust between contact points and improper alignment can affect a thermostat's operation. Your heating and cooling contractor should inspect all thermostats during the annual service call. If you prefer, you can maintain the thermostats yourself. This annual maintenance should include the following:

- **Dust:** Remove the thermostat's cover and dust the inside surfaces and any metal coil with a soft brush.
- **Contact Points:** Clean metal contact points by working a piece of heavy bond paper or thin card stock between the contact points and blowing the contacts clean.
- **Liquid Mercury Contacts:** The previous step is not necessary if the unit has a liquid mercury contact enclosed in an airtight glass tube instead of contact points.
- **Switch Contacts:** Clean any metal switch contacts along the top or edges of the unit with a cotton swab moistened with alcohol.
- **Alignment:** Check alignment with a level and adjust as necessary.
- **Calibration:** Check temperature readings for accuracy and adjust as necessary.

Heating

Forced Air Heat

Forced air heating systems warm many modern homes. First a furnace or electric heat pump heats cool air. A blower then forces the heated air throughout your home. The heated air travels through ducts and registers into your home's living areas. Next cool air returns to the furnace by a separate register and duct known as the cold air return. Finally, the furnace heats the returning cool air and the cycle begins again.

Your forced air heating system requires comprehensive annual maintenance by a professional heating contractor at the beginning of each heating season. In addition, you should follow the simple maintenance suggestions discussed below to keep your system operating at peak performance.

- **Air Filters**

- Dirty air filters restrict airflow and reduce the heating system's efficiency. Inspect your air filters once a month when the system is in use for heating or cooling. Clean or replace dirty air filters as necessary.
- The first step in inspecting your air filters is to locate and remove the metal panel covering the filter or filters. The cover panel should be located near the heating system's blower. Next, slide out the filters. Clean or replace the filters with new filters of the same size. Slide the new filters into position according to the air-flow directions on the filter. Finally, replace the cover panel. Regular inspection, cleaning and replacement of your furnace filters will reduce your heating bills and prolong the life of your heating unit.

- **Balancing The Heat**

- If some rooms seem too hot or too cold, you can "balance" the heat distribution throughout your home. Open and close supply registers and duct dampers as necessary to control the flow of heated air.
- If your system has duct dampers, they should be found where one duct branches from another. The damper handle shows the direction of the damper vane. A damper is fully open when the handle is parallel to the duct. It is fully closed when the handle is perpendicular to the duct.
- Increase air flow to cold rooms and reduce air flow to overheated rooms. If you have problems adjusting the heat to your satisfaction, consult your professional heating contractor.

- **Professional Maintenance**

- Call your heating contractor early before the start of the heating season to schedule a service call. This way you will beat the winter rush. The contractor should do the following:
 - Thermostats: Clean and adjust all thermostats.
 - Blower Blades: Clean the furnace's blower blades.
 - Fan Belts: Check fan belt tensions and adjust as necessary. Worn or faulty fan belts should be replaced.

- **Motors:** The blower motor and any other motors should be oiled. Do not oil permanently lubricated motors.
- **Humidifier:** Examine humidifier for water leaks and flush mineral deposits from unit.
- **Heat Source:** Inspect and service the heat source as discussed at this link.
- **Ducts:** Examine supply ducts for gaps or leaks and repair as necessary.
- **Homeowner Maintenance**
 - Between maintenance calls, you should do the following once each month when your forced air system is in use for heating or cooling:
 - **Filters:** Inspect air filters and clean or replace as necessary.
 - **Registers:** Reduce dust in your home by vacuuming heat registers and the cold air return as part of your regular cleaning. Remove any objects or debris that may have fallen through the registers.
 - **Ducts:** Examine exposed supply ducts for gaps or leaks allowing heated air to escape. Look for gaps and run your hand along exposed supply ducts with the blower running to feel for escaping air. Seal any leaks with duct tape.
 - **Obstructions:** Remove any drapes, furniture or other objects blocking registers, interrupting airflow and lowering your system's efficiency.
 - **Listen:** Listen to your furnace and the rest of your system. If you hear unusual noises, follow the appliance manual's directions or consult with your professional heating contractor.

Gravity Air Heat

A gravity air system is similar to a forced air system. Both systems use air to transfer heat from the furnace to the living areas. A gravity air system does not have a blower. Instead, the natural convection created by warm air rising circulates air throughout the system. Gravity air system maintenance is similar to the forced air system maintenance. Gravity air systems, of course, do not have blowers to maintain. In addition, there are no filters to obstruct the slower moving air. Like forced air systems, gravity air systems require annual maintenance by a professional heating contractor.

Hot Water Heat

Hot water heat is a common heating system. First, oil, gas, electricity or another fuel heats water in a boiler. Next, the heated water travels through pipes to radiators, convectors or radiant piping concealed in floors, walls or ceilings. Heat from the water then radiates throughout the living space. After giving up some of its heat, cooler water returns to the boiler to be heated again.

Water can circulate through the system by gravity (lighter, heated water rises to displace heavier, cooler water) or by circulating pumps. Distribution piping can be laid out in a variety of arrangements. Some combination of thermostats, aquastat controls (on/off control based on preset water temperatures), relays and manual controls will control the system. Some systems divide the home into separate heating areas or "zones." Your heating contractor can identify and explain the particular features of your hot water system.

Although the theory is simple, you have a complicated system. Your system must be inspected and serviced by a professional heating contractor annually. Careful operation and periodic home owner maintenance are also required for safe, trouble free operation.

If you have any questions or concerns regarding the operation of your hot water or steam heating system, call your professional heating contractor. Call immediately. Do not wait for the system to fail before consulting an expert.

- **Radiators & Convector**

- Radiators and convectors are the most common radiating devices. Radiators are large cast iron tubes. Convectors are smaller copper or steel tubes surrounded by metal fins housed in grilled cabinets or baseboard units. The fins increase the convectors heated area.
- Dirt, dust and obstructions interfere with the heat transfer from the radiators or convectors to the room air. Clean the radiators or convectors with a vacuum brush attachment regularly. If a radiator cannot be cleaned with a vacuum brush attachment, spread damp newspapers under the radiator and clean with a radiator brush. Remove any drapes, furnishings or other objects obstructing air flow around your radiators or convectors. Do not place anything on top or in front of your radiators or convectors.
- Air trapped inside a radiator or convector, can interfere with heat distribution. Some radiators and convectors have automatic air valves that bleed air from the units. If yours do not, they should be bled manually at the beginning of the heating season and after adding or removing water from the system. If a radiator or convector will not heat properly, bleeding the unit may solve the problem.

- **Balancing the Heat**

- You can “balance the heat” distribution when some rooms feel too hot or too cold. First, turn the system on and allow room temperatures to stabilize. Next, open or close the valve leading to the radiator or convector to be adjusted. Then wait for room temperatures to stabilize before making another adjustment. You may need patience, it can take several days of adjustments to balance the system.

- **Freezing**

- Do not allow the water in your distribution pipes to freeze. Mechanical problems, extended power failure, fuel oil delivery problems, gas supply interruptions and other causes can shut down your system. If the system is to be off for several days, contact a heating professional to add anti-freeze to or drain water from the system. Leave the system running at a low temperature when you leave your home during the heating season.

- **Controls**

- If your system has a constant running pump, turn the pump on at the beginning of the heating season. Turn the pump off after the heating system ends. This task does not apply to gravity systems or circulation pumps controlled by aqua-static or relay controls.
- Your system heats water under pressure. An automatic pressure relief valve guards against excessive pressure. This safety control device will open, if needed, to release pressure and prevent serious damage.

- **Professional Maintenance**

- Call a professional heating contractor to schedule an annual inspection and service before the start of the heating season. The contractor should do the following:
 - Thermostats: Clean and adjust all thermostat.
 - Controls: Inspect all aquastats, relays and other controls.
 - Temperature Pressure Relief Valve: Check the temperature pressure relief valve by lifting the valve lever and allowing a small amount of water to flow into a bucket. Replace if no water flows from the valve.
 - Water Temperature: Inspect the water temperature gauge and adjust water temperature as necessary.
 - Water Pressure: Inspect the pressure temperature gauge, showing boiler water level, and make any necessary adjustments. Some systems have a pressure reducing valve that maintains the proper water level automatically.
 - Pumps & Motors: Oil all pumps and motors unless they have permanently lubricated bearings. Non-lubricated pumps are expensive to replace.
 - Radiators & Convector: Bleed radiators and convectors if there is no auto air valve.
 - Pipes: Inspect pipes for rust and leaks.
 - Heat Source: Inspect and service the heat source.

- **Homeowner Maintenance**

- Between maintenance calls, you should do the following once each month during the heating season:
 - Radiators & Convector: Clean radiators or convectors with a vacuum brush attachment.
 - Obstructions: Remove any drapes, furniture or other objects blocking radiators or convectors. These obstructions interrupt airflow and lower your system's efficiency.
 - Temperature Pressure Relief Valve: Examine the temperature pressure relief valve. Call your contractor if you see signs of leaking or discharged water.
 - Pipes: Check exposed pipes for rust and leaks. If you discover a problem, contact a heating professional immediately, before the problem worsens and extensive repairs become necessary.
 - Listen: Listen to your heating system. If you hear unusual noises, review the appliance manual for the boiler and any separate manuals for the pumps and motors. Follow the manufacturer's directions or call your heating contractor.

Steam Heat

Steam heat systems are similar to hot water systems. Boilers, pipes and radiators or convectors generate, distribute and radiate heat. The boiler heats cool water until it turns to steam. The steam then rises through the pipes to radiators or convectors. After the steam gives up its heat, it condenses back to water and runs back to the boiler to be heated again.

You should maintain your steam heat system similar to the hot water system. Steam systems must be serviced by a professional heating contractor. There are some differences between the two systems. Steam heat systems do not have pumps and pump controls to maintain. The steam boiler's water level should be monitored periodically. In addition the low-water cutoff should be flushed once a month to prevent buildup of sediment. Ask your contractor how to maintain your system throughout the heating season.

- **Gas Burner**

- Gas burners are common in forced air, hot water and steam systems. The burners can be fueled by natural gas, manufactured gas or bottled liquid propane gas. Gas burners are generally reliable and require little maintenance.
- In a gas system, an automatic gas valve opens when the thermostat calls for heat. Gas flows into a manifold and through venturi tubes where the gas mixes with air. A pilot light then ignites the air-gas mixture when it emerges from burner ports. The burning gas produces heat.
- A thermocouple next to the pilot light closes the gas valve if the pilot light goes out. This prevents unburned natural gas from accumulating and creating a fire hazard. If the thermocouple is faulty, the pilot will not light.
- Pilot lights can be electric or gas pilots. If you have problems with an electric pilot, call your professional heating contractor. You can clean and re-light a gas pilot by following the instructions printed on the front of the boiler or furnace.
- Some home owners turn off their gas pilot lights during the non-heating months. This may save energy but can create other problems. Keep the pilot burning all year to reduce condensation within the system and prevent corrosion.

- **Professional Maintenance**

- Your heating contractor should do the following during the service call:
 - Pilot: Clean the pilot orifice and adjust the pilot flame as needed.
 - Burners: Clean the burners and adjust as necessary.
 - Heat Exchanger: Clean heat exchanger surfaces. Inspect to ensure there is no deterioration allowing poisonous exhaust gases to mix with indoor air.
 - Flue: Clean flue passages to remove soot buildup and inspect for exhaust gas leaks.

- **Oil Burner**

- Two types of oil burners usually heat air or water. The most common is the high pressure or gun-type burner. The other is a vaporizing or pot-type burner.
- When the thermostat calls for heat, a high pressure or gun-type oil burner pumps oil through a nozzle, producing an oil mist. A blower mixes the oil mist with air and propels the air-oil mixture into a combustion chamber. A high-voltage spark created by two electrodes then ignites the air-oil mixture.
- In a vaporizing or pot-type burner, an oil control valve opens to allow oil to pool in a pot. A blower or natural draft adds the air needed to support combustion. An electric spark

then ignites the oil. The heat of the burning oil causes the oil in the pool to vaporize and mix with the air. The vaporized oil-air mixture then ignites and the cycle continues. The vaporizing burner requires a higher grade of oil that vaporizes easily for efficient operation.

- **Controls**

- If the oil does not ignite in either type of burner, a safety control cuts off the flow of oil to the burner. This control may be a flame sensor in the burner or a heat sensor on a stack control attached to the flue. Without this safety device, the boiler or furnace could flood with flammable oil and put your home in danger.
- A proper draft over the fire box is important for efficient operation of either oil burner. Most oil burners have a draft regulator mounted in the exhaust stack near the boiler or furnace. The regulator contains a small damper that opens and closes automatically to maintain the proper draft.

- **Professional Maintenance**

- All oil burners require an annual inspection by a professional heating contractor. A burner that is out of adjustment can waste up to 50% of your fuel dollars. Your heating contractor should do the following:
 - Burners: Clean the burners and adjust as necessary.
 - Heat Exchanger: Clean heat exchanger surfaces. Inspect to ensure there is no deterioration allowing poisonous exhaust gases to mix with indoor air.
 - Flue: Clean flue passages and inspect for exhaust gas leaks.
 - Efficiency Testing: Test burner efficiency and adjust as necessary.

- **Electric Elements**

- Electric resistance heating can be the heat source for your boiler or furnace. Electrical resistance coils are immersed directly into the furnace's flowing air or the boiler's water. It is a simple system. When a thermostat calls for heat, the resistance coils become warm and transmit their heat directly to the air or water. When the thermostat signals that the demand for heat has been satisfied, the coils are turned off.
- Have a qualified professional maintain your electric boiler or furnace once a year. Likewise, if you have any problems with the electric heating elements, call a qualified professional.

Heat Pumps

Heat pumps are another heat source for forced air heating systems. Electric heat pumps are more energy efficient than other electrical heating systems because they use electricity to move heat, instead of producing heat.

The most common heat pumps are air-to-air systems. They extract heat from the outside air and transfer it to the inside air. Other systems include solar-assisted, water-source and ground-source heat pumps. The principles for air-to-air systems discussed below also apply to other types of heat pumps.

It may seem hard to believe that heat from outside air can heat your home during freezing weather. As long as the air temperature is greater than absolute zero, -460 degrees F., there is some heat in the air. At 32 degrees F., air possesses 88% of the heat that it has at 100 degrees F.

- **Operation**

- Heat pumps move heat by moving a refrigerant with a boiling point around -20 degrees F., such as Freon, between indoor and outdoor coils or heat exchangers. The cold refrigerant, like any fluid, absorbs heat when the outside air heats it to a boil.
- A compressor then compresses the vaporized refrigerant and raises its temperature to over 100 degrees F. The heated refrigerant passes through a pipe to the inside heat exchanger, transfers its heat to the inside air and condenses to a warm liquid.
- The warm liquid then, passes through an expansion valve, reducing the refrigerant's pressure, expanding its volume and lowering its temperature (the reverse of compression). The cold refrigerant is ready to absorb heat from the outside air again and repeat the cycle.
- The air at your registers may seem cool during the heating cycle. This is because a heat pump does not deliver sudden bursts of hot air like conventional furnaces. Instead, it delivers a more constant flow of 85 to 90 degrees F. air at a higher velocity. The air feels cool because it is less than your body temperature. The air is sufficiently warm to keep you comfortable.

- **Air Conditioning**

- Air conditioning is another advantage of heat pumps. A reversing valve reverses the refrigerant's flow for cooling so that the system extracts heat from the inside and discharges it outside.

- **Supplemental Heating**

- Supplemental electric heating elements will help heat your home when cold outside air reduces the heat pump's heating capacity. Raising the thermostat setting by more than 2 degrees F. increments may also turn on the supplementary heating and increase your energy usage. For maximum efficiency, set the thermostat and leave it at that setting day and night.

- **Outdoor Unit**

- It is normal for ice to build up on the outdoor coil, or heat exchanger, during winter heating. The heat pump defrosts the ice automatically to maintain efficient operation. Steam or fog may rise from the outdoor unit during the defrost cycle.
- Do not allow snow, grass, clippings, vines, shrubs or other items to accumulate on or around the outdoor unit. Do not stack or store items on or around the unit. Maintain a minimum 12 inch clearance between the outdoor unit and snow banks and other obstructions. It is important to allow air to flow to the unit unrestricted.
- Make sure that no one steps on the copper tubing between the indoor and outdoor units. Do not place or hang items on the tubing either. The heat pump may malfunction if kinks or dents in the tubing causes refrigerant to leak or restricts refrigerant flow. Repairing or replacing the copper tubing can be expensive.

- **Professional Maintenance**

- Once a year, call a professional heating and cooling contractor to do the following:
 - Blower.: Inspect, clean and oil the indoor blower motor and blower wheel. Permanently lubricated motors should not be oiled.
 - Coils: Inspect and clean indoor and outdoor coils.
 - Drains: Inspect and clean the indoor coils primary and auxiliary drain pans and drain lines. Unplug if necessary.
 - Wiring: Inspect wiring for loose electrical connections, discolored contacts and terminals and bare or frayed wiring.
 - Performance: Check the system's performance and adjust as necessary.

- **Homeowner Maintenance**

- Between maintenance calls, you should do the following:
 - Filters: As discussed in the forced air section, filters must be cleaned once a month when the system is in use. For a heat pump system, that means cleaning the indoor unit's filter (there is no filter in the outdoor unit) once a month, 12 months a year.
 - Indoor Coil: Periodically clean the indoor coil or heat exchanger with a vacuum cleaner's soft brush attachment. If this is insufficient to clean the coil, call your heating and cooling contractor.
 - Outdoor Coil: Clean around the outdoor coil unit. Remove any leaves, grass clippings or other debris from around the unit. Clean the outdoor coil or heat exchanger using a soft brush or the vacuum attachment discussed above. If the dirt is deeper in the coil than you can reach, call your heating and cooling contractor. Do not use a garden hose to clean the outdoor coil.
 - Winter Care: If it snows in your area, keep snow away from the coil surface. Clear the snow with a broom or soft brush.
 - Listen: Listen to the outside unit and the rest of your system. If you hear unusual noises, follow the appliance manual's directions or consult with your professional heating contractor.

Electric Baseboard Heat

Electric baseboard heat is easy to control, requires little or no maintenance and provides clean, quiet, comfortable, draft-free heat. Unless you have a problem, the heating units require no professional maintenance.

Electric baseboard systems convert electricity to heat by forcing large amounts of electricity through a thin, highly resistant wire, causing the wire to become warm. The wire, or heating element, runs through a ceramic-lined metal tube surrounded by metal fins. A natural draft draws air through openings at the bottom of the baseboard unit's exterior housing. The air flows over the finned tube, picks up heat and rises through openings at the top of the housing to heat the room.

An alternate electric baseboard heating system uses fluid in a sealed tube. The heating element heats the fluid, which heats the tube and fins, which heats the passing air. The fluid retains heat and continues to warm passing air for a time after the thermostat turns off power to the heating element.

- **Controls**

- Thermostats control the flow of electricity to the baseboard units. Each unit has its own thermostat built into the unit's housing or mounted on a wall. The individual thermostats allow rooms to be heated as needed. This "zone" heating is more efficient than heating rooms that are not being used.
- Most electric baseboard units have a temperature cutoff control. This safety device prevents the heating element from burning out when obstructions block air flow to the unit.

- **Homeowner Maintenance**

- Electric baseboard heaters require little maintenance. However, you should do the following once each month when your baseboard heaters are in use for heating:
 - Dust: For efficient heat transfer, remove the baseboard unit's cover and dust the inside surfaces, the heating element and the radiator fins with a soft brush.
 - Obstructions: Remove any drapes, furniture or other objects blocking baseboard units. An obstruction can interfere with the efficient flow of heated air and heat from the units can damage the obstructing item.
 - Problems: Electric baseboard heaters are very reliable. If you ever have a problem with a baseboard unit, call a professional electrician.

Electric Ceiling Heat

Electric ceiling heat is a true maintenance free heating system. Only the thermostats controlling the heat require maintenance.

Your ceiling system converts electricity to heat by forcing large amounts of electricity through thin, highly resistant wires embedded in the ceiling. The wire becomes warm and radiates its heat to the room below.

Thermostats control the flow of electricity to the ceiling units. Each unit has its own thermostat mounted on a wall. The individual thermostats allow rooms to be heated as needed. This "zone" heating is more efficient than heating rooms that are not being used.

Do not drive nails, drill holes or screw hangers through the ceiling. This can sever the thin wires and damage your system. If you have a problem with a ceiling unit, call a professional electrician.

Air Conditioning

Central Air Conditioning

Central air conditioning systems commonly use a forced air heating system's duct work. The furnace's blower forces cool air through ducts and vents into your home. If you do not have a forced air heating system, a separate duct system can carry the cooled air.

Cooling takes place when a cold liquid (-20 degrees F. boiling point), such as Freon, passes through an evaporator coil. The refrigerant absorbs heat from the inside air and begins to boil.

An electric compressor pumps the vaporized refrigerant under pressure to a condenser coil in an outside unit. A fan cools the refrigerant in the condenser. The refrigerant passes through an expansion device. The rapidly expanding refrigerant then cools to form a cold liquid. The now cold refrigerant returns to the evaporator coil to repeat the cycle.

The cold evaporator coil will collect condensing moisture from the circulating air. A pan collects water dripping from the evaporator. The water then drains through a primary drain and possibly a second overflow drain.

- **Balancing**

- As with heating, you can “balance” the distribution of air-conditioned air throughout your home. Adjust supply registers and duct dampers as necessary. Because hot air rises and cold air falls, you may want to increase the flow to upstairs rooms and decrease the flow to downstairs rooms. If the ducts also distribute heated air, remember to readjust the registers and duct dampers before the heating season.

- **Professional Maintenance**

- Energy costs for most air conditioning systems can be high. For that reason, it is important to maintain your system properly. Ask your professional heating and cooling contractor to inspect your air conditioning system during the annual service call. The contractor should:
 - Refrigeration System: Inspect and service as necessary.
 - Coils: Inspect and clean condenser and evaporator coils.
 - Drains: Inspect and clean the evaporator coils primary and overflow drain pan and drain lines. Unplug if necessary.
 - Wiring: Inspect wiring for loose electrical connections, discolored contacts and terminals and bare or frayed wiring.
 - Motors: Oil all motors unless they have permanently lubricated bearings.
 - Performance: Check the system’s performance and adjust as necessary.

- **Homeowner Maintenance**

- Between maintenance calls, you should complete the maintenance tasks listed below once each month, or as necessary, during the cooling season.
- Filters: Air filters must be cleaned once a month when the system is in use.
- Coils: Clean the condenser and evaporator coils with a vacuum cleaner’s soft brush attachment. If this is insufficient to clean the coil, call your heating and cooling contractor.
- Listen: Listen to the outside unit and the rest of your system. If you hear unusual noises, follow the appliance manual’s directions or consult with your professional heating and cooling contractor.

Window Air Conditioners

Clean filters monthly throughout the summer. Clean condenser coils with a garden hose every spring prior to use, making sure to turn the power off.

Mechanical Ventilation

Whole-House Exhaust Fans

Whole-house exhaust fans can be very effective in reducing cooling costs, but they are very problematic in that they also present a significant air and moisture leakage problem during the northern heating season. Any summer cooling savings are sacrificed proportionally during the heating season. If a whole-house fan exists in your home, great care should be taken to weatherize the fan opening with an insulated and tightly sealed access panel/door.

Bathroom Exhaust Fans

Bathroom exhaust fans are critical in reducing interior moisture build-up in homes without Heat Recovery Ventilators (HRVs), but they are often installed poorly and, therefore, cannot perform to their potential. Typically, bathroom exhaust fans have small, low CFM blowers that require short, smooth ductwork to operate properly (always make sure that the exhaust fan vents outside and never directly into the attic). Flexible plastic ductwork or metal ductwork with large lengths and numerous elbows can make fans ineffective. Ductwork in unconditioned space must be insulated to prevent condensation. Depending upon the installation, bathroom exhaust fans often move much less air than their rated capacity. By controlling the exhaust fan with a timer rather than a wall switch, you can adjust the run time to help assure that residual showering and bathing moisture is exhausted.

Kitchen Range Hoods

Kitchen range hoods are of two types, vented (to the outside) and recirculating. Both types employ grease filters in order to capture grease and particulates. In vented range hoods, it is critical to regularly clean the grease filters to prevent grease from entering exhaust ductwork where it can condense and create a potential fire risk. Recirculating range hoods rely on a grease filter to capture grease and particulates and a carbon filter to capture odors. The grease filter must be cleaned periodically depending upon build-up. The carbon filter should be replaced annually.

HRV/ERV (Heat Recovery Ventilator/Energy Recovery Ventilator)

HRVs and ERVs can be stand-alone devices that operate independently, or they can be built-in, or added to existing HVAC systems. The only requirements are an air supply, either directly from an exterior wall or ducted to one, and an energy supply for air circulation, such as wind energy or electricity for a fan. When used with 'central' HVAC systems, then the system would be of the forced-air type.

HRV and ERV maintenance is relatively simple. The unit core should be cleaned every six months. The intake and exhaust ports should be inspected periodically for obstructions and must be kept clear of snow during the winter. Many Heat Recovery Ventilators (HRVs) are operated with a time control switch. As with radon ventilation fans, the goal is to provide adequate ventilation with minimal unit operation time. The interior humidity level is a good indicator of adequate ventilation. Interior humidity levels should not exceed 45%. An inexpensive hygrometer can be used to monitor interior humidity levels. Another indicator is moisture condensation on windows. The HRV should be operated at a rate that greatly reduces or eliminates window condensation. Adjust the unit run time until the proper humidity level is maintained.

Radon Ventilation Fans

The operation of a radon ventilation fan depends on the tested radon level within the home. The current recommended safe threshold level is less than 4 pCi/L of radon. The goal is to provide adequate radon reduction with minimal fan operation. Radon ventilation fans should be placed on an adjustable time control. A tested level of 4-7 may be remedied by periodic fan operation (Example: On 30 Min./Off 30 min. or On 20 min./Off 40min.). Higher tested levels may require continuous fan operation. Since every situation is unique, the only way to determine what strategy is most effective is by trial and error. Try a fan operation strategy and then re-test. Then make adjustment and re-test until the optimum operation strategy is realized.

Natural Ventilation

In this era of inexpensive energy, Americans have become reliant on mechanical systems to condition the air inside of our buildings. Many of us have forgotten or never were trained that nature can provide adequate ventilation and cooling at many times of the year. It is a natural phenomenon that outdoor air becomes cool and dry at night. Opening windows at night from mid-May through September, and closing windows during the daytime can greatly reduce cooling costs and can passively improve indoor air quality. The prevailing summer winds in the upper Midwest move from southwest to northeast. Opening windows on these sides of the home allows natural breezes to move through thus cooling and ventilating the home.

In two story homes or homes with clerestories it is also possible to ventilate during the daytime by capitalizing on the stack effect. Opening intake windows on the south side of the first floor and also opening exhaust windows on the north side of the second floor can provide significant temperature reduction during the daytime. However, this strategy will not reduce humidity.

Mechanical air conditioning is expensive, so utilizing natural ventilation can result in a significant reduction in energy costs.

Safety Alarms

Smoke Alarms: It is recommended that all homes have a smoke alarm installed on each living level of the home, at stairwells and in each bedroom.

Carbon Monoxide Detectors: If combustion appliances exist in the home, a carbon monoxide detector should be installed on each living level of the home. The basement alarm should be installed near the furnace/water heater area.

Notes:

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Plumbing Systems

Water and Sewage

Main Water Valves

Homeowners should locate the home's main water valve and operate it so that they are familiar with its operation should they need to turn the water off in the event of an emergency.

Rainwater Collection

Rainwater collection or "harvesting" is common in areas of the U.S. and the rest of the world where central water systems cannot supply adequate water or where central systems do not exist. Rainwater collection has several economic and environmental benefits. Collected rainwater can be used to flush toilets, wash clothes and feed exterior hydrants and irrigation systems after simple filtration. After purification it becomes potable and can be used for any purpose.

Rainwater collection also retains rainwater runoff on the site, which is environmentally beneficial. Rainwater collection can be as simple as running downspouts into a rain barrel and then re-using the collected water for plant watering, irrigation, etc. A more complex system directs water into a buried cistern from which it can be pumped for use in toilets, clothes washers and exterior hydrants/irrigation systems. Sizing rainwater collection systems depends on geographical location, roof collection area and rainwater re-use requirements. There are many online resources that can help you calculate your rainwater system. A first flush device (\$50-100) that removes most of the roof debris during the first few minutes of the rain event is essential. A submersible pump and a shallow well pressure system deliver the water as if it were from a central system. Overflow water from the cistern can be directed to a rain garden. Although experimental, rainwater has the potential to provide radiant cooling in homes with hydronic heating systems.

Exterior Hydrants

Exterior hydrants are predominantly used during the spring, summer, and fall when humidity levels are often high. Condensation on the hydrants' waterlines can be a significant contributor to residual interior moisture. Insulating the hydrant supply lines with pipe insulation (R-3 to R-4) eliminates this problem. Another potential problem with exterior hydrants is the backflow of caustic chemicals from plant fertilizer and pesticide applicators attached to garden hoses (alternative pest and fertilizer options are encouraged). Unless the exterior hydrant is equipped with a backflow preventer, the potential exists for pollutants to be drawn into the fresh water system within the home. New exterior hydrants should all be equipped with backflow preventers. In retrofit situations, it is recommended never to leave chemical applicators connected to a hose when not being used. Replacement hydrants should be equipped with backflow preventers.

Septic Systems

As a general rule, septic systems work properly for many years without any maintenance. Problems can arise, however. Most problems are related to the materials flushed into the tank, or the effectiveness of the leach field to infiltrate and evaporate effluent.

Septic systems rely on the natural action of bacteria and enzymes to decompose waste solids leaving a liquid effluent, which is dispersed through a distribution box and the leach field. Typically septic tanks have two compartments. The first compartment is where the primary decomposition process occurs. The second compartment contains less solids and completes the decomposition process.

Septic systems are very sensitive to the products flushed into them. Caustic chemicals such as paint thinner, pesticides, motor oil, certain cleaning fluids and drain cleaners, etc., should not be flushed into septic systems, as they can kill the bacteria and stop the decomposition process. This results in a build-up of solids what will eventually plug the system and require pumping the tank and re-starting the decomposition process. Occasionally the stoppage requires excavating the tank and/or distribution box for cleaning.

Another potential problem is flushing large quantities of vegetable waste into a septic system. Plant material is more difficult to breakdown and can build up, eventually requiring pumping of the tank. Small amounts of vegetable waste from a garbage disposal are acceptable, but most vegetable wastes should be composted or disposed of in another manner. The periodic addition of purchased enzymes (Rid-X, etc.) can help assure that the decomposition process is working properly.

Another problem with septic systems is the flushing of solids such as tampons, etc. These products do not decompose in a septic system and tend to collect in the distribution box or in the leach lines plugging them and causing the septic tank to back up into the home. This situation requires excavation to repair and is very expensive and destructive to the yard. Dispose of these items in a different manner.

Some solids may build up in septic systems and may require pumping every several years. If the toilet flushing action becomes slow and sluggish, that is an indicator that the tank should be pumped by a septic system professional.

Sewage Ejectors

A sewage ejector is a type of pump that is designed to pump solid materials into a sewer. If you suspect a problem with a sewage ejector, contact a plumber for repair.

Sump Pumps

Sump pumps are often essential to prevent subsurface water from entering basements, etc. In areas where high subsurface water is a regular occurrence, it is highly advisable to have a sump pump with a battery back-up system that will assure that the pump will continue to operate during an electrical power outage.

Sump pump wells or pits have the potential for silt or sand build-up and should be checked after each high water event and cleaned as required.

Another common problem with sump pumps is that they often sit idle for long periods of time (months or even years) before they are needed to operate during a rare high water event. Sump pumps spend their life in a high moisture environment and, if not operated regularly, can rust, corrode or seize up so that they cannot operate properly when called upon to do so. Sump pumps in this situation should be manually operated 3-4 times per year to assure their proper operation when required.

Condensate Pumps

Condensate pumps, which are often installed on furnaces and other appliances, can plug or cease operation and may create a wet area on the basement floor that may not be obviously related to the condensate pump. If you suspect a condensate pump is not operating, an HVAC professional or a plumber should be contacted.

Floor Drains

Floor drains often sit unused for long periods of time. This can allow the water in the drain trap to evaporate and allow sewer gasses to enter the home. If you smell sewer gas, it is most likely coming from a floor drain with a dry trap. Simply pour a pint of water in all unused floor drains every 1-2 months to prevent this problem. NOTE: If sewer gas is present during the winter, and filling the floor drain does not stop the odor, the plumbing vent pipe on the roof has most likely frozen shut and will need to be opened to eliminate the odor.

Drains and Traps

Many clogged drain problems are the result of build-up in the trap below the sink.leaning these traps is simple and well within the capability of most homeowners. Use a large pair of channel-lock pliers to loosen the nuts, remove the trap, clean and replace. Care should be taken on older metal fittings as they can be easily damaged and require replacement. Repair of the trap will eliminate the need for caustic polluting drain cleaners.

Vent Piping

The primary problem that occurs with plumbing vent piping is the vent outlet freezing shut during very cold periods during the winter. This can cause a build-up of sewer gas in the home. The problem can be solved by breaking or melting the ice from the vent opening. If the problem persists, the size of the vent outlet pipe needs to be increased to 4". The larger pipe size is much less likely to freeze closed.

Water Piping

Both hot and cold water lines can benefit from the addition of pipe insulation (R-3 to R-4). Insulating hot water lines saves energy and reduces the wait time for hot water. Insulating cold water lines also saves energy and reduces or eliminates the potential for condensation. Pipe insulation should be carefully fitted and glued or taped at all joints with the appropriate products. Manufacturers for each type of pipe insulation recommend a specific type of glue or tape to use.

Plumbing Appliances and Fixtures

Gas/Electric Tank-Type Water Heaters

Water heaters may require periodic maintenance depending upon the mineral content of the water. First of all, water heater temperature should be reduced to 125 degrees F. Most water heaters are pre-set to 140-150 degrees F. This temperature is not necessary for any household activities, and can pose a scalding risk. In addition, keeping hot water at higher than necessary temperatures is expensive and energy wasteful. You can check the water heater temperature with a common kitchen thermometer and reduce the setting accordingly.

Older water heaters can benefit from the addition of a water heater insulation blanket, which will reduce energy loss from the tank.

If the mineral content of the water is high, a build-up of condensed minerals can occur in water heater tanks. Most water heaters include an anode rod whose function is to collect mineral deposits. If you know that you have a high mineral content in your water, the anode rod should be checked annually and replaced if necessary. Also, annual flushing of the tank by draining and re-filling will remove the condensed mineral deposits that build-up on the bottom of the tank. If such build-up is not removed, it can greatly reduce the efficiency of the water heater.

Gas/Electric Tankless Water Heaters

Tankless water heaters work on the principle of heating a small volume of water very rapidly. This requires much higher temperatures at the gas-fired heat exchanger or electric heating element. Higher temperatures can result in greater build-up of mineral deposits on the heat exchanger or heating element. This condition can rapidly reduce the efficiency of the heater, and may require regular replacement of the heat exchanger or heating element. The output temperature should be set to 125 degrees F.

Lavatory/Kitchen/Utility Sinks

All sinks have the potential for leaking around their rims or at the junction of the countertop or sink top and the walls. Often these leaks are small and are not readily detected, but they contribute to the residual moisture in the home and increase the potential for structural deterioration or mold and mildew growth. Periodic replacement of caulking and rim sealants eliminate this problem.

Bathtubs

Bathtubs often have inaccessible drain traps, so removal of hair, etc., from the drain screen reduces the potential for a clogged drain and the need for drain cleaning products or professional drain cleaning. Bathtub caulk should be checked once per year for adhesion and structural integrity. Failed caulking can allow water to enter the walls around the bathtub, creating the potential for structural deterioration or mold and mildew growth.

Whirlpool Bathtubs

Whirlpool bathtub electrical circuits are required to be protected by a GFCI receptacle or circuit breaker. These receptacles or circuit breakers should be tested by pressing the test button every three months. If the test is not successful, do not use the bathtub until an electrician is contacted to remedy the problem.

Hot Tubs/Spas

Like whirlpool bathtubs, hot tubs and spas are required to be protected by a GFCI (Ground Fault Circuit Interrupter) receptacle or circuit breaker. These receptacles or circuit breakers should be tested by pressing the test button every three months. If the test is not successful, do not use the hot tub or spa until an electrician is contacted to remedy the problem.

Showers

Like bathtubs, showers also often have inaccessible drain traps, so preventing drain-plugging materials from entering the drain can greatly reduce potential clogging products. Also, failed caulking, tile grout, etc. can allow water to enter the surrounding walls creating a potential for structural deterioration or mold and mildew growth.

Toilets

Federal law requires that all toilets sold in the U.S. must use 1.6 GPF (gallons per flush) or less. If an older toilet with a 5 GPF rate still exists in a home, it should be changed. The water savings will rapidly pay for the new toilet. An even better option is to replace any single flush toilet with a dual flush toilet that offers a 0.8-0.9 GPF option for liquids and a 1.28-1.6 GPF option for solids. The incremental cost difference is modest and the life cycle savings in water use are huge.

Bidets

Bidets are an excellent alternative to a complete shower or bath. Bidets are effective for both females and males. Bidets use a fraction of the water of a shower or bath. Bidets that are not used regularly have the potential to have their drain traps dry out and permit sewer gas to enter the home similar to a floor drain. The problem is remedied by running a small amount of water down the bidet's drain.

Urinals

Urinals typically use 0.2-0.4 GPF and can result in significant water savings, especially in families with several male members.

Faucets/Fixtures

All faucets should have their aerators cleaned every 6 months. Flow restrictors should be installed in all existing faucets. All new faucets should be low-flow. The following flow rates are recommended: Shower: 1.5 gallons/minute, Lavatory/ Utility: 1 gallon/minute, Kitchen Sink: 1-1.5 gallons/minute.

Clothes Washer Faucet

If the clothes washer supply faucets are left open at all times, the potential for a broken hose while the home is unoccupied exists. This can result in catastrophic damage especially if the clothes washer is installed above finished space. A simple solution is to close the faucets when the washer is not in use. Several manufacturers offer a faucet with a single lever handle that turns off both the hot and cold supply lines with one simple action (much like a light switch).

Notes:

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Electrical Systems

Electrical

The wiring in your home should meet or exceed code requirements and safety standards for the normal use of electrical appliances. Ordinarily, small appliances may be plugged into any electrical receptacle without fear of overloading a circuit. The use of a large appliance, however, or many small appliances on the same circuit may cause an overload. If a circuit breaker trips frequently, contact a licensed electrical contractor to determine whether additional wiring is needed.

Overhead Service

An overhead electrical service (power lines) can be damaged by high winds or other storm damage (falling trees, etc.). Following major weather events the overhead service should be visually inspected to make sure that the wire is not damaged and that the mast is intact and is securely fastened to the building. Any irregularities should be reported to the electrical utility provider.

Underground Service

Occasionally, underground service wires can become exposed due to earth settling or washout from a heavy rain event. Exposed wires pose a significant safety hazard and should be re-buried immediately by a professional. PVC conduit housing service entrance wires can be damaged by mowers and other power equipment. Most utilities are responsible for all equipment from their transformer to your meter. The homeowner is responsible for all equipment from the meter into the building. An electrician will be required to repair or replace any damaged equipment that is the homeowners responsibility.

Electrical Meters

The electrical meter should be periodically visually inspected to verify that the meter seal and glass cover are intact.

Service Entrance Panel

The electrical service entrance panel should only be accessed by an electrician. All electrical service panels must have a cover to prevent accidental contact with energized terminals within the panel. Inspect the panel cover to ensure that all unused circuit breaker openings are covered with a protective plug. If all circuits are not listed on the service entrance panel cover, the circuits should be identified and recorded on the panel cover. This can aid in future repairs.

Grounding

Proper grounding is essential for a safe electrical system. Lightning and surge protection devices are only as effective as the grounding system they are connected to. Households are rapidly becoming more electronic and digital. Electronic equipment is very sensitive to lightning strikes and power surges. Utility studies have shown that most residential grounding systems are not optimally effective. Many utilities require two ground rods placed a minimum of six feet apart and tied together in order to increase the grounding potential of the system. Grounding systems are required to have a maximum electrical resistance of 25 Ohms. Most utilities will test your grounding system upon request.

Lightning Protection System

Complete home lightning protection systems are less common today than in times past, but considering the potential damage that lightning strikes pose to a home, it is an option worth considering. Contrary to popular belief, the function of a lightning protection system is not to attract and ground lightning strikes but rather to dissipate the electrical charge that builds up in the earth during a thunderstorm. This greatly reduces the potential for a lightning strike. An economical alternative to a complete lightning protection system is the installation of a lightning arrester on the home's electrical system. Lightning arrestors need to be installed by an electrician.

Electricity Usage Monitors

Electrical usage monitors are useful in determining the power consumption of appliances and devices and can help a homeowner reduce their power usage. Monitors that check one appliance at a time can be purchased for \$30-50. By plugging the monitor in and then plugging the appliance into the monitor the homeowner can see the current usage, the current cost per day, the projected cost for the month, etc. Whole-house electricity usage monitors are tied to the electrical system and monitor total electrical usage. Some models identify each appliance in the home and provide continuous monitoring of their use. This information is then graphed on a computer so that the homeowner can see when they use the appliance and for what period of time.

Most models also allow the homeowner to project energy cost savings based on the altered use of various appliances. These monitors are very effective at identifying the conservation and cost saving opportunities that are available in every home. Quality whole-house electricity usage monitors can be purchased for \$150-300 and have many additional features not mentioned here.

Circuit Overloading

Overloading electrical circuits presents a significant fire hazard. Increasing the fuse or breaker amperage size will allow more electrical current to pass through undersized wire, which can increase heat build-up and potentially trigger a fire. The safer solution is to move some devices to other circuits. Household extension cords typically have much smaller wire than the wire installed in the home. Excessive loads on extension cords also pose a significant fire hazard. As Americans continue to add new electrical devices to their homes, the fire risk from older electrical systems increases. In retrofit situations, it is recommended that the electrical service entrance be upgraded to a 200 Amp minimum. 300- 400 Amp is preferred on larger homes.

Phantom Loads

In 2009, phantom electrical loads accounted for 10% of all the electricity used in the U.S. Phantom electrical loads are those numerous small loads that homes have operating 24/7. Any appliance that has a remote control is using energy even when it is off so that it can respond to the remote control when required. All rechargeable devices utilize a transformer that reduces the utility voltage to the voltage amount required by the device. (Cell phones, laptops, electric toothbrushes, cordless shavers, cordless vacuums, etc.). The transformers used to charge these devices are using energy when they are plugged in whether or not the device is being charged, wasting energy and money.

Phantom loads can be eliminated by unplugging or turning off charging transformers and remotely operated devices. This can be done by having transformers plugged into a common out-

let strip that can be turned off when it is not required. In new construction, switched circuits can be installed to control phantom loads. Such circuits can be controlled by an occupancy sensor that automatically turns the circuit off when occupants leave the room.

Circuit Breakers

Circuit breakers protect the electrical wiring and equipment in your home. They are heavy-duty switches that serve the same purpose as fuses. When a circuit is carrying more current than is safe, the breaker switches to RESET. On most breakers, the switch has to be pushed to OFF and then to ON after the circuit trips.

“Exercise” your circuit breakers at least once a year by switching the breakers OFF and then back ON again by hand. If a breaker is frozen in the ON position, it will not trip when needed. By exercising your circuit breakers, you can verify their mechanical parts move freely. Have a professional electrician replace any circuit breaker that does not switch OFF and ON properly.

AFCI Circuit Breakers

An Arc Fault Circuit Interrupter (AFCI) is a circuit breaker designed to prevent fires by detecting an unintended electrical arc and disconnecting the power before the arc starts a fire. An AFCI must distinguish between a harmless arc that occurs incidental to normal operation of switches, plugs and brushed motors and an undesirable arc that can occur, for example, in a lamp cord that has a broken conductor in the cord.

Arc faults in a home are one of the leading causes for electrical wiring fires. Each year in the United States, over 40,000 fires are attributed to home electrical wiring. These fires result in over 350 deaths and over 1,400 injuries each year.

Conventional circuit breakers only respond to overloads and short circuits, so they do not protect against arcing conditions that produce erratic, and often reduced current. An AFCI is selective so that normal arcs do not cause it to trip. The AFCI circuitry continuously monitors the current and discriminates between normal and unwanted arcing conditions. Once an unwanted arcing condition is detected, the AFCI opens its internal contacts, thus de-energizing the circuit and reducing the potential for a fire to occur. An AFCI should not trip during normal arcing conditions, which can occur when a switch is opened or a plug is pulled from a receptacle.

AFCI circuit breakers must be tested periodically according to the manufacturers’ instructions.

GFCI Receptacles

GFCI (ground Fault Circuit Interrupter) receptacles must be tested periodically according to the manufacturers’ instructions.

Lightning protection and surge protection devices are relatively inexpensive. If your system does not have this protection, it is highly recommended that you have them installed. Some insurance companies provide these devices free of charge, as they reduce their risk resulting from a surge event.

Appliance Cords

Cords on appliances and lamps are often subject to pulling and twisting that can sever the wires inside and break down the insulation. This can result in a short circuit. Periodically inspect electrical appliance cords for signs of damage. **Caution.** Replace — do not repair — any electrical cord with broken wires or worn insulation.

Switches and Controls

Electricity is the most easily controlled of all energy sources. Timers, motion sensors, occupancy sensors, humidistats, dehumidistats, thermostats, solid state dimmers, photoelectric switches, etc. are a few examples of electrical switches and controls that can be used to reduce electrical usage, increase occupant comfort, modify behavior, and improve the home's durability.

Lighting

In 2012, conventional incandescent light bulbs started being phased out of the U.S. market. Only bulbs that have an improved efficiency of 25-30% will eventually be available. CFL (compact fluorescent light), LED (light emitting diode) and others will be the only light bulb choices available.

Lamps (Bulbs)

CFL lamps typically use 75% less energy to provide the same amount of light as an incandescent bulb. Changing all incandescent lamps to CFL lamps will return the investment in a matter of months and provide significant savings going forward. CFL lamps can last 4-5 times as long as incandescent lamps, but that life can be shortened by frequently turning the lamp on and off. The general rule of thumb is the 15-minute rule – if you are going to be gone from a room for longer than 15 minutes, turn the lights off. If you are returning within 15 minutes, leave them on as this decreases the wear and tear on the CFL bulb and extends its life. LED lamps are much more expensive than CFL lamps, but they last 2-3 times longer and generate almost no heat. As the price of LED lamps declines, they will become a more practical and cost effective option.

Fixtures

In anticipation of the 2012 change, manufacturers are producing a wider variety lighting fixtures that have the fluorescent transformers installed in the fixture so that the lamp does not have to have an integral transformer. These lamps are less expensive and reduce the environmental consequences of CFL disposal.

Landscape Lighting

Landscape lighting is an attractive addition to the exterior of a home, but can constitute a significant energy expense if used regularly. Many manufacturers offer solar powered landscape lighting that charges batteries during the day and powers the lights in the evening.

Security Lighting

Exterior security lighting on urban homes should be controlled by a motion sensor and checked periodically for proper function. In rural locations, some utilities offer security lighting for a fixed monthly fee. These lights tend to be large with high lumen output and may be required in locations where a large area must be illuminated. If large area coverage is not required, it may be advisable to eliminate the utility provided security light and rely on house mounted CFL fixtures on motion sensors.

Smoke/Fire Alarms

Smoke and fire alarms should be tested regularly in accordance with manufacturers' instructions. Low batteries should be replaced immediately.

Notes:

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Appliances

Appliances offer homeowners the greatest opportunity for energy saving by purchasing energy efficient appliances and then operating them in the most efficient manner.

As with all appliances, homeowners must read the owner's manual and familiarize themselves with the appliance's features and proper operation. All appliance owner's manuals should be retained for future reference.

If an electric appliance fails to operate, be sure that it is plugged in before you call a repair service. Be sure the circuit breaker for that appliance is on. If a gas appliance fails to work, check to see that the pilot light is lit. If you suspect a gas leak, turn off the main gas shutoff valve near the meter and call the gas company immediately.

Many appliances such as refrigerators, washing machines, dryers, dishwashers, etc., have motors that require periodic servicing. Consult the manuals that came with the appliances for information about care of these motors.

Inspect the cold water supply pipe, the hot water outlet pipe, the water heater's metal housing and along the unit's base for rust, corrosion and signs of leaks. If you find a moist area, wipe it with a towel to determine whether the moisture is from a leak or from condensation. Repair all leaks or have the tank replaced if necessary.

If you have a gas or oil-fired water heater, you should have the unit professionally serviced at the same time your heating system is serviced. The service person should inspect and test the temperature and pressure relief valve, drain sediment from the tank, inspect the flue assembly and clean and adjust the burner ports.

Garbage Disposals

Your garbage disposal's instruction booklet gives precise directions for the disposal's operation. Be careful not to clog disposal drains with grease. You should be as careful of grease in your disposal as you are with any other drain.

Clean your garbage disposal by grinding ice cubes in the disposal regularly. Then "flush" your garbage disposal with hot water and baking soda once a month to prevent residual grease and soap from fouling your garbage disposal or clogging its drain.

Always run cold water when the disposal is on. Should the disposal drain become clogged, do not put chemicals down the disposal. If your disposal becomes overloaded with a substance it cannot grind, consult your instruction book.

Twice a year, tighten the drain connections and fasteners and look for signs of water leaks. See the manufacturer's instruction booklet for more information.

Automatic Dishwashers

Clean your dishwasher control panel with a lightly dampened cloth. Dry thoroughly. Do not use abrasives or sharp objects on the panel. Clean the outside with a good appliance polish wax. Scouring pads and harsh and gritty cleaners can damage the outside cabinet.

Clean the strainer and the spray arm once every three months. Other than that, the inside of the dishwasher should never need cleaning.

Inspect for water leaks every six months. First, complete a load of dishes in the dishwasher. Then, look along the front of the dishwasher for leaking water. Next, take off the front panel along the bottom of the unit and look underneath for signs of leaks. Look for water, water spots and signs of water damage. Have any leaks repaired immediately.

Ovens

Your oven's appliance manual sets out safety precautions, operation instructions and oven care suggestions. Do not use scouring pads or abrasive cleaners on the control dial area, front door or trim of your oven.

You can test your oven's thermostat by placing an accurate oven thermometer in the center of a 350 degree oven. After 20 minutes, check the reading. If it's more than 100 degrees too high or too low, replace the control. If the difference is less than 100 degrees, pull the oven control knob off and locate the calibration screw. Tighten or loosen the screw. Keep testing until the temperature is correct.

Cooktops

Review your cooktop's appliance booklet for safety precautions, operation instructions, care and maintenance suggestions and troubleshooting information. Follow the manufacturer's recommended cooking procedures.

Never let the burners get too dirty. If you have a spill over, let the burner cool, then clean immediately. If stains and cooking soil are allowed to burn onto the burner, they become more difficult to remove. Be careful when lifting heavy grills.

Range Fans

A range fan near your cooktop vents cooking fumes. This fan contains a filter for trapping grease. This filter should be removed and cleaned periodically. You can clean this metal filter by hand with dishwashing detergent and water or place it in the dishwasher. Clean the fan blades and the fan's housing twice a year.

Smoke Detectors

A smoke detector may be the only warning that saves you and your household from a fire while you sleep. Test your detector once each month by pressing the test button. The detector should sound its alarm. Pick a day, such as payday or the first day of the month, and test all smoke detectors. When you adjust your clocks in the spring and fall, change the batteries in each smoke detector.

Dust can interfere with the smoke detector's sensor. Use a vacuum attachment to clean around your smoke detectors and their sensor's when you change batteries. By maintaining your smoke detectors, you may save the life of someone you love.

Refrigerators

Refrigerators have a drain in their floor. Water from melting frost flows out this drain, into a pan and evaporates. Food particles can clog the drain and cause odors. Clean the drain regularly by removing its stopper and using a pipe cleaner or similar device to push any accumulations through to the drain pan below. Force a cleaning solution of detergent and water through the drain. Empty, wash and replace the pan. You should also vacuum the condenser coils along the back or bottom of the refrigerator.

The door gasket, if washed often with soapy water, should last as long as the refrigerator. If you suspect the gasket is no longer sealing well, test it by holding a dollar bill so it's caught in the closed door. You should feel resistance when you pull the bill out. Repeat the test in several places. A gasket that does not pass the test or that is obviously cracked or torn should be replaced.

Temperature settings for refrigerator and freezer compartments are given arbitrary numbers by manufacturers (for example, 1 through 9, warmest to coldest). Generally, 37 degrees Fahrenheit is ideal for the refrigerator compartment and 0 degrees Fahrenheit for the freezer. If you suspect a problem, test the temperatures with a refrigerator or outdoor thermometer.

Clothes Washers

If you have not done so already, insert your clothes washer instruction booklet in Part 6 of this Homeowners Guide. Clean the water inlet filters and inspect hoses for leaks twice a year. Replace hoses if necessary.

If your washer ever fails to work, first check its power supply. Be sure the cord is plugged in and not defective. Next check the circuit breaker. Also, be sure the faucets are fully open and screens in the water inlet valve or hoses aren't clogged. For causes and remedies of these and other problems, see your instruction booklet.

Clothes Dryers

Vacuum lint from the dryer's ducts and surrounding areas twice a year.

If your dryer doesn't do its job, be sure the cord is plugged in and isn't defective. Next, check the circuit breaker. After that, clean the lint trap and remove any lint from the exhaust duct with a vacuum or piece of wire.

If you have a gas dryer and it doesn't heat, have your gas company or a qualified professional inspect the pilot or adjust the air-gas ratio.

For causes and remedies of these and other problems, see your appliance manual.

Water Heaters

Most homes have domestic hot water that is heated by electric, gas or oil water heaters. As a hot water faucet is opened, heated water is drawn from the top of the water heater's tank. The heated water is replaced by cold water that flows into the bottom of the tank. When the water temperature drops below a pre-set minimum, a thermostat activates electric heating elements or a gas or oil burner.

A temperature-pressure relief valve guards against excessive temperatures and pressures. This safety valve should be located near the top of the tank. A discharge pipe should be attached to the relief valve and run down the side of the tank to just above the floor. This discharge pipe prevents burns and other damage from discharged water. There must be no valves, caps or other obstructions preventing discharged water from draining rapidly.

If the temperature-pressure relief valve ever discharges steam or boiling water, shut off the water heater and call a plumber immediately.

Sediment can accumulate at the bottom of your water heater's tank. This reduces the unit's efficiency and can cause serious damage. Unusual noises from the tank such as "whistling and sizzling" or "rumbling and cracking" can be a sign of sediment buildup. A drain valve near the

bottom of the water heater can be used to prevent sediment accumulation. Once a month, place a bucket under the valve and drain water and sediment from the bottom of the tank (5 gallons or so) until the water runs clear.

You should also inspect your water heater once every 6 months. During the inspection, check to see whether there are any signs that water has leaked or been discharged from the temperature-pressure relief valve. If so, call a plumber immediately. The relief valve may be faulty or there may be a problem with the water heater.

Test the relief valve by lifting or pressing down on its handle. Water should flow through the valve and down the discharge pipe. If water does not flow through the valve or if water continues to drip from the valve after the handle is released, call a plumber immediately to replace the defective valve.

Static Air Cleaners

Static (electrostatic) air filters clean the air by using static electricity - a safe, naturally occurring phenomenon. An electrostatic charge is generated by air flowing through a maze of static prone fibers. Airborne particles are attracted and held by the static charge until released by washing. Refer to the owner's manual for instructions regarding the performance of these operations.

Humidifiers

A humidifier is a household appliance that increases humidity (moisture) in a single room or in the entire house. There are point-of-use humidifiers, which are commonly used to humidify a single room, and whole-house or furnace humidifiers, which connect to a home's HVAC system to provide humidity to the entire house. Humidifier elements can experience sediment build-up and may require cleaning. Perform the cleaning prior to the heating season. Humidifier elements are inexpensive and are easily replaced if necessary.

Dehumidifiers

A dehumidifier is generally a household appliance which reduces the level of humidity in the air, usually for health reasons. Humid air can cause mold and mildew to grow inside homes, both of which pose numerous health risks. Very humid climates or air make some people extremely uncomfortable, causing excessive sweating that can't evaporate in the already-moisture-saturated air. It can also cause condensation that can disrupt sleeping, or prevent laundry from drying thoroughly enough to prevent mustiness. Higher humidity is also preferred by most pests, including clothes moths, fleas, cockroaches, woodlice and dust mites. Relative humidity in dwellings is preferably 30 to 50 percent.

By their operation, dehumidifiers produce an excess of water which has been removed from the conditioned air. This water, usually called condensate in its liquid form, must be collected and disposed of. Some dehumidifier designs dispose of excess water in a vapor, rather than liquid form.

Dehumidifiers should be thoroughly cleaned annually. Unplug prior to cleaning. An inexpensive hygrometer can be purchased to monitor the level. Excessive window condensation when outdoor temperatures range from 0-20 degrees F is also a good indicator of excessive interior moisture levels. Dehumidification may be required if high humidity levels are present.

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Homeowners Guide

to Managing and Maintaining Your Home

CHAPTER | 5



Home Health and Safety

- » Asthma in Your Home
- » Mold in Your Home
- » Home Safety Checklist

Asthma in Your Home

While the exact cause of asthma is unknown, it appears to result from a complex interaction of predisposing factors (tendency to have allergies), causal factors that may sensitize the airways (such as animal dander, dust mites, mold, cockroaches and workplace contaminants) and contributing factors, such as tobacco smoke during pregnancy and childhood, respiratory infections and indoor and outdoor air quality.

Management of asthma involves the individual, their family and their physician. Asthma specialists recognize the importance of avoiding or controlling known environmental factors, or “triggers,” that aggravate asthma. Triggers include biological pollutants, such as mold, house dust mites and pollen, as well as irritating pollutants, such as nitrogen oxide, ozone and formaldehyde. For some individuals, avoiding allergens (substances that produce allergic reactions) can be the most important element of asthma management. Implementing a management plan that includes reduction of aeroallergens, molds, tobacco smoke, vehicle and industry emissions, noxious odors and scents that can trigger asthma episodes is recommended. Increasing medication should not be a substitute for avoiding exposure to allergens and irritants.

This section of the guide deals with reducing your exposure to causal and contributing factors in the home. The recommendations are aimed at reducing exposure to allergens and other substances that are known to have a potential impact on respiratory health and indoor air quality. When allergens are involved, elimination is preferable to reduction, since even very small amounts can provoke symptoms.

Understanding Volatile Organic Compounds (VOCs) in Your Home

If you or a family member suffer from Asthma or other respiratory diseases, you are likely aware of some of the causes and, if severe enough, are under a doctor's care. However, what most homeowners are not aware of is how the decisions they make with regard to product or material selections, as well as their lifestyle, can have a positive impact on improving the quality of the environment in their homes. Therefore, if you are building a new home, renovating your existing home, or simply replacing existing products and materials (such as carpet, paint, and furniture), you should be aware of Volatile Organic Compounds.

VOCs are a large group of carbon-based chemicals that easily evaporate at room temperature. While most people can smell high levels of some VOCs, other VOCs have no odor. Odor does not indicate the level of risk from inhalation of this group of chemicals. There are thousands of different VOCs produced and used in our daily lives. Some common examples include:

- Acetone
- Benzene
- Ethylene glycol
- Formaldehyde
- Methylene chloride
- Perchloroethylene
- Toluene
- Xylene

Where do VOCs come from?

Many products we have in our homes release or “off-gas” VOCs. Some examples of sources of VOCs are:

- Building Materials
- Carpets and adhesives
- Composite wood products
- Paints
- Sealing caulks
- Solvents
- Upholstery fabrics
- Varnishes
- Vinyl Floors

Home and Personal Care Products

- Air fresheners
- Air cleaners that produce ozone
- Cleaning and disinfecting chemicals
- Cosmetics
- Fuel oil, gasoline
- Moth balls
- Vehicle exhaust running a car in an attached garage

Behaviors

- Cooking
- Dry cleaning
- Hobbies
- Newspapers
- Non-electric space heaters
- Photocopiers
- Smoking
- Stored paints and chemicals
- Wood burning stoves

Studies have shown that the level of VOCs indoors is generally two to five times higher than the level of VOCs outdoors. VOC concentrations in indoor air depend on many factors, including the:

- Amount of VOCs in a product

- Rate at which the VOCs are released
- Volume of the air in the room/building
- Ventilation rate of the area
- Outdoor concentrations of VOCs

What are the health effects of VOC exposure?

The risk of health effects from inhaling any chemical depends on how much is in the air, how long and how often a person breathes it in. Scientists look at short-term (acute) exposures as hours to days or long-term (chronic) exposures as years to even lifetime.

Breathing low levels of VOCs for long periods of time may increase some people's risk of health problems. Several studies suggest that exposure to VOCs may make symptoms worse in people who have asthma or are particularly sensitive to chemicals. These are much different exposures than occupational exposures to VOCs.

VOCs refer to a group of chemicals. Each chemical has its own toxicity and potential for causing different health effects. Common symptoms of exposure to VOCs include:

Short-Term (Acute) to high levels of VOCs

- Eye, nose and throat irritation
- Headaches
- Nausea / Vomiting
- Dizziness
- Worsening of asthma symptoms

Long-Term (Chronic) to high levels of VOCs

Increased risk of:

- Cancer
- Liver damage
- Kidney damage
- Central Nervous System damage

What levels of VOCs is safe?

The best health protection measure is to limit your exposure to products and materials that contain VOCs when possible. If you think you may be having health problems caused by VOCs, try reducing levels in your home. If symptoms persist, consult with your doctor to rule out other serious health conditions that may have similar symptoms.

Health Risk Values (HRVs) are "concentrations of chemicals or defined mixtures of chemicals emitted to air that are unlikely to pose a significant risk of harmful effects when humans are exposed to those concentrations over a specified time."

Most health related studies have been conducted on single chemicals. Less is known about the health effects of exposure to combinations of chemicals. Because the toxicity of a VOC varies for each individual chemical, there are no federal health-based standards for VOCs as a group.

Are some people at greater risk from VOC exposure than others?

Persons with respiratory problems such as asthma, young children, elderly, and persons with heightened sensitivity to chemicals may be more susceptible to irritation and illness from VOCs.

What can I do about VOCs that are in my home?

Although home screening kits (devices) are available to measure total volatile organic compound (TVOC) levels they are of limited use and won't correct a VOC problem. Instead of testing, the first step is to conduct an inspection of your home for the common sources of VOCs. Sources that may be problematic include household furnishings which tend to off-gas more VOCs when they are new. Possible sources include carpet, furniture, paint, plastics or electronic devices.

Once you determine the probable source(s) of VOCs, steps can be taken to reduce your exposure. If you are unable to determine probable sources, a professional indoor air quality investigator or an industrial hygienist can be consulted.

How do I reduce the levels of VOCs in my home?

The most effective action is to remove the product that gives off VOCs. Most products containing VOCs will off-gas within a short period of time, although some will continue to give off VOCs for a longer period of time.

Some steps you can take to reduce your exposure to VOCs in the home are:

1. Source control: Remove or reduce the number of products in your home that give off VOCs. Only purchase amounts of chemicals that you know you will use and carefully follow directions on product labels. Remove unused chemicals from the home because stored chemicals in closed containers can sometimes "leak" and release VOCs into indoor air. Check with your community for household hazardous waste collection sites.

For new items consider purchasing:

- floor models that have been allowed to off-gas in the store
- solid wood items with low emitting finishes
- new products that contain low or no VOCs (environmentally preferable products)

As a last resort, airtight sealers have been used to minimize VOC emissions. Check with vendors of composite wood products to choose a non-toxic sealant to reduce exposure to VOCs.

2. Ventilation and climate control can be used to reduce exposure to VOCs.

- Increase ventilation by opening doors and windows, use fans, maximize air brought in from outside
- Keep both the temperature and relative humidity as low as possible or comfortable. Chemicals will off-gas more under warmer conditions with high humidity
- Wood smoke is an irritant for people with asthma. If you are using a wood stove, ensure there is no backdrafting. If neighbors use wood-heating systems, you may have to make your house more airtight to prevent the smoke from entering your home.

Air Purifiers

Ozone generators are not recommended since ozone is an irritant that may aggravate asthma. Furthermore, ozone effectiveness in controlling mold and other pollutants is questionable. Ozone can be produced as a by-product of negative ionizers and improperly wired electrostatic filters.

Most portable air cleaners have a filter to remove particulates and a carbon filter (usually a cloth or membrane) to remove gases. The unit passes the room air through the filters to remove the pollutants. Several air purifiers have been shown to reduce the level of irritants in test chambers, but the health benefits have yet to be demonstrated consistently. The effectiveness of an air cleaner depends on several factors:

- The amount of air the unit can pull through. Small tabletop units have limited use in larger areas.
- The effectiveness of the filters. This refers not only to the appropriateness of the filter (a particulate filter will not remove a gaseous pollutant) but also to how much the filter is capable of removing before it is replaced. A carbon cloth or membrane can adsorb (hold) only so much gaseous contaminant, after which the filter will return removed contaminants to the air.
- The rate pollutants are being generated in the room or space. If there is a continuous source of pollutants, their production rate may be greater than the air purifiers removal rate.
- The size of the room. A room air filter may have only a limited impact on the air in a large room with many pollutant sources. It may also have a limited impact in a small room that is well connected to the rest of the house by doors, ducts, leaks, etc., as pollutants will continue to move into the space.

Green Building Practices

Green Building practices, and more specifically state and local Green Building Codes as well as Green Building Rating systems, embrace minimum Indoor Air Quality performance. Addressed are recommended standards on Low-Emitting Materials that include:

- Adhesives and Sealants
- Paints and Coatings
- Flooring Systems
- Composite Wood and Agrifiber Products
- Furniture and Furnishings

In Summary

The recommended approach is to find the sources of contaminants and remove or reduce them. A portable air purifier may be an option when source control is not possible.

If you have a choice, perform replacement or renovations when home is unoccupied or during seasons that will allow for additional ventilation.

Mold in Your Home

- Mold can be harmful or helpful — depending on where it grows
- Mold needs moisture to grow
- Mold does not grow on dry materials
- Mold growing inside a home can affect the occupants
- Occupants can learn to recognize mold

Molds are microscopic organisms that grow on wet or damp surfaces. Under normal circumstances, preventing moisture from reaching high levels in your house is the only way of limiting mold growth. To control the growth of molds, the relative humidity (RH) should be low enough to prevent moisture condensation on windows. This may mean 35 per cent RH or less.

Exposure to indoor mold is associated with an increased prevalence of asthma-related symptoms, such as chronic wheezing, irritation symptoms and non-specific symptoms. Asthma-like responses, inflammatory responses in the lungs of rodents and severe histological and biochemical changes have been observed in laboratory animal studies.

Why is mold growing in my home?

Molds are part of the natural environment. Outdoors, molds play a part in nature by breaking down dead organic matter such as fallen leaves and dead trees, but indoors, mold growth should be avoided. Molds reproduce by means of tiny spores; the spores are invisible to the naked eye and float through outdoor and indoor air. Mold may begin growing indoors when mold spores land on surfaces that are wet. There are many types of mold, and none of them will grow without water or moisture.

Can mold cause health problems?

Molds are usually not a problem indoors, unless mold spores land on a wet or damp spot and begin growing. Molds have the potential to cause health problems. Molds produce allergens (substances that can cause allergic reactions), irritants, and in some cases, potentially toxic substances (mycotoxins). Inhaling or touching mold or mold spores may cause allergic reactions in sensitive individuals. Allergic responses include hay fever-type symptoms, such as sneezing, runny nose, red eyes, and skin rash (dermatitis). Allergic reactions to mold are common. They can be immediate or delayed. Molds can also cause asthma attacks in people with asthma who are allergic to mold. In addition, mold exposure can irritate the eyes, skin, nose, throat, and lungs of both mold-allergic and non-allergic people. Symptoms other than the allergic and irritant types are not commonly reported as a result of inhaling mold. Research on mold and health effects is ongoing. This brochure provides a brief overview; it does not describe all potential health effects related to mold exposure. For more detailed information consult a health professional. You may also wish to consult your state or local health department.

How do I get rid of mold?

It is impossible to get rid of all mold and mold spores indoors as some mold spores will be found floating through the air and in house dust. The mold spores will not grow if moisture is not present. Indoor mold growth can and should be prevented or controlled by controlling moisture indoors. If there is mold growth in your home, you must clean up the mold and fix the water problem.

Mold Cleanup Tips and Techniques

Who should do the cleanup depends on a number of factors. One consideration is the size of the mold problem. If the moldy area is less than about 10 square feet (less than roughly a 3 ft. by 3 ft. patch), in most cases you can handle the job yourself.

- Fix plumbing leaks and other water problems as soon as possible. Dry all items completely.
- Scrub mold off hard surfaces with detergent and water, and dry completely.
- Absorbent or porous materials, such as ceiling tiles and carpet, may have to be thrown away if they become moldy. Mold can grow on or fill in the empty spaces and crevices of porous materials, so the mold may be difficult or impossible to remove completely.
- Avoid exposing yourself or others to mold.
- Do not paint or caulk moldy surfaces. Clean up the mold and dry the surfaces before painting. Paint applied over moldy surfaces is likely to peel.
- If you are unsure about how to clean an item, or if the item is expensive or of sentimental value, you may wish to consult a specialist. Specialists in furniture repair, restoration, painting, art restoration and conservation, carpet and rug cleaning, water damage, and fire or water restoration are commonly listed in phone books. Be sure to ask for and check references. Look for specialists who are affiliated with professional organizations.

Bathroom Tip

- Places that are often or always damp can be hard to maintain completely free of mold. If there's some mold in the shower or elsewhere in the bathroom that seems to reappear, increasing ventilation (running a fan or opening a window) and cleaning more frequently will usually prevent mold from recurring, or at least keep the mold to a minimum.

However, if there has been a lot of water damage, and/or mold growth covers more than 10 square feet, and you choose to hire a contractor or other professional service provider to do the cleanup, make sure the contractor has experience cleaning up mold. Check references and ask the contractor to follow the recommendations in EPA's Mold Remediation in Schools and Commercial Buildings, the guidelines of the American Conference of Governmental Industrial Hygienists (ACGIH), or other guidelines from professional or government organizations.

If you suspect that the heating/ventilation/air conditioning (HVAC) system may be contaminated with mold (it is part of an identified moisture problem, for instance, or there is mold near the intake to the system), consult EPA's guide *Should You Have the Air Ducts in Your Home Cleaned?* before taking further action. Do not run the HVAC system if you know or suspect that it is contaminated with mold - it could spread mold throughout the building.

If the water and/or mold damage was caused by sewage or other contaminated water, then call in a professional who has experience cleaning and fixing buildings damaged by contaminated water.

If you have health concerns, consult a health professional before starting cleanup.

What to Wear When Cleaning Moldy Areas

Avoid breathing in mold or mold spores. In order to limit your exposure to airborne mold, you may want to wear an N-95 respirator, available at many hardware stores and from companies

that advertise on the Internet. (They cost about \$12 to \$25.) Some N-95 respirators resemble a paper dust mask with a nozzle on the front, others are made primarily of plastic or rubber and have removable cartridges that trap most of the mold spores from entering. In order to be effective, the respirator or mask must fit properly, so carefully follow the instructions supplied with the respirator. Please note that the Occupational Safety and Health Administration (OSHA) requires that respirators fit properly (fit testing) when used in an occupational setting; consult OSHA for more information (800-321-OSHA or www.osha.gov).

Wear gloves

- Long gloves that extend to the middle of the forearm are recommended. When working with water and a mild detergent, ordinary household rubber gloves may be used. If you are using a disinfectant, a biocide such as chlorine bleach, or a strong cleaning solution, you should select gloves made from natural rubber, neoprene, nitrile, polyurethane, or PVC. Avoid touching mold or moldy items with your bare hands.

Wear goggles

- Goggles that do not have ventilation holes are recommended. Avoid getting mold or mold spores in your eyes.

How Do I Know When the Remediation or Cleanup is Finished?

You must have completely fixed the water or moisture problem before the cleanup or remediation can be considered finished.

- You should have completed mold removal. Visible mold and moldy odors should not be present. Please note that mold may cause staining and cosmetic damage.
- You should have revisited the site(s) shortly after cleanup and it should show no signs of water damage or mold growth.
- People should have been able to occupy or re-occupy the area without health complaints or physical symptoms.
- Ultimately, this is a judgment call; there is no easy answer.

Moisture and Mold Prevention and Control Tips

- Act quickly when water leaks or spills occur indoors. If wet or damp materials or areas are dried 24-48 hours after a leak or spill happens, in most cases mold will not grow.
- Clean and repair roof gutters regularly.
- Make sure the ground slopes away from the building foundation, so that water does not enter or collect around the foundation.
- Keep air conditioning drip pans clean and the drain lines unobstructed and flowing properly.
- Keep indoor humidity low. If possible, keep indoor humidity below 60 percent (ideally between 30 and 50 percent) relative humidity. Relative humidity can be measured with a moisture or humidity meter, a small, inexpensive (\$10-\$50) instrument available at many hardware stores.

- If you see condensation or moisture collecting on windows, walls or pipes ACT QUICKLY to dry the wet surface and reduce the moisture/water source. Condensation can be a sign of high humidity.

Actions that will help to reduce humidity

- Reduce the humidity.
 - Increase ventilation or air movement by opening doors and/or windows, when practical. Use fans as needed.
 - Cover cold surfaces, such as cold water pipes, with insulation.
 - Increase air temperature.

Actions that will help prevent condensation

- Reduce the humidity.
 - Increase ventilation or air movement by opening doors and/or windows, when practical. Use fans as needed.
 - Cover cold surfaces, such as cold water pipes, with insulation.
 - Increase air temperature.

Testing or Sampling for Mold

Is sampling for mold needed? In most cases, if visible mold growth is present, sampling is unnecessary. Since no EPA or other federal limits have been set for mold or mold spores, sampling cannot be used to check a building's compliance with federal mold standards. Surface sampling may be useful to determine if an area has been adequately cleaned or remediated. Sampling for mold should be conducted by professionals who have specific experience in designing mold sampling protocols, sampling methods, and interpreting results. Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA), the American Conference of Governmental Industrial Hygienists (ACGIH), or other professional organizations.

Hidden Mold

Suspicion of Hidden Mold

You may suspect hidden mold if a building smells moldy, but you cannot see the source, or if you know there has been water damage and residents are reporting health problems. Mold may be hidden in places such as the back side of dry wall, wallpaper, or paneling, the top side of ceiling tiles, the underside of carpets and pads, etc. Other possible locations of hidden mold include areas inside walls around pipes (with leaking or condensing pipes), the surface of walls behind furniture (where condensation forms), inside ductwork, and in roof materials above ceiling tiles (due to roof leaks or insufficient insulation).

Investigating hidden mold problems

Investigating hidden mold problems may be difficult and will require caution when the investigation involves disturbing potential sites of mold growth. For example, removal of wallpaper can lead to a massive release of spores if there is mold growing on the underside of the paper. If you believe that you may have a hidden mold problem, consider hiring an experienced professional.

Cleanup and Biocides

Biocides are substances that can destroy living organisms. The use of a chemical or biocide that kills organisms such as mold (chlorine bleach, for example) is not recommended as a routine practice during mold cleanup. There may be instances, however, when professional judgment may indicate its use (for example, when immune-compromised individuals are present). In most cases, it is not possible or desirable to sterilize an area; a background level of mold spores will remain - these spores will not grow if the moisture problem has been resolved. If you choose to use disinfectants or biocides, always ventilate the area and exhaust the air to the outdoors. Never mix chlorine bleach solution with other cleaning solutions or detergents that contain ammonia because toxic fumes could be produced.

Dead mold may still cause allergic reactions in some people, so it is not enough to simply kill the mold, it must also be removed.

Additional Sources of Allergens

Dust Mites

Dust mites are microscopic bugs that live on pillows, mattresses, bedding, stuffed toys, upholstered furniture, fabrics and carpets. They feed on skin flakes from people and thrive in humid environments. They can trigger asthma symptoms and can cause asthma in children with no previous asthma symptoms.

Animal Dander

Some people with asthma are allergic to animal dander, which comes from the saliva and the oil glands of fur-bearing animals, such as dogs, cats, hamsters, gerbils and mice. Even short-haired cats and dogs produce dander.

Cockroaches

Cockroaches are a recognized source of allergens that can trigger asthma reactions in cockroach-sensitive people with asthma.

Outdoor Pollen

Outdoor pollens (tree, grass, ragweed and other weeds) can trigger asthma in people who are allergic to pollen. Pollen concentrations are highest early in the morning. Keep the windows closed at nights.

Other Respiratory Irritants

Tobacco Smoke

The most significant respiratory irritant is environmental tobacco smoke (ETS). Exposure to ETS is associated with increased frequency and severity of asthma and the development of asthma in predisposed infants and young children.

Nitrogen Dioxide, Gas Stoves, Wood Smoke

A study found that women who used mainly gas for cooking reported higher asthma-like symptoms such as wheezing, waking with shortness of breath, asthma attacks and reduced lung function. If you have a gas stove, install a range hood exhausted outdoors and use it when cooking.

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Home Safety Checklist

Escape Plans

- Create an escape plan with two exit routes in case of fire. Practice it twice a year (once at night) with the whole family.
- Choose a meeting place. Set a plan for meeting up in case of a local or national disaster.
- If you live in a two-story house, buy a rescue ladder. It should attach to an upper-level window casing to provide an alternate escape route.

Buglars and Home Intrusion

- Install a sturdy deadbolt lock on every door to the outside. This should include the door into the house from the garage.
- In any room with window bars, make sure at least one has a quick-release mechanism. Replace or retrofit as needed.
- Install motion-sensing floodlights in the backyard.
- Keep your house looking lived-in when you're away. Arrange for the lawn to be mowed, stop mail delivery, install timers for selected lights, leave a car in the driveway, and leave drapes or shades open at least a bit.
- Advertise prominently any home security system you have installed. You might think about putting up signs even if you don't have a system.
- Examine your landscaping. Trim shrubs and trees near windows and doors that provide hiding places for burglars, and prune limbs that serve as ladders to upper windows.
- Purchase a metal bar or a solid-wood dowel to insert in the tracking of sliding glass doors. This will prevent anyone from opening them.
- Put your street number, not your name, on your mailbox.
- Give a spare key to a trusted neighbor or nearby friend. Thieves know all about fake rocks and other hide-a-key tricks.

Alarms

- Install smoke alarms and carbon monoxide detectors generously. These should be on each floor of the house, covering all sleeping areas.
- Test alarms monthly. Replace any that don't work. (In any case, alarms should be replaced every 10 years.)
- Replace batteries annually. Or sooner, if the alarm chirps.
- Clean all detectors. Vacuum each grille.
- Post the fire department's carbon-monoxide-reporting emergency number. If it differs from 911, keep the number by every phone.
- Demonstrate the sound of each detector. Family members need to know the difference.

Fire Extinguishers

- Place extinguishers strategically. Keep one in the kitchen and one on every floor. And learn how to use them.
- Replace extinguishers when necessary. Follow the schedule suggested by the manufacturer, and always replace an extinguisher that appears damaged.
- Consider installing a sprinkler system.

Electrical and Lighting

- Check for frayed wires. Repair or replace any loose or frayed wires on all electrical devices.
- Follow the path of cords. No cords should run under rugs or across doorways.
- Rethink extension cords. Consider adding electrical outlets where you currently rely on extension cords.
- Baby-proof. If you have any small children in your house, place plastic safety covers over unused outlets.
- Check for a faulty electrical system. Feel all outlets and plugs to see if any are warm; if so, have an electrician check them.
- Don't overload the system. Make sure that you've followed manufacturers' directions about maximum wattage of lamp bulbs and outlet requirements for plugs.
- And don't overload any one outlet. Be certain that you have no more than one high-wattage appliance plugged into a single outlet.
- Unplug appliances and electronics when not in use and store them out of reach.
- All major appliances should be grounded. Be sure to check your ground fault circuit interrupters regularly.
- Put lights and light switches at the top and bottom of the stairs. Prevent falls in the dark.

Heating

- Examine the outside vents. They should be properly sealed and clear of obstruction to prevent carbon monoxide buildup in the house. Recheck during and after a snowstorm.
- Pick the right wood. If you use a fireplace or a wood stove, stock up on dry seasoned wood, which burns without producing a lot of creosote. A buildup of creosote—soot—in the chimney or flue can be dangerous, causing chimney fires.
- Hire a chimney sweep. Have flues and chimneys inspected and cleaned by a professional annually.
- Inspect wood-burning stoves twice monthly.
- Make sure the door latch closes properly. The room should have a working smoke detector, and never let a child use the stove unattended.
- Inspect water heaters annually. The temperature should be set at no higher than 120 degrees to prevent burns. Never leave children alone near a water heater, and keep combustible and flammable materials well away from it.

Miscellaneous

- Make sure your house number is visible from the street. It should be easily spotted, in case an emergency vehicle needs to look for it.
- Store flammable liquids away from any flame source. It's preferable to store them outside the house.
- Keep flammable objects away from the kitchen stove.
- Plug a rechargeable flashlight into a socket by your bed. You'll be able to light the way through smoke in a fire or signal to firefighters.
- Install nonslip decals or a nonskid tub mat in your tub.
- Paint the bottom basement step white so it's more visible. You'll be less likely to mistake it for the floor.
- Don't Get Tippy. If young children are in the home, bookshelves and other furniture should be firmly secured with wall brackets to prevent tipping.
- Check walls for loose paint. If re-painting, do so in a well-ventilated area and consider VOC-free paint.
- Set your water heater below 120 degrees Fahrenheit to avoid potential burns and to save energy.

Children and the elderly require different sets of rules when their safety is at issue. The following links offer excellent guidance if you have concerns about these two special groups.

Kids Health: http://kidshealth.org/parent/firstaid_safe/home/household_checklist.html

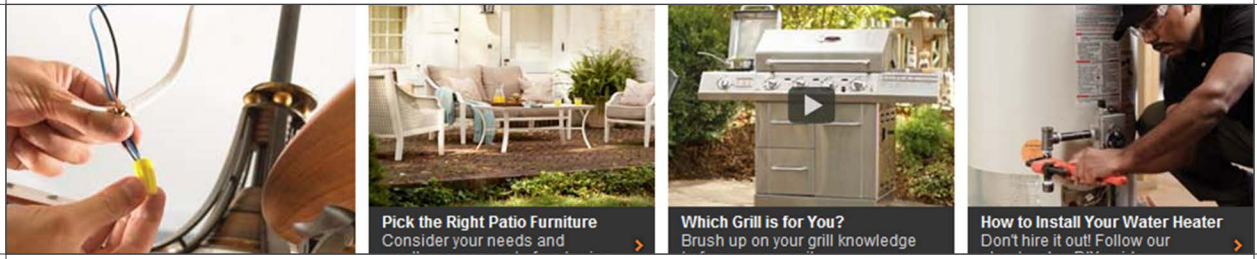
AARP Caregiving: http://assets.aarp.org/external_sites/caregiving/checklists/checklist_homeSafety.html

Notes:

Homeowners Guide

to Managing and Maintaining Your Home

CHAPTER | 6



Pick the Right Patio Furniture
Consider your needs and

Which Grill is for You?
Brush up on your grill knowledge

How to Install Your Water Heater
Don't hire it out! Follow our

Additional Resources and Lists for Homeowners

- » Additional Resources for Homeowners
 - » Government Sites
 - » General Information Sites
 - » Home Improvement Store Sites
 - » Home Improvement Sites
 - » Home Improvement Radio/TV Sites
 - » Specialty Sites
- » Additional Lists for Homeowners
 - » Disaster Survival Kit
 - » Vacation Checklist

Additional Resources for Homeowners

The Internet offers endless information for the homeowner, from step-by-step instructions to checklists for maintaining your home, to finding a contractor. Much of the information in this Homeowners Guide was collected from resource articles and websites located online. These include, but are not limited to: the EPA, Center on Sustainable Communities (COSC), Canada Mortgage and Housing Corporation (CMHC), contentisking. Here are a few resources for starters:

Government Sites

- U.S. Environmental Protection Agency (EPA) <http://www.epa.gov/>
- Energy Star <http://www.energystar.gov/>
- COSC <http://icosc.com/>
- CMHC http://www.cmhc-schl.gc.ca/en/co/co_001.cfm

General Information Sites

- Start with How Stuff Works if you want to know how items in and around your home work. Click on “Home & Garden” for home repair and improvement items. In this section you will find topics on home improvement, home cleaning, lawn & garden, appliances and more.

Home Improvement Store Sites

- The Home Depot How-To Center has videos for numerous projects. There are also articles, calculators, buying guides, project guides, and design tools. You can also get the schedule for weekly clinics, workshops, and kids workshops.
- Lowe’s has a Project & Video Center filled with a how to library, buying guides, projects, interactive guides, quick tips and more. Articles, descriptions, step-by-step instructions and videos are available on many topics.
- Ace Hardware has a Projects and Solutions section containing Project How-To’s, Project videos, The Helpful Hardware Man’s Corner, Frequently Asked Questions, and learning guides.
- TrueValue Hardware has a Project Library with many helpful articles.

Home Improvement Sites

- DoltYourself.com is a site that provides how-to guides and tips. It also has a hardware store. Use the site map at the bottom of the page to quickly find information on a variety of home improvement and repair topics.
- Handyman USA is a site full of tips and how-to’s in an easy to navigate format. The list of categories is accessible on the left side of most pages.
- Hometips.com is a site that provides buying guides, DIY instructions, and other information related to home improvement, remodeling houses, home repair, decorating, buying appliances and more.
- The Popular Mechanics Home How-To and DIY Central sections have step-by-step articles and videos.
- The Old House Web offers a number of information and how-to articles targeted to owners of older homes. They also provide links to repair and restoration products.

Home Improvement Radio and TV Show Sites

- Home improvement has become a popular source of home entertainment in recent years. Here are links to a few favorites that include informative articles and tips. Some may have annoying ads but you're used to that, right?
- The Money Pit Home Improvement Radio Show
- This Old House (show and magazine)
- Danny Lipford from the Today Show and the Weather Channel
- HGTV is home to such shows as Bang for Your Buck, Curb Appeal, Divine Design, Hammer Heads and more.
- DIY Network
- HomeTime on PBS
- Bob Vila
- Ask Jon Eakes

Specialty Sites

- Theplumber.com has a plumbing FAQ, articles on the history of plumbing, a Plumbing Care & Repair handbook, and links to other plumbing sites.
- The Original Homeowners Painting Guide is a site provided by Calvert Painting in North Carolina. It covers paint failures and ways to make your paint last longer.
- The Paint Quality Institute provides information for homeowners including paint advice and paint tools, blog and more.
- The American Hardwood Information Center is provided by the Hardwood Manufacturers Association. It provides facts, tips, and other useful advice about hardwoods and the use of hardwoods in cabinets, flooring, furniture, and woodworking projects.

When it comes to roofing, you can find information on the sites of the different roofing trade associations:

- National Roofing Contractors Association, Homeowner's Guide to Buying a New Roof
- Asphalt Roofing Manufacturers Association
- Tile Roofing Institute Information for homeowners
- Roof Coatings Manufacturers Association
- Cool Metal Roofing Coalition
- Greenroofs.com, a portal to information on green roofs

Notes:

[illegible]



Prepare a Disaster Survival Kit

Every household should have a survival kit that includes:

- First aid kit and manual
- Prescription medicines as needed
- Water in non-breakable containers
- Canned or other non-perishable food
- Non-electric can opener
- Flashlights
- Portable radio and/or television
- Extra batteries
- Extra clothing and blankets
- Emergency cash and credit cards
- Copy of your homeowners insurance policy

Notes:

Checklist



Vacation

A Handy Vacation Checklist

Use this vacation checklist next time you go away on vacation so your mind can really stay where it belongs – a million miles away.

- Check with authorities where you are vacationing to make certain you have proper I.D. such as drivers license and/or passport.
- Let a trusted neighbor know you will be away and have them keep an eye on your home. It's a good idea to leave your vacation address and telephone number with a neighbor so you can be reached in case of an emergency.
- Advise your alarm company and local police if you will be gone for an extended period.
- Arrange to have the newspaper and mail held until your return, or have them picked up by a trusted neighbor.
- Arrange to have your lawn mowed (or snow shoveled) while you're away. Ask a neighbor to set out your trash on collection day and then retrieve empty cans and recycling bins the same day.
- Arrange for the care of pets.
- Never leave your house key hidden outside your home.
- Lock all windows and doors.
- Set the heating system to provide minimum heat of 55 degrees.
- Set timers on interior lights.
- Make sure all electrical appliances are turned off.
- Make sure to unplug televisions, computers and appliances susceptible to lightning and power surges.
- Clean the refrigerator of all perishable foods, and take out the garbage.
- Store jewelry and valuable items in a safe-deposit box.

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