E&E INSPECT, LLC.

Professional Home Inspections

Serving the Greater Philadelphia Five County Region

Congratulations!

You are now the happy owner of a new home, maybe even your first home. This PDF is designed to make owning your new home easier. From pre-closing tips to maintenance information and helpful checklists, everything you need is conveniently located here.
Homeowners can expect to spend about 1 to 3 percent of the purchase price of their home on continued maintenance (including periodic service and repair) throughout their years of owning a home. So, browse through this PDF and learn how to best care for and protect your new investment.

Welcome Home!

Click the topic you would like to view

PRE-CLOSING TIPS

Preparing For Your Final Walk-Through

Be sure that you conduct a pre-settlement walk-through and check each of the systems prior to settlement. Review the overall condition of the home just prior to your taking ownership, and confirm that systems that were operating properly during the home inspection are still in working condition.

Occupied House

If the house was occupied at the time of the inspection, personal belongings, furniture, etc., may have obscured items/areas and made them inaccessible for inspection. Normally these belongings are removed prior to the pre-settlement walk-through and you will have an excellent opportunity to view all of the surfaces and systems at that time. If an item was obscured during the inspection and you feel that it may be defective after you have had an opportunity to view it during your pre-settlement walk-through, you should discuss it with your title company or attorney right away.

Vacant House

While a vacant house is easier to inspect visually than an occupied one, there are disadvantages. This is particularly true if the house has been vacant for a long time. Seals and bearings of mechanical systems may have dried out and caused accelerated deterioration or failure. Further, possible leaks may not have been detected during the inspection because lack of use had prevented accumulation of sufficient water to create a stain or other observable evidence.

Utilities Off
You should ensure that the utilities will be turned on prior to your presettlement walk-through inspection and that you will have an opportunity to check all of the systems. If the utilities were off at the time of your inspection, contact your inspector to ascertain the steps/checks you should perform to satisfy yourself that any uninspected systems are working properly prior to settlement.

Declaration
If a declaration has been made by the sellers or agents concerning the age of any item, condition, repair, service contract or warranty, those statements should be placed in writing. A request should be made for the seller to provide you with all instruction books, operator's manuals, warranties and other documents related to the various systems and appliances within the property. This paperwork will be extremely useful to you.

TOP 10 MOST NEGLECTED MAINTENANCE ITEMS

Maintaining Your New Home

Creating a maintenance schedule for your home is a great way to take care of your house now, while helping to reduce the need for major repairs down the road. Simple, inexpensive maintenance chores that are ignored today can lead to major, expensive maintenance headaches tomorrow. And if problems are not discovered until you are ready to trade in your home, they could take a big bite out of your profits. The following is E&E Inspect's Top 10 list of maintenance items most often neglected by homeowners.

1. **Changing Furnace Filters**: You can spend $5 or $10 on a permanent furnace filter, or buy cheap throwaways for about $1. However, if you do neither, you may have to spend thousands. Accumulated dust and debris on the furnace and filter can shorten its lifespan by requiring the motor and fan to work harder to pull the air through the filter. You could find yourself spending several hundred dollars to replace the fan and motor, or $1,000-$3,000 to replace the entire furnace.

2. **Replacing Deteriorated Caulk (Interior):** In many homes, the caulking between the tub and surrounding wall (or shower pan and shower walls) has either deteriorated or is missing altogether. If not corrected, this condition can allow water to migrate behind the walls promoting dry rot and mildew. Eventually, the wall will fail. Removal of tile walls can run as high as $5,000.

3. **Maintaining Windows/Doors:** Inoperable, improperly fitted, or non-weather stripped windows and doors is a prevalent condition in many houses that are 20 or more years old. Windows and doors that do not open and close properly can be life-threatening if they are needed as an escape route in the event of a fire. In addition, climate-control problems can be created if windows are loose and/or improperly sealed, allowing conditioned air to escape. Not only does wear/lack of care increase your monthly heating and cooling bills, but it also forces your furnace and air conditioner to run overtime to attain the desired temperature, shortening their lifespan significantly.

4. **Eliminating Leaks:** Leaky water supply valves under sinks and faucets can cause floors (or walls if the faucet also is leaking) to deteriorate. If neglected, repairs can cost anywhere from $200 to $1,000, depending on how long the leak has been active and undetected.

5. **Trimming of Overgrown Plants:** Foundation bushes, ivy growth on the building face or trees that hang over your roof can be beautiful, but can also be terribly damaging. Yet these conditions exist in many homes. Retained water in vegetation contributes to accelerated deterioration and rot: Ivy's root system is so strong that it can move mortar or get behind the siding and pop it out. Leaves deposited on a roof are a breeding ground for degeneration. Depending on the extent of growth, you may have to re-roof or re-side your house at a cost of several thousand dollars. At best, your roof's life expectancy will be reduced by 20%.

6. **Repairing Grading Problems:** Even if a lot was graded properly when the house was built (it should slope away from the structure), it can be expected to shift over time. The cause is usually heavy rain and erosion from overwatering shrubs placed too close to the house. But sometimes the granular soil next to the foundation simply settles. If the ground within 10 feet of the house slopes toward the house, water will pond adjacent to the building. Many times this can be eliminated by a few wheelbarrows of dirt and some spadework. But if water is allowed to remain over a period of time, it will migrate under the structure, create conditions conducive to wood-destroying insect infestation, and weaken the foundation.

7. **Unclogging Gutters/Downspouts:** A third of all houses have gutters and downspouts clogged by roof debris or dead vegetation. These clogs enable water to back up on the roof, causing not only the roof to deteriorate more quickly, but also erosion that leads to a negative grade at the foundation.

8. **Installing Proper Exhaust Fans:** In too many homes the exhaust fan in bathrooms without windows is either disconnected or inoperable. This allows condensation to accumulate, causing moisture damage. Eventually the walls and flooring can rot.

9. **Replacing Deteriorated Caulk (Exterior):** So many homes have either deteriorated caulking or none at all. Deteriorated or missing caulking on exterior walls, where dissimilar materials meet, can allow water to intrude into wall cavities, where it will cause the framing to rot.

Note: Caulking wears out. It shrinks, cracks, blisters and hardens, so it needs to be evaluated annually. If caulking goes unchecked or is not replaced when necessary, you may end up replacing entire sill plates, interior studs and framing at a cost of several thousand dollars.

10. **Ensuring Proper Air Movement Around AC/Heating Pump Condensing Units:** If you want to avoid spending $2,000-$3,000 to replace your air conditioning system, make sure the condensing unit outside does not have restricted air flow. In 10 percent to 15 percent of houses, units are not ventilated properly. Landscaping, overgrowth, vegetation, aesthetic walls and enclosures can limit or prevent the condenser's ability to take in and release air for efficient functioning. Lack of proper air intake and maintenance causes the motor and fan to work harder, shortening the unit's lifespan.

LIMITATIONS OF A GREAT HOME INSPECTION

EVEN THE BEST INSPECTION HAS ITS LIMITATIONS

Perhaps the greatest value of your home inspection is the opportunity to have a one-on-one consultation and orientation of your home with a professional inspector. You will also gain the peace of mind that comes from having your inspector examine the property for conditions that, if undiscovered, could result in major repairs or replacement costs down the road. The modest fee for an inspection is far smaller than the premium an insurance company would charge for a policy with no deductible, no limit and indefinite policy period. Truly, you get what you pay for, and a professional inspection is the best buy to protect your interests. Your home inspection is your golden opportunity to learn about your prospective home and be alerted to any major conditions that exist; however, a home inspection is not designed to eliminate all risk.

Even after the most comprehensive professional inspection, there are sometimes conditions that you discover after moving into your new home. We understand that this can be frustrating. You wonder, “Why didn’t the inspector reveal this problem?” And so we encourage you to take a look at the following information.

For the following reasons, you may discover a condition in your home after moving in that was not revealed during your home inspection:

THE LIMITATIONS OF A NON-DESTRUCTIVE INSPECTION

A home inspection is a visual, functional, non-invasive inspection of the readily accessible elements of the home—conducted without moving personal property, furniture, equipment, plants, soil, snow, ice, or debris. No damage or destructive techniques are permitted or implemented. After moving in, if you happen to tear down a wall for an addition, pull up carpet, or remove fixtures/cabinetry, it is possible that a problem may be discovered that simply was not observable in an earlier visual, non-destructive inspection.

INTERMITTENT OR CONCEALED PROBLEMS

Some problems cannot be discovered during the time of a home inspection and will be revealed only by day-to-day living in the house. For example, some shower stalls will begin to leak only when the showering time is lengthy or if someone is standing in the shower, but will not leak during a test phase during the inspection. Some roofs and basements leak only when certain specific conditions exist, such as during an unusually strong storm or consistent high wind and rain blowing from a particular direction. Some flooring problems will be discovered only when all furniture, fixtures or finishes are removed or when carpets have been completely rolled back.

INSPECTION DAY CONDITIONS

What were the circumstances under which the inspection was performed? Was there snow? Had it been dry for many weeks? And what usage, events or changes have transpired since the inspection was conducted? These factors may explain the appearance of a condition not revealed in your report. It is sometimes hard to remember the conditions under which the inspection was conducted, such as prevailing weather, or that the room was filled with storage items, or that the air conditioning unit was not activated due to cold temperatures; but these factors may have prevented the current condition from being identified by your inspector.

FOLLOWING CLUES

Home and building inspectors are a lot like detectives. They search for and follow clues that suggest the presence of a problem, or hint at a developing one. Our inspections are based on past functions of the house or building. If the past has left no observable clues, then we won't suspect anything is wrong or improper. Minor problems are the ones that typically leave no clues. The primary focus of our inspections is to uncover the truly significant problems – the ones that substantially affect the habitability, value, or safety of the home. In our search for major defects, we may note minor conditions discovered in the process.

These notations are presented in our reports as useful information as a courtesy so you can monitor, service, and repair as necessary. Sometimes conditions viewed as minor, due to the lack of further information, may become a larger issue, requiring more extensive repair. Since we are focusing on major defects, we do not want to suggest that all minor conditions have been uncovered.

GENERAL PRACTIONERS VS. SPECIALISTS

Consider This: You go to your doctor for a physical one day and he finds you have some brown spots on your arm. He recommends that you see a dermatologist (a specialist) to further examine the spots. After meeting with the dermatologist, he identifies the spots as melanoma. Your general practitioner saw the spots, but how come he did not see the skin cancer? We all know that our general practitioner examines the general health and functioning of our bodies, whereas a specialist (who has expertise in a particular focus of medicine) is able to more closely examine, test and diagnose conditions. You can think of your inspector and your contractor in much the same way. As in the above example, you can reasonably expect a contracting specialist to provide you with more comprehensive information about a particular condition that your inspector has flagged. The contractor is examining the condition with a narrower focus and has specific experience repairing the particular condition. And so, just as the spots the first doctor saw turned out to be skin cancer, you may find conditions identified in your report to be more extensive after they have been evaluated by a contractor or professional specialist.

WORKING WITH CONTRACTORS

When dealing with contractors, ensure that they are qualified or properly licensed if your State requires it. For example: carpenters, electricians, HVAC, landscapers, plumbers, roofers, waterproofers, etc. Also, be aware that contractors' estimates vary as much as 300 percent in the marketplace. It is important that you obtain a minimum of three (3) estimates, and that these estimates are in writing.

AVOID CONFUSION

Confusion often arises when recommendations from different contractors seem to conflict, and even more so when those recommendations also seem to conflict with your inspection report. For instance, your report flags a localized defect in your roof. You begin working with contractors and gathering quotes, and one roofing contractor recommends an inexpensive fix for a section of the roof, while another roofing contractor believes the roof needs a total replacement.

In another example, no issue was found by the home inspector. However, as the new homeowner, you decide to improve and start a project on a component in your home. Once the contractor looks at the job, he identifies concerns or issues related to the project at hand. How could this happen? Many times, it is simply the site-specific repair or modification that opens up a repair requirement. If the condition or component is left alone, many times no work or modification is required. But once change is envisioned and the component (as it relates to the specific job) is viewed in a broader scope, the contractor may see the need for a repair or modification to the component. However, anticipating all possible scenarios of improvements or modifications that could possibly be performed on a component is beyond the scope of the home inspection process and standards of practice.

Additionally, repairs can be tackled from different perspectives; and this subjectivity is another cause of varied opinions and recommendations among various professionals. The approach that a particular contractor takes with a repair is a function not only of experience, but of the type of tools in which he has invested and the number of employees available to work on the project. Thus, scope, cost and resources can cause contractors' opinions to vary considerably.

The seemingly contradictory information you sometimes receive from various sources happens because the inspector, contractor, engineer, architect, etc., have different views of a home, based upon their training and varying standards of practice.

THE LAST-ONE-IN SYNDROME

Many times, contractors will demonstrate a reluctance to undertake a basic level of repair. Termed the Last-One-In Syndrome, this behavior is a reflection of the contractor's understandable reluctance to perform a minor repair on something that may later fail, and thus result in blame simply from having been the last one to work on it. The contractor is naturally inclined to recommend a complete replacement, at a higher cost to you, in order to reduce the likelihood of a callback. You should look for the most effective, least costly solution to any servicing or repairs needed in your home.

SHOULD THINGS GO WRONG…

There may come a time in the future when you unexpectedly discover something wrong with your house. The first thought that will probably come to mind is “Why didn’t the home inspector reveal this problem?” We understand your thinking, and we respectfully ask you to consider the following:

INTERMITTENT OR CONCEALED PROBLEMS

Some problems cannot be discovered during the few hours of a home inspection, and will be revealed only by day-to-day living in the house. For example, some shower stalls will begin to leak only when the showering time is lengthy, or if someone is standing in the shower; but will not leak when a small amount of water is run from the tap. Some roofs and basements leak only when certain specific conditions exist; such as during an unusually strong storm or consistent high wind and rain blowing from a particular direction. Some flooring problems will be discovered only when all furniture, fixtures or finishes are removed or when carpets have been completely rolled back.

FOLLOWING CLUES

Home and building inspectors are a lot like detectives. They search for and follow clues that suggest the presence of a problem, or hint at a developing one. Our inspections are based on past performance of the house or building. If the past has left no observable clues, then we won’t suspect anything is wrong or improper. Minor problems are the ones that typically leave no clues. The primary focus of our inspections is to uncover the truly significant problems — the ones that will have the greatest impact on the purchaser’s pocketbook, or perhaps the decision of whether or not to purchase at all. Our inspection reports may seem inconsistent because sometimes they identify certain minor problems in one area, but not in others. In our search for serious problems, we may note minor defects discovered in the process. These notations are presented in our reports as a courtesy, and are not to suggest that every minor defect has been uncovered.

CONFLICTING ADVICE & OPINIONS

A frequent source of confusion about home inspections is caused by the third-party comments of contractors. For instance, two or more roofing contractors may each agree that the roof needs a total replacement, while our inspection report states that, with minor repairs, the roof has a few more years of service life. Also, the repairs of more complex problems with electrical or plumbing systems may be tackled from different perspectives. Frequently, the approach that a particular contractor will take with a repair is a function not only of his experience, but the type of tools he's invested in and the number of employees available to work on the project. Thus, scope, cost, and resources may cause a contractor's opinions about a repair to vary considerably from the inspector's view.

THE LAST-ONE-IN SYNDROME

As professionals with a history of experience in examining homes and buildings, we feel the advice we give our clients represents the most prudent thing to do. Many times, however, contractors will demonstrate a reluctance to undertake the precise level of repair which we have recommended. Termed the Last-One-In Syndrome, this behavior is a reflection of the contractor's understandable reluctance to perform a minor repair on something that may later fail, and thus result in blame simply from having been the last one to work on it. The contractor is naturally inclined to recommend a complete replacement, at a higher cost to the homeowner, to reduce the likelihood of a callback. This is understandable and no blame is intended.

There is one other aspect of the Last-One-In Syndrome, and that is The Most Recent Advice Is the Best Argument. This perspective suggests that it is only human nature for homeowners to believe the most recent bit of "expert advice" they have received, even if it is contrary to the inspection report prepared for them. As home inspectors, our role unfortunately places us in the position of being the first-one-in, and as a result, sometimes our advice is the first to be discarded when other "experts" begin to toss-in their two cents worth later.

WHY DIDN'T I SEE IT?

Sometimes, a contractor may be called in to fix a problem and he will comment, "I can't believe you had this house inspected and they didn't find this problem." We are quick to point out some important elements that impact on the inspection process, which the contractor had probably not considered:

- It's impossible for the contractor to know the circumstances under which the inspection was performed, or what subtle usage and not-so-subtle events or changes have transpired since the inspection was conducted. Homeowners too easily forget or find it hard to remember the conditions under which the inspection was conducted, such as prevailing weather conditions; the room was filled with storage items; or the furnace was not operated because the air conditioning unit was running, etc.

- Monday-morning quarterbacking provides an infallible insight; anyone can comment accurately on the basement floor being wet when there's two inches of water standing in it. Predicting the possibility of the floor becoming wet in the future is another matter altogether, and that is what a home inspection is all about: an informed, professional opinion of the condition before a disastrous situation occurs and likelihood of a need for repairs in the near future.

- Inspections must have reasonable limits in terms of time and cost: if the amount of time spent on an inspection was doubled or tripled, it is reasonable to conclude that a higher number of faults and problems would be uncovered, but not necessarily ones more likely to fail or involve higher costs to repair. As experienced professionals, however, we have developed an inspection method that will provide a balanced, quality review at a reasonable cost:

- Home inspectors are generalists, not specialists. A contractor who specializes in only one system, such as air conditioning, is reasonably expected to have more knowledge of his area of expertise than others. Inspectors, however, must have a far broader range of knowledge encompassing all systems and all trades; but it is a body of knowledge that is focused in identifying potential problems, not actually repairing them. The difference lies in the fact that the contractor is typically called in after the failure, and then put to repairing it.

- A home or building inspection is a visual inspection, not an invasive one. No damage or destruction is carried out to reveal faults. Perhaps later, when the owner is remodeling and tearing down a wall, pulling up carpet, or removing fixtures and cabinetry, a problem will be discovered that simply was not observable in an earlier visual, non-destructive inspection.

THE TRUE VALUE OF A HOME OR BUILDING INSPECTION

Perhaps the greatest value of a thorough professional inspection is the peace of mind that comes from having a skilled and objective professional examine the property for those faults or problems that, if undiscovered, could result in huge repairs or replacement cost that would impact so unfavorably on the purchase price and spoil the pleasure of closing on the deal. A professional inspection improves the odds of a successful purchase, but it is not designed to eliminate all risk. The modest fee for an inspection is far smaller than the premium an insurance company would charge for a policy with no deductible, no limit and an indefinite policy period. It would also not include the value added by the inspection. Truly, you get what you pay for, and a professional inspection is the best buy to protect your interests.

GLOSSARY

1-Pipe system: A hot water or steam heating system with a single piping run to and from the boiler and the radiators or convectors.

2-Pipe system: A hot water or steam heating system with separate supply and return piping from the boiler to the radiators or convectors.

A-Coil: A type of evaporator coil in a cooling system that consists of double plates of coils connected at the top, forming a A-shape.

ABS: An abbreviation for acrylonitrile butadienen styrene, a black plastic piping used in DWV piping. Uses mechanical no-hub joints.

Acoustic tiles: A ceiling tile made of fiber board, fiberglass, cork or mineral particles.

Adapter: A device with a 3-slot receptacle for an appliance plug and a 2-prong plug for inserting into a 2-slot outlet.

Aerobic bacteria: Bacteria that live in an oxygen-rich environment and break down solid waste matter.

Air cooled air conditioning: A cooling system where heat is removed from the refrigerant by means of a fan blowing air over the condenser.

AL: A rating indicating that breakers are approved for use with aluminum branch circuit wiring.

Alligatoring roofing: A condition with built-up roofing where a network of cracks covers the surface due to expansion and contraction.

Alternating current: An electrical current, used in homes, in which electrons move back and forth at a frequency of 60 cycles per second.

Ampacity: The number of amps that can safety pass through a given conductor.

Amperage: See *Current*

Amperage rating: In homes, the size of the amp service supplied to a home. For example, a 100-amp or 200-amp service.

Amps: The unit of measure for current.

Anaerobic bacteria: Bacteria that live in an oxygen-free environment and break down solid waste matter.

Anchor post: In a tie-back, the wooden post that connects to a wooden retaining wall and extends back into the soil.

Anode rode: In a water heater, a rod that will give up ions before the steel tank does, thus protecting the tank. Usually magnesium or aluminum.

Anticipator: A device on a thermostat that turns a heating system on and off just before present temperature settings are reached.

Anti-oxidant paste: A grayish paste applied to aluminum wiring connections to prevent aluminum oxide from forming.

Anti-siphon device: See *Backflow preventer.*

Aquastat: A temperature-sensitive device in a boiler that is immersed in water to detect temperature changes in water, thereby activating the circulation pump.

Aquifer: A water-bearing strata in the earth of permeable rock, sand or gravel.

Areaway: An open sub-surface space around a basement doorway. Provides light, ventilation and access.

Artesian well: A well whose aquifer has enough pressure to bring water to the surface without a pump.

Asbestos: A mineral fiber found in rocks, used in home products including insulation, roofing, siding and floor tiles. The EPA considers asbestos fibers to be a health hazard.

Asbestos cement shingles: A mixture of Portland cement and asbestos fibers in a single form, used as a roof covering.

Asbestos cement siding: A mixture of Portland cement and asbestos fibers in shingle form, used as wall cladding.

Ash dump: Door or opening in the firebox that leads directly to the ash pit, through which the ashes are swept after the fire is burned out.

Asphalt shingles: Asphalt impregnated felted mats coated with an asphalt formation and covered with a granular material, used in shingle form as a roof covering.

Automatic fill valve: A valve on the plumbing line to a boiler that adds water to the system.

Auxiliary condensate line: Drain piping from an air conditioning system in addition to the main condensate line. Also called secondary condensate line.

Awning window: A window hinged at the top to open outward.

Backfill: The material used to re-fill excavation around the outside of a foundation wall or pipe trench.

Backflow preventer: A device such as an anti-siphon device or vacuum breaker that prevents water from being siphoned from the supply system into the DWV system.

Balancing duct damper: A damper located in the branch supply ducts that equalizes the flow of warm air from the furnace to the house.

Balcony: A platform protruding from the building that is not typically supported by the ground.

Balloon framing: A construction method where long vertical studs and corner posts run from the foundation to the roof and the floors are hung on the wall frame.

Baluster: One of a series of small pillars that are attached to and run between the stairs and the handrails. The spacing between the balusters should be no more than 4 inches to prevent small children from falling between the balusters.

Barometric damper: A hinged plate located in the smoke pipe above an oil-fired heating system, which swings open or closed to regulate drafts.

Baseboard trim: A wood trim board that is placed against the wall around the perimeter of a room next to the floor.

Basement window: A window opening installed in the basement wall. Basement windows are occasionally below the finish grade level and will be surrounded on the exterior by a window well.

Batts: Pre-cut lengths of fibrous insulation manufactured to fit between studs and joists, made of fiberglass or rock wool.

Battens: Narrow strips of wood placed over joints in vertical wood plank siding to seal the joints.

Bay Windows: Three windows set at angles with each other in a bay that protrudes from the structure.

Bead board: Rigid board polystyrene insulation produced by expanding and fusing granular pellets.

Beam: See *Girders.*

Beveled siding: Clapboards that are tapered planks rather than perfectly rectangular in cut.

Bi-fold doors: A 2-section door hinged in the middle to allow one section to fold back on the other before the door is swung to the side.

Bi-metallic vent damper: A damper in a smoke pipe that expands open when exhaust gases heat up and contracts closed when gases cool.

Bitumen: Petroleum asphalt or coal tar.

Blankets: Continuous rolls of fibrous insulation manufactured to fit between studs and joists, made of fiberglass or rock wool.

Blast tubs: The component of an oil burner that holds the nozzle and ignition electrodes and extends into the combustion chamber.

Bleeder: Piping that runs from exterior drain tile under the footings to interior tile and to the sump pump.

Blind or Shutter: A lightweight frame in the form of a door located on each side of a window. They are constructed of wood (solid or louvered panels) or plastic. Originally they were designed to close and secure over the windows for security and foul weather. Most shutters now are decorative pieces that are secured to the house beside the windows.

Blocking: A bracing method using a brace of wood between joists that is the same depth as the joists giving stiffness to the joists.

Boiler: An enclosed vessel in which water has been heated for circulation as hot water or steam for heating.

Bonding: Electrically connecting two or more conductive items together and to the grounding system.

Bow windows: More than three windows set at angles with each other in a bay that protrudes from the structure.

Box bay windows: Bay windows where the windows are set in a bay at right angles to each other.

Branch circuit wiring: That portion of the electrical system that runs from the electrical panel to outlets, switches and fixtures in the home.

Branch lines: Water supply pipes that carry water from risers to fixtures and faucets in the house.

Brass: An alloy of copper and zinc.

Brazed: The use of silver solder in the soldering process.

Breaker: See *Circuit Breaker*

Brick ties: Accordion-style metal fasteners used to attach a brick veneer to the wood framework of a home.

Brick veneer: A wall construction method in which an outer layer of bricks is attached to the wood framework of the house using brick ties.

Bridging: Pieces of wood or metal strapping placed in an X-pattern between the floor joists at mid-span to prevent the joists from twisting and squeaking and to provide reinforcement and distribute stress.

British Thermal Unit (BTU): A unit of measure of heat output, representing the amount of heat required to raise or lower the temperature of 1-pound of water 1 degree F.

Building paper/Underlayment: Building material, usually felt paper, that is used as a protective barrier against air and moisture passage.

Built-in gutters: A trough built as part of the roof at the rafter ends, normally made of wood lined with metal.

Built-up roofing: Alternating layers of impregnated felt and hot bitumen topped with a weather resistant coat of bitumen, used as a roof covering. Usually topped with gravel, slag or a layer of roll roofing.

Busbar: A conductor bar that provides connections and power for fuses and breakers and thus to circuits.

Butterfly roof: A roof style with tow opposite slopes sloping inward toward the center of the roof.

Cantilever: An extension of the floor structure, which depends on the strength of the unsupported portion of the girder or joists to carry the load of the structure. Can be an interior balcony or an exterior balcony or deck.

Carbon monoxide: A life-threatening gas and combustion by-product. Abbreviation CO.

Casement windows: A window hinged at one side to open outward.

Casing: The trim pieces used around window and door frames where they meet the wall.

Caulking: A waterproof material used to seal joints at interfaces between building components, used with some wall claddings.

Cavity wall: A masonry wall with a dead air space left between inner and outer layers of mansonry.

Ceiling joist: A horizontally placed framing member at the ceiling of the topmost living space of a house that provides a platform to attach the finish ceiling material.

Cellulose insulation: An insulating material made of shredded recycled newspaper or wood fibers treated with a fire retardant, used as loose fill.

Cement: A substance made of powdered lime and clay mixed with water and used to fasten stones and sand together to form concrete.

Centrifugal pump: A motorized pump that lifts water from a well by means of a paddle wheel driven by a motor. Used in jet and submersible pumps.

Ceramic tiles: Hard fired clay tiles that can be glazed or unglazed, used as floor covering.

Cesspool: A masonry lined hole used to hold and break down solid materials from the home's waste system before releasing them into the ground through porous masonry.

Chair rail: Decorative trim applied around the perimeter of a room such as a formal dining room or kitchen/breakfast nook at the same height as the back of a chair. It is sometimes used as a cap trim for wainscoting.

Chase: See *Chimney chase.*

Check valve: On a sanitary pump, a valve that prevents waste from the sewer line from backing into the crock.

Checking: In wood plank siding, a crack or split along the grain as a result of cupping.

Chemical corrosion: Corrosion that occurs when metals react with oxygen, carbon dioxide, or salts in water, using metal atoms to form new compounds.

Chimney: A masonry or wood framed enclosure that surrounds and contains one or more flues and extends above the roofline. A chimney transports smoke and combustion gasses to the outside of the home.

Chimney cap: The metal or masonry protective covering at the top of the chimney that seals the chimney shaft from water entry between the chimney enclosure and the flue tiles.

Chimney flashing: Metal or roll roofing flashings used in the joint between chimney and roof to prevent water penetration.

Chimney flue: The space or channel in a chimney that carries off the smoke and other combustion gasses to the outside air.

Chinking: A mortar made of clay, sand and other binders such as animal hair used to fill the gaps between logs in a log home.

Chord: An outside member of a truss, horizontal or on an angle.

Cinder block: A block made of slag from steel making or railroad cinders there were used in home construction.

Circuit: A complete path of an electrical current.

Circuit breaker: An overload protection device, that opens a circuit and stops the flow of electricity when the circuit overloads.

Circulating pump: The pump that circulates water in a hot water heating system.

Cladding: See *Wall cladding.*

Clapboard: Overlapping, horizontal wood plank siding made from either rectangular planks or tapered planks.

Cleanout: A plug-sealed extension at the sewer outlet, which is unplugged when work needs to be performed on the sewer line.

Closed cornice: Trim and moldings at the eave with both a vertical fascia board and a horizontal soffit.

Closed system: A hot water system with a sealed expansion tank located just above the boiler.

Closed valley: A valley where the roof covering continues over he valley and flashing is not visible.

Coated steel: Steel sheeting coasted with tin, antimony, lead or nickel alloys, used as a roof covering.

Collar beam/tie: A horizontal piece of framing lumber that provides intermediate support for opposite rafters. They are located in the middle to upper third of the rafters. It is also known as a collar beam or collar brace.

Columns: Vertical supports that carry the weight of the structure from the girders to the ground, transmitting weight to the footings.

Combustion air: The air required for mixing with fuel such as oil or gas before the fuel is burned.

Combustion chamber: The chamber in a furnace or boiler in which fuel is burned. Called a firebox in older boilers.

Composition board: Planks or sheets of compressed wood fibers with weather resistant binders, used as wall cladding.

Compressor: The component of a cooling system that moves refrigerant and pressurizes the refrigerant gas in order to raise it temperature.

Concrete block: A block made of crushed stone and builders sand used in construction, especially foundation walls.

Concrete masonry unit (CMU): Various kinds of hollow-core blocks used in foundation construction.

Concrete slab floor: A slab is approximately 4" thick and provides a number of uses. It creates a solid level surface to walk and work on. It provides a separation between the grade/soil and a potentially livable area. It also provides lateral compression resistance for the foundation walls, preventing soil pressure from outside the foundation from pushing the foundation walls and footings inward.

Condensate line: Drain piping from an air conditioning system to dispose of condensation.

Condensate tray: A tray under an air conditioning unit to collect condensation.

Condenser: A coil in a cooling system through which the refrigerant gas flows that removes heat from the gas, condensing it into liquid form.

Conduction: The transfer of heat from a warmer object to a cooler object by physical contact.

Conductor: A material that offers a low resistance to an electrical current flowing through it. Also, the wire used in the home's electrical system as in the grounding conductor, service conductor, and so on.

Conduit: A metal cable, rigid or flexible, used in branch circuit wiring, which carry two hot wires, a neutral and a ground wire.

Convection: The transfer of heat through air, water or steam that moves heat from a warmer location to a cooler location.

Convectors: Heat outlets in the home consisting of finned plates or pipes that deliver hot water from a boiler and warm the air passing over them.

COPALUM: Special crimp connectors that are used in connecting aluminum branch circuit wiring to copper at each outlet, switch and junction.

Coping: The upper surface of a wall or chimney. Seals against water penetration and shaped to shed water.

Copper pigtailing: A wire nut method used in connecting aluminum branch circuit wiring to copper at each outlet, switch and junction.

Corner brace: Diagonal braces placed at the comers of framed walls to stiffen and provide extra strength.

Cornice: An overhang of a pitched roof at the eave line that usually consists of a fascia board, a soffit and any appropriate moldings or vents.

Cornice molding: A trim piece used at the intersection of the wall and ceiling.

Counter flashing: A second layer of flashing that covers a bottom layer of flashing where the roof and wall meet.

CPVC: An abbreviation for chlorinated polyvinyl chloride, a white or beige plastic piping used in supply piping. Joints are solvent welded.

Crack (angled): A diagonal foundation crack caused when the upload and download on the foundation offset each other.

Crack (horizontal): A horizontal foundation crack often caused by pressure being applied by soil outside and water pressure against the foundation wall.

Crack (stair step): An angled crack appearing along the block joints in a concrete block foundation or walls.

Crack (vertical): A vertical foundation crack often caused by settlement of the structure.

Crack (v-shaped): A crack that increases in width along its path.

Crawlspace: Unfinished space beneath the first floor of a house. This space is typically 18 inches - 48 inches high.

Creosote: A by-product of a wood burning fire.

Cricket: A small peaked roof perpendicular to the main roof slope constructed at the high side of a chimney to divert water run-off.

Cross connection: A condition where water from the DWV system can be siphoned back into the supply system.

Current: The flow of electricity that results when the electromotive force is applied across a given resistance. Current, also called amperage, is measured in amps.

Damper: A mechanical device used with heating systems to regulate the movement of air through vent piping or supply ducts.

Dead load: The weight of a structure itself, its sheathing and wall coverings and other integral components.

Deadman: In a tie-back, a cross piece spiked to the anchor post at the end in the soil, used to anchor a wooden retaining wall to the soil.

Deck: An independent structure or platform that is attached to the house.

Dedicated circuit: A circuit provided for the sole use of a large appliance such as the refrigerator or dishwasher.

Delamination: A deterioration process during which the layers in the laminated plywood panel begin to separate.

Desulfovibrio bacteria: Bacteria that live in hot water in the presence of magnesium, causing hot water to smell like rotten eggs. Can contaminate water heaters.

Detachment: With veneer or stucco wall cladding, the separation of the siding materials from its attachment to the exterior wall.

Dielectric connector: A type of connector used between two dissimilar metal pipes that prevents metal-to-metal contact between the pipes and stops the flow of electricity along the pipes.

Dip Tube: In a water heater, the tube that sends cold water to the bottom of the tank.

Door casing/trim: The finish trim details around the perimeter of the door on the interior finished wall.

Door frame/jamb: The top and sides of the door to include the wall framing as well as the actual doorframe and trim.

Dormer: A structure built out from the roof slope having its own roof and walls.

Double hung windows: A window with tow sashes which both move.

Double tapping: Adding wires at fuses or breakers for the purpose of adding more circuits to the electrical system. Not allowed, except with breakers approved for double tapping.

Downspout: A metal or vinyl pipe that is connected to the gutters and is used to carry the roof-water runoff down and away from the house.

Downspout gooseneck: Segmented section of downspout that is bent at a radius to allow the downspout to be attached to the house and to follow the bends and curves of the eaves and ground.

Downspout shoe: The bottom downspout gooseneck that directs water from the downspout to the extension or splash block at the grade.

Downspout strap: Strap used to secure the downspout to the side of the house.

Draft air: The air required to insure discharge of exhaust gas from a heating system through the flue.

Draft diverter: A device on top of the boiler that protects the heating system from excessive updrafts and chimney downdrafts.

Draft hood: A device on top of a water heater or furnace that prevents back drafts from the chimney sending exhaust gases into the building.

Drain pipes: Any discharge pipes in the DWV system.

Drain tile: A tube or cylinder that is installed around the exterior perimeter of the foundation footings. It collects and directs ground water away from the foundation of the house. The tile can be individual sections of clay or asphalt tubing or, in more recent construction, a perforated plastic drain-tile that is approximately 4 inches in diameter. The drain tile leads either towards a sump or to an exterior discharge away from the house.

Drain valve: On water heater, a valve at the base of the tank used to drain water.

Drain, waste and vent system: Piping that carries water and waste from home's fixtures to the sewer or septic system. Abbreviated *DWV*

Drip edge: A flashing laid at the eaves and rakes to direct water flow into the gutters or off the roof.

Drip loop: Slack in electrical wires at the masthead, which prevent water from running into the conduit.

Drum trap: A canister-shaped un-vented trap used fixtures such as bathtubs and laundry sinks.

Dry base boiler: A boiler with the heat exchanger set above the combustion chamber.

Dry laid: A stone foundation laid stone upon stone without mortar or footings.

Dry vent: A vent in the home's DWV system that carries only air and water vapor.

Drywall: A pre-manufactured plaster sheet covered with paper, used as a wall and ceiling covering.

Drywell: A drainage pit lined or filled with stone so that roof runoff, liquid effluent, or other sanitary wastes will leach or percolate into the surrounding soil.

Duct damper: A piece of metal inserted into a duct which allows the regulation of airflow through the duct runs.

Ducts: Round or rectangular pipes used for distributing air from the furnace throughout the house.

DWV: See *Drain, waste and vent system.*

Eave: The overhang or lower portion of the roof that extends beyond the outer wall of the structure.

Efflorescence: A white powder substance that is deposited on masonry wall surfaces. It is composed of soluble salts brought to the surface by water or moisture movement and evaporation. It usually appears after the moisture has evaporated.

Ejector pump: See *Solid waste pump.*

Electrical meter: The meter provided by the utility company that measures home electrical use in watts.

Electric plenum heater: An auxiliary heater, usually added to an oil-fired furnace, located in the plenum.

Electric resistance heating: Baseboard convectors, wall mounted strips, or floor inserts that each operate as a separate heating plant.

Electrolytic corrosion: Corrosion that occurs when two dissimilar metals are connected to each other in water containing dissolved salts, releasing metal ions and causing a current to flow.

Electromotive force: The force that drives a current of electrons through a given resistance. Electromotive force, also called voltage, is measured in volts.

Electronic vent damper: A damper in a smoke pipe that automatically opens before the burner the burner starts and closes when exhaust gases cool down.

Entrance canopy: A small overhanging roof that shelters the front entrance.

Entrance stoop: An elevated platform constructed of wood framing or masonry at the front entry that allows visitors to stand above or out of the elements. The platform should be wide enough to allow someone to stand on the platform while opening an outward swinging door such as a storm door even if one is not present.

Evaporator: A coil in a cooling system through which refrigerant flows that causes the refrigerant liquid to absorb heat, which changes the liquid to gas.

Evaporator cooler: A cooling system that uses the evaporation process to cool and moisturize the air for home cooling.

Expansion device: A device in a cooling system through which refrigerant liquid flows that depressurizes the liquid and cools it down.

Exterior siding: The decorative exterior finish on a house. Its primary function is to protect the shell of the house from the elements. The choice of siding materials varies widely to include wood, brick, metal, vinyl, concrete, stucco, and a variety of man-made compositions such as compressed wood, compressed cellulose (paper), fiber-reinforced cement, and synthetic stucco.

Extruded polystyrene insulation: Rigid board insulation produced by extrusion.

Fan control: A temperature-sensitive switch that turns the furnace fan off and on at preset high temperatures.

Fan/Limit switch: A furnace control combining both a fan control and a limit on temperature control.

Fan safety switch: A switch on a furnace that prevents the fan from operating when the access panel is removed.

Fascia/Rake board: The visible flat front board that caps the rafter tail ends and encloses the overhang under the eave that runs along the roof edge and at the edge of the roofing at the gables. The gutter is usually attached to this board at the eaves.

Faucet: A device to turn water on and off at a delivery point, which operates with a washer, cartridge, ball, valve or an O-ring mechanism.

Felt paper: An underlayment laid on roof sheathing under the roof covering.

Fiberglass insulation: An insulating material made of threads of glass covered with a coating that binds the fibers in place, used as batts, blankets, loose fill and rigid board.

Fiberglass shingles: Mats of glass fibers covered with a granular material, used in shingle form as a roof covering.

Finish flooring: The final floor covering inside the living space of a house. The most common types of finishes are carpeting, hardwood flooring, ceramic or stone tile, parquet panels or vinyl sheet flooring.

Finished grade line: A pre-determined line indicating the proposed elevation of the ground surface around a building.

Fink truss: A triangular roof truss with w-shaped interior webbing.

Firebox: The cavity in the open face of the fireplace in which the fire is maintained. The firebox is constructed of fire or refractory brick set in fireclay or reinforced mortar in traditional masonry fireplaces. The firebox may also be constructed of metal or ceramic-coated metal panels in more modern prefabricated fireplaces. See also *Combustion chamber.*

Fireplace cleanout door: The access door to the ash pit beneath the fireplace. The cleanout door is usually located in the lowest accessible level of the house such as the basement or crawl space, or located at the exterior of the chimney.

Fireplace hearth: The inner or outer floor of a fireplace usually made of brick, tile, or stone.

Fireplace insert: A metal stove with a door that is totally or partially inserted into a fireplace.

Firewall: A fire resistant wall used where garage wall abut the house, preventing the spread of fie.

Fishmouth: A condition with asphalt shingles where the center portion of the tabs curl upwards due to overheating.

Fixed pane widows: A window that does not open or close.

Fixture: Any sink, tub, shower, or toilet to which water is delivered in the home.

Flame retention burner: An oil burner with a flame retention ring that provides for more efficient combustion.

Flame retention ring: On an oil burner, a cone-shaped, slotted head on the blast tube that provides pressure, velocity and rotation to the air stream.

Flame rollout: A condition in a gas water heater or furnace or oil furnace where the flames burn outside the heating chamber.

Flashing: The building component used to connect and cover portions of a deck, roof, or siding material to another surface such as a wall, a chimney, a vent pipe or anywhere that runoff is heavy or where two dissimilar materials meet. The flashing is intended to prevent water entry and is usually made of rubber, tar, asphalt or various metals.

Flat roof: A variation of a shed roof with a very small slope, less than 2/12.

Flexible black tubing (solid): Solid, flexible tubing three or four inches in diameter used to carry roof water from the base of the downspout away from the building.

Floating slab: Where an independent slab does not rest on the foundation wall.

Floor joists: The main sub floor-framing members that support the floor span. Joists are usually made of engineered wood I-beams or 2x8 (or larger) lumber.

Floor truss: An engineered, prefabricated rectangular floor framing component.

Flue: See *Chimney flue*

Flue liner: A material that lines the chimney, usually terra cotta tiles.

Flue pipe: The exhaust pipe running from a gas appliance to the chimney or to the exterior.

Flux: A material, which eliminates chemical contamination, used in the soldering process.

Footing drain: A drainage system laid around the perimeter of a foundation below the level of the slab, which drains water from the soil to another location.

Footings: The bases on which the foundation rests which support and distribute the weight of the structure to the soil.

Forced hot water heating system: A system in which water heated in a boiler is circulated by means of a circulating pump through pipes to radiators or convectors throughout the home. Also called a hydronic system.

Forced warm air heating system: A system in which air heated in a furnace is circulated by means of a blower unit through ductwork to registers in the house.

Foundation: The part of the structure that supports it, transmits its weight from above-grade walls to the footings and protects it from effects of soil pressure.

Foundation footing: The base on which the foundation walls rests. The foundation is wider than the foundation wall in order to spread out the load it is bearing and to help prevent settling.

Foundation wall: The concrete block, concrete slab or other non-wood material that extends below or partly below grade, which provides support for exterior walls and other structural pans of the building. The foundation provides a flat level base for construction as well as a separation between the wood-based construction and the ground. Direct ground contact of wood leads to rot & deterioration as well as insect infestation.

Framing studs: A 2x4' or 2x6' vertical framing member used to construct walls and partitions, usually spaced 12 to 16" apart.

French Drain: A drain that is constructed of tile laid in a bed of gravel. It is designed to collect water and carry it away from the building

Functional drainage: A determination of whether water drains fast enough and completely.

Functional flow: A determination of whether water flows with enough pressure and volume.

Furnace: An enclosure in which energy, in a non-thermal form, is converted into heat.

Fuse: An overload protection device that melts and opens a circuit when the circuit overloads. May be a cartridge or screw-in types.

Fuse block: See *Pull-out fuse block*

Gable roof: The vertical and horizontal framing members that make up and support the end of a building as distinguished from the front or rear side. A gable is the triangular end of an exterior wall above the eaves.

Gable vent: A vent located in the gable ends of the roof.

Galvanic corrosion: See *Electrolytic corrosion*

Galvanized steel: Steel coated with zinc.

Gambrel roof: A roof style with a double slope on each side where the bottom-most slope is steepest.

Garage door: The door for the vehicle passage into the garage area. Typical garage doors consist of multiple jointed panels of wood, metal or fiberglass.

Gas chiller: A cooling system that uses ammonia as a refrigerant and uses heat to drive the refrigerant cycle.

Gas manifold: In a gas burner, the gas line that delivers gas to the burners.

GFCI: An abbreviation for a ground fault circuit interrupter, a monitoring device that will trip after a ground fault is detected, stopping the flow of electricity in a circuit.

GFCI tester: A testing device used to test the operation of GFCI outlets and 3-slot outlets for polarity and grounding.

GFC outlet: An outlet, which has a monitoring device that will trip the circuit when a ground fault is detected.

Girder: A large beam supporting floor joists at the same level as the sills. A larger or principal beam used to support concentrated loads at isolated points along its length.

Gpm: An abbreviation for gallons per minute, a measurement of water flow.

Grade: The surface or slope of the earth on the property.

Grade beams: Poured reinforced concrete beams that rest on grade, just in the ground, or on piers.

Gravel fill: A bed of course gravel that is laid atop the existing soil prior to pouring the concrete slab. The gravel serves a dual purpose of breaking surface tension on the concrete slab and providing a layer that interrupts capillary action of subsurface moisture from reaching the concrete slab. Typically, polyethylene sheeting will be installed between the gravel fill and the concrete slab for further moisture proofing.

Gravity hot water heating system: A system in which water heated in a boiler rises naturally through pipes to radiators in the house.

Gravity steam heating system: A system in which water boiled in a boiler changes to steam which rises naturally through pipes to radiators and condensate drains back to the boiler.

Gravity warm air heating system: A system in which air heated in the furnaces rises naturally through ductwork without the aid of a blower unit. Also called an octopus furnace.

Gray water: Wastewater not containing sewage or fecal matter or food wastes. Wastewater from bathing and laundry is gray water, wastes from garbage disposers and toilets is not.

Grounded outlet: An outlet wired with a ground wire that is connected to the ground system.

Grounding: The process of electrically connecting electrically conductive items to the earth by which means excess electrical current is absorbed into the ground.

Grounding conductor: The wire used to ground the home's electrical system.

Grounding system: The means by which a home's electrical system is grounded, typically by connecting a ground wire to plumbing pipes or to a metal rod buried in the earth.

Ground-level gutter: A concrete trough in the ground that catches rainwater runoff from the roof and carries it away from the building.

Gusset plate: A piece of wood placed over partial bearing joists and nailed into the joists to hold them in place. In a truss, metal or wood connectors that hold members of the truss together.

Gutter: A channel used for carrying water run-off. Usually located at the eaves of a house and connected to a downspout. The primary purpose of the gutters and downspouts is to carry roof water run-off as far away from the house as possible.

Gypsum: A common mineral also called sulfate of calcium, used in plaster.

Hartord loop: A loop of return piping that turns downward to connect to he equalizer just below the water level, preventing water from flowing out of the steam boiler in case of a leak in return piping.

Header: A horizontal framing member that carries the load above windows, doors and other opening is framed walls. Also called lintel.

Header joist: The perimeter joist nailed to the sill. All called the rim joist.

Header rows: Rows of brick turned small end out as ties to hold a brick wall together.

Hearth: The floor of the fireplace, usually poured concrete about 4" thick.

Heartwood: The wood taken from the inner core of a tree.

Heat exchanger: A heavy metal hood above the combustion chamber that holds and contains the burner flame. In a furnace, it separates exhaust air from the circulating air that heats the house. In a boiler, it separates exhaust air from the circulating water.

Heat pump: A reverse-cycle air conditioner that operates as both a cooling and heating system, by reversing the flow of refrigerant.

Heating chamber: In a gas water heater, the chamber where the gas is burned.

Heating elements: In an electric water heater, the upper and lower electrical heating units.

Hollow core door: A door with a honeycomb or patterned cardboard core framed in solid rails and jambs and covered with a veneer.

Hopper windows: A window hinged at the bottom to open outward.

Hose bib: A faucet on the exterior of the home.

Hot wire: An electrically charged wire, carrying a charge of 120 volts in a home circuit.

House main: See *Service pipe.*

House trap: A large U-shaped fitting with capped heads found where the home waste lines join the public sewer.

Howe truss: A triangular roof truss that incorporates vertical webbing into its configuration.

Humidifier: A device designed to increase the humidity within a room or a house by means of the discharge of water vapor. Humidifiers may consist of individual room-size units or larger units attached to the heating plant to condition the entire house.

Hydronic boiler: A device used in a forced hot water heating system.

Ice damning: A phenomenon that occurs when melting snow freezes at the eaves and traps water from snow melting from the upper part of the roof.

Ignition electrodes: On an oil burner, a pair of electrical elements located in the blast tube to provide a spark that ignites the oil.

Induced draft fan: A fan that pulls combustion by-products through a furnace or boiler, ensuring a good draft and reducing heat loss.

Insulation: A man-made or natural material that resists heat flow that is installed in a house's shell to keep the heat in a house in the winter and the coolness in the house in the summer.

Insulator: A material that offers a high resistance to an electrical current flowing through it.

Interlayment: Roofing felt installed between courses of wood shakes.

Intermittent pilot: A pilot which lights only on a call for heat.

Jack/King stud: The framing stud that supports the header above a window, door or other opening within a bearing wall.

Jalousie widows: A window with narrow strips of glass that move together, lifting out from the bottom as the window opens.

Jambs: The side pieces in a window frame.

J-Channel: A manufactured component of an aluminum or vinyl siding system, which has a curved channel that the planks fit into. Used around window and door openings to make a weathertight seal.

Jet pump: A motorized pump that recirculates pressurized water into a well and pushed water to the surface by means of a centrifugal pump and jet assembly.

Joist: Horizontal members of a floor system that carry the weight of the floor to the foundation, girders, or load-bearing walls.

Junction box: A covered metal or plastic box used to protect connections or junctions in an electrical circuit.

Kalsomine: A mixture of glue, pigment, and water that was once used as a finish on plaster ceilings.

Knee wall: Supporting wall running from the ceiling joists to rafters, which prevents rafter sag.

Knob-and-tube wiring: Old branch circuit wiring using ceramic knobs to secure wire to surfaces and tubes to pass wires through framing members.

Knockout: The fuse holder. An open knockout is one without a fuse in it.

Laminated glass: A multiple light glazing with a sticky plastic inner light that holds broken pieces of glass together when the glass breaks.

Lath: Strips of wood, wire mesh, or gypsum board attached to studs and joists to form a base for plaster to adhere to.

Leach field: See *Seepage field*

Ledger: In balloon framing, a horizontal framing member attached to the wall studs providing supports for the 2nd floor joists.

Ledger strips: Lengths of wood nailed along the bottom edge of a girder to provide support for joists.

Light: Each layer of glass making up a window.

Limit control: A control that turns off the burners in a furnace when circulating air reaches a preset high temperature or in a boiler when water reaches a preset high temperature (forced hot water) or pressure reaches a preset high pressure (steam).

Lintel: A horizontal framing member that carries the load above a window, door or other opening. Also called Headers.

Live load: The weight of the home's occupants, the furnishings, of the home and other weight the structure must support.

Load: A light or appliance that uses electricity on a circuit.

Loose fill insulation: A loose insulating material poured or blown into place between wall studs and attic joists, made of fiberglass, rock wool, cellulose or vermiculite.

Louvered door: A door with plastic, wood, or cloth slats in a frame.

Low voltage system: A lighting system featuring boxes of relays, unusual switches and one or more switching panels.

Low water cut-off: A safety control on a boiler that shuts off the burner when water levels fall below the required amount for the system.

LP gas: Liquified propane or petroleum gas used as a fuel source.

Main automatic gas valve: A device on a furnace or boiler that starts and stops the flow of gas to the burners.

Main disconnect: Fuse(s) or breaker(s) that alone or together stop the entire flow of electricity to the home. Located in a service box or the main panel.

Main panel: A metal box holding overload protection devices and/or disconnects for the home's electrical circuits.

Main shut-off valve: A valve that turns off the water supply to the building.

Mansard roof: A variation on the hip roof with steeply sloping sides and a top portion either flat or meeting in a peak or a ridge.

Mantel: The ornamental or decorative facing around a fireplace including a shelf that is attached to the breast or backing wall above the fireplace.

Manual turn-off: A valve that turns off the fuel supply to a heating unit.

Master shut-off: A device that turns off electricity to the heating system and its controls. Also called a safety switch or serviceman's switch.

Mechanical vent: A device installed for venting purposes in an un-vented location. Does not vent to the outside.

Metal shower pan: A shower pan made of lead or tin notorious for leaking.

Millboard: An insulating material made of asbestos and gypsum.

Modulating aquastat: A device in a hot water boiler that senses outdoor temperature and changes circulating water temperature requirements accordingly.

Moisture/Vapor barrier: A non-porous material such as plastic or polyethylene sheeting that is used to retard the movement of water vapor into walls and attics and to prevent condensation in them. A vapor barrier is also installed in crawl space areas to prevent moisture vapor from entering up through the ground.

Moisture permeable: A surface that allows moisture to pass through it.

Monolithic Slab-on-grade: Construction where the slab and the foundation are poured as one piece.

Mortar: A mixture of sand, water and a binder used between courses of masonry. The binder is either lime or cement or both.

Mortise and tenon connections: Joining joists to girders where a mortise (hole) in the girder accepts the tenon (a projecting end) of the joist.

Motorized duct damper: A damper located in the smoke pipe above the furnace or boiler that opens and closes automatically to prevent heat loss up the chimney.

Multiple tapping: See *Double tapping*

Muntins: A grid of cross pieces of wood or lead that hold small panes of glass in a multi-pane window.

Nail pops: A condition where nails cause bulges in drywall when they back out of the studs.

National Electrical Code (NEC): A national standard for electrical installations published by the National Fire Protection Association.

Neutral busbar: A conductor bar that provides connections for the neutral service conductor, neutral, circuit ground wires and the grounding conductor.

Neutral wire: A wire with no electrical charge (where equal and opposite currents cancel each other out) that provides a return path for electricity in a circuit.

Newel post: The post at the top and bottom of the handrails and anywhere along the stair run that creates a directional change in the handrails is called the newel post. The newel post is securely anchored into the underlying floor framing or the stair stringer to provide stability to the handrails.

Octopus furnace: See *Gravity warm air heating system.*

Ohms: The unit of measure for resistance in the electrical system.

Oil burner nozzle: A device located in the blast tube which shoots out oil particles into the firebox.

Open ground: Where an outlet is not grounded.

Open return: In the basement, an opening in the furnace or return ducts for collecting return air. Most often this is prohibited.

Open system: A hot water system that has an expansion tank open to the atmosphere and located above the highest radiator in the home.

Open valley: A valley where the roof covering stops short of the valley and the flashing is visible.

Outlet: An electrical connecting device providing receptacles into which appliances can be plugged for power.

Overflow: An auxiliary drain in bathtubs and some sinks.

Overfusing: Using a fuse or circuit breaker on a circuit that is larger than the wire's capacity. Not allowed.

Overhead door: A garage vehicle door made of hinged panels that “bend” along overhead tracks as the door is opened. May be manually or automatically opened.

Overload protection device: A fuse or breaker, which will break the circuit when it overloads.

Overshooting: A condition when a house is heated higher than the thermostat is set for.

P-trap: A P-shaped trap commonly used today below fixtures and floor drains. Usually vented.

Paint, Alligatoring: A process in which the solvent in paint evaporates too quickly, leaving residual solvent in the paint and causing wrinkling or cracking of the surface.

Paint, Chalking: A process in which ultra violet radiation causes the vehicle in exterior house paint to break down and pigment particles to be released.

Paint, Crazing: A condition in a paint surface where the new layer of paint shrinks while drying causing a net-like pattern of cross cracking.

Palmer valve: A hinged valve in the floor drain that allows water from the drain tile system to flow through the floor drain into the sewer.

Parapet wall: That portion of wall, which extends above the roof surface.

Parquet flooring: 6-inch squares made up of six 1-inch strips of wood, laid at right angles to each other to provide a finish floor.

Patio: A flat, paved area abutting the house.

PB: An abbreviation for polybutylene, a blue plastic piping used in supply piping. Uses press-on fittings on joints.

PE: An abbreviation for polyethylene, a plastic piping sometimes used in public water systems.

Perlite: An insulating material made of volcanic rock, used as loose fill.

Picture window: A large fixed-pane window.

Piers: Columns supporting a structure that are built on footings in a hole below the frost line.

Pilaster: A flat, rectangular column that is attached or set into a wall as an ornamental device or as a reinforcement for the wall.

Piles: Columns supporting a structure that are driven into he ground to reach soil of bearing strength.

Pilot: The small flame that ignites gas in a gas furnace.

Piston pump: A motorized pump that lifts water from a well with a series of pistons. Also called a reciprocating pump.

Pitch: (Roof Pitch) The slope of he roof stated as the amount the roof rises in 12 feet of length. A 4 in 12 roof pitch rises 4-inches for each foot horizontally.

Pitch pocket: A circular metal box surrounding the plumbing stack, filled with a plaster of paris material, and topped with tar or bitumen, used as stack flashing.

Plaster: A powder made of gypsum and other aggregates that forms a paste when wet and a durable surface when applied and dried. Used as a wall and ceiling covering.

Platform framing: A construction method where the stories of the house are constructed one on top of each other.

Plenum: The first large section of supply duct directly over a furnace from which smaller ducts branch out to distribute heat to the house.

Ply: A layer of roof covering.

Plywood siding: Plywood sheets, some with a decorative or grooved outer surface, used as a wall cladding.

Pocket door: A door designed to slide sideways for concealment in a wall.

Pointing: Repairing mortar between masonry units (brick, stone and block).

Polarized outlet: An outlet with a large neutral slot and a smaller hot slot for plugging in appliances with large and small prongs.

Polystyrene foam boards: A plastic rigid board insulation used as a wall insulator. Must be covered for fire safety.

Polyurethane foam boards: A plastic rigid board insulation used as a wall insulator. Must be covered for fire safety.

Porch: A roofed extension of the house that is built as a part of the house.

Porch column: Vertical members that support the porch roof and the floor system.

Post and beam: An old construction method in which a small number of posts and beams carry the weight of the structure to a plank flooring.

Power ventilator: An electrically powered ventilator located at the gable end of the roof or on the roof surface between rafters.

Pressure gauge: On a pressure tank, a gauge that shows the pressure reading of the tank.

Pressure reducing valve: A valve on the service pipe near the meter that reduces city water pressure as it reaches the building.

Pressure reducing valve boiler: A valve on the water supply line to a boiler that reduces water pressure to an acceptable boiler pressure.

Pressure relief valve boiler: A valve on a boiler that will discharge water from the boiler if pressure approaches dangerous limits.

Pressure switch: On a pressure tank, a switch that automatically starts and stops the well pump at preset pressures.

Pressure tank: A storage tank that holds well water under pressure by being partially filled with air.

Pressure-treated wood: Wood impregnated with chemical preservatives that protect the wood from termites and fungi that cause rot.

Primary control: A control on a oil burner that starts and stops the burner in response to thermostat signals and verifies ignition. May be located on the smoke pipe or the burner housing.

Psi: An abbreviation for pounds per square inch, a measurement of water pressure.

Puffback: In an oil burner, a condition where smoke, soot or flames escape from the combustion chamber.

Pull-out fuse block: A handle block containing cartridge fuses that can be pulled out to stop the flow of electricity.

Pulse unit: A furnace or boiler with a combustion method involving a sealed combustion chamber and a tailpipe that create self-perpetuating series of shockwave ignitions.

Pump control: A control on a boiler that turns on the circulating pump at a signal from the thermostat upon a call for heat or from an aquastat at a certain preset temperature.

Pump house: A separate building or shed built for the purpose of housing the well equipment.

PVC: An abbreviation for polyvinyl chloride, a white plastic piping used in DWV piping. Uses mechanical no-hub joints.

Quarry tiles: Hard fired clay tiles that can be glazed or unglazed, used as floor covering.

R-rating: The total heat resistance for a given thickness of insulation and equal to the insulation's R-value times it's thickness.

R-value: A number that represents an insulation materials resistance to heat flow per inch of thickness.

Radiant heating: A system consisting of continuous piping from the boiler or electric cables laid out in rows buried in the floor or ceiling, thereby heating a room by radiation.

Radiators: Heat outlets made of heavy metal piping that deliver hot water or steam from the boiler and radiate heat into the room.

Radon: A gas that occurs naturally when uranium in the soil and rocks breaks down. The

Resilient floor coverings: A range of tiles and sheet goods laid as a finish floor. Includes linoleum, rubber tiles, and various vinyl sheets and tiles.

Resistance: The opposition offered by a material when a current passes through it. Resistance is measured in units called ohms.

Retaining wall: A wall constructed to hold back soil.

Return ducts: Ducts that deliver cool air from the home back to the furnace.

Reverse trap toilet: A 2-piece (tank and bowl) toilet with a larger wetted area than earlier models.

Reversed polarity: Where the hot wire is wired to the large slot in an electrical outlet and the neutral wire is wired to the small slot, the opposite of how it should be done.

Reversing valve: A valve in a heat pump that changes the direction of the refrigerant flow process.

Ribbon slate: Slate shingles with a ribbon of color in them.

Ridge: The horizontal intersection of two sloping roof surfaces.

Ridge beam: The horizontal structural member at the top of a roof where the rafters meet.

Ridge board: The board placed on edge at the top-most point of the roof framing, into which the upper ends of the rafters are joined or attached.

Ridge cover: Protective flashing laid across the ridge and finished with shingles or roll roofing to protect he ridge from water penetration.

Ridge vent: a vent located on the roof ridge, running the length of the ridge.

Rise: The vertical height of the roof.

Risers: In supply piping, the pipes that carry water vertically up through the house.

Rock wool: An insulating fibrous material made by blowing steam through molten rock or slag, used as batts, blankets or loose fill.

Rolled roofing: An asphalt-impregnated felted mat of fibers coated with asphalt formations and covered with a granular material, used in strips as a roof covering.

Romex cable: A non-metallic sheathed cable used in branch circuit wiring which carries a hot, a neutral and ground wire.

Roof covering: The outer layer of shingles, tiles or other materials used to protect the roof from water penetration.

Roof rafters: Inclined structural framing members which support the roof, running from the exterior wall to the ridge beam. Rafters directly support the roof sheathing and create the angle or slope of the roof.

Roof sheathing: The material used to cover the outside surface of the roof framing to provide lateral and rack support to the roof, as well as to provide a nailing surface for the roofing material. This material most commonly consists of plywood or horizontally laid wood boards.

Roof truss: An engineered, prefabricated geometric roof framing component.

Roofing: The finished surface at the top of the house that must be able to withstand the effects of the elements (i.e. wind, rain, snow, hail, etc.). A wide variety of materials are available such as asphalt shingles, wood shakes, metal roofing, ceramic and concrete tiles, and slate.

Roughed in fireplace: An opening left with a connection to the chimney intended to provide the space for a fireplace to be installed later.

Run: The horizontal length of the roof from the eave to he center point.

S-Trap: An S-shaped un-vented trap once used under plumbing fixtures.

Safety glazing: Glazing that is held in place when it breaks. May be tempered or laminated glass.

Sanitary pump: A sealed crock located in the basement floor containing an electric pump which pumps gray water from fixtures into the sewer line or drywell.

Sash: The framework in a window that holds the glass or other material.

Scarfed joint: A joint used in plywood siding where edges of abutting sheets are angle cut to fit snugly and prevent water penetration.

Scissors truss: A roof truss used in vaulted or cathedral ceilings.

Scuttle hole: A small opening either to the attic or to the crawlspace.

Seepage field: Underground porous concrete drain tiles receiving liquid discharge from a septic system for seepage into the ground. Also called drain field.

Self-flashed valley: A valley where the roof covering continues over the valley, but there is no flashing underneath.

Separation walls: Walls between the garage and living area, which must be covered with drywall for fire resistance. Also called firewalls.

Septic tank: A tank that separates liquid and solid waste before the liquid is discharged into a leaching bed underground.

Service box: A metal box, separate from the main panel, that contains the main disconnect.

Service conductors: The wires bringing electricity to the home.

Service drop: Overhead wires bringing the electrical service to the home.

Service entrance: The portion of a home's electrical system from the utility pole to the home's main disconnect.

Service lateral: Underground wires bringing the electrical service to the home.

Service pipe: The pipe that brings water from its public or private source into the building.

Setback feature: A feature on a thermostat that can be set to automatically lower temperature settings during certain hours.

Sheathing: Sheets of plywood, planking or other materials used to cover a roof, wall or floor framing system.

Shed roof: A roof style with a single slope slanting in on direction.

Shiplap: A style of milled plank used in plank siding that is laid close enough to appear to be butted.

Short cycling: A condition where the heating or cooling turns on and off too often.

Sidewalk: A walkway that provides a direct, all-weather approach to an entry. The sidewalk can be constructed of poured concrete, laid stone, concrete pavers, or gravel contained between borders or curbs.

Sill: The 2 X 4 or 2 X 6 laid flat on and anchored to the foundation or slab, providing a pad for the framing system. Also called a sill plate.

Sill plate: The horizontal wood member that is anchored to the foundation masonry to provide a nailing surface for floors or walls built above.

Silt fabric: A porous fabric that acts as a barrier between the backfilled soil and the gravel surrounding the drain tile. This barrier prevents soil particles from blocking the movement of ground water to the drain tile.

Single-bus panel: An electrical panel with a single pair of busbars for either 120-volt or 240-volt circuits.

Single-hung windows: A window with two sashes, only one of which moves.

Single-ply: One layer of roof covering.

Single-ply membrane: A modified asphalt, plastic or rubber membrane laid in adhesives or mechanically fastened, used as a roof covering.

Siphon jet toilet: A reverse trap toilet with a quiet flush.

Siphon vortex toilet: A late model 1-piece toilet with a large wetted area and a silent flush.

Slab-on-grade: A poured concrete slab that rests directly on the ground.

Slate shingles: Sedimentary rock in shingle form, used as a roof covering.

Slider windows: A window with a sash that moves horizontally.

Slope: The ratio of a roof's rise to its run. Normally expressed with the measure of the rise over a run of 12'. A slope of 3/12 is said , "Three in twelve."

Smoke chamber: In a fireplace, the area between the damper and the flue that guides smoke toward the flue.

Snow shovel: In roofing, a metal finger-like claw installed with slate roofing to hold snow and ice in place until it melts.

Soffit: The horizontal underside of the eave.

Soffit vent: A vent located in the soffit along each side of the roof.

Soil pipes: Waste pipes that carry waste from toilets in the building.

Soil stack: Main vertical waste pipe fed by all other waste pipes that carries waste to the sewer to the septic.

Soldering: The process of using flux and a soft solder to make a joint in copper piping.

Sole plate: In platform framing, the horizontal framing member nailed to the header and the floor joists at the outer edge of the structure.

Solid brick wall: A wall construction where three layers of brick are used to construct a solid wall with no wood framing.

Solid waste pump: A sealed tank in the basement floor containing an electric pump which pumps toilet waste up to the sewer line. Also called an ejector pump.

Spalling: The crumbling and falling away of the surface of bricks, blocks or concrete.

Spillage: A condition where combustion by-products spill out of a heating unit's exhaust system.

Split-bus panel: An electrical panel with tow or more pairs of busbars. The upper busbar is for 240-volt circuits, one of which provides power to the lower busbar. The lower busbar is for 120-volt circuits.

Square: The amount of roofing material used to cover 100 square feet of roof surface area.

Stack relay: A oil burner primary control that is located on the smoke pipe.

Stacks: Vertical piping in the DWV system.

Stair rail: A sturdy handhold and barrier that follows the outside (and sometimes the inside) perimeter of the stairs. The stair rail is used to prevent falls and to provide a means of additional support when walking up or down the stairs.

Stair riser: The vertical boards that close the space between each stair tread on a set of stairs.

Stair stringer: The supporting members in a set of stairs that are cut or notched to accept the individual treads and risers.

Stair tread: The horizontal board in a stairway that is walked upon (see stair riser and stair stringer).

Standing pilot: A pilot flame that burns continuously.

Standpipe: An outdoor elevated water reservoir:

Starter course: Shingles or shakes laid under the first course of shingles at the edge of the roof.

Step flashing: Short lengths of overlapping flashing to form a continuous slopping flashing, used parallel to the slope of the roof.

Stippling: A texturing process where a stipple finish is sprayed over drywall.

Stop molding: A framing piece in a doorframe that stops the movement of the door.

Structure: A home or buildings skeleton, including its foundation, footings, roof, walls, and floor framework.

Stucco: A water resistant, plaster-like material made of sand, cement and water, applied and used as a wall cladding. May have an acrylic finish.

Studs: See *Wall Studs.*

Sub floor: Boards or plywood installed over joists on which the finish floor is laid.

Sub-flooring: Horizontal sheets or planks that transfer the load of the home's furnishings and people to the floor joists.

Submersible pump: A motorized pump that sits in the well and pushes water to the surface by means of a motor and centrifugal pump.

Sub-panel: A panel connected to a main panel for the purpose of providing more circuits and better distribution of electricity to the home.

Sump pump: An electrical pump normally located in a hole in the basement slab with the purpose of pumping accumulated water away from the footing. The water should be discharged to the exterior of the building.

Sump pump (pedestal style): A sump pump which has the motor mounted on a shaft that sits above the water level.

Support post: A vertical framing member usually designed to carry or support a beam or girder. In newer construction a metal lally (pronounced "lolly") column is commonly used, as well as 4x4" or 6x6" wood posts.

Supply system: Distribution piping form the source of water supply to the buildings fixtures and faucets.

Surround: The wall around the bathtub, made of ceramic tiles or a pre-molded fiberglass.

Swale: A wide shallow depression in the ground to form a channel for storm water drainage.

Tab: In a shingle roof, each shingle.

Tankless coil: A coil inserted into a boiler to heat water for domestic use.

Temperature, pressure gauge: A gauge on a boiler that shows the current operating temperature and pressure of the boiler.

Tempered glass: Glass that shatters into small, smooth edged cubes when it breaks.

Termite shield: A metal flashing that is installed below the sill plate that directs termite tunneling around the metal flashing which exposes their existence.

Terne metal: A copper containing steel alloy sheet covered with an 80% lead, 20% tin plating, used as a roof covering.

Terrazzo: A mix of marble chips and concrete laid in squares bordered by lead beading and polished smooth, used as a floor covering.

Thermalcouple: A bimetallic element that senses whether or not the pilot is lighted and controls the pilot control valve, turning off the flow of gas to the pilot when the pilot flame is out.

Thermostat: A temperature-sensitive device that opens and closes a circuit in response to temperature changes in the air, thereby activating a heating or cooling system.

Throat: In a fireplace, the top of the firebox.

Tie-back: A heavy wooden post and cross piece used to anchor a wooden retaining wall to the soil behind it.

Tile: Concrete or clay flat, curved or corrugated shaped forms, used as a roof covering.

Top plate: The topmost horizontal framing members of a framed wall. Most construction practices require the top plate to be doubled in thickness.

Trap: A device that holds water in the plumbing system and prevents the backflow of gases.

Truss: A frame or joint structure engineered to span long distances. Engineered trusses can be made for floors or roofs.

Truss uplift: A phenomenon where the bottom chord of a roof truss bows upward during the cold months and returns to normal position during the warmer months.

Turbine vent: A vent with air powered vanes on a central rotating spindle, located on the roof face.

Turn-off valves: Valves in the water supply system that allow water to be turned off to certain locations in the building.

UFFI: An abbreviation for urea formaldehyde foam insulation which is made of an insulating material in a syrup from and a reactant to create a site-formed insulation.

Underlayment: Roofing felt laid in a single layer between the roof sheathing and the roof covering materials.

Unlined flue: A chimney where the chase itself serves as the flue.

Upheaval: A condition where sections of a driveway rise doe to poor construction, an insufficient base, or tree roots and stones moving under the surface.

Urethane insulation: A plastic foam insulation manufactured as rigid boards or foamed in place at the building site.

Vacuum breaker: See *Back-flow preventer.*

Valley: The trough formed by the junction of two sloping sides of the roof.

Valley flashing: Metal or roll roofing flashing laid in a valley to protect the junction from water penetration.

Vapor barrier: A type of waterproof sheeting used to prevent the passage of moisture through a surface.

Vault: An elevated indoor water reservoir, often located in the attic, from which water flows by gravity.

Vent pipes: Pipes that carry gases and pressure that builds up in the DWV system.

Vent stack: Main vertical vent pipe fed by all other vent pipes that exhaust through the roof.

Vent system: All vent pipes in the building, exhausting above the roof.

Vermiculite: An insulating material made from heating and expanded mica, used as loose fill.

Veneer: See *Brick Veneer.*

Vinyl siding: Horizontal polyvinyl chloride planks, used as a wall cladding.

Volts: The unit of measure for electromotive force.

Wainscoting: The wooden paneling of the lower part of an interior wall up to approximately waist-height or between 36" to 48" from the floor.

Wall cladding: A siding or covering for the exterior of the house that protects the framework of the structure.

Wall insulation: A man-made or natural material that resists heat flow that is installed in a house's shell to keep the heat in a house in the winter and the coolness in the house in the summer. The most common form of wall insulation is fiberglass baits.

Wall sheathing: The material used to cover the outside surface of the wall framing that provides lateral and shear support to the wall as well as a nailing surface for the exterior siding.

Wall Studs: Vertical wall framing members. Connected in platform framing to the sole plate and the top to a top plate. In balloon framing, connected to the sill.

Waste pipes: Drain pipes that carry water away from the fixtures in the building

Water-cooled air conditioning: A cooling system where heat is removed from the refrigerant by means of water surrounding the condenser.

Water hammer: A condition that occurs when water is shut off suddenly and shock waves move back and forth in the supply piping. Can cause banging in loose pipes.

Water heater: A steel tank lined with glass, porcelain or cement in which water is heated for domestic use.

Water level sight gauge: A glass tube showing water level in a steam boiler.

Waterlogged: A condition with a pressure tank where its air is absorbed into the water it holds causing a well pump to cycle rapidly and repeatedly.

Watts: The unit of measure of power. One watt is equal to 3.4 BTU’s.

Web: An interior member of a truss.

Weep Holes: Openings in the bottom row of brick in a veneer wall providing an exit path for water accumulating behind the veneer.

Well pit: An underground chamber, usually made of masonry, which houses well equipment.

Well pump: A pump that draws water from a well and pushes it through the buildings piping system.

Wet vent: A vent pipe in the home's DWV system that combines carrying air and water vapor with carrying waste matter.

Whole house fan: A fan with an intake form the house, designed to change house air every minute or so. Can be gable mounted with a self-closing louver in an upper hall ceiling.

Winders: Pie-shaped treads used when staircases curve or make turns.

Window casing/trim: The finish trim details around the perimeter of the window on the interior finished wall.

Window cripple: Short studs placed between the header and a top plate or between a sill and sole plate.

Window frame/jamb: The top and sides of the window, to include the wall framing as well as the actual window frame and trim.

Window header: A beam placed perpendicular to wall studs above doors, windows or other openings to carry the weight of structural loads above the window or door.

Window sash: The framework that holds the glass in a door or window.

Window well: An excavation around a basement window that prevents the surrounding soils from collapsing into the window. The window well is normally constructed of formed corrugated galvanized metal, built-up masonry, or pressure treated wood.

Wiping: The process of using molten lead to make a bulb-shaped joint lead piping.

Wire mesh: A mesh attached to the wall sheathing and studs used to anchor a stucco base coat to the wall.

Wood plank siding: Rectangular wood planks, installed vertically or horizontally as a wall cladding.

Wood Shakes: Thick, rough, uneven shingles that are hand-split, split and sawn on one side, or sawn on both sides, used as a roof covering.

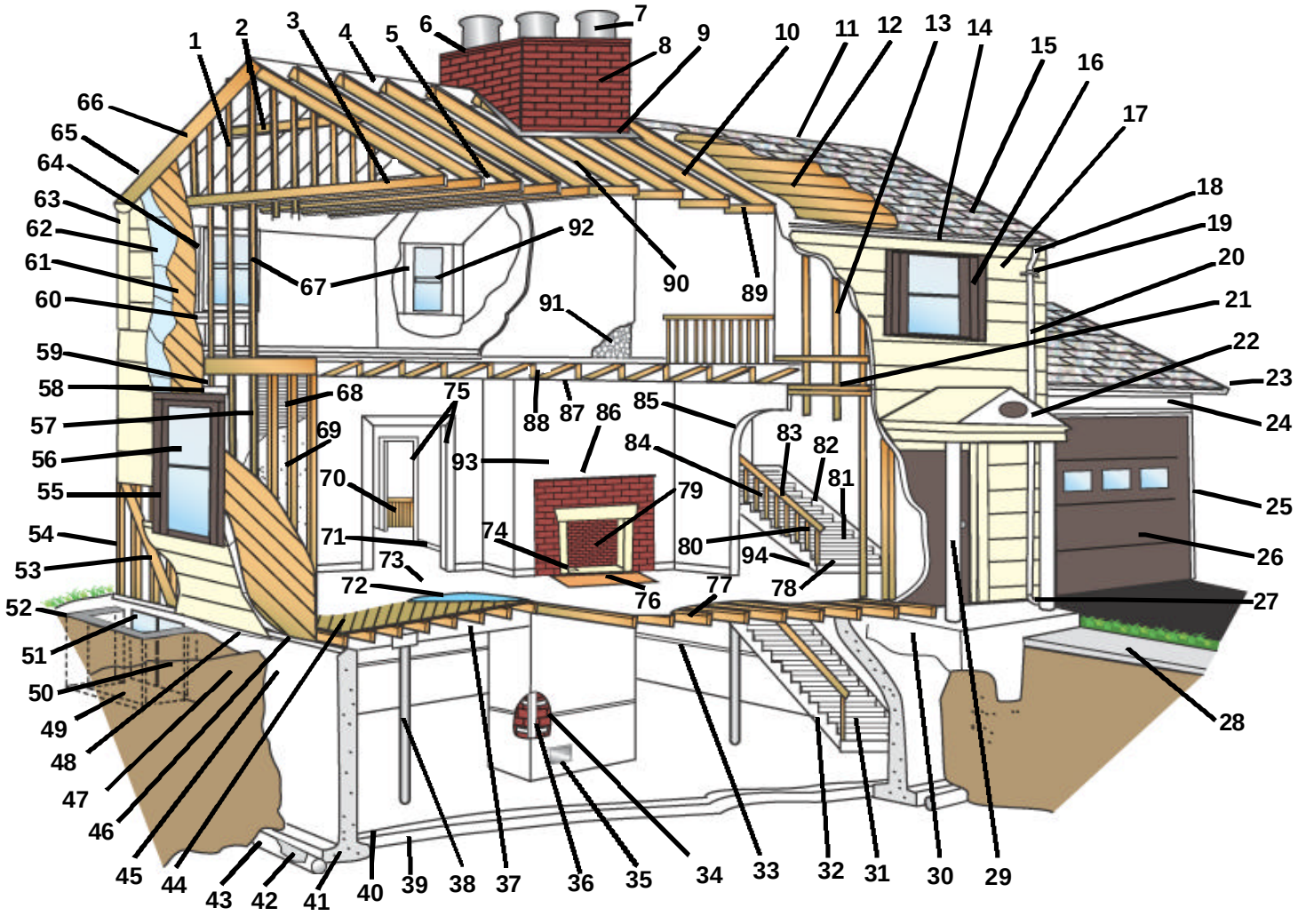
Wood Shingles: Shingles that are sawn and are of uniform thickness, used as a roof covering.

Wood stove: An insulated freestanding metal wood-burning unit with a door.

Yankee gutters: Planks nailed to the roof surface to prevent rainwater from escaping from the roof in areas such as over doorways.

Zero clearance fireplace: A prefabricated insulated metal fireplace unit that can be wall-mounted or freestanding.

SCHEMATIC OF A HOME



1. Gable stud
2. Collar beam
3. Ceiling joist
4. Ridge board
5. Insulation
6. Chimney cap
7. Chimney flues
8. Chimney
9. Chimney flashing
10. Rafters
11. Ridge
12. Roof boards
13. Stud
14. Eaves gutter
15. Roofing
16. Blind or shutter
17. Bevel siding
18. Downspout gooseneck
19. Downspout strap
20. Downspout leader
21. Double plate
22. Entrance canopy
23. Garage cornice
24. Fascia
25. Doorjamb
26. Garage door
27. Downspout shoe
28. Sidewalk
29. Entrance post
30. Entrance platform
31. Stair riser
32. Stair stringer
33. Chair rail
34. Furring strips
35. Cleanout door
36. Corner stud
37. Girder
38. Girder post
39. Gravel fill
40. Concrete floor
41. Foundation footing
42. Paper strip
43. Drain tile
44. Diagonal subfloor
45. Foundation wall
46. Sill plate
47. Backfill
48. Termite shield
49. Window well wall
50. Grade line
51. Basement sash
52. Window well
53. Corner brace
54. Corner stud
55. Window frame
56. Window
57. Wall studs
58. Header
59. Window cripple
60. Rough header
61. Wall sheathing
62. Building paper
63. Pilaster
64. Window stud
65. Cornice molding
66. Fascia board
67. Window casing
68. Lath
69. Insulation
70. Wainscoting
71. Baseboard
72. Building paper
73. Finish Floor
74. Ash dump
75. Door trim-casing
76. Fireplace hearth
77. Floor joists
78. Stair riser
79. Fire brick
80. Newel cap
81. Stair tread
82. Finish stringer
83. Stair rail
84. Balusters
85. Plaster arch
86. Mantel
87. Floor joists
88. Bridging
89. Lookout
90. Attic space
91. Metal lath
92. Window sash
93. Chimney breast
94. Newel

SITE

Foliage

Foliage on a property requires maintenance. Bushes, shrubs, trees, etc., should not be allowed to brush against structural members, such as roof surfaces, siding and trim. Vines and ivy should be kept off structural members such as masonry, aluminum, wood and vinyl as they can be very destructive. If the building does have ivy, vines, or poison ivy on it, these plants should be killed and allowed to dry before being carefully removed. Firewood should not be stored in the interior of a building or close to any of the walls on the exterior. Firewood often has pests in it, and improper storage gives them ready access to the interior.

Decks

Many houses have decks. Most decks built today are constructed of pressure treated lumber (PTL), which is good. PTL has a long life and requires little maintenance. This lumber does have a tendency to warp and will require occasional re-nailing. Decks constructed with standard lumber can deteriorate rapidly if they are not covered with a preservative. As members decay, they should be replaced with pressure treated lumber. A standard lumber deck will eventually need replacement. PTL may be treated with a silicone-type agent to reduce cracking and splitting. Decks, railings and stairs must be solidly constructed in accordance with local building codes.

Driveways

The life of an asphalt driveway is dependent upon both its base (which is not observable) and the thickness of the asphalt surface. An asphalt driveway will eventually crack. When cracks develop, the driveway should be resealed with a sand-asphalt emulsion slurry. Do not simply use liquid asphalt; such a treatment will make the driveway look nice for a month or two but do little good otherwise. If there are low spots in the driveway that allow water to pond, these areas will deteriorate more rapidly and should be eliminated by patching when the driveway is resurfaced.

Concrete driveways almost universally crack. Spalling of a concrete driveway is a common occurrence, which is caused by over working the concrete, excess moisture, poor mixing, or use of salt for ice control. If the driveway spalls there is little that can be done to correct it, other than removing the driveway. Patching concrete is a short-term repair. It is possible to install asphalt on top of the concrete, if local covenants permit.

Walkways, Patios and Slabs

Concrete walkways and patios are often poured on the surface and have a tendency to shift because of moisture, freezing, tree roots, or normal settlement. If the concrete walkway or patio settles toward the house, it acts as a funnel, forcing water against the foundation and possibly leading to a wet basement. When this situation occurs, the concrete walkway or slab should be removed and re-poured. If it is necessary to remove a concrete walkway, we suggest that you consider replacing it with a loose laid type material (brick or stone), which is much easier to maintain. It is inadvisable to try to convert a patio into a covered porch, for the patio probably has no footings and the resulting structure would be unstable.

Fencing

Fencing around the property comes in many different materials and styles. Wooden fencing should be constructed with a decay resistant material such as redwood, cedar or pressure treated lumber. It is imperative that non-pressure treated wood fencing be kept covered with a preservative to retard decay. The ownership of property line fencing is difficult to establish and can be positively determined only with a survey. Pool fences have exacting safety standards governing materials, opening, heights, gates and latches. Consult your local code authority for requirements.

Retaining Walls

Retaining walls may settle, bow, lean or crack, particularly if they do not have weep holes. Weep holes allow moisture, which accumulates on the back of the retaining wall, to seep through. Wood retaining walls require occasional replacement of members as they decay.

Masonry retaining walls are expensive to rebuild. If it is necessary to rebuild a masonry retaining wall, we suggest that you consider using pressure treated lumber, as it is less expensive and more easily drained. Proper grading behind retaining walls is essential.

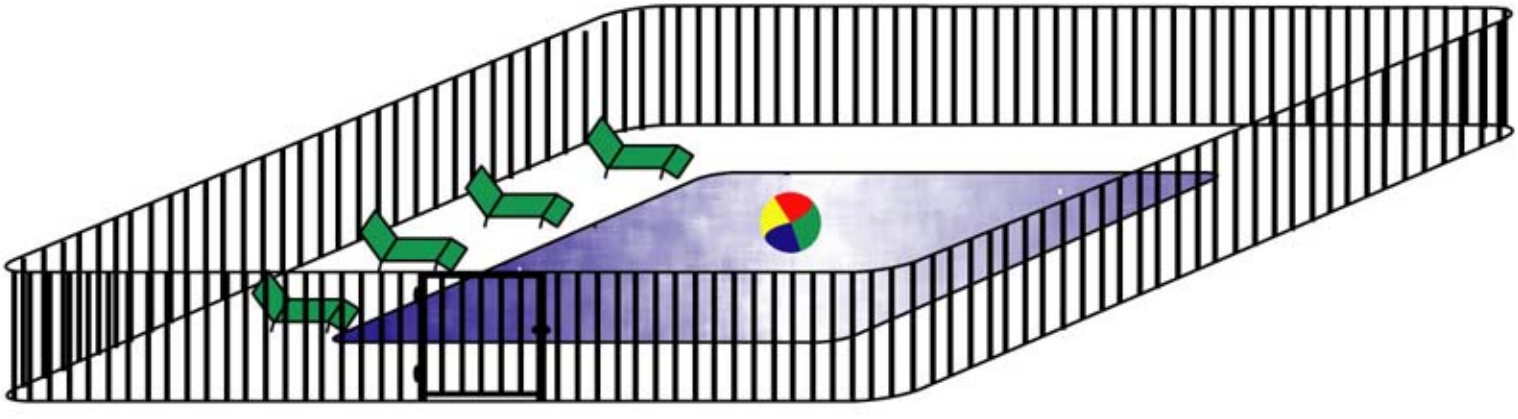
Swimming Pools

Swimming pools, hot tubs, fountains, etc., are special items that are best maintained under a service contract with a professional company. Filter pump, electrical system maintenance and winterization are some of the considerations that should be covered by the service contract. Adequate fencing is imperative with a pool.

Barriers and Fencing

Minimum Safety Requirements for swimming pools and whirlpools

The fence or barrier must completely surround the pool. If the house is part of the barrier, the doors to the pool need to have an alarm. The fence or barrier must be at least 4 feet high and have no footholds or handholds that young children could climb. A chain link fence can have no part of the diamond-shaped openings be larger than 1 3/8 inch. Vertical slats, as shown below, must be less than 4 inches apart to prevent a child squeezing through.



Self-closing and self-latching gate

EXTERIOR

The exterior surface of a building, like the roof, is designed to keep the weather out. Maintenance of the exterior surface is very important. Wearing of exterior components is common, requiring painting, routine maintenance, or repair from time to time.

Brick

Many older homes are constructed of solid masonry walls, with a thickness of at least 8". Newer brick walls are often veneer and only one brick thick. It is important that the veneer brickwork be securely fastened to the interior load-bearing wall. Metal strapping is most commonly used for this purpose. Most brick walls have weep holes near the bottom of the wall. A weep hole is an absence of mortar between the butt ends of two adjacent bricks, which will allow accumulated moisture to flow out of the wall.

All brick walls will eventually need some re-pointing as the mortar deteriorates. Other bricks will lose their fired face (known as "dead brick"). Loss of the fired face is the result of inferior manufacture, improper firing, damage, or water intrusion. The only good repair for a dead brick is to take it out and replace it. The area most susceptible to dead brick is in chimneys where there are wide fluctuations of temperature and moisture.

The brick faces develop hairline cracks, allowing water to penetrate the surface. When making repairs or re-pointing, ensure that all loose mortar is dug out before new mortar is applied. The new mortar should be tooled, so that it does not trap water. If brickwork is painted and you desire to return it to its natural state, the only good solution is to allow the paint to wear off. Blasting with any material will damage the brick. In the late 1950's and early 1960's it was common for builders to use old brick. Many of these bricks were designed for interior use only.

Interior bricks will deteriorate quickly when exposed to weather. Silicone solutions are now available for treatment of brick and mortar to reduce susceptibility to damage from water. If the water is coming from some other source (such as through a cracked chimney cap), these sealers may trap water inside the brick and do more harm than good.

Concrete Block

Block walls generally require little maintenance. The mortar joints should be maintained as for brick. Block walls are frequently painted both inside and out. Exterior painted surfaces will require periodic repainting.

Stucco

Stucco is a cement type material that can be applied to many surfaces. It is very brittle and can be damaged with a blow. As sections become loose it is important that the stucco be patched. As cracks develop in stucco they should be sealed with caulking. Treating stucco with waterproof paint is recommended. Failure to repair the stucco will only accelerate deterioration. With care, stucco has a long life.

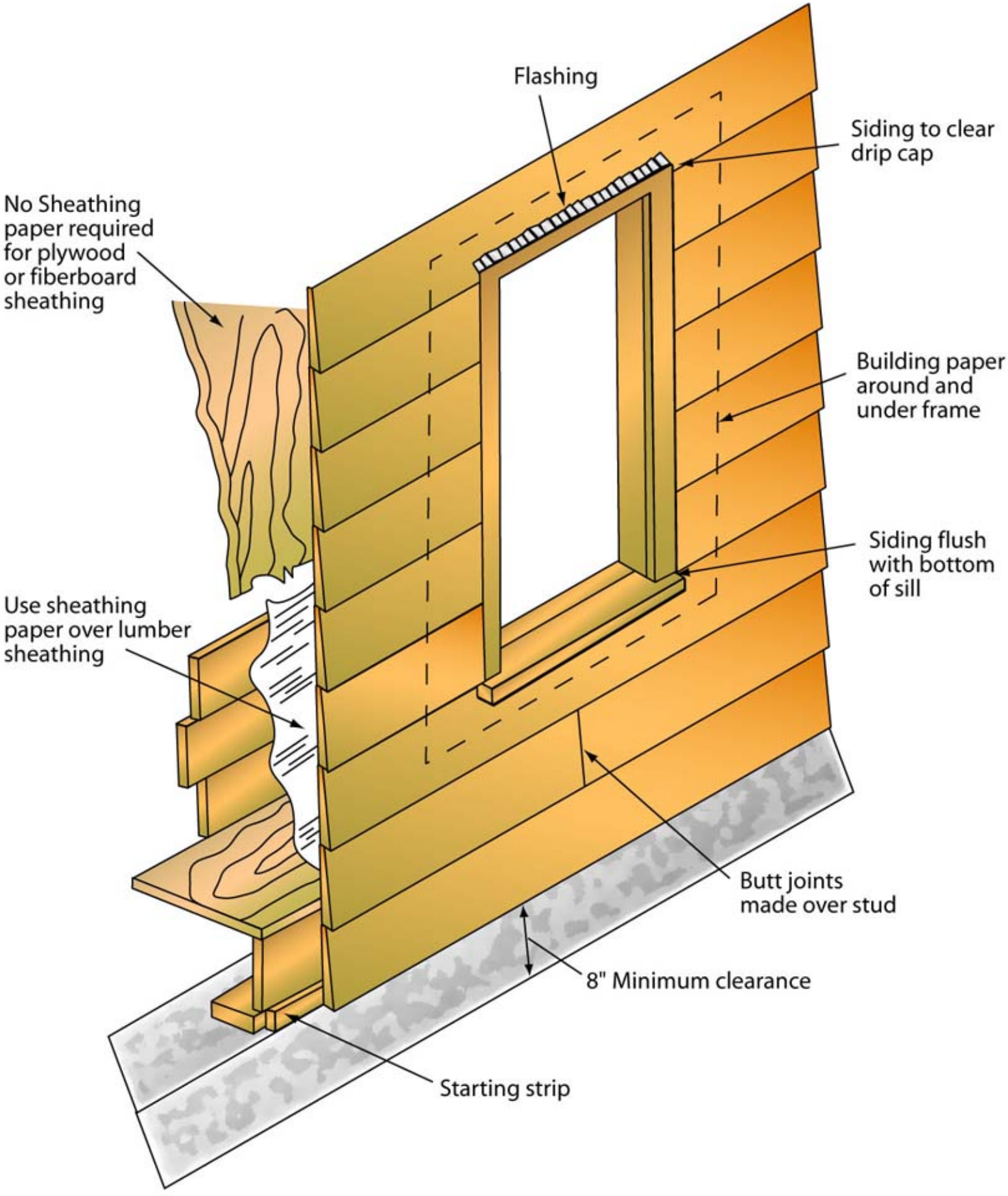
Metal and Vinyl Siding

Aluminum, vinyl and steel sidings have factory prepared surfaces. The life expectancy is in the neighborhood of 15-40 years. Paint will fade with time. If repainting is desired, it is possible. However, once these materials are painted, routine repainting will be required every 3-4 years. Pieces of these sidings will occasionally come loose and will need to be re-secured. Repairs to these materials should be performed by a professional. Driving a nail or inserting a screw into the siding to secure it to the sheathing will mar the surface and is not a good solution.

Wood Siding

The use of wood as a siding is very common. Wood siding is found in many different forms, which include clapboard, plywood, tongue and groove, and board and batten to mention just a few. It is very important that the siding be kept secured to the sheathing. As pieces warp or become loose, they must be re-secured. The surface must be kept painted or treated. As paint starts to peel, you must spot paint. If raw wood is exposed to the weather, you can expect deterioration in less than a year.

Typical Wood Siding Details



Hardboard

Hardboard was commonly used for siding houses in the past. It is a less popular material today. Hardboard siding is a manufactured pressed board that is very susceptible to damage by moisture. It must be kept covered with good quality paint. If moisture penetrates this material it will swell, scallop, deteriorate and become unsightly. Once scalloping has occurred, there is little that can be done to repair the material, other than replacing the affected pieces.

Wood Shingles

Wood shingles are not commonly used today as siding; however, they are frequently found on older houses. On a vertical surface, wood shingles have a very long life. The shingles do wear with time and become thin, requiring replacement. Individual shingles may slip out and a new shingle may need to be installed. The top course of shingles and those that fit around windows and doors frequently break and will require more attention.

Cement Asbestos Shingles

Cement asbestos shingles are no longer available; we do, however, find this type of siding on many older houses. Frequently it has been covered with another type of siding. Cement asbestos shingles require little maintenance and do not need to be painted. Once they are painted, it will be necessary to repaint on a routine schedule. Because this material is brittle, it will crack and break from a light blow. It can be damaged by leaning a ladder against it. If damage occurs it is possible to slip in a new shingle. Replacement shingles are becoming difficult to locate and, typically, will not match the surrounding shingles. Cement asbestos shingles can release hazardous material if improperly handled. They should not be drilled, sanded or cut with power tools. Non-asbestos cement shingles are available today for any repairs needed for damaged shingles.

Wood Trim

Trim board, fascia board, soffits, window frames, doors and door frames made of wood should be inspected annually and repaired as necessary. Painting of these members is as important as painting the siding.

Caulking

The house should be inspected annually for caulking around the windows, doors and other seams. The caulking should be completely redone when the house is painted. A good quality flexible caulk is recommended. It is important that the old caulking material be removed before new caulking is applied.

Vegetation

Trees, shrubs and other types of foliage can be very damaging to siding. Trees and shrubs are frequently planted too close to the house. The limbs brush against the exterior material and cause damage. Trees and shrubs may shade siding materials and not allow proper drying.

Vines and ivy should be kept off all exterior surfaces. While they are pleasing to the eye, the vines can cause rapid deterioration of the surface. It is recommended that the ivy be killed and allowed to dry before it is pulled off the building. Failure to do this can damage some material, particularly aluminum, steel, and vinyl sidings.

STRUCTURE

Structure is the portion of the house that is load bearing and holds it together. The load bearing capability of a structure is determined by the material and size of the components. Codes call for different load bearing capacities, depending upon the use of the building. A detailed engineering design is required in order to establish the proper structural components to carry the prescribed loads. The design is checked and certified as part of the building permit process. Our inspection does not evaluate the design or codes requirements.

Most homes rest on a footing, which should be below the frost line. Modern footings are for the most part, poured concrete. Older houses sometimes have brick or stone footings. Pressure treated wood is used in some areas. The use of pressure treated wood for footings is new. This technique has not been used long enough to comment on its durability.

There are several different types of foundations. These include walls, piers, piles or combinations. All of these systems are good if properly built.

Slab Construction

Slab construction is very common in many sections of the United States. Slab houses often have earth in close proximity (less than 8") to wooden structural members. This condition makes these members very susceptible to pest infestation and decay. We will discuss pest infestation later. Slab houses also frequently have utility systems (water and drain lines, heat ducts and electrical cables) that are laid under or in the slab.

In the case of water and waste systems, a rupture of the lines can be expensive to repair because it will be necessary to break the slab to make the repairs. If the heating ductwork running through the slab is below grade level, water can infiltrate the ducts and cause a great deal of moisture to accumulate in the property. Floors of slab houses are normally cooler than in houses of other styles. This is particularly true of tile and wood surfaces.

Wall and Beam Construction

Wall and beam construction consists of a foundation wall and a beam, normally running down the center of the basement or crawlspace. The beam is usually wood or steel. The beam is normally supported by the wall at each end and piers or posts spaced 8-12 feet apart on their own footings. We do not recommend wood posts because they are susceptible to pest infestation and decay. We frequently see amateurish shoring or supports in crawlspaces that have been installed to support a particular load or stop floor sag and squeaking. If these posts and the shoring do not have proper footings they have little or no value.

Wood beams are frequently constructed of several side-by-side pieces of 2" lumber. The size of this manufactured beam is dependent upon the load being supported. The joists normally run from the exterior wall to the beam and are of 2" material. The depth and spacing of the joists are dependent upon the span and the load being supported. Bridging helps to stabilize the joists and to eliminate movement and squeaking of floors, and is installed between the joists. Many newer houses are constructed using manufactured trusses or wooden I-beams with a plywood web. It is important that these trusses and built up wooden beams not be modified. Removing a member or cutting a hole can destroy the load carrying capacity of the truss.

Pier Construction

A pier foundation is normally a series of masonry (brick or block) piers. The piers support beams, which in turn provide the support for the joists, similar to wall and beam construction. Piers can include pilings that are driven or twisted into the ground.

Foundation Cracks

Nearly all houses have cracks of some kind. Normally a hairline crack in the slab is of no structural significance. Cracking in foundation walls is more important. A crack that has opened up 1/8" to 1/4" may be cause for concern; cracks of lesser width may also be important depending on the particular circumstances. The key consideration with a crack in a load-bearing wall is to be certain that there is no ongoing movement.

Usually filling this type of crack and watching it over a period of 6 months to a year for further movement is prudent. If there is additional movement, steps will have to be taken to arrest the movement. Stopping movement may be a simple matter, such as re-grading the property, or it could require underpinning the foundation, which is expensive. Cracks frequently appear around windows, doors and stairways, which are areas of inherent weakness. Small cracks in these areas are usually of no significance.

Floor Sag

Most floors are not completely level, even though they were constructed with great care. Wood shrinks as it dries and foundations settle. Settlement and floor sag around stairway openings are very common.

Pests and Termites

The structure should be maintained under contract with a reputable pest control firm. The annual contract recommended is the type in which the cost of any treatment or repair required because of pest infestation is automatically covered by the annual fee. The best pest contracts cover elimination of all pests and are not limited to termites.

Attics

Most residential structures contain attics to which there is access. If there is no access to the attic space it is advisable to install a scuttle hole so that ventilation and insulation can be monitored.

Structure

The two most common types of roof structure are manufactured trusses and roof rafters. Both are very common and acceptable. Trusses are used more frequently in new construction. A truss should not be modified by removing any members. Such modification destroys its load carrying capability. Heavy articles should not be stored in attics. Rafters and floor joists may be capable of carrying some load; however, trusses rarely are. Storing articles in the attic often compresses insulation, which causes the insulation to lose its effect. If articles are to be stored in the attic, use shelves so insulation will not be compressed.

Leaks

The attic should be entered occasionally during a heavy rainstorm and inspected for leaks. Staining on rafters, sheathing, and other structural members is a sign that the roof has leaked in the past. It is impossible to tell if an existing stain is an active leak. We do not guarantee that we will detect all leaks.

BASEMENTS AND CRAWLSPACES

Basements

In some areas of the United States, virtually all houses have basements, while in other areas most houses are constructed on slabs. In still other locations, homes are almost universally constructed over crawlspaces. It is not uncommon to find all three types of construction in one building. Basements are used for a variety of activities, such as workshops, recreation rooms, storage, utilities, garages, and living space. If the basement is used as living space it should have a source of heat.

Often the basement is not air conditioned because it is normally a cool portion of the property. If you are going to convert the basement into living space, be sure that the basement is dry before you do so. This can best be determined after living in the property for a complete year. If the basement is not dry, be sure you take the steps necessary to create a dry basement. Floor drains frequently found in exterior basement stairwells are in many cases connected to drywells or sump pumps. If the floor drain is connected to a drywell it has limited capacity and may fill or back up. It is important that the stairwell be kept clean so that leaves and other debris do not clog the floor drain causing water to rise over the sill and run into the basement.

If the basement has standing water or signs of moisture, such as stains, efflorescence, damp odor, peeling paint or dampness, you will need to take steps to improve or correct this situation. Appropriate methods are discussed in the Roof and Surface Water Control sections of the CD.

Crawlspaces

If there is a crawlspace, the homeowner should inspect it twice a year. This inspection is to ensure that there is no accumulation of moisture on the floor or condensation on the structural members. Ventilation in the crawlspace is very important. Through-the-wall ventilators should be provided. To ensure that the amount of ventilation is adequate, inspect the crawlspace on very hot and very cold days. Any sign of moisture accumulation is an indication that there is inadequate ventilation.

If additional ventilation is required, it is possible to provide an opening in the wall. The ventilation system should have screening to prevent the entry of unwanted guests such as rodents, animals, and insects. It is normally unwise to use the crawlspace as storage for structural materials or personal belongings. If there is trash or other material in the crawlspace, it should be removed. A vapor barrier should be placed over the earthen floor. This vapor barrier can be either a concrete slab or a piece of 4 or 6 mil plastic, which can be laid loosely on the surface.

Water supply lines running through the crawlspace should be insulated to reduce the possibility of freezing during cold weather. Insulation installed in the crawlspace between the floor joists should have a vapor barrier. The vapor barrier should be against the heated space. When adjoining the basement it is helpful to have an insulated wall and access door between the crawlspace and the basement. Heat ducts and boiler lines that run through crawlspaces should also be insulated.

We frequently detect asbestos insulation around boiler lines in basements and crawlspaces. If the asbestos is in good condition, it can be covered with tightly sealed plastic to keep the fibers from entering the atmosphere. If it is not in good condition it should be removed by a properly trained and licensed asbestos removal contractor. This work is likely to be expensive. Under no circumstances should asbestos removal be attempted by the homeowner. Asbestos inspection and identification is not part of the home inspection, as it requires specialized knowledge and licenses.

PIERS, BULKHEADS, AND OUTBUILDINGS

Outbuildings

Outbuildings consist of sheds, barns, boathouses, playhouses, corrals, animal shelters, etc. These structures are very often amateurishly built and neglected even if the principal structure on the property is well maintained. The amateurish construction often extends to electrical wiring, plumbing, and roofing as well as the structure itself. The most common problems with these structures are pest infestation (such as termites), failure to re-roof when necessary, and failure to repaint.

Very often these structures have improper footings. We frequently find wood or siding in contact with the earth; this contact will lead to accelerated deterioration and is an open invitation to pest infestation. Metal sheds have very little value. They frequently are built of metals that rust rapidly. They are also easily damaged by high winds, falling limbs, and heavy snow loads. Failure to paint metal sheds is the most commonly noted defect.

Waterfront Piers

The life expectancy of a pier is almost completely dependent upon the weather, particularly high wind that causes wave action. A pier constructed with standard lumber has a very short life, sometimes less than a year. Treated lumber has a much longer life. Treated lumber does have a tendency to warp, sometimes resulting in a tripping hazard. If boards warp, they should be re-secured to a stringer with bolts or screws.

The construction of a pier is often amateurish and its load carrying capacity is small. Piers that have stringers secured with nails should not be used until these members have been bolted to pilings.Having water and electricity available on a pier is very convenient to boaters. These systems are frequently amateurishly installed. The electrical lines are often of a small gauge and not capable of carrying the capacity required by larger boats.

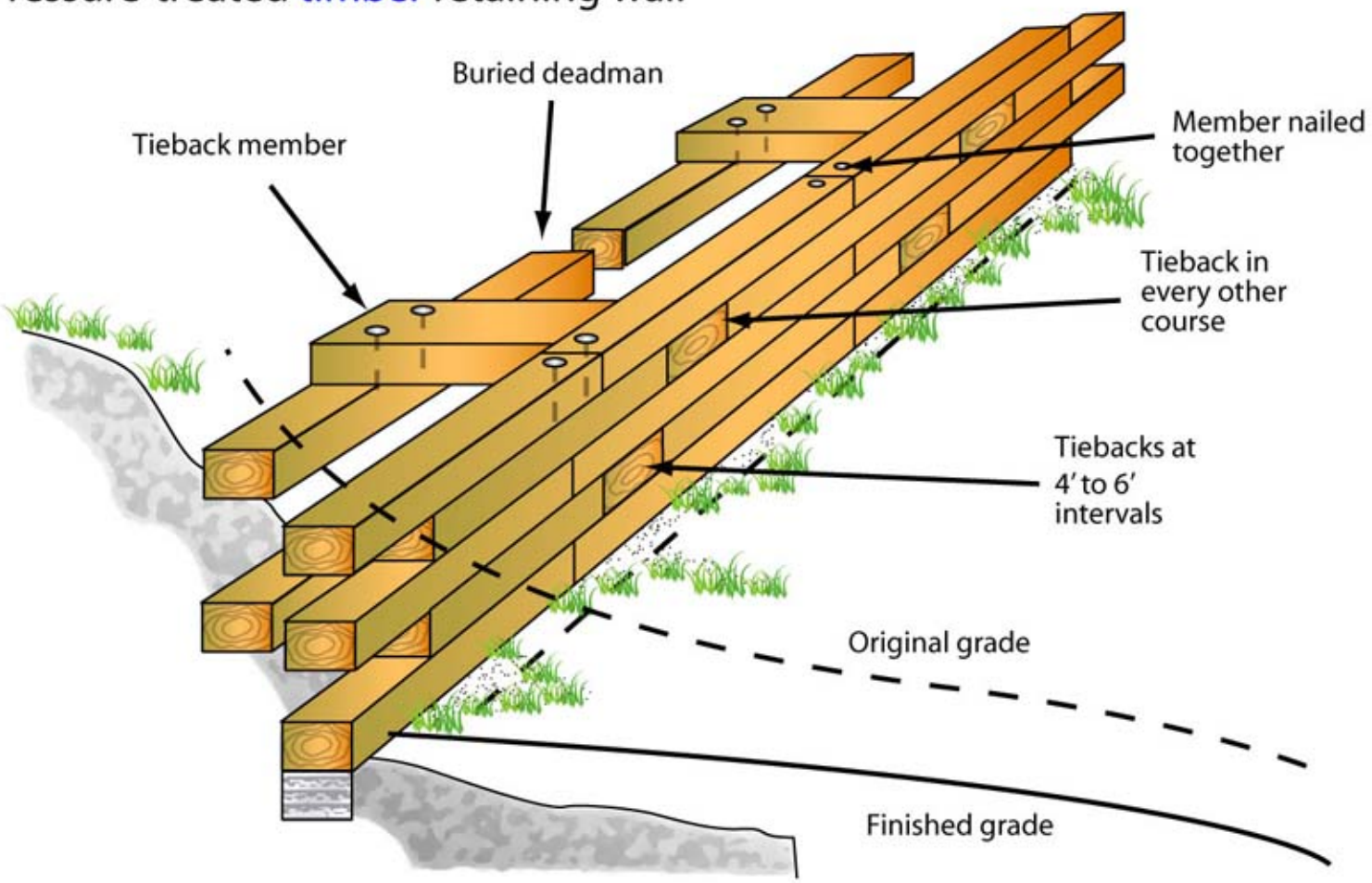
The electrical line should be run either in conduit or sunlight-resistant cable. Water systems in climates that freeze will need to be completely drained during winter weather. In northern climates installing bubblers around piers will assist, but not completely eliminate, the danger of damage from ice.

Bulkheads

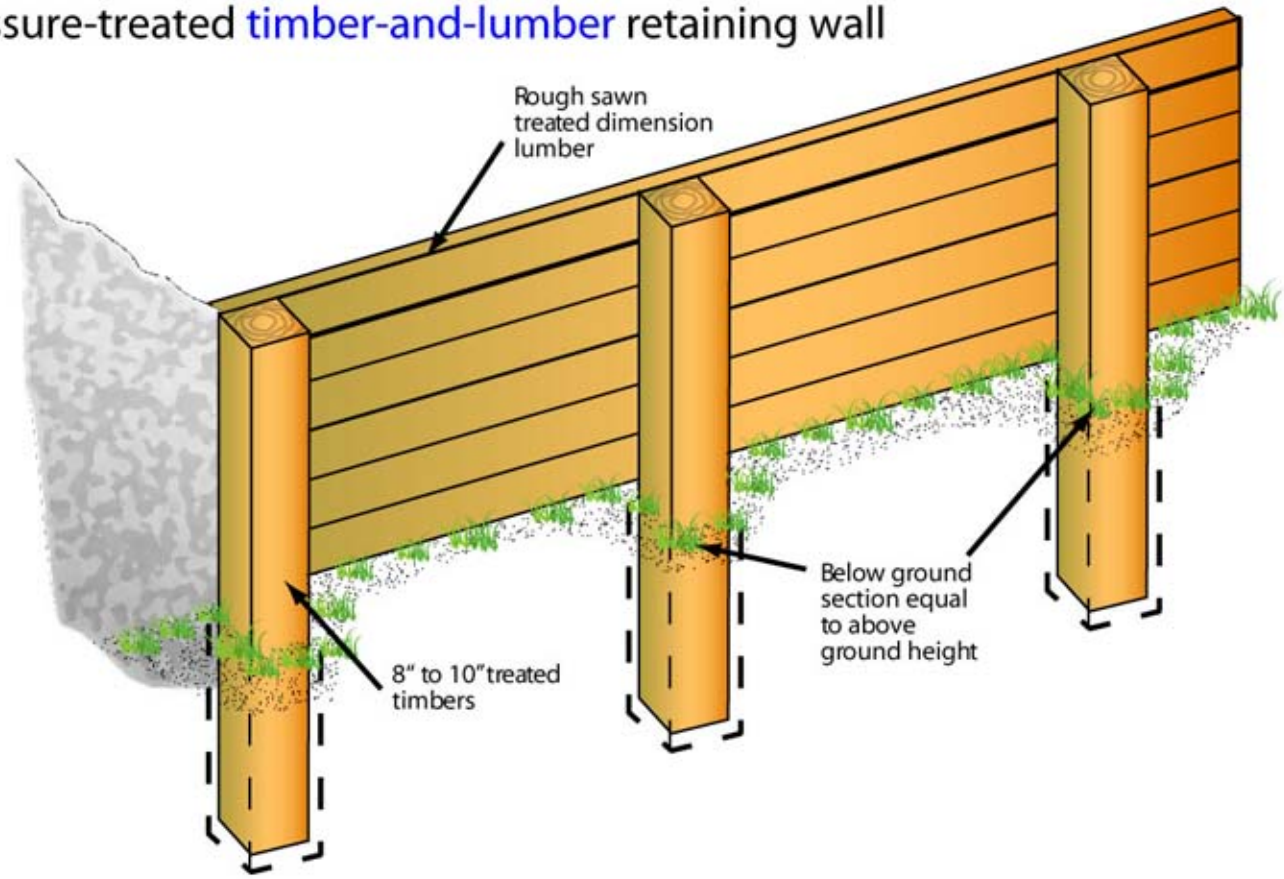
Bulkheads are constructed from a variety of different materials, which include loose-laid stone, rubble, treated lumber, metal and masonry. Like piers, bulkheads are easily damaged by severe weather, particularly abnormal wave action. The most commonly noted problems with bulkheads are deteriorating wood, failing masonry, and improper backfill.

The landside of the bulkhead should be completely filled to the top of the bulkhead with well-compacted, non-porous material (i.e. no rock, brick, rubble) to prevent the water from working on both sides of the bulkhead. Bulkheads, in some jurisdictions, have very sensitive environmental implications. Before installing or repairing a bulkhead, make certain that you obtain approval from the local jurisdiction if required.

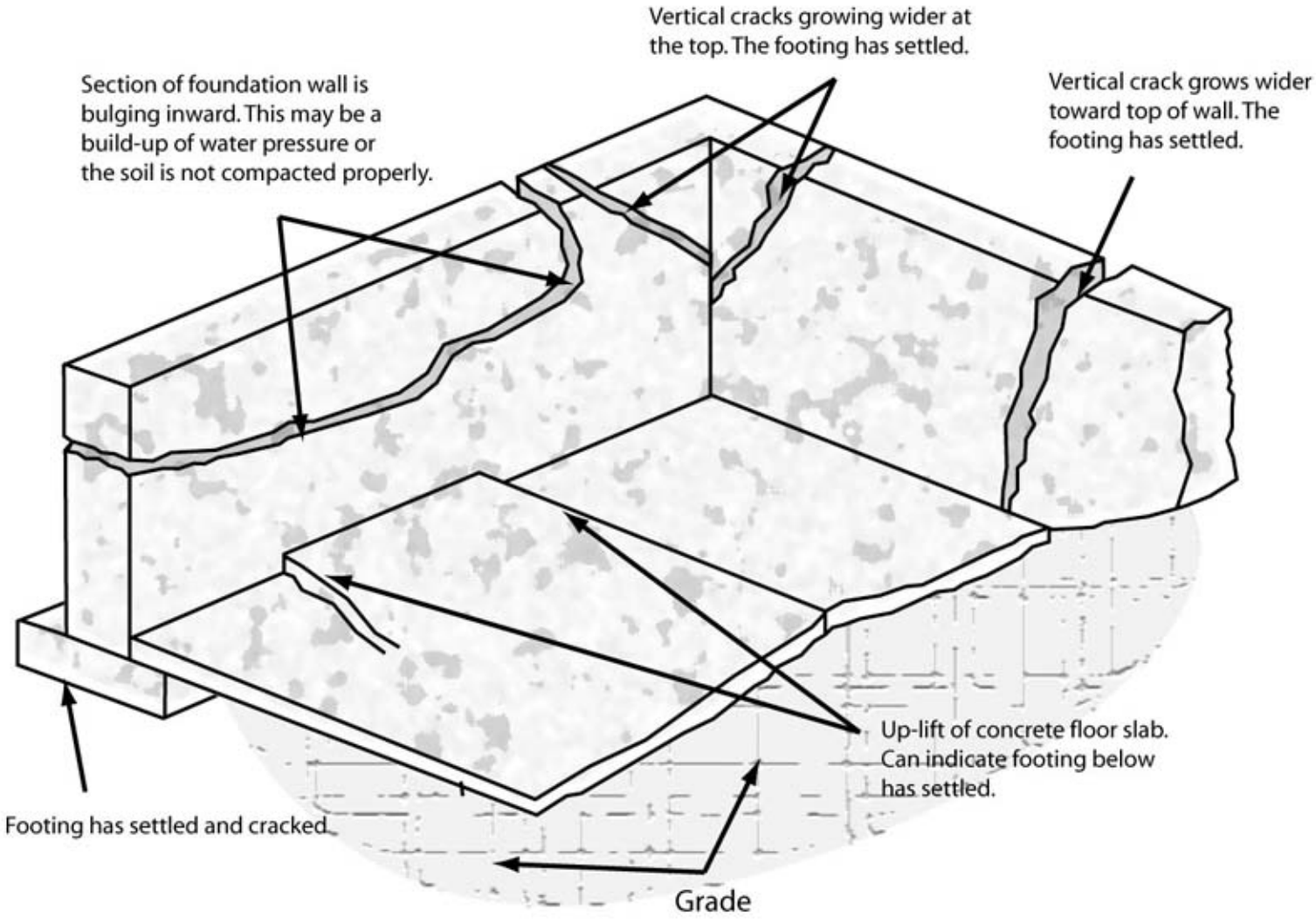
Pressure-treated timber retaining wall



Pressure-treated timber-and-lumber retaining wall



Foundation Evaluation



Note: in old homes, it is not uncommon to see small hairline cracks in foundation walls. The cracks and separations described above are at least 1/4" and wider.

INSULATION INFORMATION

ATTIC

Identification of existing insulation type:

Fiberglass batts	- pink and yellow fiber
Blown fiberglass	- pink, yellow, white fiber (.67 to .99 lbs./cu. ft.)
Rockwool batts	- paper both sides, black fiber
Rockwool blown	- black or white fiber (1.9 lbs./cu.ft.)
Blown cellulose	- gray or brown (2.4 to 2.7 lbs./cu. ft.)
Wood chip sawdust	- tan or red
Expanded plaster/cement	- white powder or solid

R-Values of Existing Insulation:

Blown Cellulose R-3.7/in. Rockwool Batts R-3.6/in.	**Fiberglass Batts R-3.1/in. Blown Rockwool R-3.0/in.**	**Blown Fiberglass R-2.2/in. Sawdust. Plaster R-2.5/in.**	**Existing R-Value**
1 inch approximately	1 inch approximately	1 1/2 inches approximately	4
2 inches approximately	2 inches approximately	3 inches approximately	7
3 inches approximately	4 inches approximately	5 inches approximately	11
5 inches approximately	6 inches approximately	8 inches approximately	19
6 inches approximately	7 inches approximately	9-10 inches approximately	22
8 inches approximately	10 inches approximately	12-14 inches approximately	30

WALLS

Frame walls can be blown adding R-12 (2 x 4 with cellulose - 2.7 to 3.5 lbs./cu. ft.).
Masonry walls can be injected with urethane foam between courses - 3/4" R4.

Pre-World War II	**Masonry or uninsulated frame**
l950's	Frame and frame with brick veneer. Insulation rare, some R-7, R-8 and R-l 1 wall insulation
1960's	Frame and brick veneer - some insulation with frame (R-8 and R-l 1), often no insulationwith brick veneer.
1970's	60-70 insulated with R-l 1 Batts
1978	First State Energy Code: Requires minimum R-l 1 Batts

UNIVERSAL INSULATION PROBLEMS

Pre-World War II to present:
1. Garage Ceilings under living space
2. Cantilever floors (overhangs)

LIKELY INSULATION PROBLEMS

1. Attic knee walls, open slopes, open floor joists - high probability when no access.
2. Skylight shafts
3. Basement rim joists
4. Crawlspaces
5. Cathedral Ceilings
6. Flat roofs
7. Dropped ceilings
8. Recessed lights
9. Ducts and pipes in unconditioned spaces

INSULATION AND VENTILATION

Attic Insulation

Adding attic insulation is one of the most cost effective energy conservation steps. If there is no insulation in the attic, you can achieve a 40 percent savings (approximately) in your heating and cooling bill by installing the recommended amount. Each area of the country has a recommended minimum and maximum "R" value for insulation. The "R" value is a measure of resistance to heat flow; higher numbers mean more effective insulation. In the mid-Atlantic states a value between R-19 and R-38 for attics is recommended. You should try to achieve the maximum "R" value recommended for your area. Attic insulation can be easily installed; many homeowners prefer to do it themselves.

Wall Insulation

Wall insulation properly installed during construction contributes substantially to energy conservation; however, retrofitting wall insulation is of doubtful value and not recommended without a detailed energy audit. In most cases it is impossible to determine accurately the amount of insulation in the wall. Installing additional insulation can leave unsightly holes. The savings achieved by blowing in additional wall insulation is difficult to predict.

Band Joist Insulation

The space along the outer wall between the floor joists above the basement is the source of significant heat loss and should be insulated. We recommend 6" faced fiberglass insulation, cut to size and stapled in place.

Ductwork Insulation

Ductwork for heating and air conditioning systems running through attics, crawlspaces and other unheated portions of the house should be insulated. Some ductwork is insulated on the inside; this can be determined by tapping on the outside of the duct. Laying insulation over the top of the ductwork in attics is adequate. In crawlspaces the ducts should be completely wrapped with insulation.

Insulated Water Heater

Water heaters should be insulated using either fiberglass jackets designed for this purpose or standard 31/2" fiberglass insulation with a vapor barrier. Cut the insulation to size and secure in place with duct tape. When installing the insulation on the water heater, do not cover openings for the flue, draft hood, or combustion air. Some new water heaters do not require additional insulation; consult the label on the heater.

Ventilation

Ventilation in the attic is very important. The best test for proper ventilation is to inspect the attic on a very cold or warm day to determine if there is any accumulation of moisture. An accumulation of moisture or ice crystals indicates inadequate ventilation. Additional ventilation is very easy to install in most types of roofing. Adding roof ventilators is probably the least expensive method.

There are many types of ventilators, including gable, roof, ridge, soffit, turbine, and cupola. Many homes have thermostatically controlled fans that can be set to activate at a predetermined temperature. The preferred type of ventilation in newer construction is a ridge and soffit vent system. When re-roofing, you may want to consider installing this type of system. The screening around the ventilators must be watched for deterioration to prevent the entry of insects, birds, and small animals.

Ventilation in the crawlspace is also very important. Through-the-wall ventilators should be provided. To ensure that the amount of ventilation is adequate, inspect the crawlspace on very hot and very cold days. Any sign of moisture accumulation is an indication that there is inadequate ventilation. If additional ventilation is required, it is fairly easy to provide an opening in the wall. The ventilation system should have screening to prevent the entry of unwanted guests such as rodents, animals, and insects. It is normally unwise to use the crawlspace as storage for structural materials or personal belongings. If there is trash or other material in the crawlspace, it should be removed. A vapor barrier should be placed over the earthen floor.

This vapor barrier can be either a concrete slab or a piece of 4 or 6 mil plastic, which can be laid loosely on the surface. Water supply lines running through the crawlspace should be insulated to reduce the possibility of freezing during cold weather.

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Fans

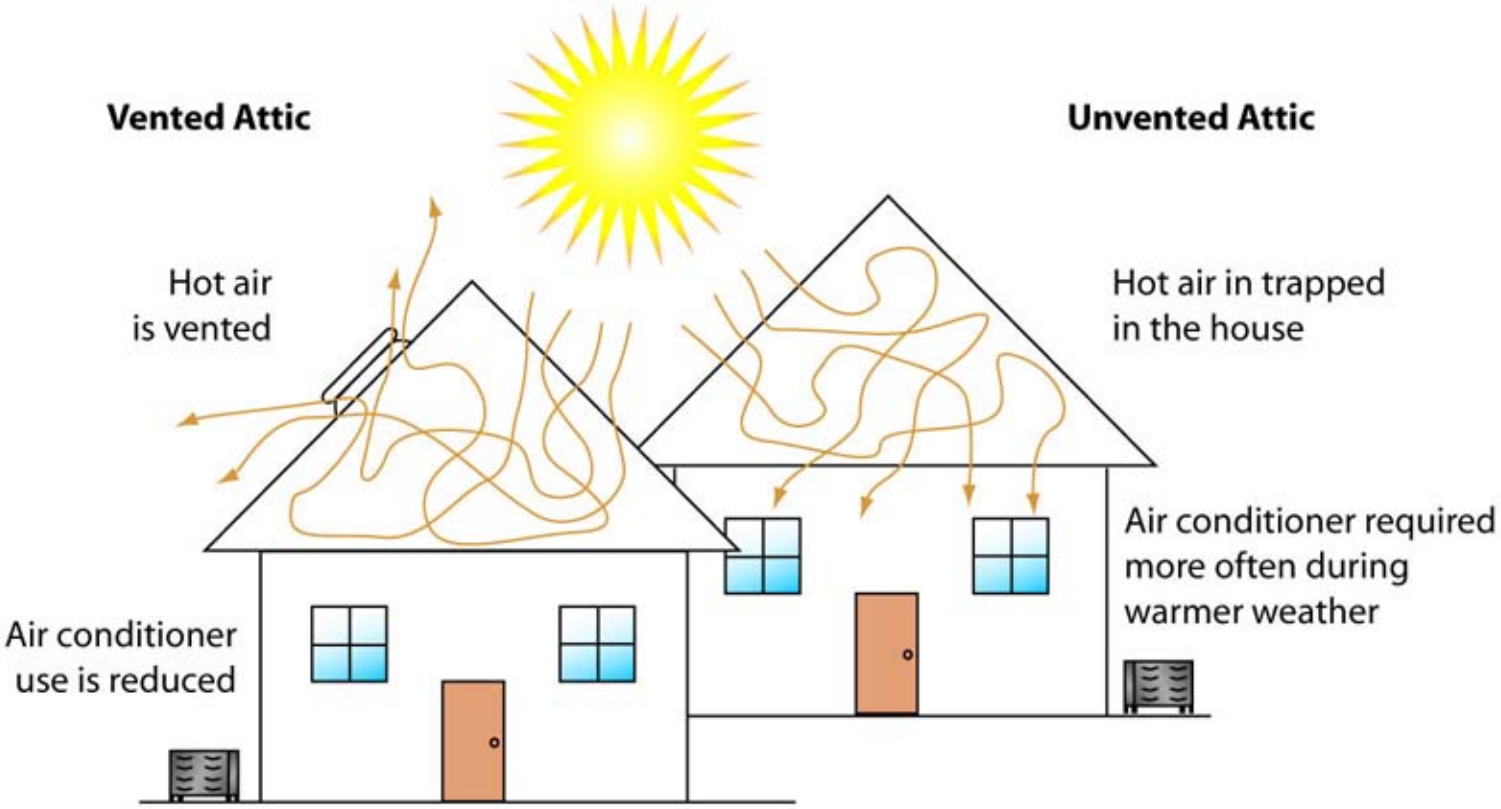
Many older houses have whole house fans. These fans are located in the ceiling of the top floor and are designed to pull air through the house for cooling. These fans can be quite effective. Windows and doors in the area that you are trying to cool should be left open while the fan is on. The fan should be covered with insulation during the winter months to conserve energy.

Stove Fan

Venting should be provided over cooking surfaces. It is preferable to vent stoves to the exterior of the house. Today many homes are built with a re-circulating unit, which is not desirable. These units all have filters, most of which are washable.

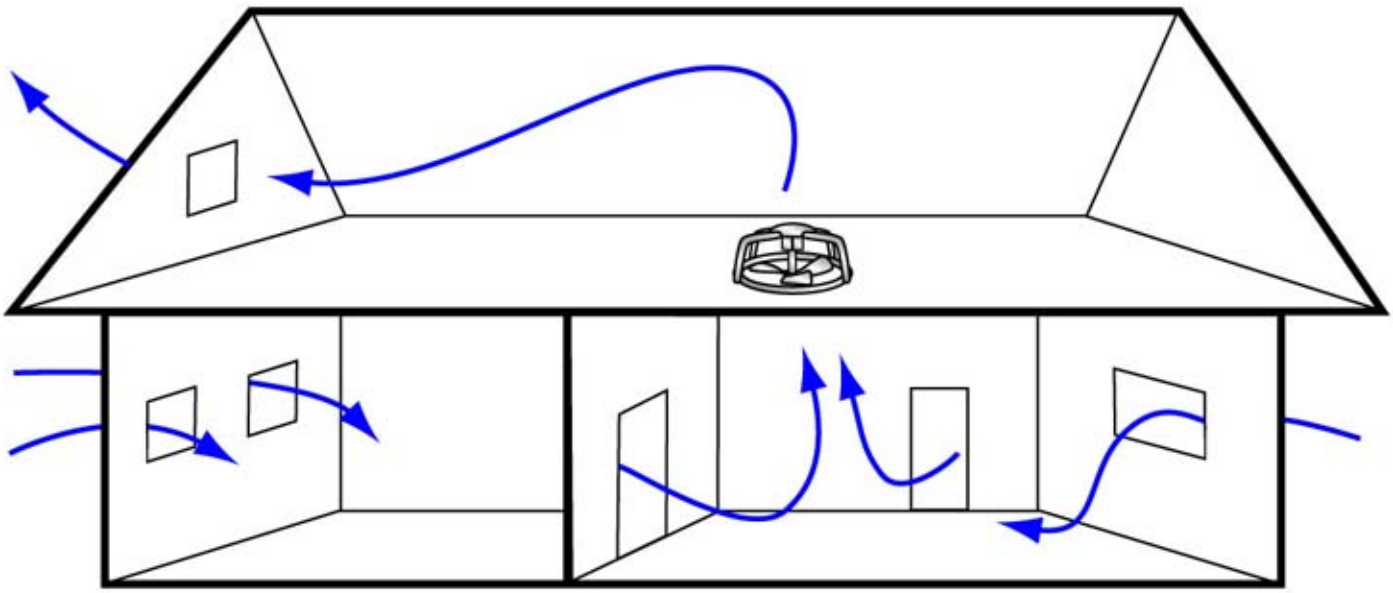
In some cases there are charcoal filters that need to be periodically replaced. Older through-the-wall ventilating fans are beneficial but require frequent cleaning. Through-the-wall fans also are not energy efficient as they provide an opening to the exterior.

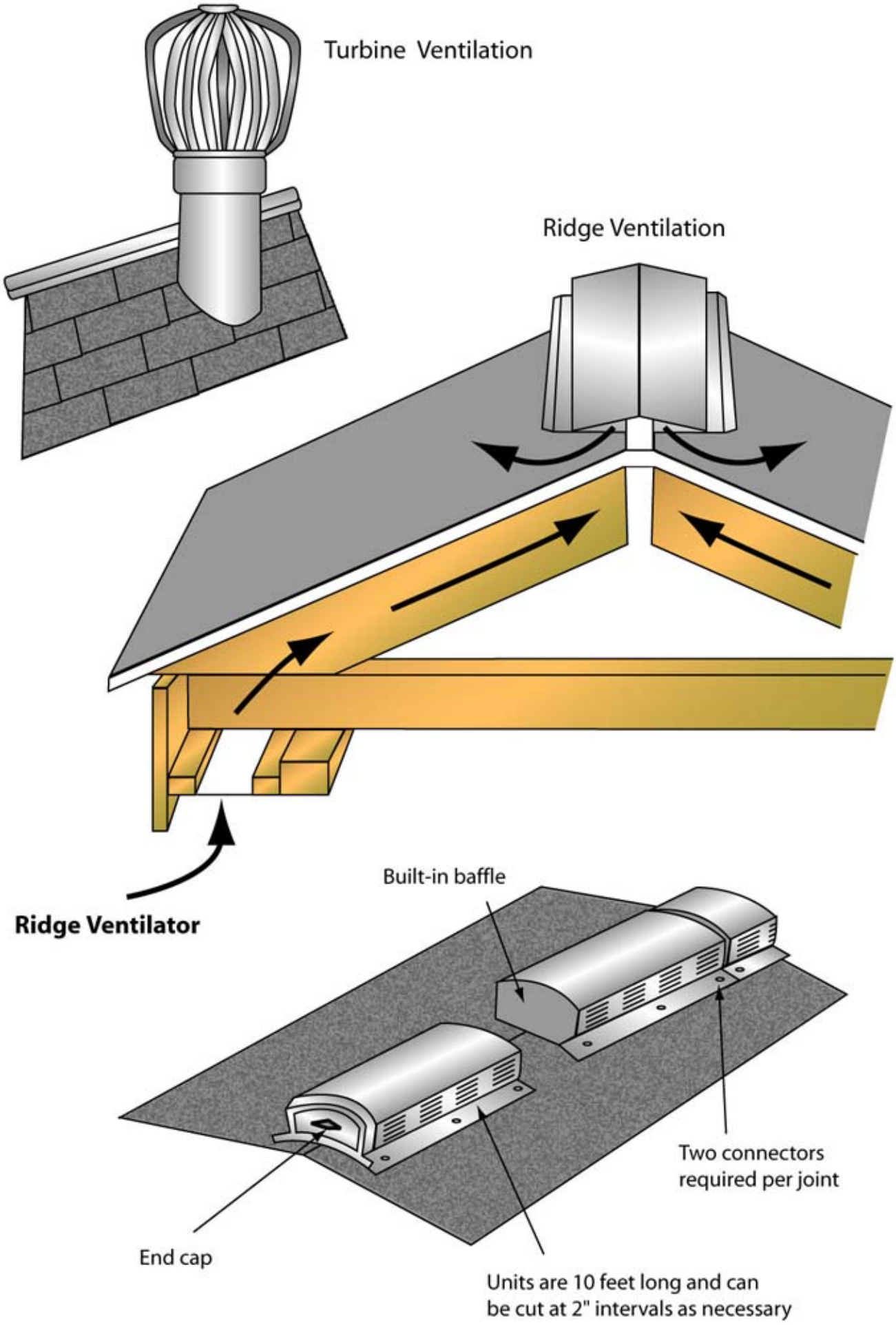
Home Ventilation Options



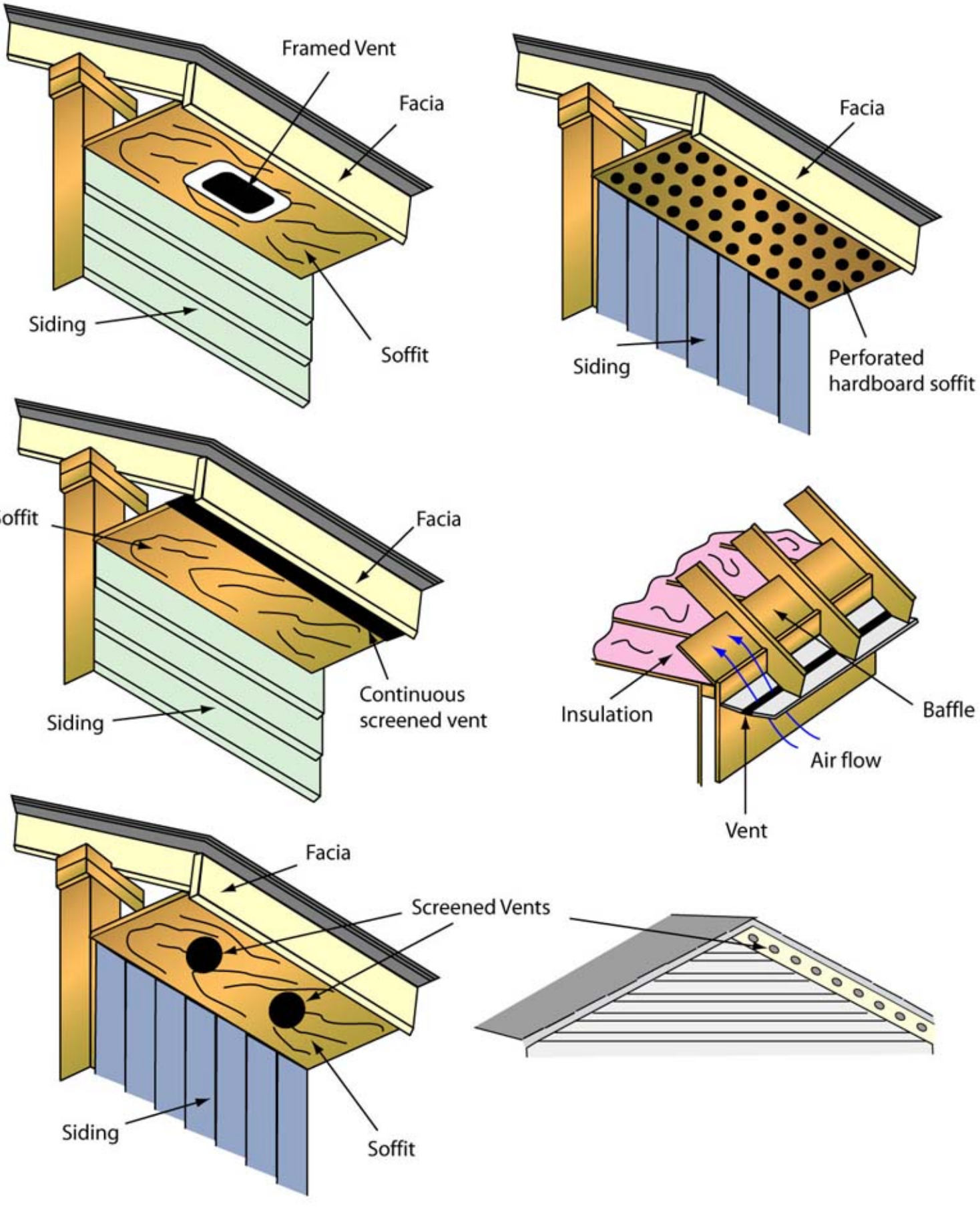
Without adequate attic ventilation, your air-conditioner will have to work continuously during summer weather.

Whole-house fan ventilation

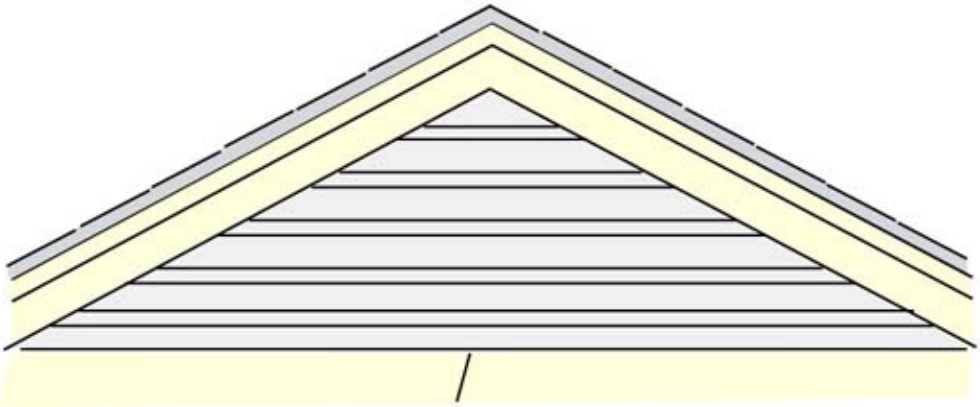


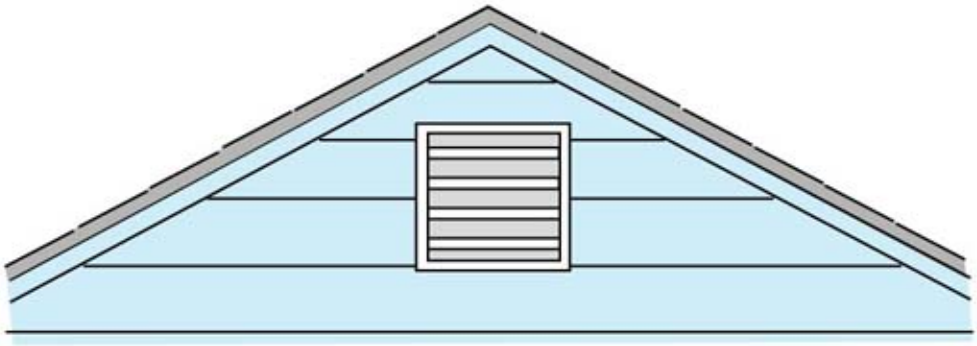

Turbine Ventilation
Ridge Ventilation
Ridge Ventilator
Built-in baffle
Two connectors
required per joint
End cap
Units are 10 feet long and can
be cut at 2" intervals as necessary

Under Eves Vents

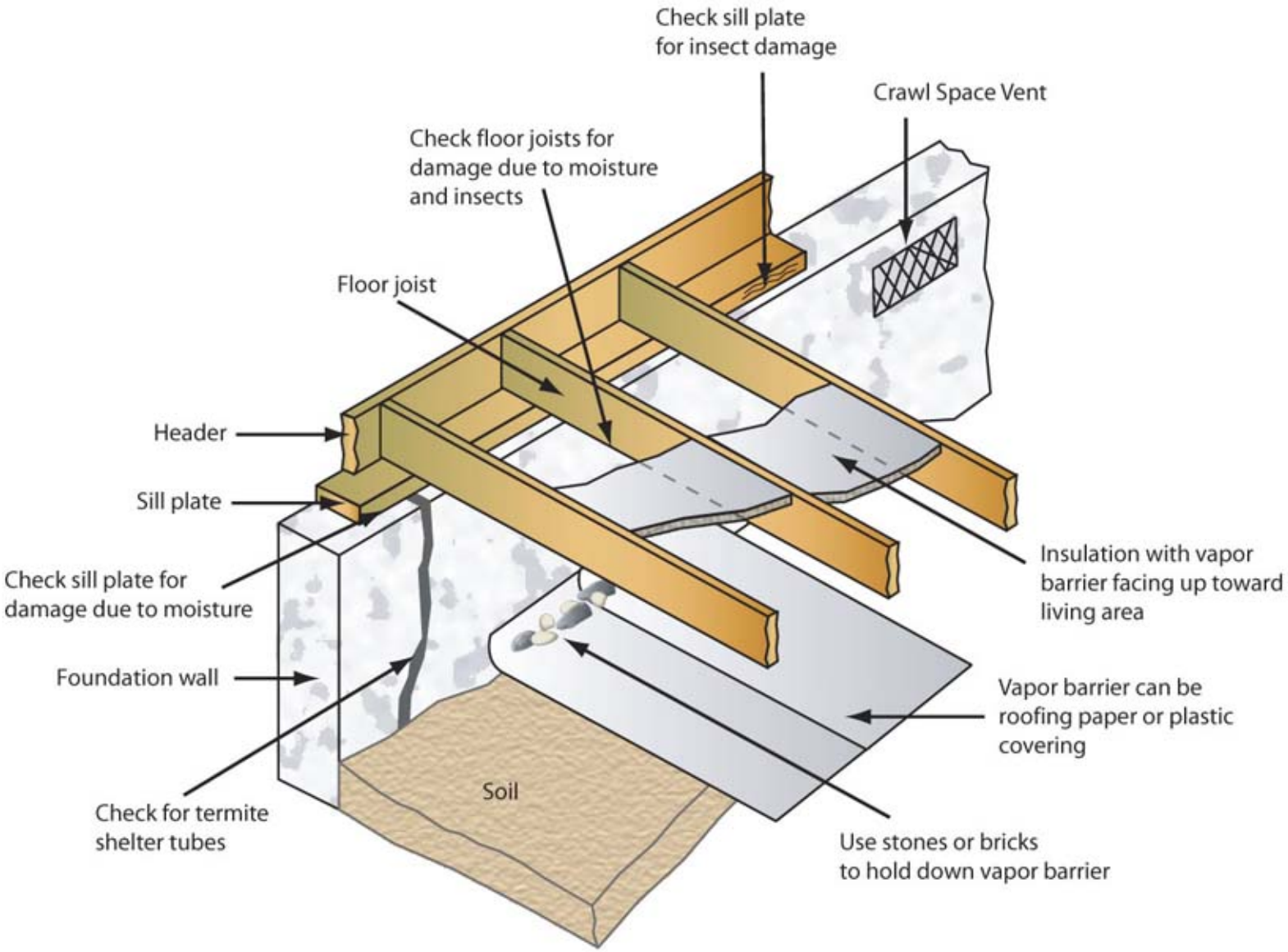


Gable-end Ventilation





Crawl Space with Vapor Barrier



ROOF

The roof is one of the most important parts of the house. The primary purpose of the roof is to keep the weather out and to protect the persons and property located below. A leaking roof can cause significant damage to the interior of a house, particularly to furnishings, wall surfaces, flooring, etc. A leak must exist for a longer period of time to cause deterioration to structural components, such as rafters. When examining a roof, there are several factors to consider including slopes, roofing material, age of the roof, remaining life expectancy, and maintenance.

Certain materials, such as cedar shake, asphalt shingle, slate, and tile are not appropriate for a low-pitched roof. On the other hand, materials such as built-up felt and bitumen, and rolled mineral, are not appropriate to a steeply pitched roof. A completely flat roof is undesirable and will almost always leak. If water stands on the roof it will certainly leak at some time and its life expectancy will be reduced by approximately 50 percent. The life expectancy of a roof varies greatly, depending upon choice of material, quality of material, ventilation, skill in installation, and maintenance.

Roof Maintenance

Most roofs will develop leaks and they are very difficult to detect. We do not guarantee that we will detect all leaks. All roofs need maintenance or they will leak. Roofs frequently leak without the knowledge of the homeowner. The leak will usually start as a very small crack, crevice or hole that will slowly open. In the early stages of a leak, only small quantities of water pass through the crack.

There is not a sufficient amount to run down the rafters, soak through the insulation, and appear as a stain on the ceiling or wall. For this reason the roof should be inspected for leaks twice a year from the attic space during a heavy rainstorm. The roof should also be inspected annually by the homeowner and every 3-4 years by a professional roofer. As leaks develop, they must be repaired. It is a common practice in some cities to tar over the roof on an annual basis. Bare tar is not a good quality roof; however, the system does work and keeps the roof from leaking.

Eventually, the build-up of tar will exceed the load-carrying capacity of the structure beneath it, and the roof will have to be replaced. Most roofs have flashing. Flashing is a piece of metal or felt located around chimneys, plumbing vents, in valleys, along walls, ventilators and skylights. Flashing is frequently neglected and often the source of leaks. Flashing must be maintained by ensuring that it is properly secured to the surfaces and that the open edges are kept covered with tar or roofing cement. Rubber is often used for flashing around plumbing vents. This type of flashing will crack and open up causing leaks; it must be routinely checked and repaired when flaws are detected.

ROOF MATERIALS

Asphalt Shingles

Asphalt shingles are available in many different varieties and weights. Newer styles often contain fiberglass and have a longer life. The life expectancy of asphalt shingles varies with the climate and the quality. In southern climates, these shingles will have a life expectancy of approximately 10 years, while farther north, 15-20 years is more common.

The life expectancy also varies with the color and exposure of the roofing surface. When the individual shingles start to cup and curl or lose their granules, they are nearing the end of their life and should be considered for replacement. It is possible to lay a second layer of asphalt shingles directly over the existing layer, provided that the cupping and the curling have not been severe. If there are already two layers of shingles on the roof, both should be removed before a new roof is installed. Asphalt shingles should not be applied to a roof with a slope of less than 3:12.

Slate

Slate is very expensive and rarely used in newer construction. The life expectancy of a slate roof varies greatly with the type and the thickness of the slate. Some slate roofs will last only 20-30 years, while others will last over 100 years. As the slate starts to delaminate and become soft on the edges, it should be considered for replacement. A deteriorating slate will take on a grayish brown color on the edges as it delaminates; this is a sign of old age.

Ridges and exposed nail heads on slate roofs must be re-tarred every two or three years. A slipped or broken slate will have to be replaced. A slate roof should be worked on only by experienced roofers with the necessary equipment to gain access to the roof without causing damage to the slate. Do not allow workmen, such as painters, chimney sweeps or TV antenna installers to walk on the slate roof. Slate roofs should not be installed on slopes of less than 8:12.

Metal

Metal roofs are installed in two basic styles and many different metals. There are a few corrugated roofs, mostly found on farm buildings. The most common metal roofs on residences are standing and flat seam roofs. These roofs are satisfactory over a considerable range of slopes and give excellent service provided they drain well. A metal roof will have an almost indefinite life, so long as it is well maintained with paint. Tarring is sometimes used, although it is not preferred. Metal roofs should be inspected annually and should be painted where required.

Rolled Mineral

Rolled mineral roofing is commonly applied to roofs with low slopes (3:12 or less). This is a good material if it is properly installed. Unfortunately it does not have a long life, normally lasting 5-10 years. There are frequently exposed nail heads that must be kept tarred. If the roof was applied during cold weather, or the roofing material was stiff or brittle, there will often be ridges that lead to accelerated deterioration. This roof material is fairly inexpensive to replace.

Wooden Shakes

Wooden shake roofs are available in a variety of different woods and thickness. Some shakes are split while others are machine cut. As a general rule of thumb, the thicker the shingle the better the quality. Wood shake roofs should be applied on nailers rather than on plywood sheathing. Unfortunately, this is rarely done in new construction. The plywood sheathing does not allow the roof to breathe properly and the shingles will not last nearly as long as they would if exposed to air from below as well as above. Individual shingles will curl, slip out and break.

The north (less exposed to sunlight) surfaces of wood shingle roofs frequently gather moss, which will further reduce their life. Wood shingles should be used only on a steep roof, to allow for proper drainage and fast drying. Shingles should be professionally cleaned and treated with a preservative every 5-10 years. Avoid walking on shingle roofs.

Built-Up

Flat roofs are commonly covered by built-up roofing that sometimes has a slag or gravel surface. The built-up portion is alternating layers of tar or bitumen, and felts. The slag or gravel acts as ballast and breaks up the sun's ultraviolet rays. These are good roofs that have life expectancies ranging from 5-10 years, depending upon quality of installation, drainage, and the number of felts used.

The gravel ballast is a very important element and if absent will lead to accelerated deterioration. Bubbles (which are signs of old age) will develop in this roof. These bubbles can be patched and repaired on a temporary basis; however, as bubbles start to appear you should budget for replacement of the roof.

Cement Asbestos

Cement asbestos shingles are no longer used, and obtaining replacements for individual shingles is difficult. They have a long life if they were installed on a steep pitch. They do wear out and discolor considerably. It is difficult to remove the discoloration.

As these roofs start to leak, shingles crack and start to slip out and you must make repairs. As with tile and slate, these roofs should not be walked on by anyone other than a qualified roofer.

Skylights

Skylights are again becoming very popular. Older homemade units almost always leak. More recently manufactured models are excellent and, if properly installed, provide a good weather seal.

SKYLIGHTS

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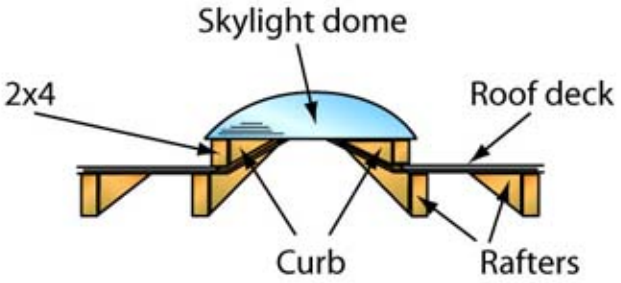
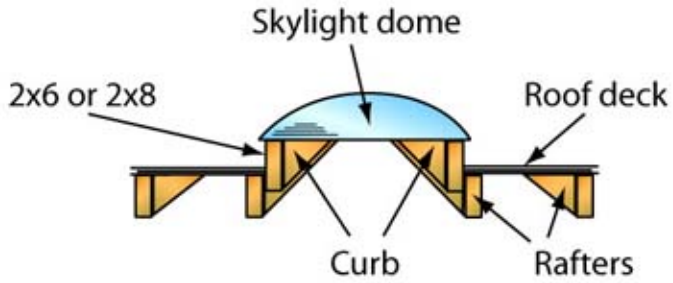
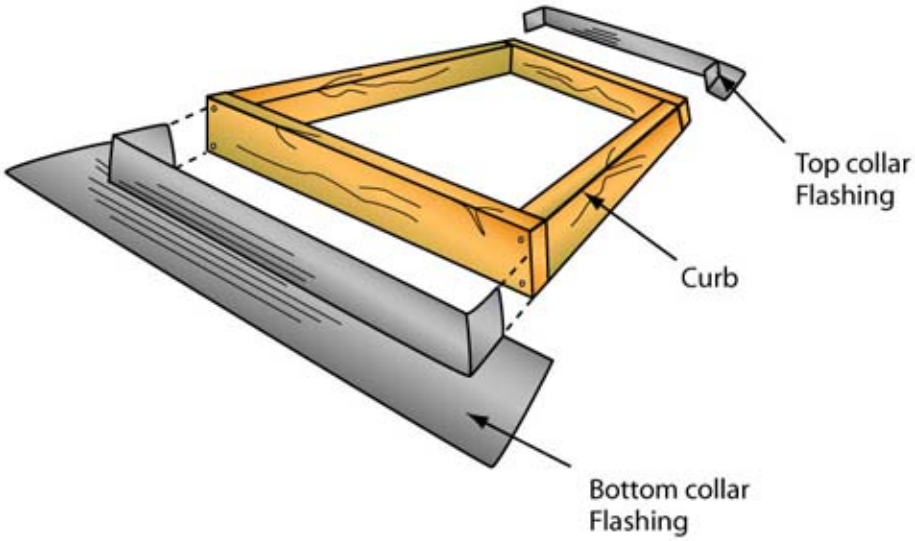
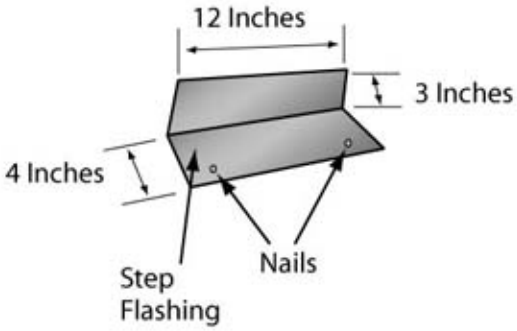
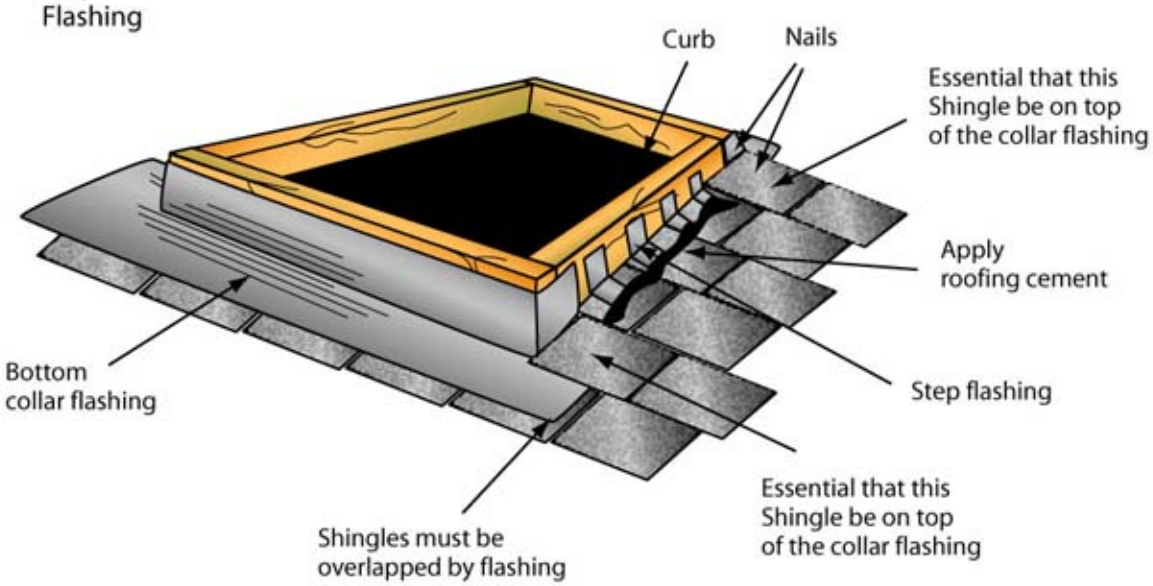
At the bottom of the skylight, the collar flashing must rest on top of one or two courses of shingles, depending on where the skylight meets the shingle courses.











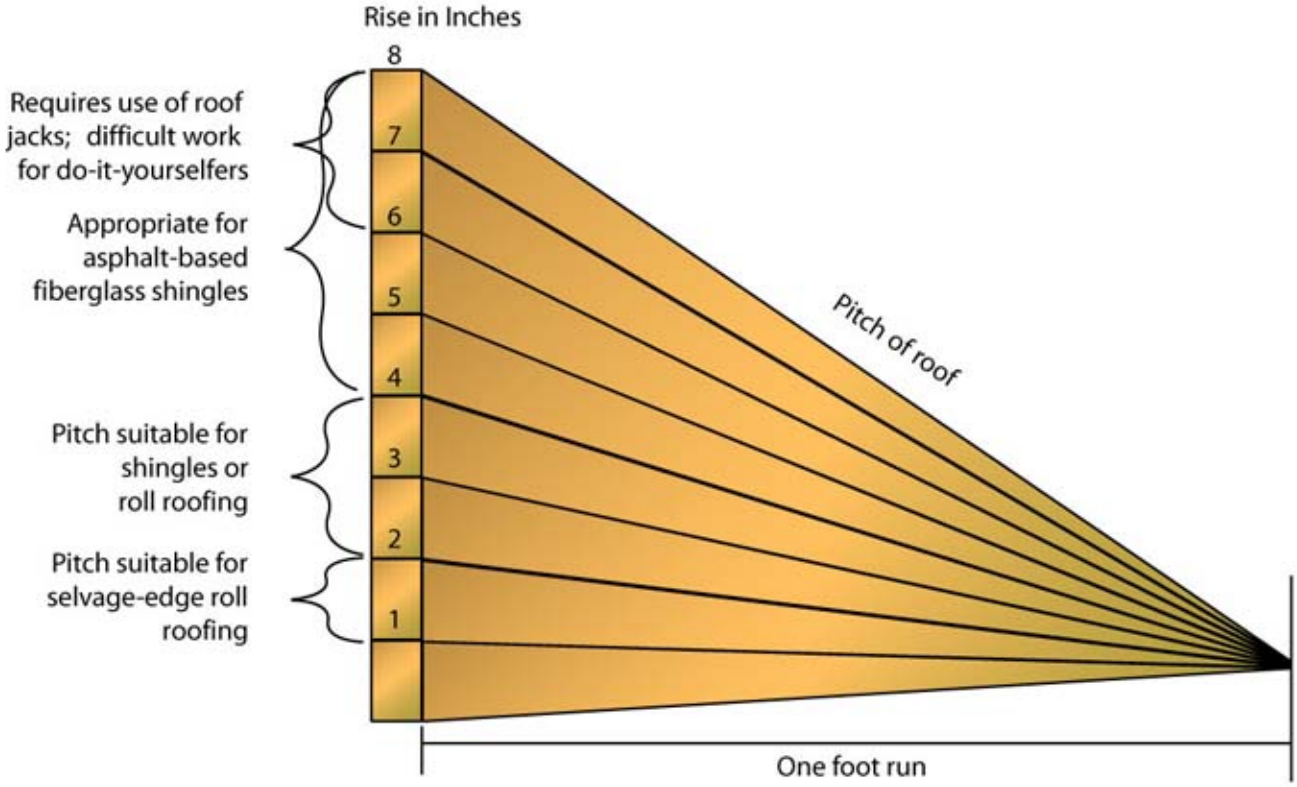
FRT Plywood

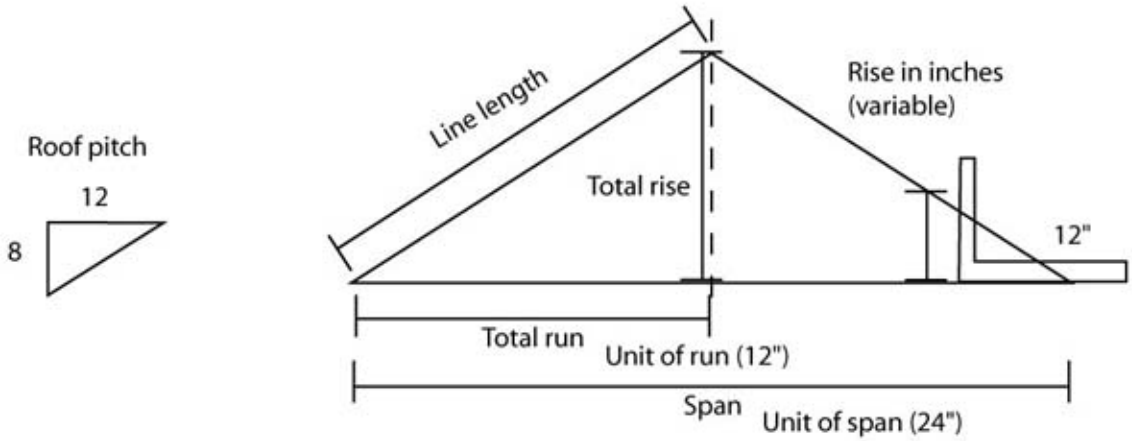
To meet the fire codes in some town house roof construction, fire-rated sheathing was used. This sheathing, known as Fire Retardant Treated (FRT) plywood, is plywood that has been chemically treated. The material is used in many, if not most, of the firewall designs incorporated into low rise, multi-family housing beginning in the late 70's. Unfortunately, an unanticipated chemical reaction in the fire retardant plywood causes a reaction that weakens the wood.

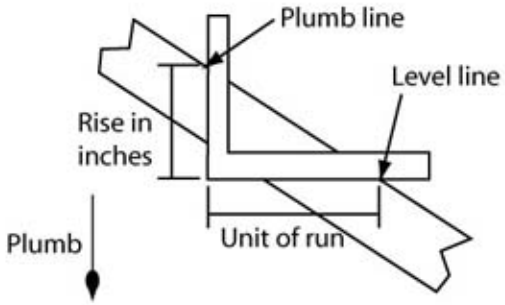
The problem of premature strength loss in FRT plywood is due to the effect of elevated temperatures in the attic space. Basically, elevated temperatures "activate" the fire retardant chemical to do what it is supposed to do: reduce the production of flammable volatiles by chemically charring the wood as the temperature rises. This is the fundamental mechanism of fire retardant chemicals.

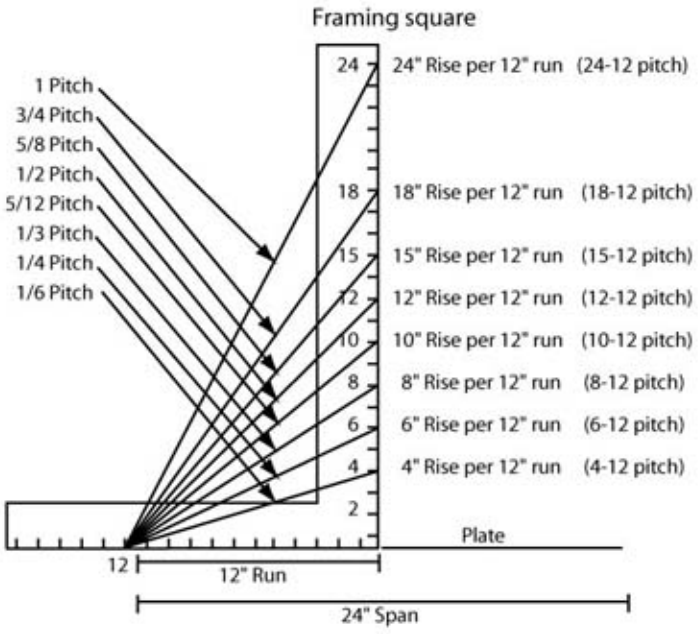
The problem is highly dependent on the particular chemicals used. At this time it is not known which chemicals are the problem, nor the temperature at which the chemicals are activated. Some treating companies are blaming the problem on lack of ventilation and the build-up of moisture in the plywood. The extent of the influence of moisture on the problem is not known at this time.

ROOF PITCHES









The pitch of a roof indicates the degree of the roof slant.
Stated as a fraction, the pitch is a ratio of the rise to the span of a roof.
Most homes have roofs that rise between 2 and 5 inches per foot.

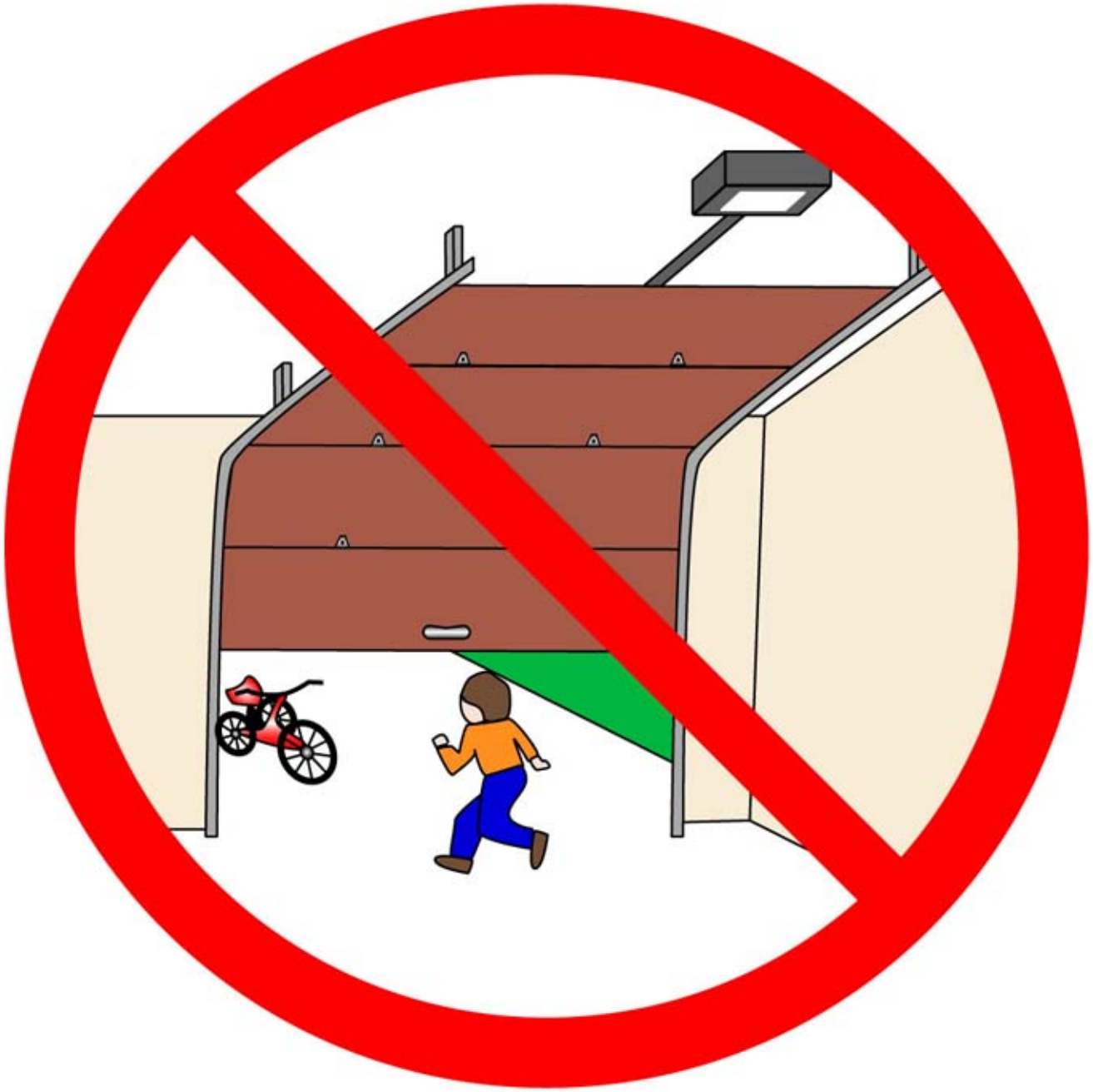
Automatic Garage Door Maintenance & Safety Tips

Death or Serious Injury can result from a child pinned under an automatic garage door.
Never let a child walk or run under a moving garage door.
Never let a child use garage door controls.
Always keep the door in sight when opening or closing.
If a person is pinned, push the control button or use the emergency release.

Test your garage door opener monthly :

Refer to your owner's manual.

Place a 1 inch object (or 2x4 laid flat) on the floor. If door the fails to reverse on contact, adjust opener. If the door still fails to reverse, repair or replace opener.



INTERIOR

WINDOWS AND DOORS

The openings for the windows and doors are high-stress areas of the building. Hairline cracking of the interior and exterior surface is common and is normally not a significant defect. Cracks can be repaired as discussed in the Walls and Ceilings and Exterior Surfaces sections. Most houses have minor defects in windows and doors. "Required Maintenance" includes adjusting hardware, reglazing, trimming, etc. These tasks are normally performed by the homeowner or can be done inexpensively by a handyman. Windows and doors are available in a variety of materials and qualities.

Better quality windows and doors are very durable. Windows provide natural light and ventilation, and doors, of course, give access to and from the home. If properly designed and maintained, windows and doors can fulfill their function yet provide protection from the elements and security against intrusion. From an aesthetic point of view, they often add beauty, symmetry, and character to a building, and thereby increase its value.

Windows

Windows are usually classified by the materials from which they are made and by the method by which they open. For example, if you have a window that is made of wood, has two sections that move up and down, and has a single pane of glass in each section, it would be called a wood, double-hung, single-pane window-a design familiar to everyone.

Types of Windows

Windows are made of wood, steel, aluminum, vinyl, vinyl-clad wood, aluminum-clad wood, or vinyl-clad aluminum. Some windows are made with a thermal-break, which is a strip of insulating material that separates the interior part of the window from the exterior. The function of the thermal-break is to minimize heat loss and condensation during the winter months. A typical window is composed of four elements: the glass or pane, the sash, the framing, and the molding and trim.

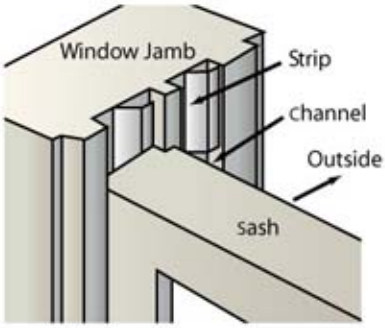
The glass, or glazing as builders call it, can be single pane, double pane, triple pane or even quadruple pane. Single-pane glass is usually no more than 3/16 of an inch thick, whereas double-glazed glass is made by hermetically sealing dry air between two panes. The air space may be 3/8 to 1 inch thick. The triple- and quadruple-pane windows use the same process. Multiple pane glass restricts the flow of heat through the glass, using dead air space as insulation.

As an alternative to extra glazing, manufacturers sometimes apply a special coating to the inside pane of double-glazed windows. Glass treated with the coating is called low-emissivity or "low-E" glass. Low-E glass reflects radiant heat and helps keep the house warm in winter and cool in summer. Low-E glass is almost as effective as glass with a third or fourth pane.The sash is the unit that slides or pivots when you open or close the window.

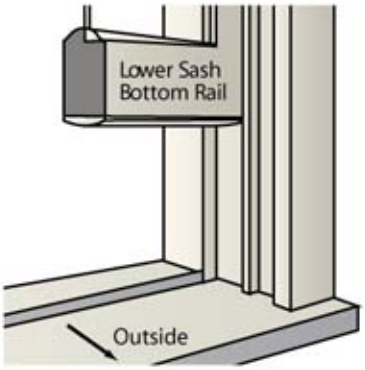
The sash includes the glass and its supporting framework, which consists of horizontal pieces called rails, vertical pieces called stiles, and bars that separate the glass panes called muntins. Locks and lifts, weather stripping, and in some cases sash cords, chains, springs or hinges are also considered part of the sash.

How to Weatherstrip Your Windows

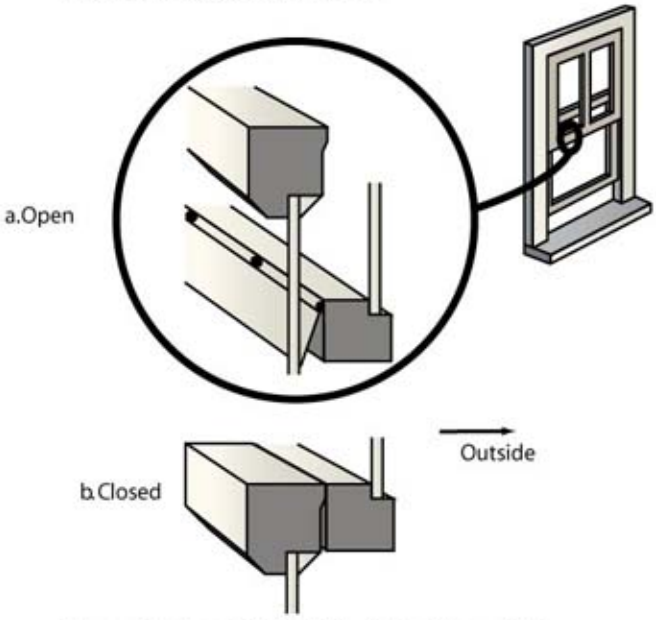
Thin Spring Metal



A Install by moving sash to the open position and sliding strip in between the sash and the channel. Tack in place into the casing. Do not cover the pulleys in the upper channels.

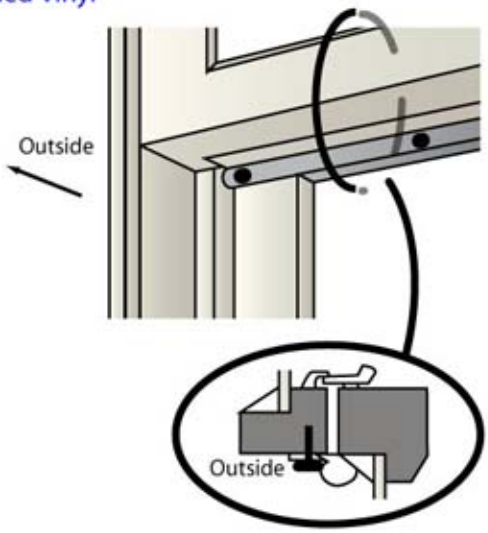


B Install strips the full width of the sash on the bottom of the lower sash bottom rail and the top of the upper sash top rail.



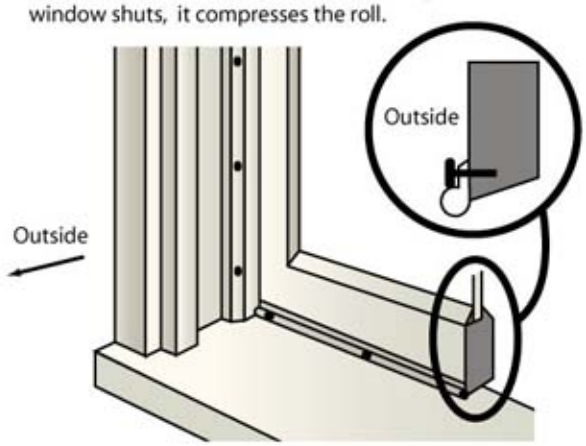
C Then attach a strip the full width of the window to the upper sash bottom rail. countersink the nails sightly so they won't catch on the lower sash top rail.

Rolled Vinyl

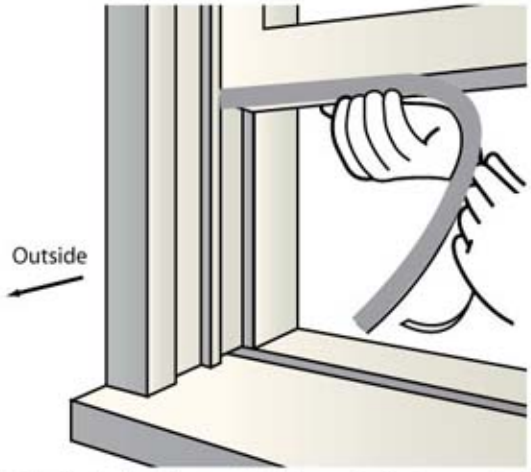


A Nail on vinyl strips on double-hung windows as shown. A sliding window is similar and can be treated as a double-hung window turned on its side.

B Casement and tilting windows should be weatherstripped with the vinyl nailed to the window casing so that, as the window shuts, it compresses the roll.



Adhesive-Backed Foam Strips



Install adhesive backed foam, on all types of windows, only where there is no friction. On double-hung windows, this is only on the bottom (as shown) and top rails. Other types of windows can use foam strips in many more places.

The exterior window frame consists of a sill, a side jamb, a bead jamb, strips called stops that hold the sash in place, and the exterior casing or framework.

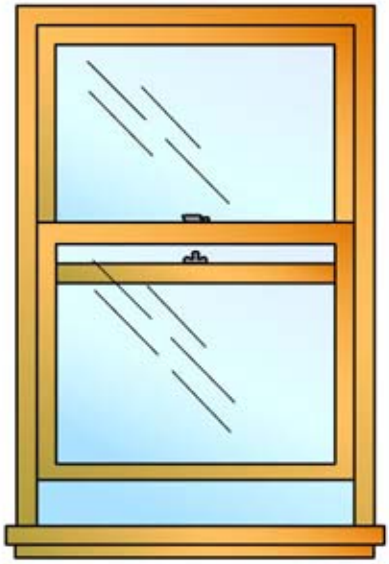
The interior window moldings include the stool, which rests on top of the sill; the right, left, and top casing, or trim; the mullion casing, which is the trim covering the joints of two or more adjacent windows; the window stops, which hold the window in place; and the apron, which is nailed under the stool.

Window Designs

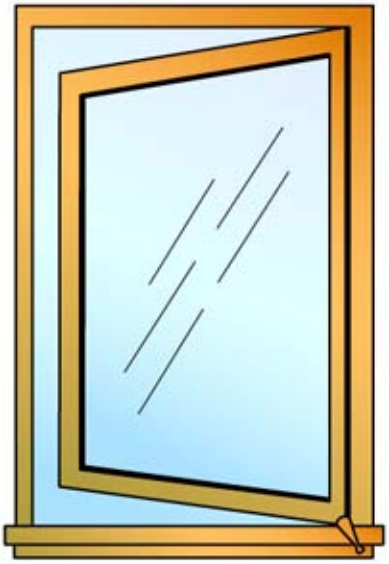
There are six basic window designs: double hung, sliding, casement, awning, fixed, and skylight. Many manufacturers use various combinations of the six designs to suit a particular style or function. For example, a greenhouse window found in many kitchens will use the fixed and awning window design.

Types of Windows

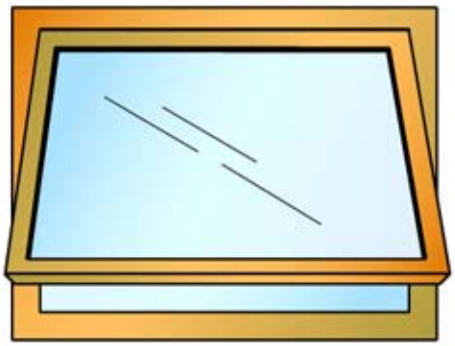
Double Hung



Casement

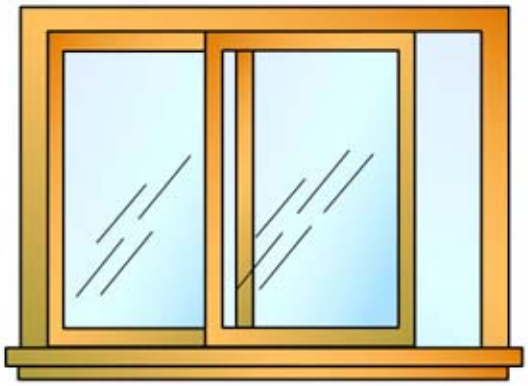


Awning

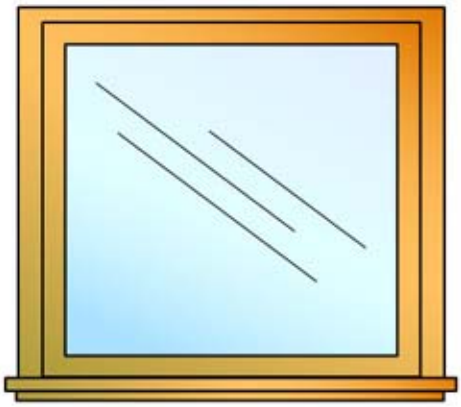


FIXED WINDOWS

Sliding



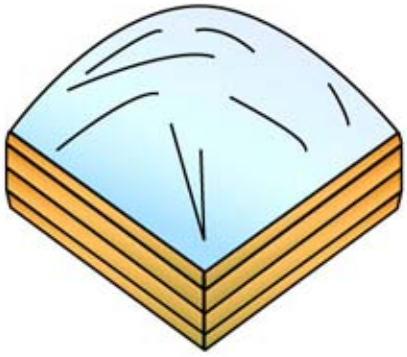
Picture



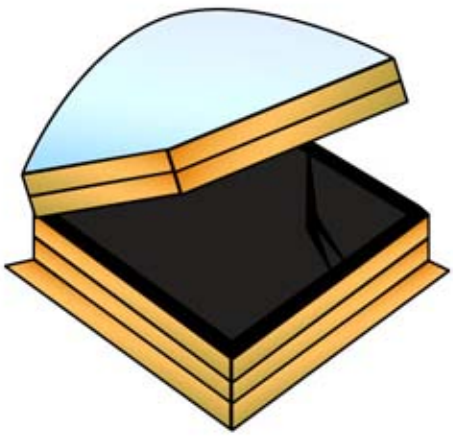
Decorative

SKYLIGHTS

Fixed



Vented



The double-hung window, which has been used since the 1700s in the United States, consists of a lower sash and an upper sash, each working independently of the other. The sashes move up and down and are often balanced by weights hung on ropes or chains. The weights counterbalance the weight of the sash and make it possible to set the window open at any position. A modern double-bung window uses springs on each side of the sash to hold the sash in place. A variation of the double-hung window is the single-hung window. Here the top sash is fixed and the bottom sash is movable.

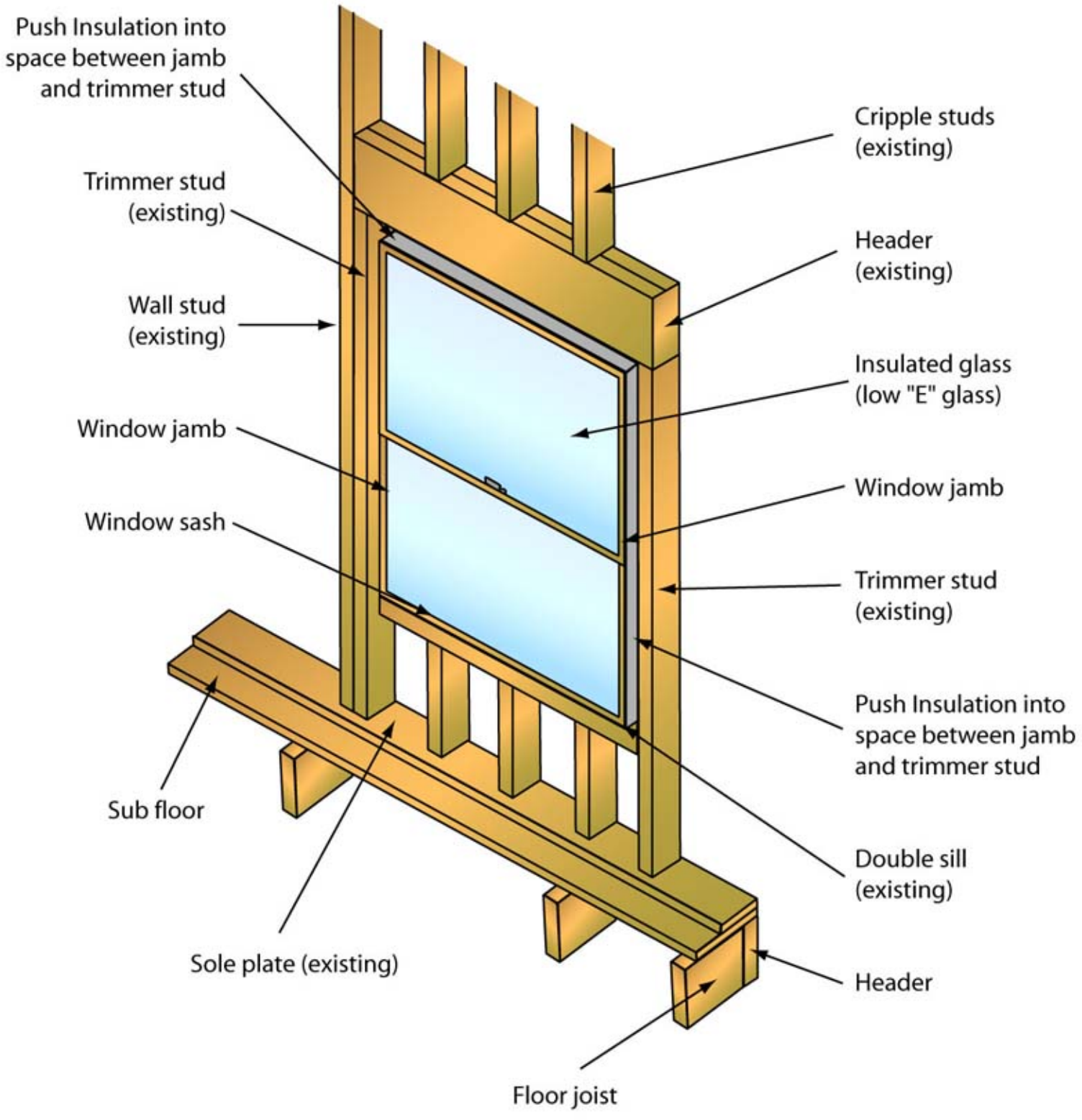
The double-hung window generally allows a maximum of 50 percent of the total window area to be used for ventilation. In other words, when the window is open as far as it will go, the two sashes are doubled up and only half of the window space is actually allowing air to pass through.

The glass within the sash may be subdivided into a number of smaller individual panes supported by the muntins. Sometimes you will hear builders or architects refer to a "six-over-six double-hung window" or a "six-over-one double-hung window." If, for example, the upper sash has six small panes of glass and the lower sash also has six small panes, the window is called a six over six. Some windows use clip-on grids to give the effect of multiple panes.

The second type of window design is the sliding or slider window, in which two or more glass panes slides past one another on a horizontal track. Sometimes one sash is fixed while the other sash is movable. Here, again, 50 percent of the total sash area is available for ventilation in a double-sash, sliding window.

Replacement of Window

Recommend High Energy Saving windows with insulated glass



Doors

Exterior doors are designed to protect the homeowner from the elements and intruders; reduce heat loss; and provide privacy for the homeowner. Interior doors provide privacy and cut down sound transmission within the home. Exterior front doors are commonly 36 inches wide and 1-2/3 inches thick, whereas secondary exterior doors-side or rear door or the door from the house to the garage-and interior doors are commonly 27 to 32 inches wide and 1-3/8 inches thick, although many other sizes exist. Most doors measure 6 feet 8 inches to 7 feet high.

A door is held at the frame by metal hinges or tracks. The frame consists of a head jamb, two side jambs, and stops against which the door closes. Exterior doors also have a sill or threshold made of wood or aluminum that slopes down to shed water away from the entry. Doors are made from a variety of materials and come in several basic types: flush, panel, batten, patio, and garage. The flush door is flat on both sides and can be either a solid-core door or a hollow-core door.

The solid-core flush door is made of wood blocks or composition material formed into a solid piece. It provides greater security, better insulation of heat and sound, and more fire resistance and rigidity than the hollow-core flush door, which is veneered plywood with a core of wood cross braces or cardboard strips. Another variation of the flush door is the metal-clad exterior door, consisting of steel-faced panels with an insulating core, and sometimes a thermal-break, a strip of insulation that prevents any part of the outside steel panel from touching the inside steel frame. This keeps the outside cold from being transmitted directly to the inside frame, eliminating condensation.

Panel doors consist of frames enclosing flat or raised plywood or solid wood panels, and may be used as either exterior or interior doors. Exterior panel doors may substitute glass for wood panels. Batten doors are made of boards secured by diagonal or cross bracing and nailed with screws or clinched (bent-over) nails. They are usually found in cellars, sheds, and other places where appearance does not count. It is difficult to make them water- and weather-tight.

The sliding patio door has a main frame, usually two glass panels, single pane or double pane, and one screen panel. The door slides on tracks. Security bar locks overhead and/or foot bolt locks at the base of sliding doors are desirable.

Garage doors are usually made of metal, wood, or fiberglass. They can be hinged, sliding, or overhead doors. The overhead type can be a roll-up door with sectional panels or a swing-up door that moves up in one piece. Garage doors should have a gasket-a type of weather stripping-along the bottom edge to keep water out.

Door hardware frequently needs adjustment, especially striker plates. This repair can usually be done by the homeowner. Doors that stick or rub should be adjusted for ease of movement. It is sometimes possible to insert a shim behind the hinge to alleviate the problem. If shimming does not work, trimming the edges of the door is necessary.

Broken or damaged door panels are difficult to repair and, in most such cases, the whole door should be replaced. Bi-fold metal and wooden doors on closets often need adjustment. Replacement hardware for these doors is available.

Rollers on sliding patio doors can be replaced. Cleaning the tracks of patio doors is important to smooth operation.

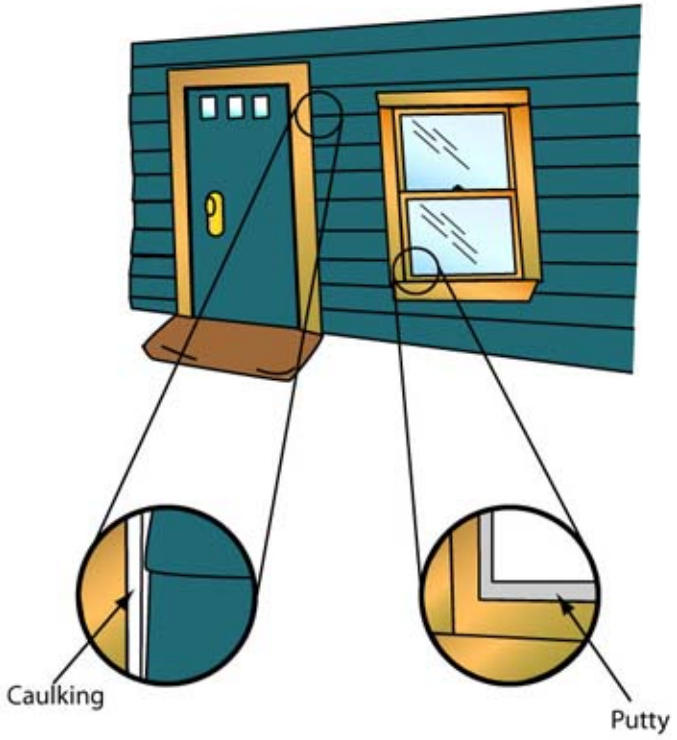
Locks on exterior doors should be re-keyed when the ownership of the house changes.

Checking Caulking and Weatherstripping on your Doors and Windows

Caulking and weatherstripping are good cheap ways to save energy. It's worth while to check if you need caulking, putty or weatherstripping on your windows and doors.

Do they need caulking or putty?

Look at the parts shown in the picture of one or two of your typical windows and doors.



Good condition, all the cracks are completely filled with caulking. The putty around the window panes is solid and unbroken; no drafts.

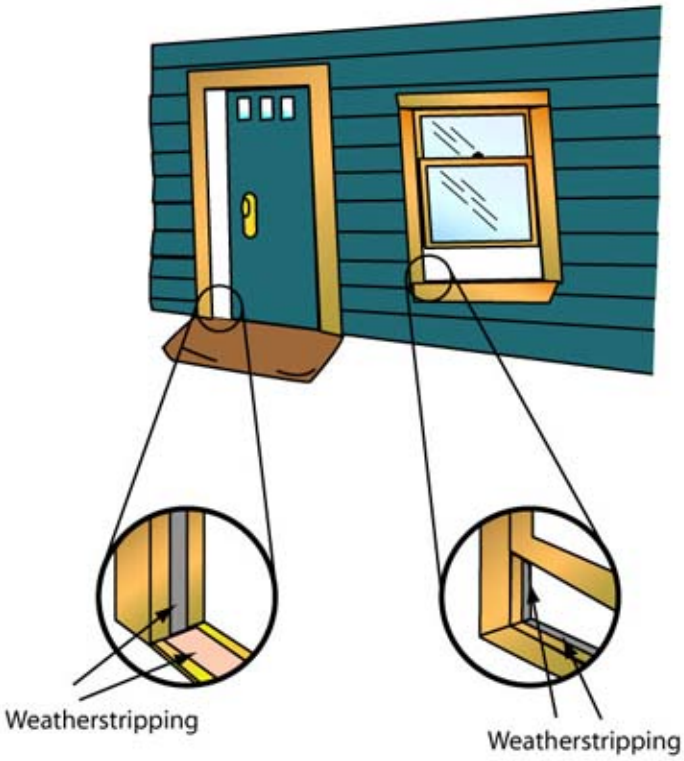
Fair condition, the caulking and the putty are old and cracked, or missing in places; minor drafts.

Poor condition, there's no caulking at all. The putty is in poor condition; noticeable drafts.

If you have found your windows and/or doors to be in fair or poor condition, then you probably need caulking.

Do they need weatherstripping?

Look at the parts shown in the picture of one or two of your typical windows and doors.



Good condition, unbroken weatherstripping in all the indicated places; no drafts.

Fair condition, weatherstripping damaged or missing in places; minor drafts.

Poor condition, no weatherstripping at all; noticeable drafts.

If you have found your windows and/or doors to be in fair or poor condition, then you need weatherstripping.

Storm Windows and Doors and Screens

Single-pane windows are a major source of heat loss in a house. Since glass is not a good insulator, heat travels through a pane of glass very easily. Storm windows, however, can reduce heat loss through windows significantly. The three basic types of storm windows are storm sashes, storm panels, and combination storm and screen windows.

The storm sash, often called the seasonal storm window, fits over the entire window and is attached to the frame of the window by means of hooks or clamps. Seasonal storm windows are common in older houses.

The storm panel is a single pane of glass edged with wood, metal, or plastic. It is placed over the sash of the window and is held in place by clips or screws. The storm panel can be attached on either the inside or the outside of the window.

Whereas the storm sash is attached to the outside window frame and effectively shuts the window for the season, a window with storm panels can still be opened.

The combination storm and screen window has storm and screen sashes installed in a single frame. These can be aluminum, steel, or solid vinyl. The frame is permanently attached to the exterior frame of the primary window by means of screws and should be caulked along the top and sides between the storm frame and the window frame to reduce air infiltration. Never caulk along the bottom of the storm-window frame. This blocks the weep holes put there to allow water to escape. Double-track and triple-track combination storm and screen windows are the most typical, with the storm sashes and screens arranged on the tracks in various ways.

Storm doors are a must for all entrances in cold climates. But a storm door may not be appropriate where a metal-clad entrance door is used, since the heat buildup between the storm door and the metal-clad door may be so great that any plastic decorative panels on the metal-clad door may actually melt.

WALLS AND CEILINGS

All walls and ceilings have cracks somewhere. Most of these cracks are of little significance and have only cosmetic implications. Hairline cracks that develop in a house around stairwells or in corners are normal and should be repaired in the course of redecoration. The most frequent causes of these cracks are changes in the moisture content of material and the normal expansion and contraction of structural members that occurs with changes of the season. These cracks are easy to repair by opening them up with a V or an inverted V groove and then filling the groove with joint compound.Joint compound should be sanded. Two or three applications of joint compound will be necessary to obtain a smooth surface. If you are lucky, the patch will be permanent. However, it is not unusual for these cracks to reopen.

Walls

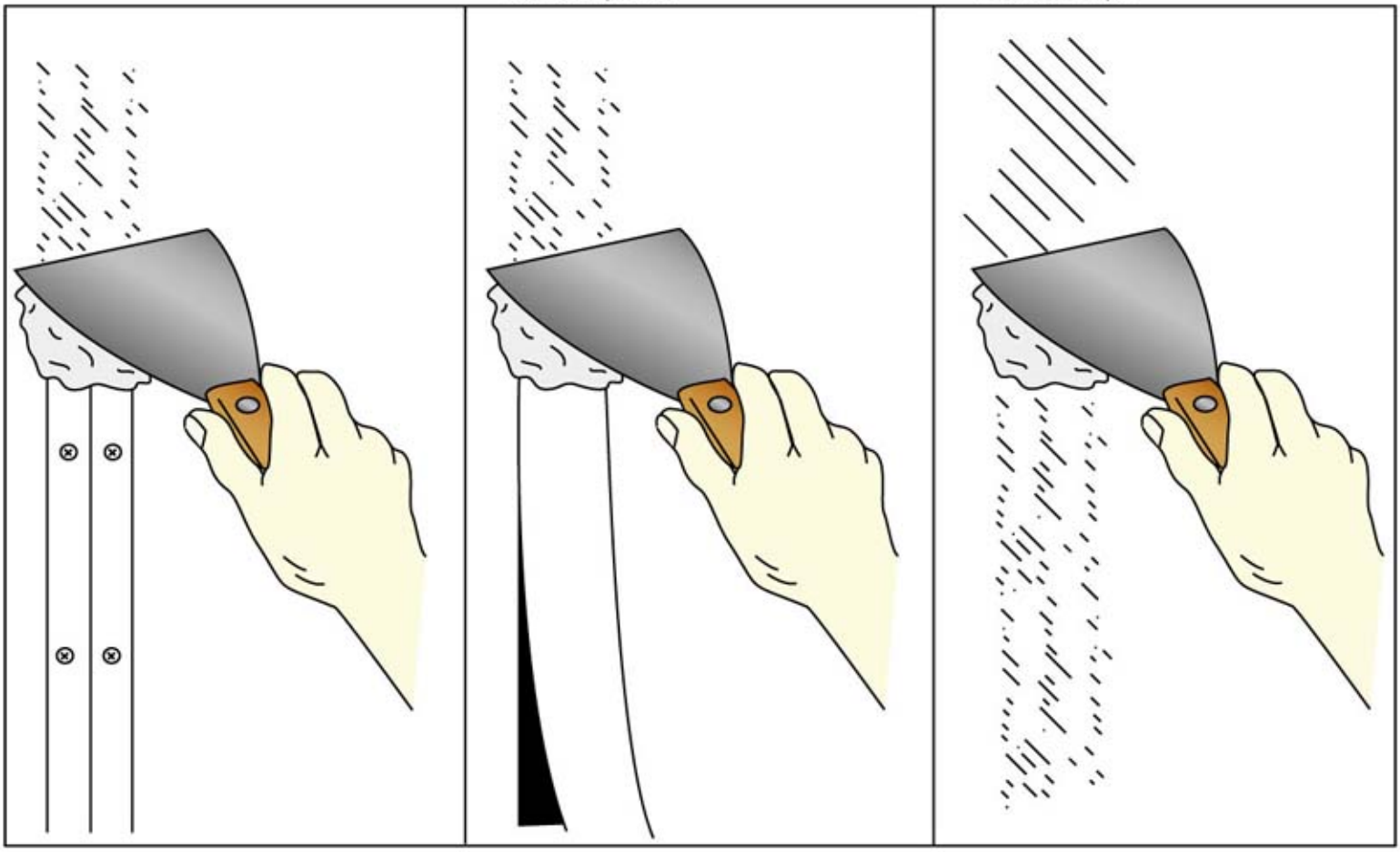
Older houses were constructed using plaster. Prior to 1930, wood lath was the most common base for plaster. In later years, rock lath was used. Both of these materials are good. However, wood lath loses its resiliency and the plaster can work loose. Metal lath, which is more durable than wood lath, is often used around bathrooms.

Drywall is the most frequently used wall material in modern construction. It is available in different thicknesses, with 1/2" being the most common. As a house ages, settlement will occur and cracks and nail pops will develop in the drywall. A drywall crack can be treated as discussed above. Nail pops are normal; the nail that popped should be reseated and an additional drywall nail used nearby. The nail should be slightly sunk into the drywall with a dimple. The dimple should be filled with joint compound and smoothed, and the joint compound sanded. Two or three applications of joint compound will be necessary to conceal the location of repair.

Paneling has been installed in many homes. The 1/8" and 1/4" paneling is most common today; 3/4" tongue and groove was used in older homes. Paneling is frequently found in recreation rooms and finished basements. Both styles of paneling are good and require little maintenance. The paneling should be polished occasionally with a good furniture polish.

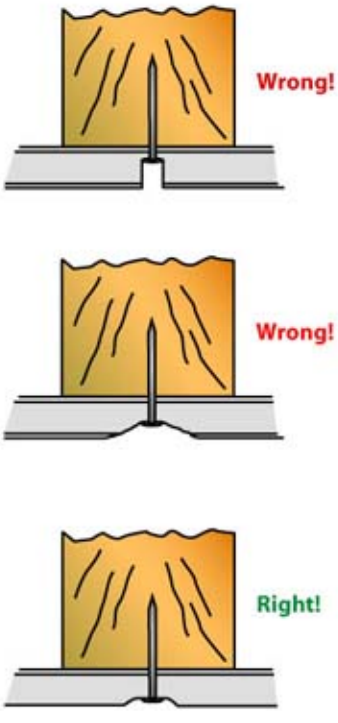
Sealing Wallboard Seams

1. Spread compound over seam
2. Press tape on and smooth with compound
3. Apply compound to level surface and hide tape

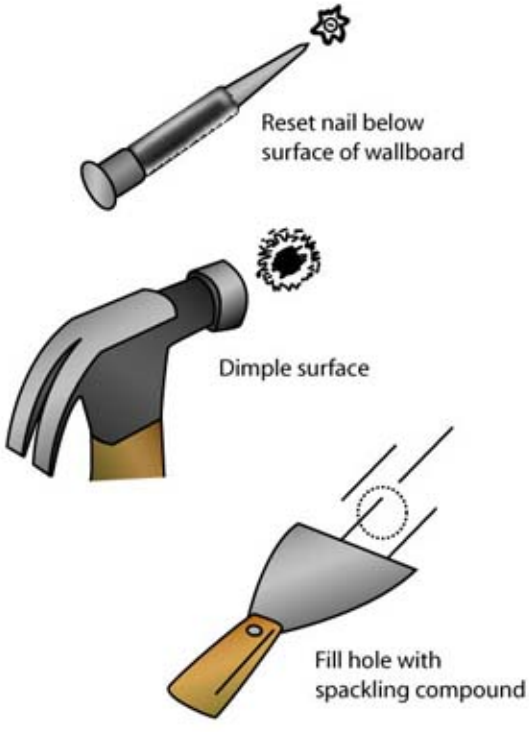


Repairing Wallboard

Recessing a Nail into Wallboard



Resetting loose nails in Drywall



Ceilings

Drywall is the material most commonly used for ceilings in modern construction. Plaster ceilings are found in many older homes. The discussion above on drywall and plaster walls applies equally to ceilings. Loose plaster on the ceiling is quite common. The best method of repair is to install drywall.

Fiber tile is often used on ceilings in basements. Fiber tile is nailed to nailing strips, which in turn are fastened to joists. This material is very sensitive to moisture and has a tendency to sag. These tiles will come loose and can be renailed and repainted. When the tiles are stained, repainting is recommended. Matching replacement tiles is very difficult. Suspended or dropped ceilings are commonly used, although they may reduce the amount of headspace in a room. The panels are normally 2 x 4 feet and suspended on a metal track. They are easily damaged and must be handled with care. If they become stained or discolored, replacing all of the panels is recommended.

FLOORS

Wood Floors/Stairs

Many homes contain wood floors. The most durable and common is oak. Hardwood floors can normally be refinished if sufficient floor material remains. To determine the amount of remaining material in a wood floor, insert a screwdriver between the strips and determine the depth to the tongue and groove. If approximately 1/8" of material remains the floor can usually be refinished. It is sometimes difficult to remove every stain from a wood floor. Wood parquet tile floors are glued to sub flooring and the tiles have a tendency to come loose. Replacing damaged tile and obtaining a good match of material are difficult.

Carpeting

Most new construction has carpeting installed over plywood. The quality of the carpeting varies considerably and the life expectancy is dependent upon traffic and maintenance. Plastic runners in high traffic areas are recommended.

Vinyl

Vinyl and vinyl asbestos tiles are glued to sub flooring. Vinyl and vinyl asbestos floor coverings are available in two styles, either sheet or 9" or 12" tiles. The quality and durability vary a great deal. Newer sheet vinyl sometimes has a cushion, which is very easily damaged or torn. Missing tiles should be replaced; however, obtaining a good color match is difficult. Loose tiles should be re-glued.

Tile

Ceramic and slate style tiling are very common in foyers. If the sub flooring material is not rigid, these tiles are likely to crack and come loose. If a tile comes loose it should be replaced and re-grouted. If the sub flooring is not rigid you should consider reinforcing it or changing to a different type of floor covering such as wood, carpeting or vinyl, which can accommodate some movement. Ceramic tiles are very susceptible to cracking and impact damage.

Maintenance

All floors require maintenance. Cleaning is the most important maintenance activity. Any accumulation of grit tends to act like sandpaper and increases wear as the floor is walked upon. Some floors also have a tendency to squeak. Squeaking is normal and, sometimes, is almost impossible to correct. If there is access to the sub flooring from below, inserting wedges between the floor joists and sub floor may partially eliminate the squeaking. If a squeaking floor is to be recovered with carpeting or tile using screws to refasten the sub flooring to the joists is recommended.

FIREPLACES AND FLUES

The warmth received from a fire burning in the fireplace is more psychological than real. Most fireplaces are energy deficits rather than adding heat to the house, for they pull a large amount of warm air, already heated by the heating system, through the fireplace and up the flue to support the combustion of the fire. In spite of this disadvantage,

many houses have fireplaces and most families use them on festive occasions. If the fireplace does not have a masonry hearth, it should be used only with great caution. A fire in this type of fireplace should never be left unattended.

One year seasoned hardwood is the best fuel for a fireplace. Do not use paper, soft woods or trash. These materials will lead to a rapid buildup of soot and creosote. Do not use coal unless the fireplace or stove is specifically designed for use with that fuel.

Masonry Fireplaces

Newer fireplaces should be constructed by using firebrick. Some are not. The mortar used should also be fire resistant, but often is not. As the mortar deteriorates it should be replaced with a fire resistant mortar. Cracks frequently develop between the hearth and the firebox and these need to be filled. There are standards for construction of fireplaces; however, many fireplaces have been built without following them.

Undesirable smoking of the fireplace often results.There are some useful techniques to alleviate the smoking. Consider pre-heating the flue by holding a lighted sheet of newspaper inside the flue, prior to igniting the fire, to start the draft. Understand that this draft will also begin pulling already warmed air from the house. Slightly open a window in the same room with the fireplace to provide outside air for the draft, especially in new construction that is very tight and has few drafts.

Newer fireplaces, less than 10 years old, may have a small opening in the bottom of the fireplace that goes to the exterior. This opening admits outside air for combustion and is much more energy efficient than using the already warmed room air.

Dampers

Some older fireplaces were built without dampers. If there is no damper, you may want to close the fireplace off with glass doors or a piece of insulation when it is not in use. Newer fireplaces have dampers; however, many of them do not fit snugly and require adjustment. The damper should fully close and seal the fireplace when there is no fire.

Metal Fireplaces and Inserts

Modern, metal fireplaces are prefabricated units that are usually well constructed. The key safety feature of the metal fireplace is that the proper standoff distances to combustible materials are honored. Some masonry fireplaces have metal inserts, or heatilators, and do provide some warm air. The most efficient ones have a circulating fan to assist the movement of the air.

Wood Stoves

Wood stoves are the source of many home fires, which are caused by poor construction, improper installation or poor maintenance. A wood stove must be installed in compliance with the local codes and the manufacturer's specifications.

The manufacturer's specifications will establish safe standoff distances to combustible materials. Frequently the standoffs are not honored and fires can occur.

Flues

Newer flues are lined with terracotta, which helps to protect the brick and mortar of the chimney from the sometimes corrosive combustion products. The chimney sweep should, in the course of his activities, perform an inspection of the flue. The metal flues on some modern fireplaces need more frequent cleaning than those on masonry fireplaces. The fireplace and flue should be cleaned when the creosote buildup exceeds 1/8"-1/4".

ELECTRICAL SYSTEM

The electrical system is potentially the most hazardous system in the property and should be kept in good repair. Only licensed electricians should work on this system. The electrical system in a property is governed by an electrical code. While there is a national code, these codes are frequently modified by local jurisdictions. When a code is updated, there is usually no requirement for an owner to modify the electrical system to comply. Consequently, the electrical systems in some older homes are less safe than those installed under current procedures. The fact that an old house does not conform to current electrical practices is not illegal.

Service Capacity

The size of the service required for a particular property depends upon a number of factors. Many older houses still have 110/120-volt service, which should be upgraded to 220/240-volt service. Some systems have a capacity of only 30-60 amps, which is inadequate. A house that is connected to a natural gas distribution system may get along just fine on 100 amps. Modern electric homes, on the other hand, will require 200, 300, or even 400 amp services, depending upon size. A modern house should have a minimum of 100 amps of electrical power.

The power is delivered to the house in either an underground or an overhead cable. The underground is preferred and is commonly used today. It is expensive to convert an overhead system to an underground system.

Protection

The electrical system should be grounded either to a ground stake or a water line. The grounding rod is preferable to a water line. You should not ground electrical systems to a gas line. If the main water entry line is plastic, the grounding must be to a stake. The circuits in the property are protected by either breakers or fuses. Breakers are almost universally used today and rarely fail. It is important that the breaker be compatible with the wire size used. Fuses are also safe, if they are used properly. Do not install a fuse with a greater capacity than the wire it is serving. Older type fuses use Edison type bases. These are interchangeable among the various sizes. The more recent S-type fuses have different threads for different capacities and can only be installed in a socket intended for the proper size. Converting the old Edison base to the S-base is easy to do and recommended.

The installation of a S-base insert should be done by a licensed electrician. Double taps (two or more circuits connected to the same breaker or fuse) are an indication of amateurish wiring; this condition needs to be checked and corrected by an electrician.

Wiring

There are many different kinds of wiring in current use. One of the earliest wiring types was knob and tube. Today, Romex is the most common. The insulation on the older knob and tube wiring is brittle, difficult to work on, and subject to failure. If you have knob and tube wiring, you should have it inspected by an electrician to be sure that it is safe. If there is any renovation anticipated, this wiring should be replaced. The most common wire used for the 110/120-volt circuits is copper. Rarely are there problems with copper wiring. Aluminum wiring was used on the 110/120-volt circuits during the period 1965-1973. It is important to have an electrician inspect an aluminum 110/120-volt system to verify its safety. This inspection requires opening all of the junction boxes, switches and outlets to ensure that the proper connectors have been used. If the proper connectors have not been used, they must be installed. Aluminum wiring installed with connections intended for copper may develop high resistance at the connections, overheat, arc, and cause fires. The use of aluminum wiring for entry cable and 220/240-volt appliances is very common and has not been a problem.

Smoke Detectors

Smoke detectors are required by law in most localities. Some jurisdictions require battery powered smoke detectors, while others require smoke detectors that are connected to the electrical system. Smoke detectors are very inexpensive and one of the best forms of fire insurance that you can obtain. Using a combination of battery and hard-wired smoke detectors is recommended.

Smoke detectors should be placed in every area of the house in which persons sleep, as well as on the ceilings of the stairwells. If an individual in the house smokes, additional smoke detectors are recommended.

Intercom Systems

Radio/intercom systems have been installed in many homes. The older systems rarely work properly.

Ground Fault Circuit Interrupters

Ground Fault Circuit Interrupters (GFCI) are safety devices which are installed on bathroom, garage, kitchen and exterior circuits. These devices, which are designed to prevent serious injury to persons operating electrical equipment in a damp environment, are an important improvement in modern electrical systems. They are inexpensive to add to existing systems, and installing them is recommended. GFCI should be tested monthly. Often a card to record testing is mounted in the electrical panel.

Low Voltage Switching Circuits

Some older buildings have low voltage switching circuits. This type of circuit has not been installed for a number of years. These systems have a series of relays, which are prone to failure and are difficult to maintain.

Security Systems

There are many different types of security systems. If the house has one you should discuss this system with the current homeowner, manufacturer, or the lessor.

Receptacles and Switches

The older two-prong electrical receptacles are frequently not grounded. The newer three-prong, grounded receptacles are preferable. In many cases it is possible to make a conversion from two prong to three prong outlets; this work should be done by an electrician. Older houses were wired with fewer receptacles than modern code requires. The scarcity of outlets often leads to the use of extension cords, which is not good.

If the property has an inadequate number of electrical outlets for your use, we recommend that you install additional circuitry, rather than use extension cords.

Cover plates should be installed over all receptacles, switches and junction boxes. Reversed polarity is a sign of amateurish wiring and should be corrected, as it can damage some types of equipment.

PLUMBING SYSTEM

The plumbing system on the property consists of a water supply system, a waste disposal system, a ventilating system, appliances, and fixtures.

Water Supply System

The water supply is provided by public or private systems. The public system is normally not a concern to the homeowner. A private system provides the water from wells. There are many different types of wells, such as shallow, dug, and deep wells. Be sure that you do obtain a test for potability and a complete chemical analysis. The potability check is frequently provided by the municipality or the jurisdiction. A complete chemical analysis is necessary to reveal the presence of undesirable chemicals or materials in the water such as: iron, nitrates, or sediments.

If there are high levels of any foreign materials in the water, you should install a water treatment system. If the system has copper piping and the water is acidic, the copper pipes may deteriorate quite rapidly. Acidic water may introduce lead into drinking water from soldered joints. The yield of a well should be checked to ensure that you have a sufficient quantity of water for your family. Typically a yield of 2-3 gallons per minute is adequate. Flow rates may be tested by turning on several faucets at one time and allowing them to run for 30 minutes, and then checking the flow from a showerhead on the top floor.

Water supply lines on most properties are constructed of copper. Copper normally has a long life. Galvanized steel is common in older houses. Galvanized steel rusts from the inside out; the buildup of rust will eventually lead to low pressure and slow flow. Galvanized pipes will also eventually leak. The normal life expectancy of galvanized pipe is 30-50 years. If you do have a low pressure or slow flow, the problem can sometimes be corrected by replacing the horizontal lines in the ceiling in the basement. If renovation is undertaken or considered, make sure that you make provisions to change the galvanized lines to copper. Plastic water lines are also approved in most jurisdictions. These pipes are flexible and although they are quite new we believe that they will have a long life. Plastic tubing is often used as a main water entry. If the main entry line is plastic, it will be necessary to ground the electrical system to a rod rather than to the water supply system.

Lead pipes are still in use in some older homes, but they are no longer being installed. Lead piping can be a health hazard and any lead lines should be removed. Most systems have a main water shut off valve, where the water line enters the house. You should be familiar with this valve and operate it occasionally to ensure that it will work in the event of an emergency.

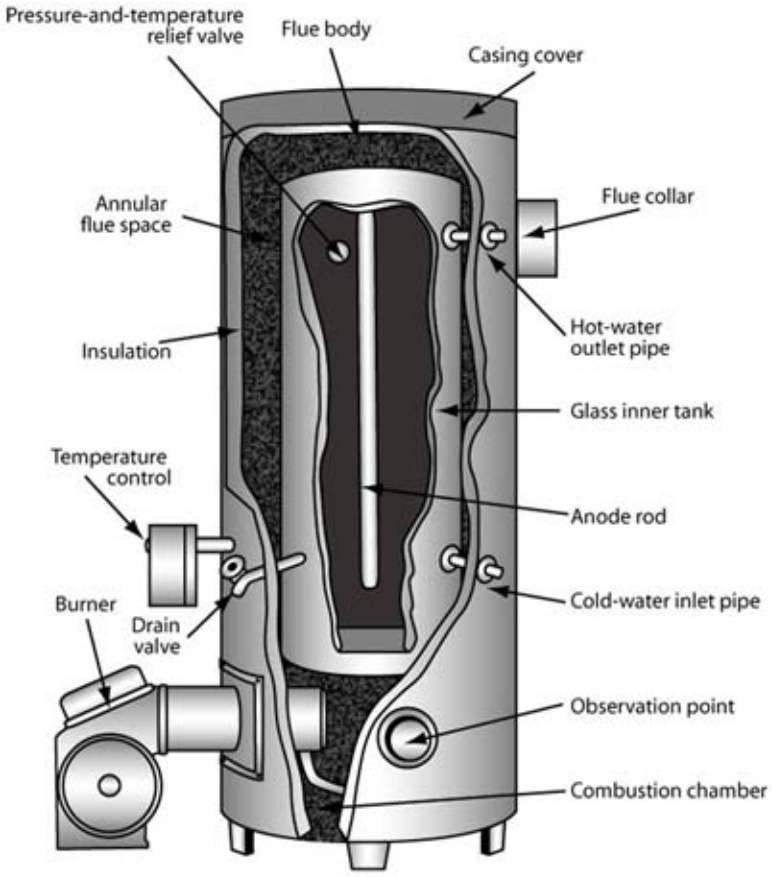
Most properties have hose bibbs on the exterior, to which garden hoses are connected. There are two basic types. The frost-free type has the valve seat well within the wall inside of the house and is not prone to freezing. The standard type should have a shut off valve on the interior of the house, which should be turned off during the winter months. When a hose bibb is turned off, you should open the valve on the outside, so there is no water left in the piping between the two valves. Even with frost-free valves, freezing and damage to the valve will occur if the garden hoses are not turned off.

Water Heaters

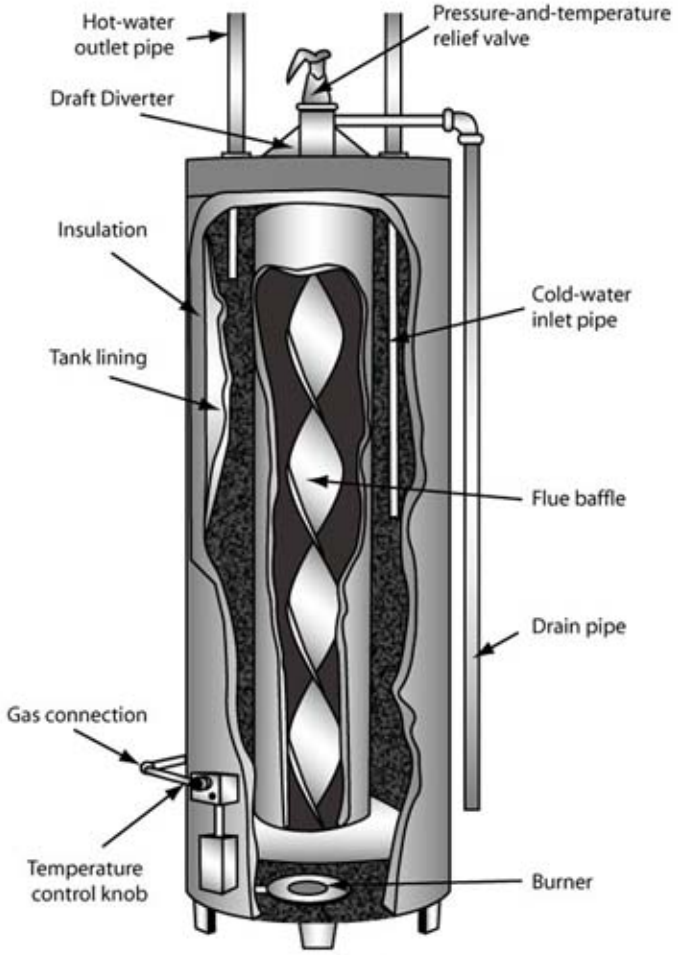
Gas and oil fired water heaters have a predictable design life of 12 years. Electric water heaters have a predictable design life of 14 years. The capability to provide hot water varies with size and recovery rate. The recovery rate is dependant on the amount of BTU's the unit can produce. Gas and oil water heaters are more effective because they have faster recovery rates. If you have an oil water heater it should be serviced annually.

Electric water heaters have elements that occasionally burn out and require replacement. Note: It is common that these elements are difficult to remove and therefore the need for total replacement of the water heater will be necessary. Some manufacturers recommend a small quantity of water be drained out of the valve at the bottom of the hot water tank to remove residue and sludge. This practice extends the life of the water heater; however, it is sometimes difficult to close the valve completely and can lead to failure of the valve. The pressure relief valve should be extended with piping to within of the floor as a safety precaution.

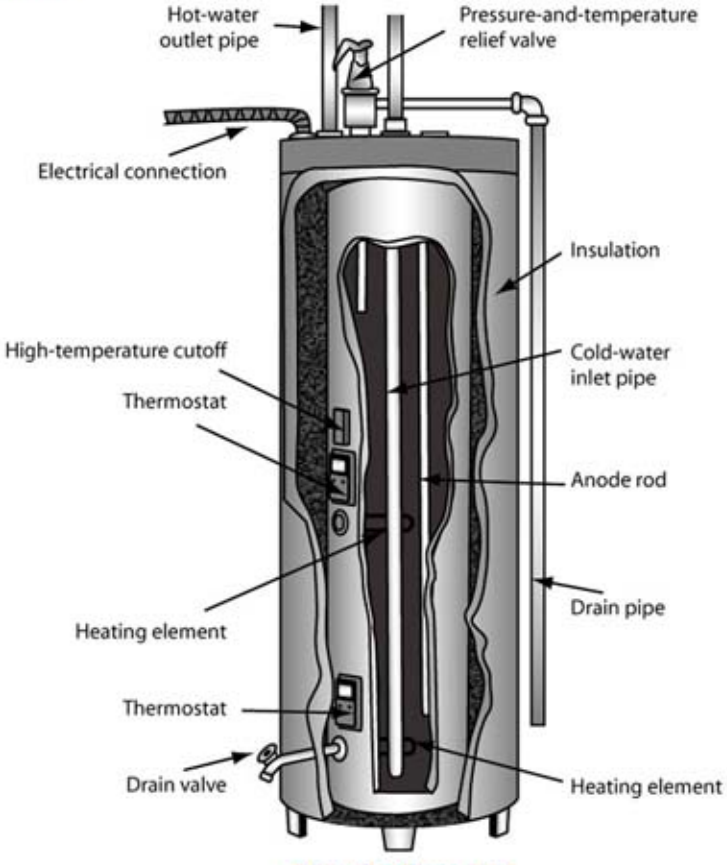
Types of Water Heaters



Oil Fired



Gas Fired



Electric Powered

POLYBUTYLENE PLUMBING PIPE

Polybutylene piping has been known to be defective at the junctions. Barbed brass or copper insert fittings with crimp ring joints are more dependable than the epoxy joints. It is vulnerable to chlorine in the water, causing deterioration. The insert fittings have been in use since 1986 and are still in use today. Most municipalities do not allow Polybutylene piping to be used, and there have been individual as well as class action lawsuits concerning this product.

This product is no longer manufactured in the United States. Shell Oil Company, who owns and manufactured the resins that were used in the production of PB has withdrawn the product from the market. Shell Oil is the major contributor to the 3.5 billion-dollar class action settlement involving PB piping. We recommend you verify the systems performance with a qualified plumber.

BATHROOMS

Fixtures

Water closets (toilets) typically have a very long life. If the water closet becomes loose, it should be properly re-secured to the waste line.

There is a wax seal between the waste line and the water closet that can deteriorate. When this occurs it should be properly replaced.

Sinks and vanities have long lives and require little maintenance, other than occasionally replacing faucet washers. Older sinks and vanities used metal traps, which rust out and will need replacing.

Tile

The ceramic tile surrounding bathing fixtures must be maintained. Loose bath tile or poor caulking and grouting can allow water to seep behind the tile, causing structural deterioration and damage to walls, ceilings and spaces below. If there is loose tile, it must be firmly affixed to the walls and grouted. The caulking around the tile and the tub is very important and must be maintained. If cracks develop the caulking should be replaced. Molded fiberglass tub and shower enclosures are easier to maintain than tile; however, caustic or abrasive cleaners should not be used on this material.

HEATING SYSTEM

All houses have some type of heating system. Some areas of the house, such as attics and basements, may not have heating and air conditioning. This is not unusual. If a house has had any addition or the attic or basement has been turned into living space, the heating in these areas is often found to be amateurish and added on to the original system.

If the heating capacity of the unit is low it is normally cost effective to adopt energy conservation techniques rather than attempting to increase the size and the capacity of the heating plant. Furthermore, applying energy conservation techniques is cost effective in both the heating and the cooling seasons.

Additions and Converted Space

Space heaters are often used in additions as well as in areas converted to living space. Space heaters are somewhat dangerous because they can tip over, particularly those that use kerosene. We do not recommend kerosene space heaters.

A good heating and cooling system for heating and cooling converted space or additions is a through-the-wall heat pump, which is efficient and relatively inexpensive to install. If the space is used only occasionally, such as a guest room, electric baseboard heaters may be cost effective. They are inexpensive to install, but are users of high-cost energy when in operation.

Fuels

Many types of fuels are used for heating plants. These include natural gas, liquid petroleum, oil, electricity, coal and wood. Electricity is the cleanest. Natural gas and liquid petroleum are relatively clean. Wood, coal and oil units require much more attention. Some heating plants can use several different types of fuel.

Zoning

Many larger homes are zoned so that different levels or areas of the house are heated with separate systems. Zoning is effective and energy efficient, particularly when the second floor bedroom area is occupied only during evening hours and the lower floor is occupied during other hours.

Occupants may program the heating and cooling for comfort during the time the areas are in use and for energy conservation at other times. If an older home does not currently have separate zones it can be quite expensive to have them installed.

Heating Plants

There are many different types and brands of heating systems. It is difficult to stay current on all of the brands. You should deal with the more common, well-established manufacturers.

Heat Pumps

The heat pump provides cooling in the summer and heating in the winter. You should not operate a heat pump in the cooling mode when the temperature is lower than 60 degrees F., or in the heating mode when the temperature is above 60 degrees F.

It is rare that a system will operate in one mode and not the other. A heat pump should be serviced at the beginning of the heating and cooling seasons by a qualified technician. Many owners prefer to obtain a service contract. The servicing should include checking the unit, cleaning the unit, oiling moving parts, checking freon levels, and making necessary adjustments.

In colder climates, a heat pump requires a backup heat source, usually an electric furnace. If you experience a power outage of more than a few minutes, consult the operator's manual before restarting, as cold starts can damage the unit.

Electric Baseboard Heaters

Electric resistance baseboard heat is quite expensive to operate but inexpensive to install or replace. A baseboard-heating unit is required in each room. If possible a separate thermostat should be installed in each room to conserve energy. Occasionally a heating element will burn out and require replacement.

Electric baseboard heaters can potentially be a potential fire hazard if located near combustible materials such as curtains or furniture due to their high operating temperature which can average 300 +/- degrees F.

Forced Hot Air Furnaces

Most hot air furnaces are fueled by lp, natural gas, oil, or electricity. Electric furnaces are the cleanest, but also the most expensive to operate. These furnaces require very little maintenance other than changing the filter and occasionally replacing a burned-out heating element. Forced air gas furnaces are quite efficient and are much more common than the oil furnace.

The heat exchanger in a gas or oil furnace is very difficult to inspect because it is encased inside the cabinet. If a hole develops in the heat exchanger the whole unit should be replaced. Our consultants attempt to examine the inside of the heat exchanger using mirrors and strong light sources. However, many surfaces cannot be examined. If there is an accumulation of rust flakes in the bottom of the heat exchanger, it is possible that there is a hole or a crack.

The unit should be checked by a qualified service technician. Maintenance of a gas forced air furnace is relatively easy, consisting primarily of cleaning the combustion compartment and flue annually. All forced air furnaces should be serviced annually by a technician.

Boilers

There are two principal types of boilers: steam and hot water. Steam boilers can be identified by the water sight glass installed on the side. When a steam boiler is in operation the water level should be visible in the sight glass. Some steam systems have an automatic feed to keep water in the boiler, while others require manually opening a valve to add water to the boiler.

This needs to be done approximately once a week. Both steam and hot water boilers should be serviced annually by a technician. Some water boilers use gravity for circulation. These systems have a slower response to the demand for heat.

It is possible to convert a gravity system to a forced system by installing a circulating pump. The circulating pump forces water through the system and makes the delivery of heat much more responsive. The circulating pumps should be oiled twice during the heating season.

DISTRIBUTION

Steam and Hot Water Systems

The distribution of heat in a steam or hot water system is normally through pipes to radiators or convectors. Baseboard radiators sometime run on a continuous loop. The water is much hotter in the radiator at the beginning of the loop than it is at the end of the loop. This temperature difference is normally compensated for by the size of the radiator. Conventional radiators need to be bled occasionally; this is done by loosening the air valve with the special radiator key.

The valve is opened to allow air to escape. When water starts flowing from the valve the radiator is full. Regulator valves on radiators frequently stick and should be exercised monthly during the heating season to make sure that they are free. Some radiator valves have only off/on positions, while others allow you to attempt adjusting the flow of heat to the radiator.

Hot Air Systems

Forced air distribution systems have both supply and return ducts. The best supply duct system has the option of a high-low delivery. This system has two registers on each duct, one near the ceiling and one near the floor. The ceiling duct is used in the summer for the delivery of cold air, while the lower register is used in the winter for delivery of warm air. Register doors can be set to assist in regulating the delivery of heat to different rooms.

Some duct systems have dampers. Dampers are normally found on the duct near the heating plant. Dampers can be adjusted to regulate the flow of air to the various rooms or areas of the house. Proper adjustment of dampers can only be achieved through experimentation. Some systems have return registers in each room; this is the preferred arrangement. Most systems have a central return, normally located in the upper and lower hallways.

With the central return system it is important that there be a space beneath the doors to the various rooms of at least 1/2 to 3/4 inch to allow the air to flow back to the return registers. The return air ducts must be left open at all times and never be covered or blocked. Ductwork that runs through attics, crawlspaces and other unheated or uncooled portions of the house should have insulation. Ductwork should be sealed with tape or insulation to prevent leakage of heated or cooled air.

OTHER EQUIPMENT

Humidifiers

Forced hot air is a very dry heat and it may be desirable to add moisture to it. This is normally done with humidifiers. Locating a humidifier directly over a furnace heat exchanger is not desirable. If the humidifier is not kept clean or if it leaks, water can flow onto the heat exchanger and cause a hole to develop, requiring replacement of the furnace.

We prefer to see humidifiers located on the ductwork and away from the heat plant. We also prefer the evaporator type humidifier to the spray type, because the evaporator type is more easily maintained. The spray nozzles frequently become clogged. All humidifiers require monthly maintenance during the heating season. Humidifiers are typically among the most neglected items in a house.

Filters

Forced air systems should have filters. The filters are normally located in the heating plant; however, some systems have filters behind the return air register. The most common type of filter is disposable fiberglass. The metal permanent filters may be washed and are effective. The filters should be inspected monthly. If a filter is dirty, it should be changed or cleaned.

Failure to maintain your filters can cause clogging of air conditioner coils, increase energy consumption, as well as restricting the air flow through the building. Electro-static air cleaners are very effective but will require monthly maintenance. You should consult your owner's manual for the proper cleaning procedures.

Oil Tank

An oil system has an oil storage tank. Buried tanks of course are not visible and cannot be inspected. Their life expectancy is quite long. If the oil tank starts to leak, it will require replacement. We recommend that an oil heating system be maintained on a service and fuel contract with the oil company.

The oil company will adjust its delivery schedule based on the severity of the weather, as measured by degree-days. This procedure ensures that you do not run out of oil.

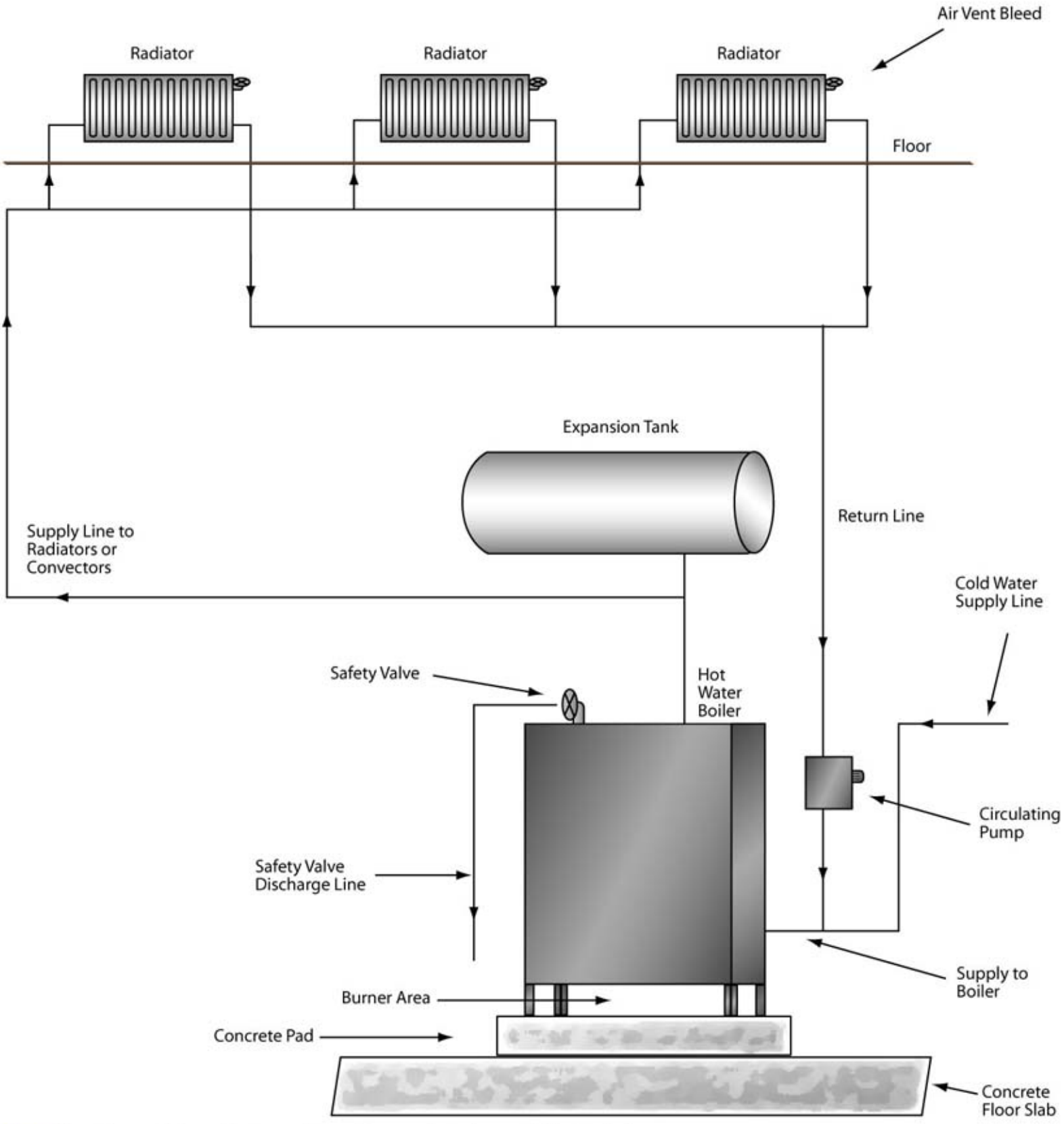
Thermostats

Thermostats are used with nearly all heating systems. There are many different types. Some simply turn the furnace on and off based on the temperature registered on a thermometer, while others have a setback feature. We prefer setback thermostats, which automatically reduce their thermostat setting during periods when the house is routinely vacant or persons are sleeping. They can be programmed to turn the heat on automatically before people arrive home or get up in the morning, to ensure comfort of the occupants.

A set-back thermostat should not be used with a heat pump, unless it is one of the modern microprocessor regulated types that will prevent the more expensive backup resistance heating from coming on when the thermostat is advanced by several degrees. Cooling thermostats are frequently located on the upper floors, which are harder to cool, while the heating thermostat is located on the lower floor, which is more difficult to heat. It is almost impossible to provide a consistent temperature throughout the house.

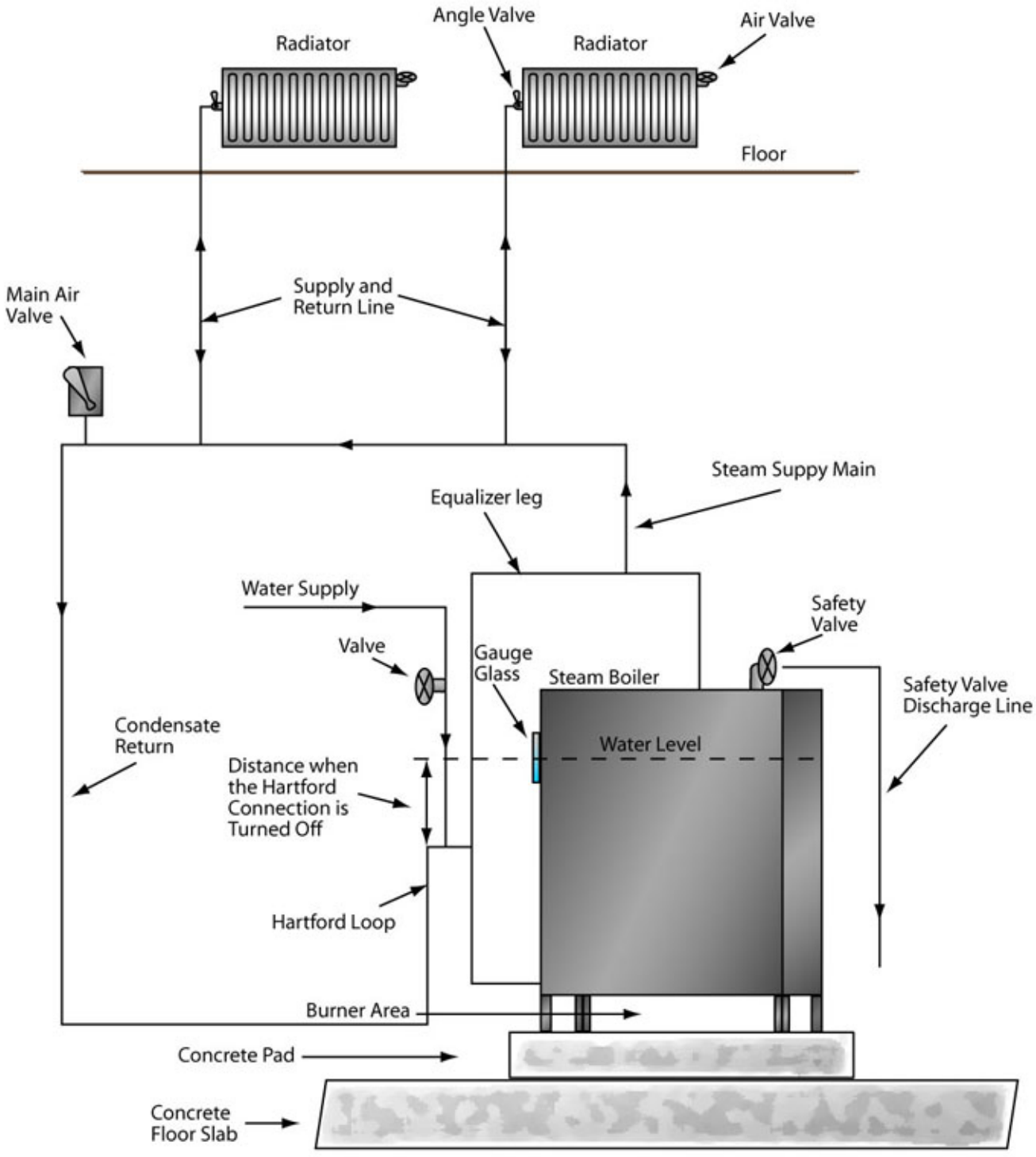
It is not unusual for the temperature to vary from 5-10 degrees F. between rooms. Attempts should be made to regulate the heat flow by using the radiator valve on water systems and dampers and register doors on forced air systems. A room may be colder or warmer depending upon its location in the building and distance from the heating plant, or the amount of glass exposed to the exterior. Wind velocity and direction can also have an effect on the temperature in the various rooms.

Schematic of Two-Pipe Hot Water System



Note: Expansion tank is used for expansion and contraction of water. With the rise in temperature, water will expand and additional volume will flow into the expansion tank.

Schematic of One-Pipe Steam System



Note: The hartford loop prevents too much loss of water from the boiler in case of a failure in the return line.

COOLING SYSTEM

Window Units

Many older homes are cooled with window air conditioners. These units are normally effective for only one room. These air conditioners use either 110/120 or 220/240-volt power. Each window air conditioner should be on a separate circuit, as they use a great deal of power. In many homes, however, there are not enough circuits to provide separate electrical outlets for as many air conditioners as are desired.

When using a window air conditioning unit do not plug other appliances that use a large quantity of electricity such as hair dryers, microwave oven, etc. into the same circuits. Window air conditioning units should be serviced every two or three years. Filters should be cleaned monthly. Window air conditioning units should be removed from the window during the winter to conserve energy. The winter months are the best time to have the units serviced. It is important that window air conditioning units be positioned so that they slope toward the exterior of the building to allow the condensation to flow outside.

Central Systems

Central air conditioning units use either gas or electricity. Electric units are by far the most common. Gas units are more complex and are very expensive to maintain. It is difficult to find a qualified service man. If a gas unit should fail, consider replacing it with an electric unit. Such a change may require major modifications to the heating/air conditioning system, and possible upgrading of the electric service. The best delivery of cooled air to a room is from the ceiling level; however, ceiling registers are rarely provided in modern construction. Older systems often have two registers in each room. The register near the ceiling should be used for the delivery of cooled air and the lower register for warm air.

In most houses, uniform distribution of cooled air is difficult to achieve and you can expect a large temperature difference between rooms. Because heat rises, the upper floors are more difficult to cool. Air conditioning systems should be serviced annually at the beginning of the season. If the power goes off for more than a few minutes, consult the operator's manual for restart procedures.

Air conditioning systems should not be turned on, nor can they be tested when the temperature is lower than 60 degrees F. If an air conditioner is turned on at temperatures lower than 60 degrees F you will probably damage the unit.

Retrofitting

Installing a central air conditioning system or heat pump in an older home constructed without one can be very expensive. This is particularly true if you do not have an existing forced air heating system and are required to run ductwork to all of the rooms. Consider a two-zone system. One zone would have the ductwork located in the attic and deliver air to the upper floor. The other would have the duct work in the basement and service the lower floor. An advantage of this type of system is that you can program each zone to operate only during periods when the area it serves is occupied. When retrofitting a house with air conditioning, you may choose not to air condition the basement, as it is normally a cooler portion of the house.

Condensate

Air conditioning systems remove moisture from the air in the form of condensation. This condensation must be carried away from the air-handling unit by a condensate line and, if needed, a condensate pump. Condensate pumps are normally located near the air conditioning unit. If the pump fails it is not expensive to replace. An air conditioning unit located in the attic must have a pan beneath it to catch the overflow condensation in the event the internal system fails. This pan should have a condensate line, which will allow the condensation to drain from the building.

KITCHEN AND APPLIANCES

Kitchen

Cabinets are available in a variety of materials. The older metal cabinets are durable and can be repainted. Wooden cabinets come in different quality levels, which include solid wood and an economy line manufactured of particleboard covered with a veneer. The solid wood cabinets are much more durable and have a longer life. Both types of cabinets require maintenance and cleaning. Cabinets which contain plastic drawers are inexpensive and do not have a long life. All wood cabinets need a periodic application of furniture polish.

Counters are normally plastic laminate (formica). Some older countertops are covered with tiling, which is not recommended. Abuse of countertops, such as failing to use a cutting board, setting down a hot cooking vessel or allowing water to stand on a countertop can lead to damage or deterioration. It is nearly impossible to repair a damaged countertop. The only solution is to replace it.

Ceramic tiling has a tendency to come loose and is difficult to maintain. When ceramic tile has deteriorated, we suggest that it be replaced with plastic laminate. Several different materials are available for kitchen floor coverings. The newer products, commonly called no-wax vinyl are recommended and are quite easily maintained. Flooring such as asphalt and vinyl tile has a tendency to deteriorate, particularly if water is allowed to attack the tile adhesive. The cooking facilities may be either gas or electric.

Older gas ranges have long lives and are usually replaced for cosmetic reasons. It is important that the pilot lights be kept properly adjusted and that the tubes running from the pilot lights to the burners be routinely cleaned. Electric ranges have a life expectancy of 15 to 20 years. The timing mechanisms on these units frequently do not work and should not be trusted.

The thermostats in ovens are frequently inaccurate and a separate thermometer should be used. We do not calibrate or check thermometers in any of the cooking appliances. Self-cleaning ovens are very convenient but do use a large amount of energy. The electrical heating elements for ranges and ovens occasionally burn out but are easy to replace.

Refrigerators do not always convey with the property. Today nearly all are electric, but there are still a few older gas refrigerators. The newer refrigerators are much more energy efficient than older models. Proper ventilation should be allowed for a refrigerator around the back and sides.

The refrigerator coil should be cleaned periodically as dust, pet hair and other debris can shorten its life. The gasket on the refrigerator door should be kept clean to allow proper sealing. Refrigerators will normally last 15-20 years.

Dishwashers are found in many kitchens. They have a life expectancy of 5 to l0 years. The dishwasher should discharge into a garbage disposal. There is an air gap installed on the discharge line, with the outlet typically on top of the sink next to the faucet. If water is flowing out of this air gap, there is a blockage in the system. Many dishwashers have a feature that allows you to turn the drying vent off as an energy conservation measure. The screens located in the base of the dishwasher need to be cleaned occasionally.

Most kitchens built or remodeled today have a garbage disposal. Garbage disposals are not recommended in a house with a septic system. Garbage disposals on stainless steel sinks are quite noisy and little can be done to eliminate the noise. Most garbage disposals have a reset switch and a wrench for freeing the unit if it should become clogged. If you cannot locate the wrench that was supplied with the unit, it is sometimes possible to free the blades by using a stick, such as a broomstick. Your hand should never be placed in the disposal.

Stainless steel sinks are very easy to maintain. The older porcelain sinks may chip, crack, and become discolored. When a porcelain sink starts to deteriorate, we recommend that you replace it with a stainless steel unit.

Washers and Dryers

Washers and dryers have a life expectancy of 8 to 12 years. High quality appliances may have longer lives. The dryers can be either gas or electric. A gas dryer must be vented to the exterior to prevent the moisture associated with this appliance from accumulating in the property. All dryers should be vented to the exterior to reduce the amount of moisture in the property. Diverters on dryer vent lines are not a good idea.

Laundry Tub

Concrete laundry tubs, found in older houses, are not used in modern construction. These tubs have a tendency to crack and leak. The cracks can be repaired, but we suggest concrete tubs be replaced with the lighter and smaller fiberglass tubs.

Typical Power Requirements of Home Appliances

Appliance	Wattage	Minimum Circuit Amps
Air Conditioner (Room)	800-2,500	15-30
Air Conditioner (Central)	2,500-6,000	30-40
Attic Fan	400	15
Blender	500-1,000	15
Clothes Dryer (Electric)	4,000-6,000	30
Clothes Washer	500-800	15
Coffee Maker	500-1,000	20
Dishwasher	1,000-1,800	20
Fan, Portable	50-200	15
Freezer	300-500	15
Furnace (Gas or Oil)	300-1,000	15
Furnace (Electric)	9,000-19,000	50-100
Garbage Disposal	450-900	20
Hair Dryer	600-1,000	15
Heater (Waterbed)	800	15
Heater (Portable)	1,000-1,500	15
Humidifier	450	15
Iron	1,000	15
Lamp (Each Bulb)	25-250	15
Oven, Microwave	500-1,000	15
Over, Radiant (Separate)	4,000-5,000	30
Radio	4-50	15
Range Top (Separate)	4,000-8,000	30-40
Range (Electric)	8,000-14,000	50-70
Refrigerator	400-1,000	15
Shaver	10	15
Stereo	50-300	15
Sump Pump	300	15
Television	300	15
Toaster	1,200	15
Vacuum Cleaner	250-1,200	15
Water Heater (Electric)	4,500	30

SURFACE WATER CONTROL SYSTEM

Surface Water Control

Surface water is very often (approximately 90-95% of the time) the cause of water seepage into the basement. If water seeps into the basement only during periods of rain, it is likely that this situation can be corrected by good surface water control. Good surface water control comes from two basic systems: roof water control and grading. Waterproofing companies who install French drains and sump pumps, parge walls, utilize water resistant paints, and attempt various other methods of sealing the basement walls are treating the symptom rather than the problem.

Our approach is to first ensure that there is good roof and surface water control. If good roof and surface water control does not correct the problem, it is possible that a system for removing water from the basement, such as a French drain or a sump pump, may be Necessary. The need for French drains and sump pumps can only be determined after good roof and surface water control has been achieved and the system has been tested during heavy rain. Many of the houses we inspect require work on the surface water control system; very few require anything more in order to achieve a dry basement .

If after our recommendations have been accomplished the basement continues to leak, call us for additional advice. In a townhouse development or in areas of high-density living units it is frequently a neighbor's surface or roof water control that is contributing to your wet basement. Sometimes these are difficult situations to resolve, as the owner of the neighboring property may be unwilling to do the required work.

Gutters and Downspouts

Gutters and downspouts are used to dispose of precipitation with minimum adverse effects on the house and yard. Gutters and downspouts are manufactured in many different materials, such as aluminum, vinyl, galvanized metal, and wood. Styles vary considerably. Some houses have an internal roof water control system.

In most cases the gutters are attached to a fascia board and suspended under the edge of the roof covering. It is important that the gutters be properly aligned so that the water flows easily toward the downspout. Proper alignment can be achieved with a very slight drop running from either the center or the end of the gutter to the downspouts. A good test of gutter alignment is to pour a small quantity of water into the gutter to see if it all flows out through the downspout. It is also very important that the gutters be kept clean. This is particularly true in the fall when the foliage is falling from the trees. In some areas mesh gutter guards are desirable.

We do not recommend gutter guards unless there is heavy foliage. Some material gets through even the mesh of the gutter guard, and it is then necessary to remove the guards in order to clean the gutter. As a minimum, gutters should be checked twice a year. During the winter, ice often builds up on the gutters and pulls them loose and out of alignment. This condition of course has to be corrected. Some gutter systems need to be maintained by painting. The painting should include the interior as well as the exterior. Of course, you cannot paint the inside of a downspout. Most roofing materials should overhang the gutters by 1". Where there is a valley in the roof, the water coming down the valley may reach such a velocity that it overshoots the gutter.

The most common solution to this problem is installation of a guard to deflect the water into the gutter. The downspouts should be located on the downhill side of the house wherever possible. This location prevents water from being concentrated on the uphill side of the house and allowed to run along the foundation. Underground drains are very desirable. In older houses, these drains lead into storm sewage systems.

Most jurisdictions no longer allow the sewage system to be used for disposal of precipitation in new construction. The use of solid flexible black tubing buried 8-12" below grade to a point well downhill from the house is best. The tubing should come to the surface for the discharge of the water. The Underground drains should be checked occasionally by running water through them from a garden hose, to ensure that they are flowing easily and do not back up. If the underground drain backs up it will need to be cleaned.

Grading

Good grading consists of nothing more than removing porous surface material such as sand, sod, mulch, gravel, or top soil and then compacting clean clay type fill din against the foundation wall so that water will flow away from the foundation. The soil in this area should be sloped at 1-3" per foot for 6-8 feet away from the foundation. Once you have achieved this grade, porous material may be returned to the surface. If the surface is a concrete slab, such as a patio, sidewalk, or a driveway, it is important that this surface also slope away from the house.

Caulking between the foundation and the concrete or asphalt slab must be maintained. When grading you may find voids underneath concrete slabs, front steps, air conditioning slabs, etc.; these should be filled. In some instances, grading may raise the soil level above the sill of windows near the ground; in these cases installation of window wells is necessary. Window wells can be made of many different materials; the most common are corrugated metal and masonry. Window wells can be installed around any window to permit grading to the proper slope.

Do not grade within 8" of any wood. Remember that a house constructed with facing brick has wood members such as sill plates and studs directly behind the facing brick. If you grade against the facing brick above the wood members, you are setting up an ideal situation for termites and/or decay. It is sometimes necessary to construct swales around the property to achieve proper grading, particularly if there is a slope towards the house from a nearby hill. A swale is nothing more than a shallow ditch used to route water around the property.

Do not install planters, flower gardens, fencing, sheds, or other items in these swales, as these obstructions will cause water to pond. Any ponding near the house should be eliminated by using swales. Resist the temptation to install improperly drained planters around the house; these planters will accumulate water and hold it against the foundation. If you do this, the likelihood of water seeping into the basement or crawlspace is increased.

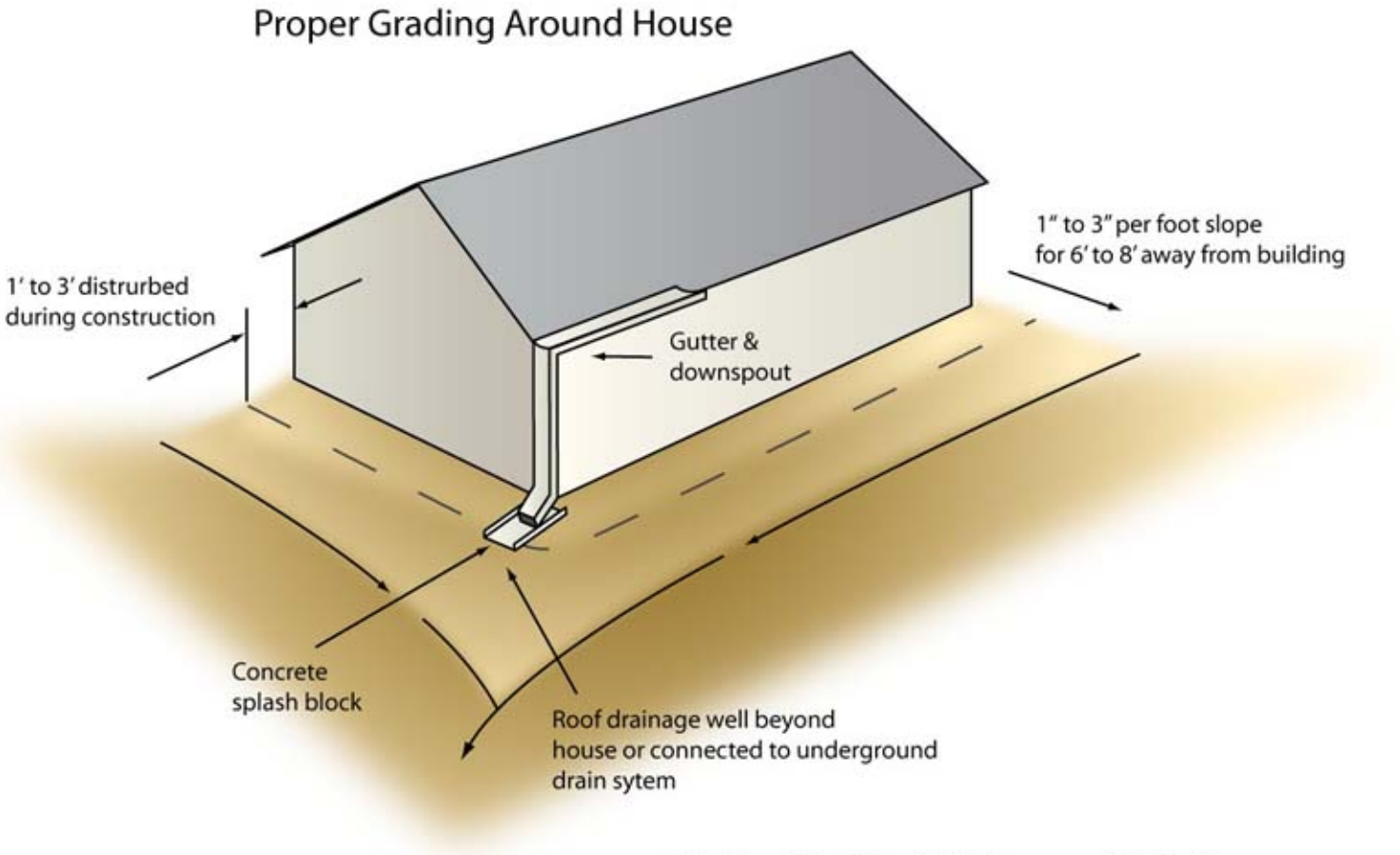
Sump Pumps and French Drains

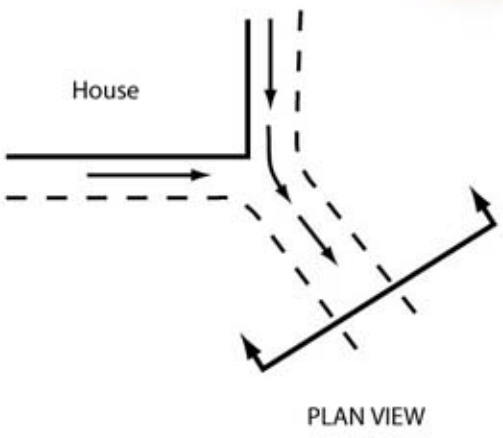
In some rare cases a high water table, underground sources of water, or a spring will require the installation of a French drain system (drains under the basement floor along the foundation) and a sump pump to maintain a dry basement. A sump pump alone, without under floor drains to carry water to the sump, will do little good.

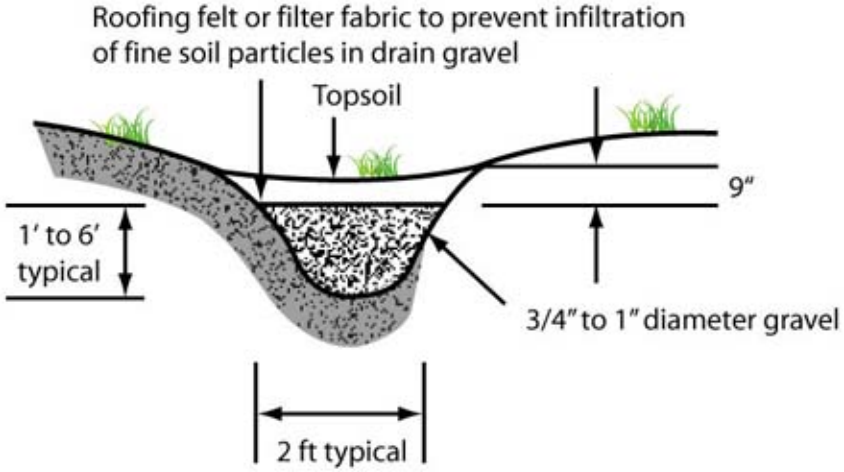
Do not install a French drain or a sump pump until you have discussed the situation with our consultant. In some areas, French drains and sump pumps are required by local building codes.

Grading

Good grading consists of first removing the porous material (sand, sod, mulch, gravel or topsoil) from the surface; then compacting 2 to 4 inches of clean, clay-type filldirt against the foundation wall. Achieve a grade with a slope of 1 to 3 inches per foot for 6 to 8 feet away from the property, so that water cannot collect on or near the foundation wall, create hydrostatic pressure, or seep into the lower living space. Once the correct grade has been achieved, the porous material may be returned to the surface. When grading, be sure that you fill any existing voids in the area.

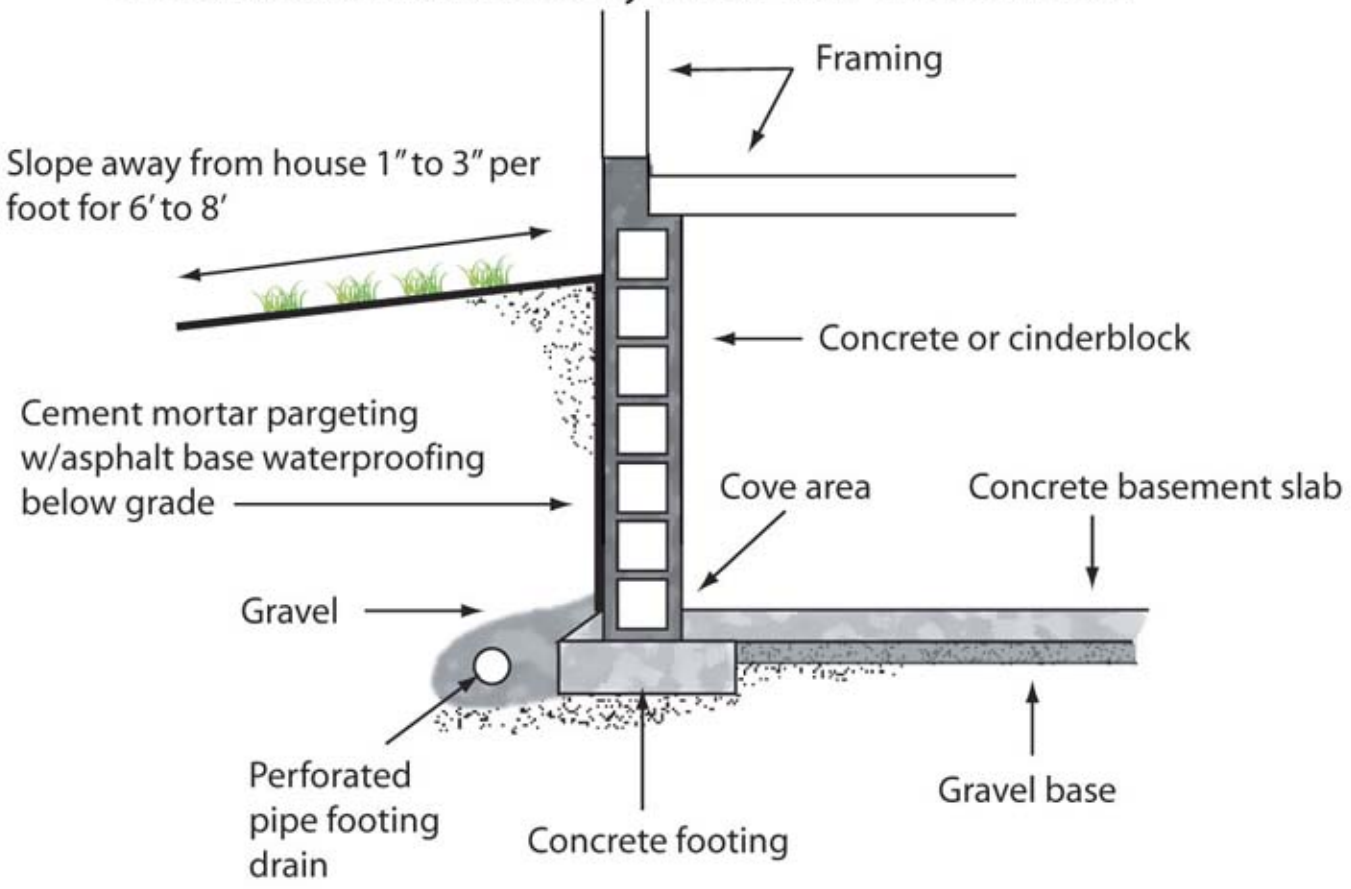




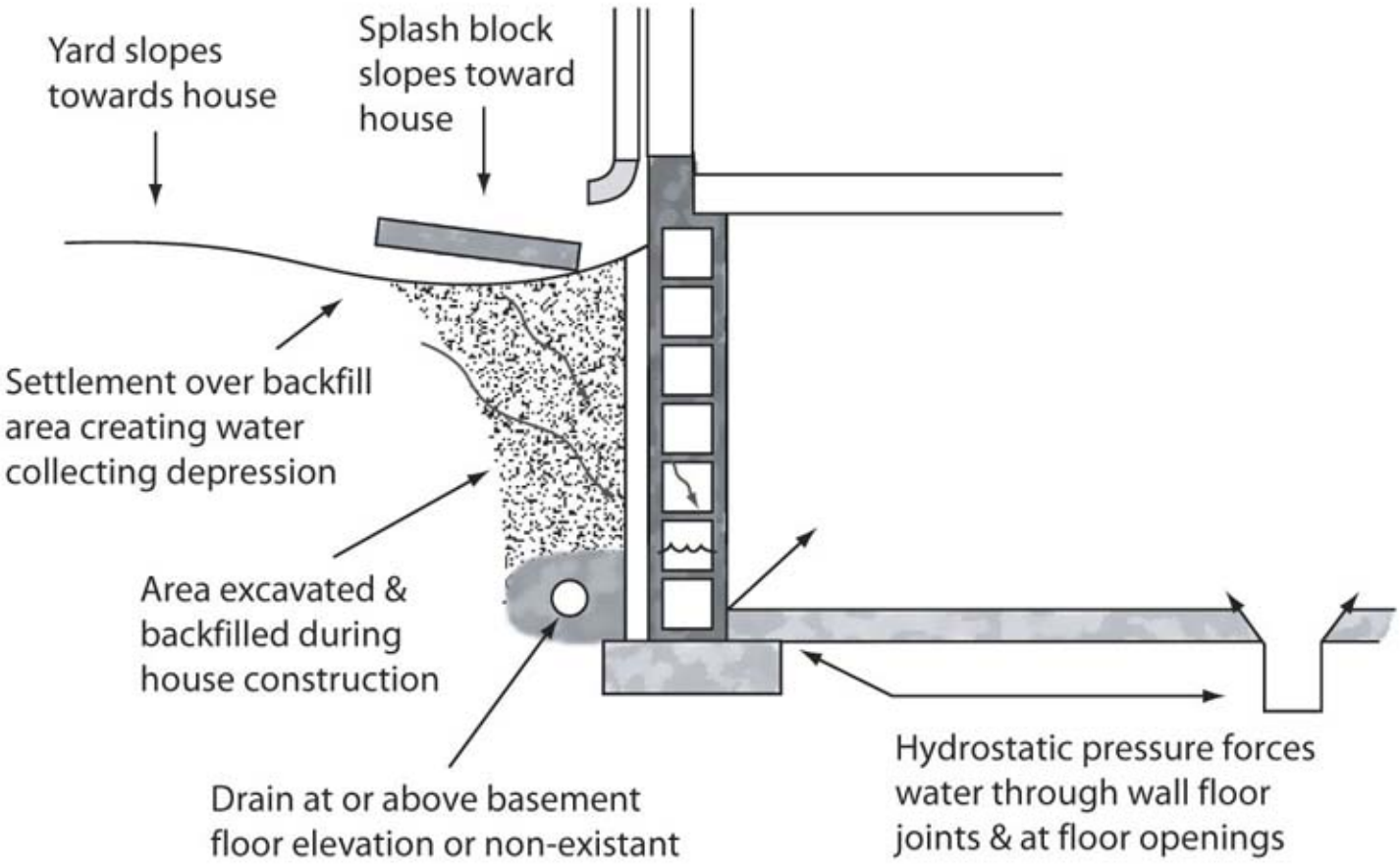


Typical French Drain (used in lieu of pipe)

Good Residential Masonry Block Wall Construction



Common Faults Contributing to Seepage in to Basement or Crawlspace



WASTE

Waste System

Like water supply systems, waste systems can be either public or private. A public system is normally not a concern for the homeowner. Private systems consist of cesspools or septic tanks that have many different designs. The life expectancy of a septic system is difficult to predict because it depends on size, quality of installation, and soils. The septic system should be checked prior to settlement by a septic firm. Septic systems need to be cleaned periodically by pumping. You should not allow non-biodegradable substances, such as grease, to be deposited into the system. A garbage disposal should not be used on a septic system.

Waste systems use a variety of different types of piping such as copper, PVC, cast iron, galvanized, and lead. Lead lines in the waste system are normally not a health problem. It is difficult to find a plumber capable of repairing lead pipes, and they should be changed in the course of renovation. The life expectancy of waste systems is normally long. There should be a clean-out access for the waste system. It is normally located in the basement or crawlspace.

Orangeberg piping, which has a paper base, was used in the early 1950's in a number of developments. This piping is fragile and subject to failure, requiring expensive replacement. It is impossible for us to determine if a property has Orangeberg piping. If the main waste lines leave the building above basement floor level and you desire to install a laundry, bathroom or powder room in the basement, it will be necessary to install a lift pump. Laundries frequently use a small lift pump located underneath the laundry tub.

Septic System Maintenance at a Glance

DO's

- Conserve water
- Pump tank regularly (every 3 to 5 years)
- Inspect system each time tank is pumped
- Direct gutters and downspouts away from drain field
- Maintain a healthy grass cover over the drain field

DON'Ts

- Allow backwash water from water softener or other water treatment devices to enter septic system
- Use biological or chemical additives in septic tank
- Scrub or disinfect tank
- Drive, plant trees, pile snow, or build anything over the drain field
- Use a septic system for the disposal of anything besides toilet wastes and the water used for bathing, laundry, and dishwashing

Common Sense Waste Disposal Practices

Septic systems are designed for the disposal of human bodily wastes and the water used for laundry, dishwashing, and bathing. Disposal, through household plumbing, of items that are not readily degradable fills the septic tank rapidly. This increases the chances that the drain field will clog and fail. Precautions should be taken in everyday use of the system. Remember that everything that goes down the drain or is flushed down the toilet goes to the septic system. The following substances should NOT be disposed of in household plumbing:

- bulky wastes
- cigarette butts
- dental floss
- fat, grease, or oil
- household hazardous wastes
- plastics
- tampons
- cat-box litter
- coffee grounds
- disposable diapers
- facial tissues
- paper towels
- sanitary napkins

PREVENTIVE MAINTENANCE

I. **FOUNDATION & MASONRY:** To prevent seepage and condensation.

a. Check basement for dampness and leakage after wet weather. (Periodically)

b. Check foundation walls, steps, retaining walls, walks, patios, driveways, garage floors, etc., for cracks, heaving, crumbling. (Fall)

c. Check chimneys for deteriorated chimney caps, loose and missing mortar. (Spring and Fall)

d. Maintain grading sloped away from foundation walls. (Annually)

II. **ROOFS & GUTTERS:** To prevent roof leaks, condensation, seepage and decay

a. Check for damaged, loose, blistered or missing shingles. (Spring and Fall)

b. Check for leaking, misaligned or damaged gutters and downspouts. Clean gutters, leaders, strainers, window wells, drains. Be sure downspouts direct water away from foundation. (Spring and Fall)

c. Cut back tree limbs touching or near roof surface. (Fall)

d. Check antenna supports for sturdiness and possible source of leakage. (Annually)

e. Check flashings around roof stacks, vents, skylights, and chimneys for leaks. (Spring and Fall)

f. Check vents, louvers, and chimneys for bird nests, squirrels or insects.
(Spring and Fall)

g. Check fascia and soffits for paint deterioration, leakage, and decay. (Spring)

III. **EXTERIOR WALLS:** To prevent paint failure, decay, and moisture penetration problems.

a. Check painted surface for deterioration. (Spring)

b. Check exterior wood siding and trim for damage, looseness, warping, and decay. (Periodically)

c. Check exterior masonry walls for cracks, looseness, missing or broken mortar. (Spring)

d. Cut back and trim shrubbery touching exterior walls. (Spring and Fall)

IV. **DOORS & WINDOWS:** To prevent air and/or weather penetration problems.

a. Check caulking for decay around doors, windows, corner boards, and joints. (Fall)

b. Check glazing putty on windows. (Fall)

c. Check weather-stripping. (Fall)

V. **ELECTRICAL:** For safe electrical performance.

a. Trip circuit breakers every six months.

b. Check ground fault circuit interrupters (GFCI). (Monthly)

c. Label each circuit in main panel. (When needed)

d. Check condition of lamp cords and extension cords. Replace at first sign of wear.(Periodically)

e. Check visible wiring and cable for wear or damage. (Annually)

f. If fuses blow or breakers trip frequently have a licensed electrician inspect system. (Periodically)

g. If you experience slight tingling shock from handling or touching any appliance, disconnect the appliance and have it repaired. If lights flicker or dim, or if appliances go on and off unexpectedly, call a licensed electrician. (Periodically)

VI. **PLUMBING:** To prevent leaks.

a. Check faucets, hose bibbs, and valves for leakage. (Periodically)

b. Drain exterior water lines, hose bibbs, sprinklers, and pool equipment. (Fall)

c. Check for leaks at traps and sewer cleanouts. (Periodically)

d. Draw off sediment in water heaters monthly or per manufacturer's instructions. (Periodically)

e. Have septic tank cleaned every two years.

f. Have well water tested annually for contamination.

VII. **HEATING & COOLING:** For comfort, efficiency, energy conservation, and safety.

a. Change or clean furnace filters, air conditioning filters, electronic filters as needed. (Monthly)

b. Inspect and service humidifier. (Monthly)

c. Service oil burning equipment. (Annually)

d. Clean around heating and cooling equipment, removing leaves, dust, overgrown shrubbery, debris. Be sure power is off! (Periodically)

e. Service gas burning equipment every other year. (Fall)

f. Service heat pump annually. (Fall)

g. Service electric furnace every other year. (Fall)

h. Service air conditioning annually. (Spring)

VIII. **INTERIOR:** General house maintenance.

a. Check bathroom tile joints, tub grouting and caulking. Be sure all tile joints in bathrooms are kept well sealed with tile grout to prevent damage to walls, floors, and ceilings below. (Periodically)

b. Water lines and drains exposed to the weather should be checked for wrapping with insulation. (Fall)

c. Check underside of roof for water stains, leaks, dampness, and condensation. (Fall)

d. Keep attic louvers and vents open all year round. Check louver screening. (Fall)

IX. **Know the location of:**

a. The main water shut off valve.

b. The main electrical disconnect or breaker.

c. The main emergency shut-off switch for the heating system.

d. Waste cleanout.

Cleaning Spills from Carpets

Removal Chart
Perform steps in order (1,2,3, etc.) until removal is satisfactory

	1	2	3	4	5	6	7	8
Acids	R	A	C	W	T			
Alcoholic Beverages	R	C	V	T				
Ammonia or Alkali		R	V	C	W	T		
Animal Urine		R	W	V	C	W	T	
Ball Point Pen	X	D						
Beer	R	C	V	T				
Bleach	R	C	V	T				
Blood		R	W	C	A	V	T	
Butter		R	D	C	W	T		
Candle Wax		R	D					
Candy	R	C	V	W	T			
Catsup	R	C	W	T				
Chewing Gum	R	D						
Chocolate		R	C	V	Z	D		
Cocktails		R	C	W	T	Z	D	
Coffee		R	C	V	T	D		
Cosmetics		R	D	C	A	V	T	
Cough Syrup		R	C	W	T			
Dye (Water)		R	C	A	V	T	P	
Egg	R	C	A	V	T			
Fruit	R	C	A	V	T			
Fruit Juices		R	C	A	V	W	T	
Furniture Polish		R	X	D	C	A	V	T
Glue (Water)		R	C	A	V	T		
Gravy		R	C	Z	D			
Grease	R	D						
Household Cement (Solvent)	R	X	D					
Ice Cream		R	C	A	V	T	Z	D
Inks (Water)		R	C	W	T	Z	P	
Inks (Solvent)	R	D	X	D	P			
Lipstick		R	D	C	A	V	T	P
Margarine		R	D	C	W	T		
Milk	R	C	A	V	W	T	D	
Merthiolate		R	X	D	C	T		
Mud, Dirt, Clay	R	C						
Mustard		R	C	V	T	Z	D	
Nail Polish		R	D	X	D	P		
Oils	R	D	C	A	V	T		
Paint (Water base, wet)		R	C	W	T			
Paint (Dried)		R	X	D	C			
Perfume		R	D	C	V	T		
Rust	P							
Sauces, Salad Dressing		R	D	C	V	T	C	D
Shoe Polish		R	X	D	C	A	V	T
Soft Drinks		R	C	A	V	T		
Syrup		R	C	V	T			
Tar	D							
Tea	R	C	V	T	D			
Unknown Stains		R	C	Z	D	P		
Vomit	R	C	A	V	T	Z	D	
Watercolors		R	D	A	V	W	T	
Wine	R	V	C	T				

Explanation of Cleaning Code:

A – Ammonia Solution (1 tablespoon household ammonia to 1 cup of water) – blot

C – Carpet Shampoo Solution. Dilute according to directions on the label.

D – Dry Cleaning Fluid

P – Call professional rug cleaner for advice

R – Remove excess material (liquids – absorb into clean white cloth or tissue;
solids – scrape lightly;
powders – vacuum, do not moisten)

T – Place ½" layer of white, absorbent material or tissues over damp area under weight for several hours.

V – White Vinegar Solution (1 tablespoon to a cup of lukewarm water) – blot.

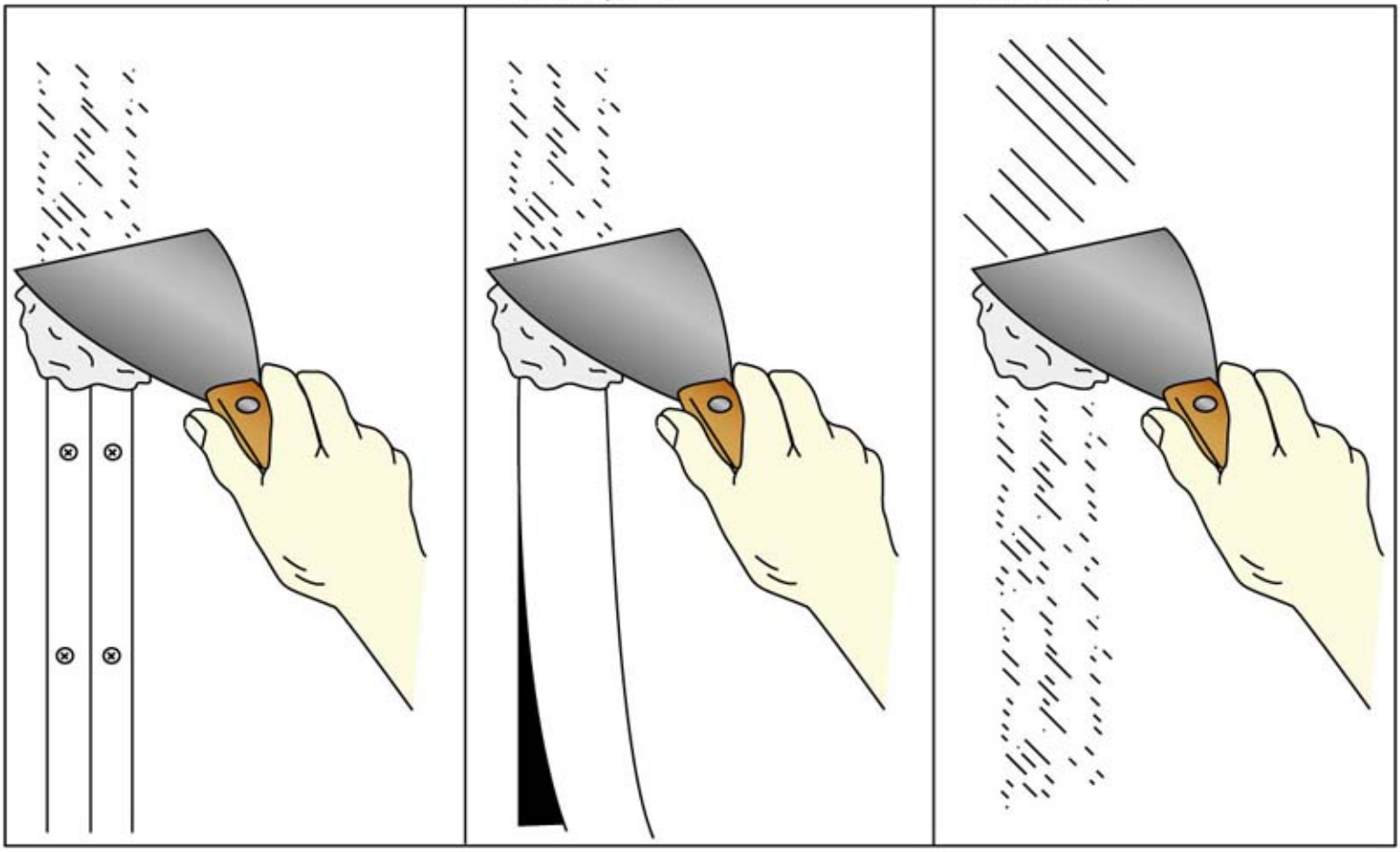
W – Rinse with plain water – blot.

X – Paint, Oil, Grease Remover

Z – Allow carpet to dry.

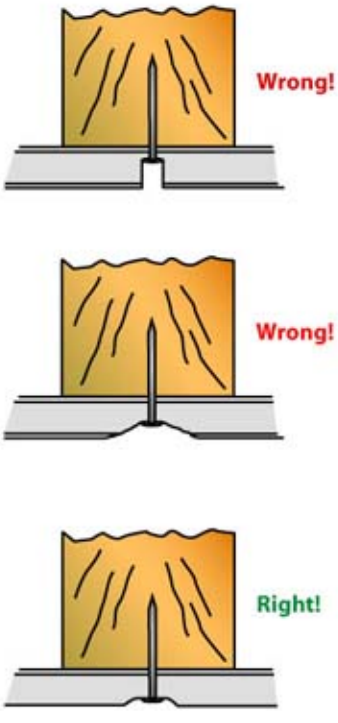
Sealing Wallboard Seams

1. Spread compound over seam
2. Press tape on and smooth with compound
3. Apply compound to level surface and hide tape

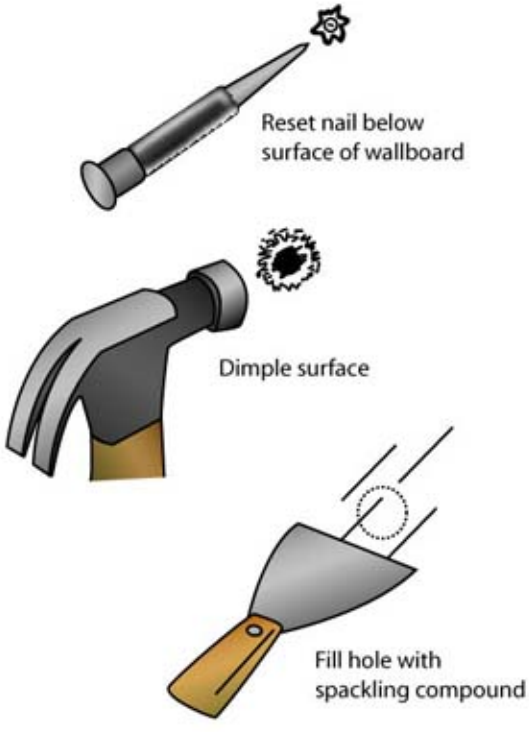


Repairing Wallboard

Recessing a Nail into Wallboard

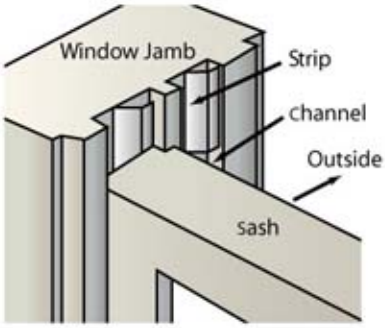


Resetting loose nails in Drywall

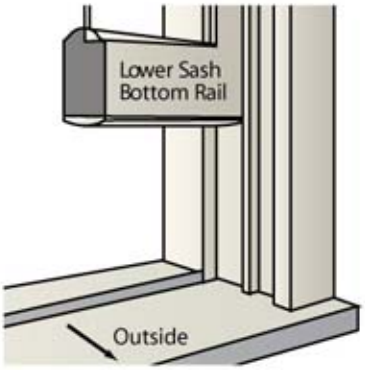


How to Weatherstrip Your Windows

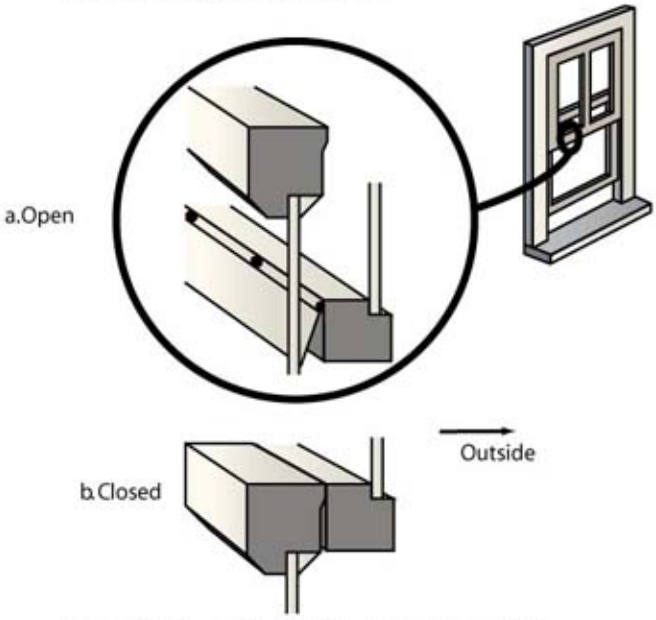
Thin Spring Metal



A Install by moving sash to the open position and sliding strip in between the sash and the channel. Tack in place into the casing. Do not cover the pulleys in the upper channels.

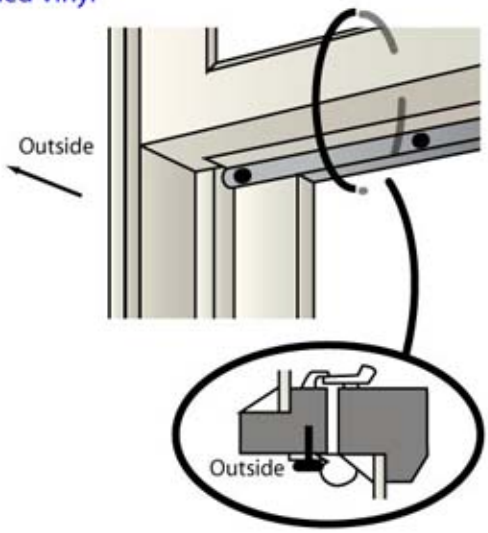


B Install strips the full width of the sash on the bottom of the lower sash bottom rail and the top of the upper sash top rail.



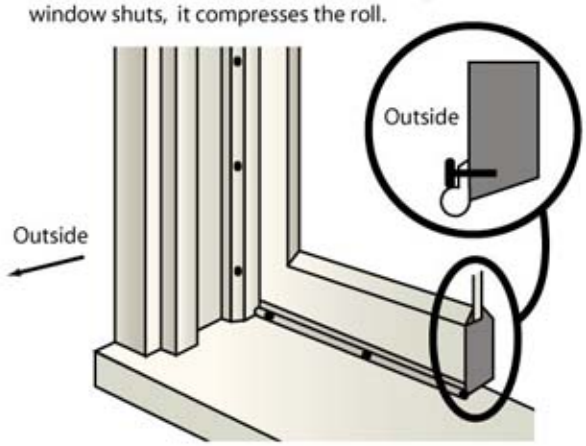
C Then attach a strip the full width of the window to the upper sash bottom rail. countersink the nails sightly so they won't catch on the lower sash top rail.

Rolled Vinyl

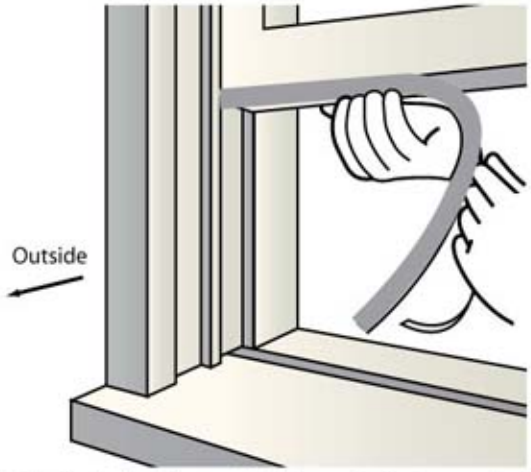


A Nail on vinyl strips on double-hung windows as shown. A sliding window is similar and can be treated as a double-hung window turned on its side.

B Casement and tilting windows should be weatherstripped with the vinyl nailed to the window casing so that, as the window shuts, it compresses the roll.



Adhesive-Backed Foam Strips



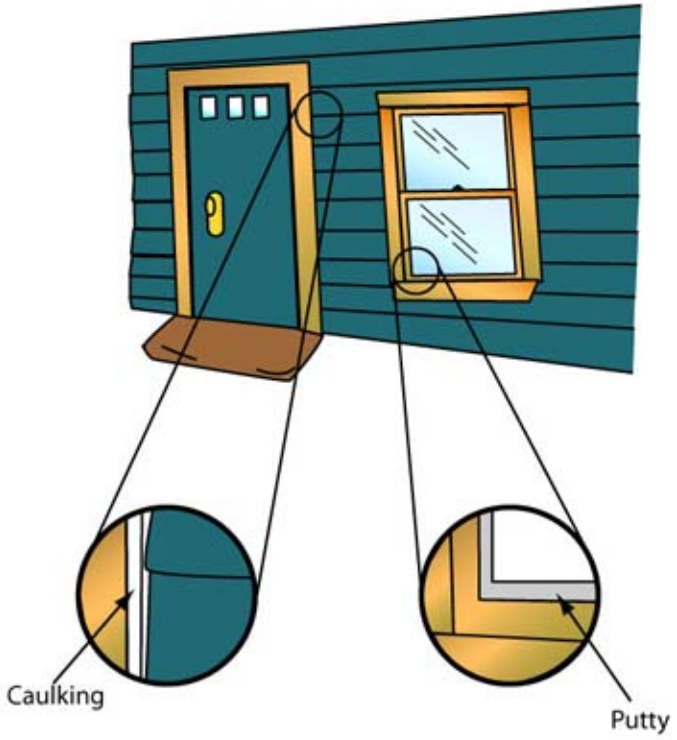
Install adhesive backed foam, on all types of windows, only where there is no friction. On double-hung windows, this is only on the bottom (as shown) and top rails. Other types of windows can use foam strips in many more places.

Checking Caulking and Weatherstripping on your Doors and Windows

Caulking and weatherstripping are good cheap ways to save energy. It's worth while to check if you need caulking, putty or weatherstripping on your windows and doors.

Do they need caulking or putty?

Look at the parts shown in the picture of one or two of your typical windows and doors.



Good condition, all the cracks are completely filled with caulking. The putty around the window panes is solid and unbroken; no drafts.

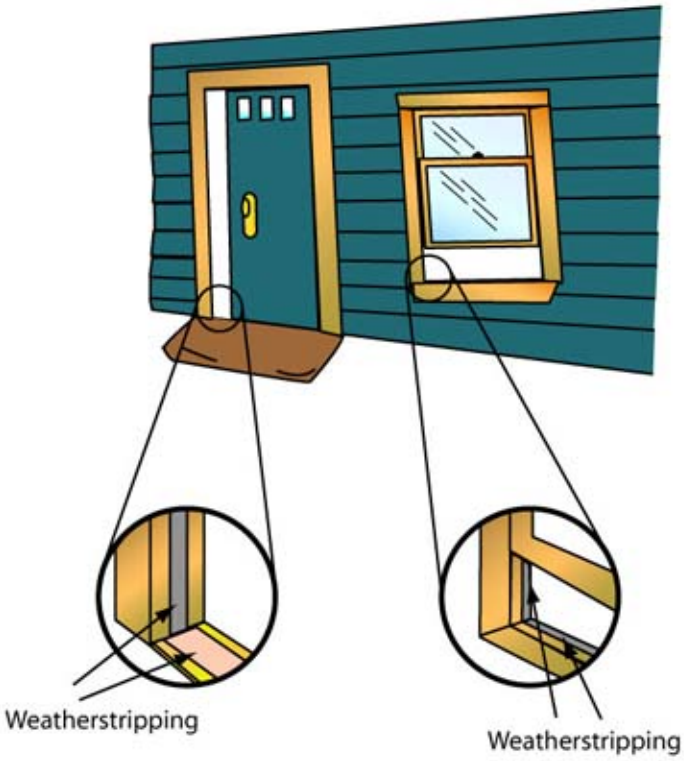
Fair condition, the caulking and the putty are old and cracked, or missing in places; minor drafts.

Poor condition, there's no caulking at all. The putty is in poor condition; noticeable drafts.

If you have found your windows and/or doors to be in fair or poor condition, then you probably need caulking.

Do they need weatherstripping?

Look at the parts shown in the picture of one or two of your typical windows and doors.



Good condition, unbroken weatherstripping in all the indicated places; no drafts.

Fair condition, weatherstripping damaged or missing in places; minor drafts.

Poor condition, no weatherstripping at all; noticeable drafts.

If you have found your windows and/or doors to be in fair or poor condition, then you need weatherstripping.

TROUBLESHOOTING A DISHWASHER

Problem	Possible Causes	Remedies
Dishwasher leaks	• Faulty hose connection • Door gasket not sealing • Dishes deflecting water	• Tighten hose clamps or replace hose • Replace door gasket • Reposition dishes
Dishwasher runs noisily	• Low water level • Defective water inlet valve	• Clean or replace screen on water inlet valve • Replace water Inlet valve*
Dishwasher doesn't run	• Door not fully closed • Defective door switch • Detective timer or selector switch	• Close door tightly • Replace switch* • Replace timer or selector switch
Dishwasher won't fill	• Blocked water inlet valve screen • Faulty water inlet valve • Jammed float switch or defective • Defective timer or selector switch	• Remove buildup from screen; or replace water inlet valve* • Repair or replace water Inlet valve* • Remove obstruction from beneath float; replace pressure switch if defective* • Replace timer or selector switch *
Dishwasher continues to fill	• Defective water inlet valve • Blocked fill spout in water inlet valve • Defective timer or selector switch • Jammed float switch or defective	• Repair or replace water Inlet valve * • Disassemble valve and clean fill spout * • Replace timer or selector switch* • Remove obstruction from float; replace pressure switch if defective*
Dishwasher won't drain	• Dirty air gap • Plugged strainer • Defective drain valve	• Clean air gap with wire • Remove strainer and clean with a brush • Repair or replace drain valve*

*** This repair is best left to a professional**

TROUBLESHOOTING A GARBAGE DISPOSER

Problem	Possible Causes	Remedies
Disposer doesn't run \ no sound	• Power off at disposer • Defective motor • Tripped overload switch • Faulty switch	• Check fuse or circuit breaker (pages 152-153) • Repair or replace motor* • Push reset button firmly (if no button, wait for switch to reset automatically) • Replace wall switch (page 158); or replace stopper switch*
Disposer doesn't run; motor hums	• Jammed impeller • Defective motor	• Clear jam (see text): push reset button firmly • Repair or replace motor*
BATCH-FEED disposer stops when you let go of stopper	• Worn switch cam on stopper	• Replace stopper
Disposer grinds or drains slowly	• Insufficient water flow • Unsuitable waste in disposer • Broken impeller blade or dull	• Open cold water faucet fully • Remove waste; see owner's manual for guidelines • Replace blade or shredder* shredder
Water leaks from disposer	• Loose drain elbow • Badly sealed motor housing and • Sink mounting flange not sealed	• Tighten drain elbow screws or replace drain gasket • Replace motor housing gasket hopper • Tighten mounting screws or replace gasket
Unusual disposer noises	• Foreign object in disposer • Loose mounting screws • Broken impeller blade • Defective motor	• Remove object with pliers or tongs • Tighten mounting screws • Replace blade or impeller* • Repair or replace motor*

*** This repair is best left a professional**
Appliance models vary; see your owner's manual for information specific to your disposer

REPAIR AND REPLACEMENT COSTS

ROOF	Average Life Expectancy (Years)	Average Cost (Dollars)
Asphalt Shingle	18-22	2-3/sq. ft.
Built up with Slag or Gravel	10-15	3-4sq. ft..
Cedar Shake	15-25	4-10/sq.ft.
Metal	Indefinite	5-8/sq. ft.
Elastromeric Membrane	10-15	4-5.50/sq. ft.
Tile	25+	9-12/sq. ft.
Rolled mineral	10-15	1.25-2/sq.ft.
Slate	50+	6-10/sq.ft.
STEEP OR COMPLEX ROOFS		Add 30-40%
TEAR OFF OLD ROOF		Add1.00-2.00/sq.ft.
APPLIANCES		
Clothes Washer	8-12	300-800
Clothes Dryer	8-12	300-800
Kitchen Range	10-20	400-1300
Refrigerator	5-25	400-1600
Disposal	5-10	100-250
Microwave Oven	Indefinite	300-800
Dishwasher	5-10	350-600
Water Heater (electric)	12-18	600-850
Water Heater (gas)	10-15	600-850
Water Heater (oil)	10-15	600-1200
HEATING AND COOLING		
Forced Air Furnace (Oil and Gas)	15-35	1900-2800
Forced Air Furnace (Electric)	15-25	1900-2800
Boiler	25-40	3000-5000
Electric Baseboard	15-25	350-450/room
Air Conditioner Compressor	10-15	1800-2400
Air Conditioning (window)	10-15	250-500
Heat Pump	10-15	1800-2500
OTHER		
Gutters and Downspouts	15-20	6-10/LF
Grading		22-32/LF
Downspout Extension Tubing	5-10	1-5/LF
Splash Block	5-10	25-35/ea.
Smoke Detectors (9-volt)	2-6	35-70/ea.
Smoke Detectors (electric)	Indefinite	150-250
Upgrade Electrical Service		900-1200
Garage Door Opener		250-375
Re-key Lock		20-40/ea.

Fireplace Safety

The U.S. Consumer Product Safety Commission estimates that at least 25,000 residential fires annually are caused by problems in residential fireplaces. The most common causes of these fires are:

- Creosote, a black tar-like deposit that builds up on the inside of the fireplace chimney, ignites, and starts a chimney fire. Although in most cases the fire is contained within the chimney, occasionally the heat from the chimney fire ignites nearby combustible materials.
- Improper construction of installation of a factory-built fireplace, which can cause heat from the fireplace or chimney to ignite nearby combustible materials. A creosote chimney fire often starts this type of fire.
- Sparks from an unscreened fireplace land on nearby flammable material.
- Vapors from flammable liquids used to kindle or re-kindle a fire ignite explosively, or flammable liquids spilled on clothing become ignited.

Even if no fire occurs, carbon monoxide poisoning can occur if the fireplace is not adequately vented.

The U.S. Consumer Product Safety Commission offers the following suggestions for the safer use of fireplaces:

- Make sure the fireplace was constructed for use as a fireplace, not just for decoration. It must be properly installed to meet all relevant building codes, and if it is factory built, it must be installed according to the manufacturer's instructions. Have it inspected by a qualified fireplace contractor to determine if it has all necessary linings and clearances. This is absolutely necessary for safety and proper functioning.

- Have your chimney inspected by a professional chimney sweep for damage and creosote build-up before each heating season. If you use your fireplace with glass doors or have an insert, you should inspect for creosote build-up monthly during the heating season. Creosote is highly flammable and burns with a very hot flame that can damage the chimney and possibly set fire to the house. Creosote build-up may also block the chimney and prevent the escape of toxic fumes.
- Don't use gasoline or other flammable liquids to kindle or re-kindle a fire because the flammable vapors can explode. Never use or store flammable liquids near a fire; vapors can travel the length of a room.
- Always keep the damper opened properly while the wood is burning or smoldering.
- Burn only one artificial log at a time. Because of their sawdust and wax content, using more than one log produces too much heat for some fireplaces to withstand. Follow the directions on the wrapper.
- Always use a screen that completely covers the opening around the fireplace to keep sparks from flying. Don't put combustible materials such as rugs, furniture or newspaper near a fireplace.
- Be especially careful when wearing loose-fitting clothing near the fire. Be especially careful to keep children away from the fire. The entire family should be aware of the danger of clothing fires.
- Check fireplaces at least once a year to determine that the damper is operating properly. Also check for and repair any structural damage to the chimney exterior.
- Keep your fireplace clean of heavy accumulations of ashes. Use only metal containers when removing hot ashes from a fireplace or carrying them to the outside. Be sure the ashes have cooled thoroughly before disposing of them.
- Make sure the fire is completely out before going to bed.
- Use chimney guards to keep small animals and birds' nests out of the chimney.

Installation of a fireplace insert may convert an occasionally used fireplace into a heating appliance. Your fireplace must be in good condition to withstand the additional heat. Before purchasing an insert:

- Determine if you have a masonry fireplace or a factory-built fireplace.
- If you have a factory-built fireplace, do not add an insert unless it is specifically tested and listed for use in that particular fireplace.
- Have a masonry fireplace and chimney professionally checked to determine if it is constructed to current building codes and is in good condition.
- Correct any deficiencies.

Install your insert according to the National Fire Protection Association (NFPS) 211 standard:

- The cross-sectional area of the chimney flue should be no larger than three times the cross-sectional area of the insert's flue gas outlet. Your chimney may have to be re-lined to accomplish this.
- Use a connector that extends from the flue gas exit on the insert to at least the first flue tile in the chimney. (Kits are commercially available).

Operate your insert safely:

- Follow the manufacturer's instructions.
- Check your chimney frequently for creosote build-up, and clean it when needed.

GARAGE-CARPORT

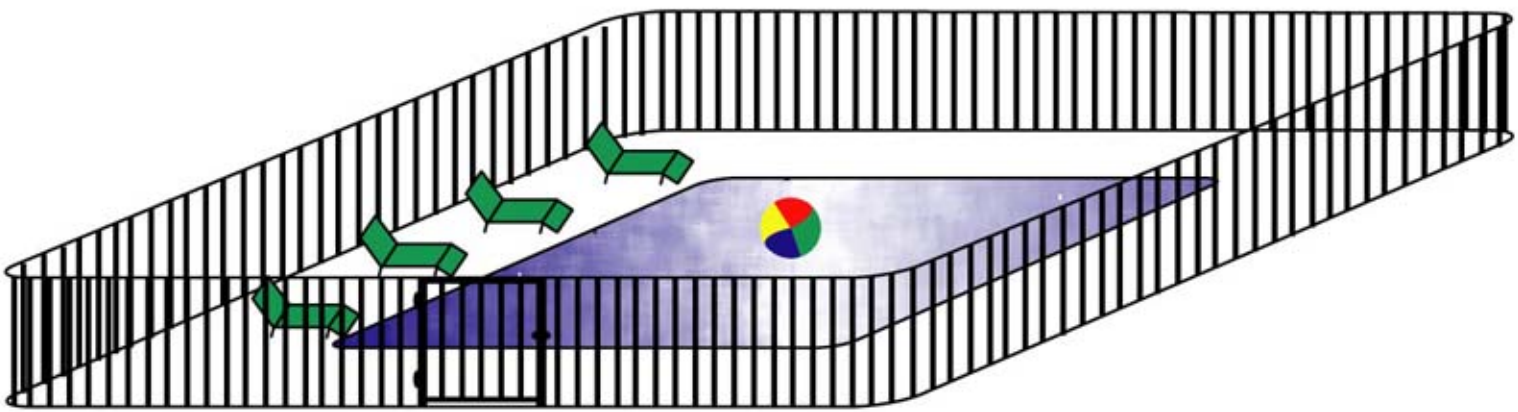
Automatic garage door openers are very useful. It is important that they be kept properly adjusted so that they reverse and do not crush items inadvertently left beneath the door. Adjustment is normally a very simple process that is outlined in the owner's manual. Do not attempt to open the door when it is manually locked. If you go on vacation for an extended period, we recommend that the automatic door opener be disengaged and a manual lock be engaged.

In many houses there is access to an attic space over the garage. We recommend that you use the attic area only for storage of light items, such as holiday decorations. The roof structure is not designed to carry significant loads other than the roof.

Barriers and Fencing

Minimum Safety Requirements for swimming pools and whirlpools

The fence or barrier must completely surround the pool. If the house is part of the barrier, the doors to the pool need to have an alarm. The fence or barrier must be at least 4 feet high and have no footholds or handholds that young children could climb. A chain link fence can have no part of the diamond-shaped openings be larger than 1 3/8 inch. Vertical slats, as shown below, must be less than 4 inches apart to prevent a child squeezing through.



Self-closing and self-latching gate

GFCI

Ground Fault Circuit Interrupter

According to the U.S. Consumer Product Safety Commission, ground-fault circuit interrupters (GFCI) installed in household branch circuits could prevent more than 200 electrocutions and many thousands of electric shocks and burns that occur in and around the home each year.

This, of course, assumes that the device has been installed properly.

Just a word about a ground-fault circuit interrupter. The GFCI is an electrical circuit that is built into a device such as a circuit breaker or an outlet receptacle. It is designed to protect people from severe or fatal electrical shocks.

It does this by switching off power to the device in a fraction of a second (about one-fortieth of a second). This is fast enough to prevent injury to anyone in good health.

The GFCI is activated when the circuit senses an imbalance as small as 5 milliamps in the electrical current between the hot and neutral line. At 50 milliamps, it takes only 3 ½ seconds of current to stop a person's pulse.

An imbalance in the electrical current occurs when there is an unintentional electrical path between the current and a grounded surface. This is referred to as a "ground fault." Without a GFCI, if a person provides the path to ground, he could be severely shocked, burned, or electrocuted.

A GFCI outlet receptacle cannot do the job for which it is intended if it is not properly installed. With a regular duplex outlet receptacle, there are two terminals for the hot wore and two terminals for the neutral wire. It doesn't matter which hot terminal you connect the hot wire to; the same holds true for the neutral wire. It's a different story, however, with a GFCI receptacle.

Markings on the back of GFCI outlets indicate LINE and LOAD. The wires from the circuit breaker or fuse-panel box must be connected to their respective LINE terminal screws.

If instead they are connected to the LOAD terminals, the GFCI outlet will not provide protection against a shock hazard. The LOAD terminals are for the connection of additional outlets to be protected by the GFCI. This is referred to as "feed-through protection."

When the line wires are connected to the LOAD terminals and the GFCI trips (activates), power to the feed-through outlets is interrupted, but power to the GFCI outlet receptacle itself is not switched off. Consequently, there will be no protection against a shock hazard resulting from any appliance plugged into the GFCI outlet.

ENERGY CONSERVATION

Installing energy conservation systems will be cost effective in most houses, especially older houses. The following are some steps that you should consider. The table included in this section gives an average cost for most of the items described below, as well as the savings that you might expect.

Understand that these are averages and that firm quotes should be obtained from contractors. The effectiveness of these measures will vary greatly in different buildings and different areas of the country.

Storm Windows

The newer triple-track windows containing two glass panels and one screened panel are ideal. The triple-track window may be cleaned from the inside. Triple track windows are low in maintenance and do not require the seasonal installation and removal that the older screens and storm windows commonly do.

Installing storm windows over basement windows is also recommended. Basement storm windows can be homemade. There are kits available that are inexpensive and effective.

Thermal Windows

Thermal windows normally are sealed units with two glass panes separated by a space filled with an inert gas such as argon. If the seal between the panes is ruptured, moisture will penetrate the space, form condensation between the panes, and eventually cloud the window.

A ruptured seal cannot be repaired and the entire panel will require replacement. In some cases it may be cost- effective to install storm windows over thermal windows.

Storm Doors

Storm doors should be installed over every exterior door, including a sliding patio door. Storm doors are available in many different quality levels. The type with a screen insert for summer months is preferred by many homeowners.

Attic Insulation

Adding attic insulation is one of the most cost effective energy conservation steps. If there is no insulation in the attic, you can achieve a 40 percent savings (approximately) in your heating and cooling bill by installing the recommended amount.

Each area of the country has a recommended minimum and maximum "R" value for insulation. The "R" value is a measure of resistance to heat flow; higher numbers mean more effective insulation. In the mid-Atlantic states a value between R-19 and R-38 for attics is recommended. You should try to achieve the maximum "R" value recommended for your area. Attic insulation can be easily installed; many homeowners prefer to do it themselves.

Wall Insulation

Wall insulation properly installed during construction contributes substantially to energy conservation; however, retrofitting wall insulation is of doubtful value and not recommended without a detailed energy audit. In most cases it is impossible to determine accurately the amount of insulation in the wall. Installing additional insulation can leave unsightly holes. The savings achieved by blowing in additional wall insulation is difficult to predict.

Band Joist Insulation

The space along the outer wall between the floor joists above the basement is the source of significant heat loss and should be insulated. We recommend six inch faced fiberglass insulation, cut to size and stapled in place.

Thermal Drapes

Thermal drapes over large glass areas such as patio doors are energy efficient in both winter and summer. In the winter closing the drapes helps prevent heat loss through the glass. In the summer, closing drapes during the daylight hours helps reduce the greenhouse effect.

Weather-stripping and Caulking

Nearly every building needs to have the weather-stripping around door and window openings upgraded. If you can see gaps in the weather-stripping when the windows or doors are in the closed position, obviously improvements are needed. Moving a lighted candle around windows and doors on windy days may reveal the existence and source of drafts. Caulking on the exterior of the building around windows and doors and other seams should be inspected annually and upgraded or repaired as necessary.

Retrofitting Heat Pump

In the more temperate climate zones, heat pumps are much more energy efficient than conventional forced air furnaces. If a forced air furnace needs replacement, consider replacing it with a heat pump and a back up furnace. Modification of the ductwork may be necessary to move the increased volume of air required by the heat pump. If the size of the ducts needs to be enlarged this may be quite costly. Some people do not like heat pumps because the air coming out of the register does not feel warm. Costs of retrofitting a heat pump vary considerably; you should have a heat loss survey conducted by a competent heating and air conditioning contractor.

Ductwork Insulation

Ductwork for heating and air conditioning systems running through attics, crawlspaces and other unheated portions of the house should be insulated. Some ductwork is insulated on the inside; this can be determined by tapping on the outside of the duct. Laying insulation over the top of the ductwork in attics is adequate. In crawlspaces the ducts should be completely wrapped with insulation.

Set-Back Thermostat

Set-back thermostats are very effective, allowing the owner to reduce the interior room temperature during times the house is routinely vacant or when people are sleeping. You can save 15-20 percent of your energy bill. Set-back thermostats should have two zones, one for the morning and one for the evening hours. Installing a set-back thermostat on a heat pump may not be cost effective if it turns on the electric resistance heat to achieve the desired room temperature.

Attic Ventilation

Thermostatically controlled ventilating fans in attics are effective during the summer months. The temperature in the attic can reach 120-130 degrees F or more. The ventilator should be set for approximately 110 degrees F. Ventilating fans can be mounted through the roof or against a gable louver.

Whole House Fans

Many older houses have whole house fans. These fans are very effective in providing a breeze. The breeze is provided by turning on the fan and opening doors and windows in the room to be cooled. These fans must be insulated during the winter months. The preferred method of insulating is to build a box around the fan in the attic, place a cover on the box, and insulate the outside of the box.

Be careful to install a correctly sized whole house fan. Over sized units can cause combustion appliances to back-draft, draw soot from fireplaces, etc.

Ceiling Fans

Ceiling fans are especially helpful in buildings with high ceilings. Operate the fan at slow speeds in the winter months to force the heat off the ceiling. In the summer, the fan should run at high speed to provide the desired breeze. Note that most ceiling fans are reversible. One direction is appropriate for summer while the other is for winter.

Insulate Water Heater

Water heaters should be insulated using either fiberglass jackets designed for this purpose or standard three and one half inch fiberglass insulation with a vapor barrier. Cut the insulation to size and secure in place with duct tape. When installing the insulation on the water heater, do not cover openings for the flue, draft hood, or combustion air. Some new water heaters do not require additional insulation; consult the label on the heater.

Water Heater Temperature Setting

Setting the water heater at a lower temperature can often save five to ten percent of the energy bill. If the house does not have a dishwasher or if the dishwasher is not used, the water heater should be set as low as possible and still maintain sufficient hot water for your family.

Most fabrics do not require a high temperature during laundering. In no case do we recommend setting the water temperature above 120 degrees F. This is a safety consideration, particularly for children. Children are more prone to scalding injuries.

Timer for Electric Water Heater

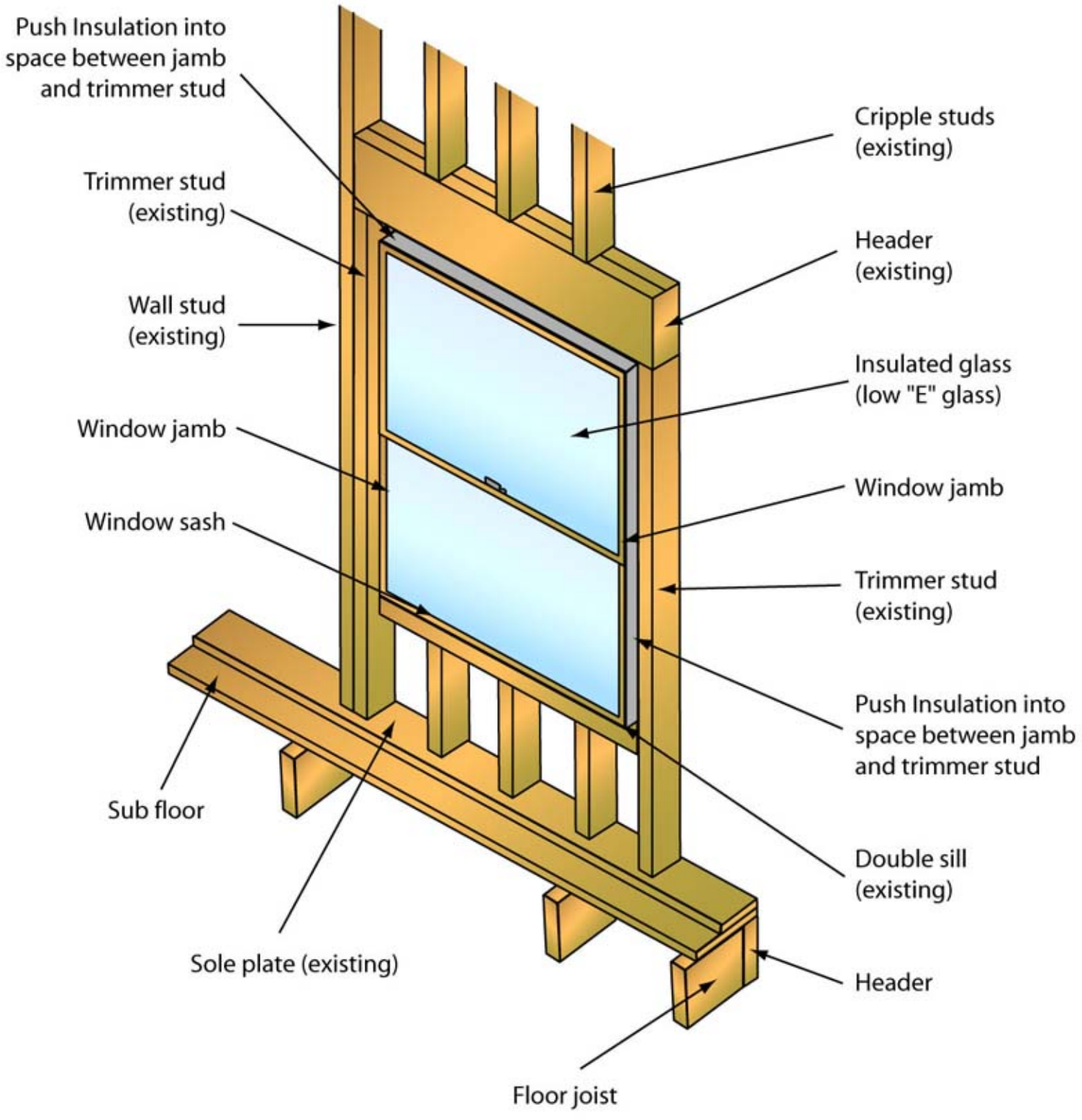
It is possible to install a timing device on an electric water heater to activate the heating coils only during periods of high water usage. To gain maximum benefit from this device, all of the activities that use hot water (bathing, laundry, dishwasher operation, etc.) should be included in one or two periods of the day.

Water and Boiler Lines

Boiler and hot water lines should be insulated. There are products designed for this purpose that are easy to use. A handy person can install 3 1/2-inch fiberglass insulation on water lines by cutting it to size and securing it in place with duct tape.

Replacement of Window

Recommend High Energy Saving windows with insulated glass



ENERGY COST SAVINGS

ITEM	Average Fuel Saving	Approximate Cost $
Storm Windows	10-20	60-80 each
Storm Windows (Basement)	3-5	15-25 each
Patio Storm Door	2-3	250-350 each
Storm Door	2-3	125-200 each
Replacement Thermal Windows	3-10	300-450 each
Setback Thermostat	7-12	150-250 each
Thermostatic Attic Vent Fan	5-8	200-400
Whole House Fan	15-25	500-700
Water Heater Timer	3-7	75-150
6" Fiberglass Attic Insulation	5-30	25-1.25/sq.ft.
Floor Insulation	4-6	.60-.90/sq.f1.
Band Joist Insulation	2-5	1-2/LF
Exterior Caulking	1-3	300-500
Weather Stripping	1-3	100-150
Thermal Drapes	1-3	300-500

Installation of these energy conservation items will create a dollar savings in the range indicated for the average house occupied by an average family.

RADON OVERVIEW

Radon is a cancer-causing, radioactive gas
You cannot see radon. And you cannot smell it or taste it. But it may be a problem in your home. That is because, when you breathe air containing radon, you increase your risk of getting lung cancer. In fact the Surgeon General has warned that radon is the second leading cause of lung cancer in the United States today. If you smoke and your home has high radon levels, your risk of lung cancer is especially high.

You should test for radon
Testing is the only way to find out your home's radon levels, EPA and the Surgeon General recommend testing all homes below the third floor for radon.

You can fix a radon problem
If you find that you have high radon levels, there are ways to fix a radon problem. Even very high levels can be reduced to acceptable levels.

If you are selling a home
The EPA recommends that you test your home before putting it on the market and, if necessary, lower your radon levels. Save the test results and all information you have about steps that were taken to fix any problems. This could be a positive selling point.

If you are buying a home
The EPA recommends that you obtain the indoor radon level in a home you are considering buying. Ask the seller for radon test results. If the home has a radon reduction system, ask the seller for information about the system.

The EPA Recommends:

- If you are buying a home or selling your home, have it tested for radon.
- For new homes, ask if radon-resistant construction features have been used.
- Fix the home if the radon level is 4 picocuries per liter (pCi/L) or higher.
- Radon levels less than 4 pCi/L still pose a risk, and in many cases may be reduced.
- Take steps to prevent device interference when conducting a radon test.

WHAT SHOULD YOU DO IF YOU FIND A HIGH RADON LEVEL?

Radon Levels Can be Reduced

The EPA recommends that you take action to reduce your home's indoor radon levels if your radon test result is 4 pCi/L or higher. It is preferable to correct a radon problem before placing your home on the market because then you have more time to address a radon problem. If elevated levels are found during the real estate transaction, the buyer reduction, as with any other aspect of the home purchase reduction, as with any other aspect of the home purchase and sale.

The cost of making repairs to reduce radon depends on how your home was built and other factors. Most homes can be fixed for about the same cost as other common home repairs, like painting or having a new hot water heater installed. The average cost for a contractor to lower radon levels in a home is about $1,200, although this can range from $500 to about $2,500.

How To Lower The Radon Level In Your Home

A variety of methods can be used to reduce radon in homes. Sealing cracks and other openings in the foundation is a basic part of most approaches to radon reduction. EPA does not recommend the use of sealing alone to reduce radon because, by itself, sealing has not been shown to lower radon levels significantly or consistently. In most cases, systems with pipes and fans are used to reduce radon. Such systems are called "subslab depressurization," and do not require major changes to your home. These systems prevent radon gas from entering the home from below the concrete floor and the foundation. Similar systems can also be installed in homes with crawl spaces.

Radon mitigation contractors may use other methods that may also work in your home. The right system depends on the design of your home and other factors. As with any other house hold appliance, there would be costs associated with the operation of the radon reduction system.

You should also test your home again after it is fixed to be sure that radon levels have been reduced. If your living patterns change and you begin occupying a lower level of your home (such as a basement) you should retest your home on that level. In addition, it is a good idea to retest your home sometime in the future to be sure radon levels remain low.

Radon and home renovations

If you are planning any major renovations, such as converting an unfinished basement area into living space, it is especially important to test the area for radon before you begin the renovation. If your test results indicate a radon problem, radon-resistant techniques can be inexpensively included as part of the renovation. Because major renovations can change the level of radon in any home, always test again after work is completed.

ASBESTOS IN THE HOME

Introduction

This booklet was prepared by the U.S. Consumer Product Safety Commission (CPSC) and the Environmental Protection Agency (EPA). Its goal is to help consumers understand the possible hazards of exposure to asbestos and materials containing asbestos in the home. The booklet describes asbestos, where it may be found in the home, and the possible dangers of exposure to asbestos. The Table of Contents lists the questions answered in this booklet. If you have additional questions, you may call the toll-free number listed at the back of the booklet.

The Federal government is concerned about asbestos-containing products in the home because sometimes asbestos fibers can be released from these products. If asbestos fibers are inhaled, certain types of cancer may later develop. Asbestos in homes poses several problems. Household members have little or no protection from exposure to asbestos fibers.

Once released, the asbestos fibers may stay suspended in the air for many hours. After they settle, fibers can be stirred up again by a household activity, such as sweeping. During this time, asbestos fibers can be inhaled. This continued presence could cause an ongoing risk in the home.

EPA and CPSC have already taken several steps to reduce your exposure to asbestos:

- In 1973 EPA prohibited the spraying of asbestos-containing materials for insulation,
  fire protection and soundproofing.

- In 1975, EPA prohibited the use of asbestos for pipe covering if the material is easily crumbled after it dries.

- In 1977, CPSC banned two asbestos-containing products: patching compounds and artificial fireplace emberizing materials (ash and embers) containing respirable asbestos.

The CPSC is investigating the risk from asbestos in other products. Information on other products will be made available as investigations are completed. This continuing research activity should produce the most effective program possible for reducing unnecessary human exposure to asbestos.

If asbestos building materials must be removed from a home, this work must only be done by a qualified asbestos removal contractor. Many states now require asbestos contractors to be trained and certified. All repair of asbestos materials must be done with extreme caution.

Q&A

Q: What is asbestos?

A: Asbestos is a mineral fiber found in rocks. There are several kinds of asbestos fibers, all of which are fire resistant and not easily destroyed or degraded by natural processes.

Q: Is asbestos dangerous?

A: Asbestos has been shown to cause cancer of the lung and stomach according to studies of workers and others exposed to asbestos. There is no level of exposure to asbestos fibers that experts can assure is completely safe.

Some asbestos materials can break into small fibers which can float in the air, and these fibers can be inhaled. You cannot see these tiny fibers, and they are so small that they pass through the filters of normal vacuum cleaners and get back into the air. Once inhaled, asbestos fibers can become lodged in tissue for a long time. After many years, cancer or mesothelioma can develop.

In order to be a health risk, asbestos fibers must be released from the material and be present in the air for people to breathe.

Q: Are all products with asbestos a health risk for the consumer?

A: NO. A health risk exists only when asbestos fibers are released from the material or product. Soft, easily crumbled asbestos, containing material has the greatest potential for asbestos release and therefore has the greatest potential to create health risks.

Q: Do all people exposed to asbestos develop asbestos-related disease?

A: NO. Most people exposed to small amounts of asbestos do not develop any related health problems. Health studies of asbestos workers and others, however, show that the chances of developing some serious illnesses, including lung cancer, are greater after exposure to asbestos.

Q: What hazards do cigarette smokers face when exposed to asbestos? Do they have a greater chance of developing lung cancer than smokers not exposed to asbestos?

A: YES. Asbestos exposure and cigarette smoking together have been shown to cause a greater risk of lung cancer than either the risk of cancer produced by smoking or working with asbestos alone.

Q: Where is asbestos used in the home?

A: Asbestos has been used in a wide variety of products, including household and building materials, such as appliances, ceilings, wall and pipe coverings, floor tiles, and some roofing materials. Basically, asbestos has been used in products for four reasons: (1) to strengthen the product material; (2) for thermal insulation within a product; (3) for thermal or acoustical insulation or decoration on exposed surfaces; and (4) for fire protection.

Q: How can I tell if I have asbestos in my home?

A: The manufacturer of a product may be able to tell you, based on the product, whether or not the product contains asbestos. People who have frequently worked with asbestos (such as plumbers, building contractors, or heating contractors) often are able to make a reasonable judgment about whether or not a material contains asbestos based on a visual inspection.

Q: If I find asbestos in my home, what should I do?

A: In most cases, asbestos-containing materials are best left alone. When it is necessary to use or work with asbestos containing materials, reduce your exposure to fibers as much as possible. To help you do this, we have provided some general guidelines for working with products containing asbestos.

If at all possible, get help from a contractor who is trained and experienced in working with asbestos. Be sure the contractor is familiar with and follows the guidelines for handling asbestos containing materials. In general, home repair contractors are not experienced in the proper procedures for handling asbestos.

Vinyl Floor Tiles and Vinyl Sheet Flooring

Asbestos has been added to some vinyl floor tiles to strengthen them. Asbestos is also present in the backing on some vinyl sheet flooring. The asbestos is often bound in the tiles and backing with vinyl or some type of binder. Asbestos fibers can be released if the tiles are sanded or seriously damaged, or if the backing on the sheet flooring is dry-scraped or sanded, or if the tiles are severely worn or cut to fit into place.

When replacement or repair becomes necessary, follow the guidelines. The tiles should be handled as little as possible. Avoid sanding or other-wise damaging them. A safe and recommended alternative is to place a new flooring material directly over the old tiles or sheet.

For additional information, you may wish to read: Recommended Work Procedures for Resilient Floor Covers," available on request from the Resilient Floor Covering Institute,

1030 15th St., NW. Suite 350, Washington. DC 20005.

Enclose a business-size, self-addressed, stamped envelope for that publication.

Patching Compounds and Textured Paints

In 1977, CPSC banned asbestos containing patching compounds. Some wall and ceiling joints may be patched with asbestos containing material manufactured before 1977. If the material is in good condition, it is best to leave it alone. Sanding and scraping will release asbestos fibers. If it is in poor condition, or if the wall or ceiling needs to be removed or repaired, follow the guidelines.

Some textured paint sold before 1978 contained asbestos. It is unlikely that asbestos is being added to textured paint today, based on information obtained from manufacturers by the CPSC. As with patching compounds, textured paint is best left alone if undamaged. Sanding or cutting a surface with textured paint that may contain asbestos should be avoided.

Ceilings

Some large buildings and a few homes built or remodeled between 1945 and 1978 may contain a crumbly, asbestos containing material which has been either sprayed or troweled onto the ceiling or walls. If the material appears damaged, you may want to consider having it repaired or removed.

If possible, contact the builder or the contractor who applied the ceiling coating to determine whether asbestos containing material was used. This may be difficult to do in older homes. If you decide that it is necessary to remove this type of asbestos material, follow the guidelines on pages 10-11. The use of a trained asbestos contractor is highly advised when asbestos containing material is to be removed.

STOVES AND FURNACES

Stove Insulation

Asbestos-containing cement sheets, millboard and paper have been used frequently in homes when wood-burning stoves have been installed. These asbestos containing materials are used as thermal insulation to protect the floor and walls around the stoves. On cement sheets, the label may tell you if it contains asbestos.

The cement sheet material probably will not release asbestos fibers unless scraped. This sheet material may be coated with a high temperature paint, which will help seal any asbestos into the material. Asbestos paper or millboard are also used for this type of thermal insulation.

If these materials have been placed where they are subjected to wear, there is an increased possibility that asbestos fibers may be released. Damage or misuse of the insulating material by sanding, drilling, or sawing will also release asbestos fibers. Suitable precautions should be taken (see guidelines).

Furnace Insulation

Oil, coal, or wood furnaces with asbestos-containing insulation and cement are generally found in some older homes. Updating the system to oil or gas can result in removal or damage to the old insulation.If the insulation on or around your furnace is in good condition, it is best to leave it alone.

If the insulation is in poor condition or pieces are breaking off, you may want to consider having it repaired or removed. First find out if the insulation contains asbestos; if it does follow the guidelines.If the insulation is breaking off around the furnace, children should not play in this dusty area.

Door Gaskets

Some door gaskets in furnaces, ovens, and wood and coal stoves may contain asbestos. The asbestos-containing door gaskets on wood and coal-burning stoves are subject to wear and can release asbestos fibers under normal use conditions. Handle the asbestos containing material as little as possible, following the guidelines.

WALL AND PIPES

Pipe Insulation

Hot water and steam pipes in some older homes may be covered with an asbestos containing material primarily to reduce heat loss, and to protect nearby surfaces from the hot pipes. Pipes may also be wrapped in an asbestos "blanket" or asbestos paper tape. Asbestos containing insulation has also been used on furnace ducts. Most asbestos pipe insulation in homes is preformed to fit around various diameter pipes. This type of asbestos-containing insulation was manufactured from 1920 to 1972.

If you have damaged insulation around pipes or boilers, the best current recommendation is to leave the insulation in place and repair the protective covering. In many circumstances, this is the best way to minimize potential exposure to asbestos. For example, small holes in pipe covering may be filled with caulking and spackling and then covered with re-wettable glass cloth.

Wall and Ceiling Insulation

Homes constructed between 1930 and 1950 may contain insulation made with asbestos. Wall and ceiling insulation that contains asbestos is generally found inside the wall or ceiling ("sandwiched" behind plaster walls). Renovation and home improvements may expose and disturb the materials. In cases of major disruption of asbestos containing material, it is exceedingly important that a trained asbestos contractor be used. Find a contractor (such as one familiar with removal of asbestos ceilings in schools) who is experienced with guidelines for handling asbestos and will follow the guidelines on pages 10-11 to do this work.

Appliances

Some appliances are, or have been, manufactured with asbestos containing parts or components. The CPSC is making an effort to identify household appliances which could release asbestos fibers during use. The CPSC has reviewed information on the use of asbestos containing parts in toasters, popcorn poppers, broilers, slow cookers, dishwashers, refrigerators, ovens ranges, clothes dryers and electric blankets.

There has been a general decline in the use of asbestos in these appliances during recent years. When asbestos is used, it is in parts which will probably not result in the release of asbestos fibers during use. It is unlikely that asbestos components in these appliances present a significant health risk from release of asbestos fibers.

An exception was hair dryers with asbestos containing heat shields. Manufacturers voluntarily recalled such hair dryers in 1979. Laboratory tests of most hair dryers showed that asbestos fibers were released during use. Current production hair dryer models do not contain asbestos heat shields. If you are concerned about asbestos in an appliance, do not repair it yourself. Instead, have a qualified repair technician repair it.

Roofing, Shingles, and Siding

Some roofing shingles, siding shingles and sheets have been manufactured with asbestos-using Portland cement as a binding agent. Since these products are already in place and outdoors, there is likely to be little risk to human health. However, if the siding is worn or damaged, you may spray paint it to help seal in the fibers.

You should avoid disturbing these products if they are already part of your home. Unless the roofing must be replaced as a result of normal wear, it is wiser to simply leave it in place. If repair or replacement is necessary, follow the guidelines on pages 10-11.

How to Identify Asbestos

You should first try to determine whether the material does in fact contain asbestos. Avoid disturbing the material if at all possible. If you cannot determine from the label, installer, or manufacturer whether the material contains asbestos, it is best to assume that the product does contain asbestos. People who have frequently worked with asbestos material (such as plumbers, building contractors or heating contractors) often are able to make a reasonable judgment about whether or not a product contains asbestos, based on a visual inspection. If you are uncertain whether some materials contain asbestos, you may want to call such people for advice.

In some cases, you may want to have the material analyzed. Such analysis may be desirable if you have a large area of damaged material or if you are preparing a major renovation which will expose material contained behind a wall or other barrier. Before attempting to sample the material, call the CPSC Hotline number on page 12 for information on sampling and to locate a laboratory capable of analyzing material samples for asbestos. Laboratory analysis can be expensive, ranging from about $20 to more than $40 per sample, and several samples may be required to have a more accurate determination of asbestos content.

GENERAL GUIDELINES FOR HANDLING PRODUCTS CONTAINING ASBESTOS

If you think that a material contains asbestos, and you have to disturb it, handle it very carefully. Special precautions should be taken during removal of exposed or damaged asbestos containing material. If possible, find a contractor trained in safe procedures for handling asbestos (such as a contractor familiar with removal of asbestos ceiling in schools). Always keep the following caution in mind:

Follow these basic precautions for working with asbestos:

1. Do not disturb any material you think may contain asbestos unless you have to. Removal of the material is usually the last alternative.

2. Seal off the work area from the rest of the residence. Plastic sheeting and duct tape may be used. Take great care not to track asbestos dust into other areas of the residence.

3. Always wear a certified respirator appropriate for the specific asbestos activity. Wear gloves, hats, and other protective clothing. If possible, dispose of all of this equipment immediately after using it. If you cannot dispose of your clothing, wash it separately from the family's wash. (Call the CPSC hotline number listed on page 12 for information on respirators.)

4. When working with asbestos containing material, wet it with a hand sprayer. The sprayer should provide a fine mist, and the material should be thoroughly dampened, but not dripping wet. Wet fibers do not float in the air as readily as dry fibers and will be easier to clean up. The addition of a small amount (about a teaspoon to a quart of water) of a low-sudsing dish or laundry detergent will improve the penetration of the water into the material and reduce the amount of water needed.

5. If you must drill or cut an asbestos containing material, do the drilling or cutting outside if possible. Wet the material first (according to instructions in item 4, above).

6. If you must remove the material, avoid breaking it into small pieces. While it is easier to remove and handle small pieces, you are more likely to release asbestos fibers if you break the material into small pieces. Pipe insulation was usually installed in preformed blocks; remove these in complete pieces.

7. Place any material you remove and any debris from the work in plastic trash bags and dispose of it in a proper land-fill. Call your health department for instructions about how to dispose of this. Take care not to break the bag.

8. After you finish removing the material, thoroughly clean the area with wet mops, wet rags, or sponges. Repeat the cleaning procedure a second time. Wetting will help reduce the chance that the fibers get spread around. Again, see that no asbestos material is tracked into other areas. If possible, dispose of the mop heads, rags and sponges in the trash bags with the removed materials. Otherwise, vigorously flush the mop, rag. or sponge in running water in a sink or basin with a drain. Make sure to completely rinse both the utensil and the basin.

9. If you are going to have work done by a contractor, discuss these guidelines and other steps to minimize asbestos exposure.

CAUTION:

Do not dust, sweep, or vacuum particles suspected of containing asbestos. This will disturb tiny asbestos fibers and may make them airborne. The fibers are so small that they cannot be seen and can pass through normal vacuum cleaner filters and get back into the air. The dust should be removed by a wet-mopping procedure or by specially-designed "HEPA" vacuum cleaners used by trained asbestos contractors.

LEAD BASED PAINT

"The Health Hazard"

Human beings are exposed to lead from numerous sources, such as paint pigments, automobile and industrial emissions, surface and ground water, and some forms of solder. While adults may suffer various ailments due to excessive lead in their blood, the groups most at risk from exposure to lead are fetuses, infants, and children under seven. Since the fetus is at risk from high blood lead levels in the mother, pregnant women and women of child-bearing age also must be aware of the hazards of high blood lead levels.

Excessive blood-lead levels can seriously damage a child's brain and central nervous system. Lead poisoning in children can cause attention span deficits, impaired hearing, reading and learning disabilities, delayed cognitive development, reduced IQ scores, mental retardation, seizures, convulsions, coma, and even death. In adults, high blood-lead levels may increase blood pressure and have other effects.

The current Centers for Disease Control (CDC) criterion blood-lead level for children is 25 micrograms of lead per deciliter of blood (ug/dl); however, recent research has indicated that blood-lead levels as low as 10 to 15 micrograms per deciliter can cause adverse health effects in fetuses and children under 7 years of age. Blood lead levels in excess of 30 micrograms per deciliter are of concern in abatement workers and other adults, especially women of child-bearing age.

Lead was a major ingredient in many types of house paint for years prior to and through World War II. In the early 1950s, other pigment materials became more popular, but lead compounds were still used in some pigments and as drying agents. Federal regulatory efforts began with the enactment of the LBPPPA in 1971.

In 1973, the Consumer Product Safety Commission (CPSC) established a maximum lead content in paint of 0.5 by weight in a dry film of paint newly applied; in 1978, CPSC lowered the allowable lead level in paint to 0.06%.

While other sources of lead, such as gasoline and water systems using lead pipes or lead-based solder in copper piping systems, have been significantly reduced in recent years, the LBP in older houses remains a significant problem. A recent report by the Agency for Toxic Substances and Disease Registry (ATSDR) estimates that some 42 million homes contain lead-based paint and house approximately 12 million children.

In the 1970s, the principal hazard to children was thought to be paint chips containing lead, primarily from peeling paint. Research in the early 1980s showed, however, that lead dust is of special concern, in part because the smaller particles are more easily absorbed by the body, and in part because then common methods of paint removal, such as sanding, scraping, and burning, created excessive amounts of dust.

Interior lead-based paint dust also can come from the normal abrasion of painted surfaces, such as the opening and closing of windows. Lead dust is especially hazardous to young children because they play on the floor and engage in a great deal of hand-to-mouth activity.

Lead dust is also a problem from exterior paints. For many years, exterior paint films were designed to "chalk," or lose some of the surface paint due to rain and ultraviolet light, in order to keep the surface looking fresh. The lead pigment which washed off in this process accumulated in the soil around the house. Other sources of lead in soil include improperly performed exterior de-leading work, gasoline exhausts washed out of the air, and some types of road dirt.

Lead-contaminated soil poses a hazard because children may play in or near it, and dirt tracked into a home can lead to increased lead dust levels in the home. These Guidelines do not directly address the issue of lead in soil; however, the Environmental Protection Agency (EPA) is currently carrying out a research and demonstration program to address the issue of estimating and controlling the potential hazard of lead in soil.

As part of its responsibility for environmental protection, EPA has addressed issues of lead in gasoline; lead in industrial emissions; lead in water due to lead pipes and lead-based solder; lead in water treatment systems; and lead in soil. EPA also regulates the disposal of hazardous and toxic substances, which may include some LBP debris.

EPA is assisting HUD in the current LBP research and demonstration program under a Memorandum of Understanding.

The action level for LBP established in the LPPPA amendments in the 1987 Housing Act is a lead content of 1.0 mg/cm as measured by an XRF analyzer. Some State and local regulations have set a lower level at 0.7 mg/cm . Since there is some concern about the reliability of XRF results at these levels, these Guidelines recommend back-up chemical testing utilizing AAS or inductively coupled plasma atomic emission spectrometry (ICP-AES). When using chemical testing, the action level is either 0.5% by weight or 1.0 mg/cm.

It should be noted that portable XRF analysis and laboratory testing may not provide directly comparable information; XRF results are calibrated to report mass of lead per unit area (area concentration) of a painted surface. AAS and ICP-AES, which report results in either mg/cm or weight percent, are bulk sample analysis methods.

HOME WATER QUALITY PROBLEMS-CAUSES AND TREATMENTS

Many areas have water-containing impurities from natural or artificial sources. These impurities may cause health problems, damage equipment or plumbing, or make the water undesirable due to taste, odor, appearance or staining.

Water-related problems will be found primarily in homes serviced by a private water supply, although occasionally, they will be found in water from municipal water supplies.

Those impurities that cause health problems should be attended to immediately; other problems caused by water impurities can be corrected if they are a nuisance. Before beginning any treatment plan, have water tested by an independent laboratory to determine the following:

SYMPTOMS

- Intestinal disorders.
- Water may or may not have off taste or odor.

PROBABLE CAUSES

- Contamination due to surface runoff containing fertilizer, pesticides, or manure.
- Unprotected plumbing cross connections.
- Sewage infiltration.

SUGGESTED TREATMENTS

Disinfect water supply with strong chlorine solution and install automatic chlorinator if appropriate. Install check valves or other protection at cross connections and maintain air gaps between faucets and any possible source of contamination.

SYMPTOMS

- Soap doesn’t lather well.
- Greasy, grimy rings in tubs and sinks.
- Dingy laundry with a harsh feel and possibly white or gray streaks.
- Milky film or spots on dishes washed in automatic dishwasher.
- Scale build-up in water heater.
- Scale build-up in pipes and reduced water flow.

PROBABLE CAUSES

- Hard water due to calcium and magnesium compounds dissolved from rocks and minerals in the earth.

The most commonly used description is:

- 0 to 3 ½ grains per gallon (0 to 60 milligrams per liter or parts per million) = Soft; 3 ½ to 7 grains per gallon (60 to 120 milligrams per liter or parts per million) = Moderate
- 7 to 10 ½ grains per gallon (120 to 180 milligrams per liter or parts per million) = Hard
- Over 10 ½ grains per gallon (over 180 milligrams per liter or parts per million) = Very Hard

SUGGESTED TREATMENTS

Install a water softener bypassing outside water lines. Alternatively — soften water in washer tub and basins by adding a packaged water conditioner. Special scale filters may be attached to the cold water supply lines to appliances.

Softeners add sodium to water and may increase corrosivity, so you may prefer to bypass drinking water lines.

SYMPTOMS

- Reddish-brown stains in sinks, toilets, tubs, dishwashers, and dishes.
- Reddish-brown stains or yellowing of laundry, especially after using chlorine bleach.
- Water tastes metallic.
- Brown sediment in standing water.

PROBABLE CAUSES

- Dissolved iron in the water that is oxidized by air to form iron oxide, which is insoluble.

SUGGESTED TREATMENTS

After determining type and amount of iron problem, select appropriate of iron removal equipment such as chlorinator and sand filter, high capacity water softener or manganese greensand filter. Choice of treatment for iron problems can be complex, depending on the level of iron in the water and the presence of other impurities.

SYMPTOMS

- Reddish slime on walls of toilet flush tank and reduced water flow.
- Slimy material suspended in clear water.

PROBABLE CAUSES

- Iron bacteria, which live on iron in the water and eventually harden into scale.

SUGGESTED TREATMENTS

Install a chlorinator to feed into the well near the pump intake and an activated carbon filter to remove excess chlorine and other objectionable tastes or odors.

SYMPTOMS

- Corroding water pipes.
- Water dripping from corroded iron or galvanized pipe has a rusty color.
- Corroded copper or brass pipes cause blue-green stains on plumbing fixtures.
- Laundry may have red, reddish-brown, or blue-green stains.
- Metallic taste.

PROBABLE CAUSES

- Low pH, commonly called acid water, often caused by a high concentration of carbon dioxide.
- Water softeners may increase the corrosivity of acid water.

SUGGESTED TREATMENTS

Depending on the acidity level, use appropriate treatment such as aeration, soda ash feeder, or neutralizing filter.

SYMPTOMS

- Rotten egg odor.
- Copper and silver turn black in the water.
- Iron, steel, or copper parts of pumps, pipes, and fixtures corroded.
- Black stains on laundry and porcelain.
- Black panicles in water.

PROBABLE CAUSES

- Hydrogen sulfide, sulfate reducing bacteria, or sulfur bacteria.

SUGGESTED TREATMENTS

Compounds such as iron sulfide, calcium sulfide, and sodium sulfide can interfere with hydrogen sulfide removal so multiple treatments may be required. Appropriate treatments include chlorination or aeration followed by filtration through a sand filter.

SYMPTOMS

- Objectionable taste or odor other than hydrogen sulfide.

PROBABLE CAUSES

- Decaying organic matter, pollution from surface drainage, insufficient chlorine being used to disinfect water.

SUGGESTED TREATMENTS

Install activated carbon filter or automatic chlorinator followed by activated carbon filter.

SYMPTOMS

- Turbid, cloudy or dirty water.
- Dingy laundry.

PROBABLE CAUSES

- Silt, sediment, small organisms or organic matter suspended in the water.

SUGGESTED TREATMENTS

Install a fiber or a sand filter.

SYMPTOMS

- Black stains on sinks, tubs, and laundry. Water may feel greasy.

PROBABLE CAUSES

- Manganese (often appears with iron).

SUGGESTED TREATMENTS

Iron removal treatment.

The problems listed above are not the only ones possible. Other impurities such as nitrate, lead, fluoride, pesticides, and chloride may contaminate water with or without visible symptoms. If there is reason to believe your water may have been contaminated and is dangerous, or if impurities are simply a nuisance, have the water analyzed, read the report carefully, and take appropriate action. Always select water treatment equipment from a reputable and knowledgeable dealer.

INDOOR AIR QUALITY ADVISORY MOLD / FUNGUS / ALLERGENS

E&E Inspect, LLC. ("E&E Inspect") advises Client that naturally occurring molds, fungi, spores, pollens and/or botanical substances, or other allergens (e.g., dust, pet dander, insect waste material, etc.) may be present both inside and outside of any building. E&E Inspect collectively refers to all such substances as "Biological Contaminants" and advises Client that identifying and disclosing the presence of latent or concealed Biological Contaminants is not within the scope of General Home Inspection services provided by E&E Inspect.

Biological Contaminants may be either visible or invisible, may adhere to walls and other accessible and inaccessible surfaces, may be embedded in carpets or other fabrics, may become airborne, and may be mistaken for other household substances and conditions. Client is advised that persons exposed to certain types and levels of Biological Contaminants can develop serious health problems. In addition, Biological Contaminants such as mold can cause extensive damage to a building structure and its contents.

This Indoor Air Quality Advisory is not a disclosure of whether or not harmful Biological Contaminants exist at this property. Biological Contaminants such as mold regularly grow and reproduce in indoor environments where organic material (e.g., wood, unfinished drywall, paper, etc.) is present and sufficient moisture is available. Mold growth is a common problem underneath water-damaged surfaces or behind walls, floors, ceilings and other areas where visible access is typically limited or impractical without intrusive and exhaustive inspection techniques.

Accordingly, Client is advised to engage the services of an environmental or industrial hygienist (or similar, qualified professional) if:

- Inspecting and testing for the presence of harmful Biological Contaminants is desired as part of Client's physical condition inspection of the Property; and

- Client desires information and guidance regarding the level of health-related risk involved and the advisability and feasibility of eradication and abatement.

Client is advised that the time necessary to accomplish indoor air quality testing or investigative services is likely to involve lengthier time frames than parties to a real estate purchase contract typically allocate for property inspection contingencies. Accordingly, Client should make arrangements for an extended contingency period if indoor air quality testing or investigative services are desired.

E&E Inspect expressly advises Client that services customarily rendered in connection with real estate transactions (for example, General Home Inspection and/or Property Condition Assessment services; Appraisals; Broker Value Opinions or Market Analyses; Mortgage Lending and Title Services; Corporate Relocation facilitation services; REALTOR® services; etc.) **do not encompass testing, analysis or evaluation of indoor air quality, or specific recommendations related to Biological Contaminants that may exist at the Property.**

E&E Inspect can coordinate the performance of indoor air quality testing or investigative services for additional fee(s). Client is advised that reliable testing for Biological Contaminants such as mold can be expensive and that there are few available standards for judging what is an acceptable quantity of mold. Client is further advised that E&E Inspect does not provide eradication and abatement services.

In selecting the General Home Inspection services provided by E&E Inspect, Client acknowledges and accepts that E&E Inspect does not in any way disclose, warrant or indemnify indoor air quality conditions at the Property and is not responsible in any way for Biological Contaminant conditions that may exist at the Property or health problems that might develop from or be related to such conditions. Client is directed to consult the U.S. Environmental Protection Agency website at **www.epa.gov** or the equivalent state environmental/health services agency if additional information concerning indoor air quality and Biological Contaminants is desired.