**The following terms are included here to provide important information for your understanding and proper use of this inspection report. Please read carefully and call your inspector or the Star Inspection Group at 800-698-0292 if you need any assistance in understanding this report or these items.**

## Property Description

**X1.** **Condominium:** A jointly owned property, with each owner holding title to an interest in the land and structure in common with others and absolute title to the air space encompassed by the unit walls. Condominiums are typically under the jurisdiction of a homeowners' association. The recorded CC&Rs and any other rules, regulations, and bylaws of the association should be examined to determine the responsibilities and liabilities of both the association and the homeowner. The association should also be consulted as to the likelihood of future assessments.

**X2.** **Steep Slope:** We recommend steep slopes be monitored periodically for indications of movement. A determination as to the stability of this slope or area soils is beyond the scope of our inspection. For this information, a qualified soils engineer should be retained.

**X3.** **Furnished, Defects May Be Obscured:** Furnishings prevent complete access and may obscure conditions in need of correction. We recommend areas obscured by furnishings be inspected when accessible, preferably before the close of escrow.

**X4.** **Contact Building Department:** It is important to learn as much as possible about any changes, repairs, additions, or other modifications to the building. The installing contractor should be contacted for information on maintenance and transferability of any applicable guarantees or warranties when there is a new roof, new furnace, or other recent installation. We recommend that a permit history be obtained from the local building department to determine whether properly finalized building permits are on file for all additions or modifications.

**X5.** **New Construction — Relatively New:** New, and relatively new, homes have not been exposed to heavy rains or storms that can cause water entry at the most vulnerable points: typically at doors, windows, roofing connections, and other areas in the exterior building envelope where dissimilar materials meet. These areas should be checked regularly for signs of water entry or premature wear. It is important that all required building permits have been obtained and have been signed off. Copies of all specification sheets for furnaces and other installed equipment should be secured to the equipment or stored in a safe place. All warrantees for materials such as roofing, siding, etc., should be obtained and filed for future use.

**X6.** **Utilities Off:** The gas, electrical, and/or water supply to the building was shut off at the time of our inspection and we did not perform an operational examination of the gas-fired appliances. We can return to the site and inspect these items for an additional fee upon request.

  

## Exterior

**X7.** **Stucco:** Stucco consists of cement and sand plaster, reinforced with wire lath and installed over a water-resistant membrane. New stucco is typically pigmented, rather than painted, and the surface may show absorption of moisture from rains. Stucco cracking is common and may be caused by movement in the wall framing, foundation settling, seismic activity, or stucco shrinkage. Minor cracks usually do not need repair and are normally filled when the stucco is painted.

**X8.** **Wood Composite:** Composite or manufactured siding materials, including hardboard and "OSB," are now commonly used instead of lumber. Some brands of composite siding have been the subject of product defects and manufacturer recalls. A common defect is lack of painting on the back side of the material, a condition not discernible by visual inspection of the completed installation. This siding should not have excessive waves or bulges, vertical joints should be caulked or provided with flashings, and fasteners should not break the surface paint. Proper maintenance of exterior paint and caulking is especially important with this kind of siding. We recommend obtaining the model number and contacting the manufacturer to determine the history and proper maintenance of this siding.

**X9.** **Cement Asbestos Siding:** This material is not considered to be particularly hazardous by many specialists. The asbestos is in a rigid form and is not normally friable. It should not be sanded or drilled, as this could create a hazardous dust. Disposal or removal, if desired, should only be done by a qualified asbestos abatement contractor.

**X10.** **Previous Stucco Crack Repairs:** The stucco siding shows indications of previous cracking and subsequent repairs. We recommend a history of stucco crack repairs be obtained to determine the extent of previous damage or movement in the structure.

**X11.** **Large Cracks** that can allow water entry should be caulked or patched.

**X12.** **Straight-Line Cracks:** "Straight-line" stucco cracking often indicates the stucco was patched without proper wire lap. The straight-line cracking is an indication that the stucco was cut and patched without proper lapping of the wire lath necessary for strength. Future cracking in this area should be expected. We recommend these areas be monitored, and kept sealed or caulked as needed to prevent water entry. Modifications to stucco should include lapping the newer added wire mesh (or lath) over the older existing wire before applying the new stucco.

**X13.** **Unvented Stucco Soffit or Cantilever:** Stucco-enclosed framing below decks, porches, and other areas that extend out from the building should be provided with ventilation to reduce the potential for moisture accumulation and decay. Screened vents are typically provided in new installations. Stains and indications of previous leaks through these surfaces may indicate the presence of damaged framing concealed behind the stucco surfaces. The framing can be examined by making vent-sized openings into these spaces. The openings can then be covered by installing round or rectangular pre-made vent screens available at building supply stores. A "soffit" is any enclosed overhead area and a "cantilever" is a portion of the building that extends out, past the foundation.

**X14.** **Stucco Test Openings:** Holes are often made in stucco by pest control firms to look for damage behind the stucco to determine the presence of wood-destroying pests or organisms. We recommend a qualified pest control firm be consulted for information on the findings of such an investigation.

**X15.** **No Weep Screed — Typical Older Style:** In older pre-1960s buildings, the bottom of the stucco often extends below the soil level and may conceal decay or termite activity. These areas should be checked periodically for damage or termites.

**X16.** **Insufficient Weep Clearance — Newer:** In relatively new construction (post 1960s), the bottom edge of stucco siding typically has a horizontal metal edge called the "weep screed." Four to five inches of clearance should be maintained between this edge and soil below to prevent termite and moisture entry. A one- to two-inch clearance should be provided above finished walking surfaces to provide a means for any moisture that enters the stucco above a route to the exterior.

**X17.** **Insufficient Plywood Nailing:** The standard spacing for plywood siding nails is six inches around the perimeter of each sheet and ten inches in the center areas. Insufficient nailing, a common defect, can allow the siding to buckle and pull away from the framing. Plywood siding is often used to reinforce the building frame and adequate nailing may be necessary to resist wind or seismic forces.

**X18. Veneers Worn — Delaminated:** Wear and delamination tend to occur in those portions of the siding that are exposed to the most sunlight. The sun causes the surface layers of the plywood to crack, allowing rainwater entry, which causes swelling and delamination. Worn areas can often be repaired by filling and repainting. Delaminated sheets of plywood that become too worn to effectively seal with paint may need to be replaced.

**X19. Brick Siding Separation:** Brick siding tends to separate from the wall framing over time. This separation can cause gaps that may need to be sealed periodically to prevent rainwater entry. Eventually the low separated brick siding walls will need removal or replacement. High or tall brick walls that separate, or come loose from the building, can be hazardous if they fall and should be removed.

**X20. Mortar, Soft — Missing:** Moisture and exposure to the weather causes mortar to get soft, deteriorate, and fail over time. Soft mortar should be scraped away and new mortar installed by a qualified mason using a technique called “repointing.”

**X21. Peeling Paint:** Exposure to sun and moisture eventually causes paint to crack and peel. All painted areas should be checked periodically for peeling. These areas should be scraped, sanded, caulked, primed, and painted as needed.

**X22. Worn Finish:** Thin paint or stain type coatings wear thinner each year, where exposed to the sun, eventually exposing the wood to sun damage. Stains have less pigment or color to block the sun and will often need more routine recoating than paints, but since they don’t usually peel, less surface preparation is needed.

**X23. Moisture-Related Damage:** Wood finish and framing materials are subject to damage and deterioration from exposure to moisture. Fungus growth that causes decay (sometimes called “dry rot”), requires the presence of moisture. Relatively minor decay or rot can often be locally treated with a preservative. Significant damage typically requires replacement of the damaged material. A qualified structural pest control firm should be consulted for a determination as to the presence of fungus, decay, or other moisture related organisms.

**X24. Improper Flashing:** Exterior flashings typically consist of sheet metal strips installed to prevent water entry at doors, windows, siding, and trim connections. Damaged flashings can allow rainwater entry and should be replaced. Most flashings are typically covered with wood trim and are not accessible to inspection.

**X25. Remove Firewood:** Firewood should be stored well away from the building for fire safety and to prevent infestation by termites or other wood-destroying insects that are often present in firewood. Areas obscured by firewood are not accessible to inspection.

**X26. Remove Plants — Trees from Building:** Vines, shrubs, or trees that touch the building should be removed or trimmed back periodically to prevent damage to the siding, eaves, or roof surfaces. Tree branches can damage the siding or roof, especially in high winds or stormy weather. Trees may also deposit substantial leaves and debris on the roof surface, resulting in poor drainage and roof damage.

**X27. Plants Obscure Access:** Defects may be present in areas that are obscured by plant growth. Plants should be trimmed away from the building exterior periodically as part of routine maintenance. Plant growth can also damage the siding and trim resulting in the need for siding repair, caulking, or painting.

**X28. Large Trees, Consult Specialist:** We recommend the area trees be examined by a tree surgeon. Regular care can extend the life of a tree and reduce the potential for falling branches.

**X29. Siding — Trim Embedded — Touching Walkway:** The lower edges of wood siding and trim are often installed in direct contact with, or buried in, concrete, masonry, and asphalt surfaces. The proper procedure is to leave a sufficient gap between the wood and the surface below. Ideally, embedded siding should be repaired to prevent damage by decay or termites. In some instances, repair is neither practical nor necessary; for example, porches protected against rainfall that show no signs of damage.

**X30.** **Wood-Soil Contact:** Adequate clearance between soil and wood siding (typically six inches in new construction) should be maintained to prevent moisture or insect damage to wood siding and framing. It is important to avoid raising the soil level too close to the siding when gardening adjacent to the structure, and soils should slope away from the building. Fence posts should be separated from wood siding by an air space or flashing. Areas of potential wood-soil contact should be checked periodically as part of routine maintenance.

**X31.** **Too High for Close Inspection:** Windows, trim, eaves, soffits, gutters, and other exterior components are too high for a close inspection. Unobserved defects or damage may be present in these areas. We can return to the property with special equipment to examine these areas for an additional fee upon request.

**X32.** **Trim:** Exterior trim may need routine caulking to prevent moisture intrusion. Caulking is especially important along the upper edges of horizontal trim as water can be easily trapped in these locations, possibly causing decay.

**X33.** **Eaves — Soffits — Fascia:** The eave is the portion of the roof framing that extends past the edge of the building. Exterior soffits are enclosed areas under eaves or other horizontal projections. Fascia is the wide trim board that runs along the roof edge. These areas are typically exposed to the weather and may require extra maintenance. Exposed eaves, soffits, and fascias at buildings with multiple stories are often too high to be inspected closely.

**X34.** **Exposed Beams:** Rafters, ridge beams, trellises, and decorative beams often extend past the edge of the roof, and are unprotected from the weather. It is important that the upper surfaces of such exposed beams be regularly painted to prevent water damage. These upper surfaces are typically not visible from the ground. The ends of exposed beams are subject to damage and it is sometimes necessary to cover these with sheet metal caps to prevent water entry and decay.

  

## Porches — Stairs — Decks — Balconies

**X35. Concrete — Tile — Brick on Wood Framing:** Concrete, brick, tile, and other masonry stairs, landings, and decks are often supported by wood framing. A membrane is typically placed over the framing to prevent moisture entry and damage. The framing beneath should be checked regularly for signs of water penetration. Any cracks or openings in these surfaces should be caulked or filled to prevent water entry.

**X36. Deck on Grade:** Wood decks placed directly over the ground may have supporting members that touch the soil or have very little ventilation, which is conducive to decay and termite entry. Grade-level decks should be checked regularly for damage unless they are framed with wood rated for direct soil contact.

**X37. Limited or No Access:** Wherever possible, access should be provided to these areas so an inspection can be made. With access and opportunity for inspection, defects may be found in areas that were inaccessible at the time of our inspection.

**X38. No Proper Ledger Flashing:** Sheet metal flashing is typically needed to prevent water entry at a ledger-siding connection. The ledger is the board that is fastened to the building to support the deck. Water entry or debris accumulation at this connection can lead to decay. These areas should be checked periodically and flashed or sealed as necessary.

**X39. Membrane Damaged:** Coatings or membranes are often applied to wood-framed decks to provide a barrier to moisture entry. Such decks should be designed to drain freely. It is advisable to obtain the name of the installing contractor and the type of coating if possible, as this can be helpful should coating repairs be necessary. Minor cracks and openings can often be repaired by applying an additional coating. Substantial damage to the coating may require complete removal and recoating of the surface. Coatings can obscure decay or moisture-related damage to the materials below and it may be advisable to consult a qualified pest control firm.

**X40. Settling:** Adjacent porches and walkways may tilt or settle away from the building, often because their footings or supports are not adequate. Rainwater may enter gaps created by the settling, resulting in additional movement or possible framing damage. Any gaps should be caulked or sealed to prevent water entry. Any substantial settling that creates a hazard to foot traffic should be repaired.

**X41. Separation at Building:** Gaps often open between porches and other walkways as they settle away from the building. These gaps should be filled periodically as part of routine maintenance.

**X42. Needs Drip Edge Flashing:** The edges in this area do not have a proper metal drip edge to direct surface water away from the wood surfaces below. We recommend the wood surfaces be kept well sealed and caulked, and that the installation of proper drip metal be considered to direct rainwater away from the building and prevent water damage or decay in the wood materials below.

**X43. Wood-Soil Contact:** Adequate clearance between soil and wood siding (typically six inches in new construction) should be maintained to prevent moisture or insect damage to wood siding and framing. It is important to avoid raising the soil level too close to the siding when gardening adjacent to the structure, and soils should slope away from the building. Fence posts should be separated from wood siding by an air space or flashing. Areas of potential wood-soil contact should be checked periodically as part of routine maintenance.

**X44. Damaged Decking and Framing:** Damage by decay, fungus growth, and other moisture-related conditions is common in exposed wood decking and support framing. Minor damage can usually be repaired by wire brushing the damaged areas and applying a preservative to the exposed wood. Wood that is significantly damaged should be replaced. This area should be checked by a qualified pest control firm.

**X45. Reinforce Framing:** We often find the framing beneath stairways, porches, and decks does not appear adequate by modern standards. We recommend these areas be examined by a qualified contractor or engineer and reinforced as needed to comply with modern safety standards.

**X46. Piers without Footings:** Pre-cast concrete pier blocks are often used under deck support posts. These piers typically require poured concrete footings to distribute the weight. The standard procedure is to excavate a hole into previously undisturbed soil and then to fill the hole with concrete to support the pier block. Deep footings are required if the piers are on a steep slope or in cold winter areas. Small, lightweight decks or porches often perform well even without proper footings beneath the support piers. It is important to assure that large heavy structures have adequate support.

**X47. Tight Spacing:** Deck boards should be installed so that there is a one-eighth to three-sixteenth-inch gap between each board to allow airflow between the boards, reducing the potential for decay to the decking and framing below. It is important to keep the spaces between the deck boards free of debris that can hold water. It may be possible to correct this condition by running a power saw between the deck boards.

**X48. No Secondary Drain:** In new construction, a secondary drain—typically installed two inches above the lowest adjacent surface—is required to prevent deep flooding in the event the lower drain becomes blocked. These drains should be checked frequently for debris, especially if there are overhanging trees. If a deck or balcony wall drain becomes clogged, deep flooding and significant damage can occur.

**X49. Steps Uneven:** Individual steps in staircases should have a consistent height and depth for safe use. The difference between one step and any other step in the same staircase should not be more than three-eighths inch. Uneven steps are a potential trip hazard and should be corrected.

**X50. Hazardous, Rx Restrict Access:** The framing and/or decking at this location is significantly damaged, creating a potential safety hazard. Access to this area should be restricted until proper repairs are made.

**X51. Unvented Stucco Soffit:** A soffit is any kind of enclosed overhead area. Soffits are often found at enclosed or boxed-in roof overhangs, eaves, and beneath portions of the building that extend out past the foundation as a cantilever or bay. Soffit areas tend to accumulate moisture in some buildings and should be provided with screened ventilation openings to prevent moisture accumulation, which can cause framing decay.

**X52. Deck Maintenance:** Regular maintenance can substantially extend the life and serviceability of wooden decks and staircases. Debris that accumulates between the deck boards can trap moisture, and should be periodically removed. Treating the deck with a good quality wood preservative may improve its appearance and extend its service life. There are firms that specialize in power washing and treating decks with preservatives and fungicides.

**X53. Decking — Framing Not Decay-Resistant:** Wood framing and decking that is exposed to the weather should be made from lumber that is resistant to decay: either naturally-resistant wood, such as heart grade Redwood, or wood that is chemically treated at a plant, such as pressure-treated lumber. Non-decay resistant wood like untreated Douglas Fir should be treated periodically with a high quality preservative to prevent decay and damage.

**X54. Guardrails:** Modern building standards call for railings at least 36 inches high for any deck, stair, or landing more than 30 inches above an adjacent surface, and for openings in the railings smaller than four inches in diameter. This standard was recently changed from six inches to four inches, as it was found that small children can slip through a six-inch opening. Large railing openings that may allow a child to fall through should be modified for safety.

**X55. Climbable:** Railings that can be easily climbed by small children, while not strictly prohibited in many jurisdictions, are potentially unsafe and should be modified or replaced with railings designed to make climbing difficult, especially if there is a potential for children to be in the area.

**X56. Handrails:** Staircases with four or more steps should have handrails that are between one and one-half and two inches wide. Handrails should be placed and shaped so they can be readily grasped for safety. Handrails should be 34 to 38 inches above the leading edge of the stairway treads. Handrails should return to the railing or post or to the ground. Handrails should not end in a projection that could be hooked by clothing.

## Walking Surfaces (Hardscaping)

**X57. Fire Truck Support:** Concrete driveways are sometimes supported by wood framing, especially where homes are located on steep slopes below the street level. A membrane is typically placed over the wood framing to prevent water entry and damage. The framing beneath should be checked regularly for signs of water penetration and decay. Any cracks or openings in these surfaces should be caulked or filled to prevent water entry, which can damage the framing. Many jurisdictions require driveway platforms to be strong enough to support the weight of fire fighting equipment. Any building permits obtained to perform repairs on these driveways may trigger a requirement for expensive engineer-designed reinforcements, especially with older, outdated driveway platforms.

**X58. Trip Hazard:** As sidewalks and other walking surfaces settle and crack with time they become uneven and can present a trip hazard. Minor trip hazards are usually easy to repair by adding mortar or premixed asphalt to provide a smooth transition.

**X59. Recessed Trash Bin, Caution:** In the 1940s and 50s trash bins were sometimes recessed into walkways to hide the containers from view. These recessed bins typically have a step-on type lid that covers the opening in the walkway. Most of these bins are no longer in use and may become filled with rainwater, creating a potential drowning hazard to children. We recommend recessed trash containers be filled with soil, sand, or gravel, or removed for safety.

**X60. Wood Dividers Damaged — Raised:** Wood divider strips used in concrete patios deteriorate with age and may protrude above the patio surface or disintegrate, leaving a gap and creating a tripping hazard. Deteriorated divider strips can be replaced with new wood or the gaps can be filled with new concrete.

**X61. Painted Walking Surfaces:** Painted walkways, stairs, landings, and decks can be very slippery when wet. Self-adhering strips or non-slip paint should be applied to these areas as needed to provide safer walking surfaces.

*end of section*

## Grading and Drainage

**X62. Faulty — Marginal Grade:** A faulty grade (where the exterior soil level is above the top of the concrete or masonry foundation) can allow moisture penetration, leading to decay and termite infestation. The standard in new construction is for the top of the foundation to be at least six inches above the soil level. Removal of soil adjacent to the foundation can eliminate a faulty grade condition, but it may also direct surface water toward the foundation. Typical repair methods include a concrete cap on top of the foundation to raise it above the exterior soil level, a concrete curb outside the foundation to act as a moisture barrier, or a low concrete or wood retaining wall to hold soil away from the foundation. A qualified contractor should be consulted as to the appropriate repair method.

**X63. Low Foundation Vents:** Crawlspaces require sufficient ventilation, typically provided by vents above or through the perimeter foundation. Vent openings must be above the adjacent soils to prevent the flow of surface water into the crawlspace and to prevent damage to any wood at the vent openings.

**X64. Exposed Soil:** Exposed soil slopes should be planted with an effective ground cover to prevent erosion.

**X65. Steep Slope:** Steeply sloped sites may be subject to erosion, slippage, or ground movement. A determination of the geologic stability of the site can be made only by a qualified geotechnical engineer or engineering geologist, and is beyond the scope of a home inspection.

**X66. Foundation Curbs:** Curbs, sometimes called “flashing curbs,” are commonly installed along the outside of a foundation wall to prevent moisture entry or wood-soil contact caused by a faulty grade condition. With time, these curbs can separate and the top edges may need periodic caulking to prevent water entry. Curbs can come loose from the building and deteriorate with age, eventually necessitating their replacement, either with new curbs or other more effective repairs, including raising the foundation wall height or lowering the exterior grade level.

**X67. Signs of Poor Drainage:** Poor drainage may be caused by uncontrolled roof water, improper slopes (see above), or an unpredictable spring that can emerge after a heavy rain. It may be necessary to retain a qualified drainage contractor for corrective measures.

**X68. Site Erosion:** Erosion typically indicates the slope of the soil is not sufficiently stable, lacking vegetation, retaining walls, or drainage systems that could prevent erosion. A qualified drainage contractor or civil engineer may be needed for corrective measures.

**X69. Improper Slope:** In general, the soil and other surfaces near a building should slope away from the foundation to prevent water entry beneath the building. Excessive water may cause foundation movement or other damage. Sloping soil away from the building may not be practical on the uphill side of a steep hillside site. Subsurface drainage systems may be necessary to correct such conditions for hillside homes.

**X70. Drainage System Added:** An underground drainage system appears to have been added to improve area drainage. We recommend that further information on this work be obtained, including the name of the installing contractor and the specifications for this work, if available.

**X71. Surface Drains:** Surface drains can be effective in reducing ponding and controlling surface water around the building. Catch basins can be clogged with debris, and care should be taken to prevent obstruction of the drain openings. We suggest all surface drains be tested periodically by using a garden hose and observing the discharge location of the drains, if known. Rain gutter downspouts are often connected to underground drainage systems to prevent water from ponding adjacent to the foundation where it could adversely affect the soils supporting the house.

**X72. Cleanouts Not Located:** Most building departments now require cleanout openings to be provided into any added subsurface drainage piping system to allow for periodic maintenance. We recommend these cleanouts be located if possible. Most older systems do not have special cleanout openings. The downspout openings into this piping can also be used to flush the sub drains of debris periodically.

**X73. Driveway Drains to Garage:** Driveway rainwater may flow onto the garage floor in wet weather. This area should be checked periodically and the drainage be improved if necessary.

  

## Retaining Walls

**X74.** **Wood Retaining Walls:** Wood retainers are subject to deterioration from moisture or wood-destroying insects. Modern wood retaining walls are typically constructed with pressure-treated lumber. Redwood, though naturally decay-resistant, eventually deteriorates.

**X75.** **Obscured by Plants:** Plant growth can conceal damage or indications of potential failure in retaining walls. We recommend the plants be trimmed back periodically to provide access for inspection.

**X76.** **Cracks:** Cracks in masonry, concrete block, or concrete retaining walls may be formed by settlement or pressures of the soils retained by the walls. Minor cracking is common. Major cracking may indicate settlement or lack of adequate drainage systems behind the retaining wall.

**X77.** **Displacement:** Displacement indicates that a retaining wall has moved from its original position. Leaning may indicate that retaining walls are not adequate to support the soil behind them. Substantial leaning indicates there is a potential for failure and retaining wall replacement may be necessary. Generally, new walls higher than four feet must be designed by a qualified engineer.

## Pool — Spa

**X78.** **Decorative Pond:** Special care should be taken to prevent access to this area by small children. We recommend the local building department be consulted on requirements for safety barriers at decorative ponds.

**X79.** **Upgrade Barriers:** Adequate barriers are necessary around a pool or spa to prevent entry by unattended children. Most jurisdictions require a four- or five-foot fence, or other barrier, and a self-closing gate. Some spas can be equipped with locking covers.

**X80.** **Low J-Box:** Electrical junction boxes that contain electrical connections for the pool lighting should be mounted at least four inches above the pool deck and eight inches above the surface of the water for safety. Older pools often have flush-mounted boxes that fill with water, creating an electrical hazard.

**X81.** **Outlet Too Close to Pool:** Electrical receptacles should be placed well away from swimming pools or spas, ideally a distance of five feet or more, to reduce a potential shock hazard.

**X82.** **Pool — Spa GFCI:** Ground fault circuit interrupters are especially important in wet areas. The general rule is that light fixtures and outlets within ten feet of the edge of a pool or spa should have GFCI protection for safety.

**X83.** **Not Bonded:** The pool equipment is not properly bonded together as typically required for electrical safety. We recommend proper bonding wires and clamps be added to the pool equipment by a qualified electrician.

**X84.** **Heater Vent Close to Wood:** The vent pipe leading from the heater is too close to combustible wood surfaces, creating a potential fire hazard. We recommend adequate vent pipe clearance be provided by a qualified contractor.

  

## Roof Surfaces

**R1. Built-Up Roofing:** A built-up roof or "BUR" (multiple layers of asphalt and felt) may have a gravel covering to protect the roof surface from the sun. These surfaces should be examined periodically to be sure the membrane is covered. It may be necessary to occasionally add gravel or redistribute existing gravel to maintain protection of the surface. Perimeter areas may be exposed and may wear out sooner than covered portions. Exposed areas can be recoated every few years with hot or cold asphalt or other suitable coatings to extend the life of the roof surface.

**R2. Roofing Improper — Non-standard:** It is not unusual to find that aspects of a roof installation are technically incorrect or non-standard. Many roofers install roofing materials and flashings according to what they believe is an "industry standard" or to local custom. Non-standard methods may be effective, but may also result in a shorter-than-normal life span and may also void the manufacturer's warranty.

**R3. Patched:** The roofing has been patched in several places, possibly indicating previous roof leakage and subsequent repairs. A history of patching and other roof repairs should be obtained, including the name of the repair contractor and the extent of any leaks and related damage.

**R4. Remove Debris:** Leaf debris that accumulates on the roof surface has the potential to trap moisture, and also prevents a complete inspection of the roof surface. All debris should be routinely cleaned off the roof.

**R5. Moss Growth:** Moss and lichen may trap moisture, which can damage the roofing material. Moss growth at the edges of the roof may be prevented by installing proper flashings (see item R38 in the following section on Roof Flashings). Substantial moss growth can be removed by a company that specializes in cleaning roofs.

**R6. Exposed Fasteners:** Nails or staples that secure the roof materials and flashings should not be exposed to the weather, as they are potential sources of water entry, especially as they corrode or loosen with time. Any loose fasteners should be replaced. Exposed fasteners should be covered with a sealant or roofing mastic.

**R7. Popping Nails:** If the nails that secure composition shingles are too short to penetrate the roof framing, they may work loose with time and "pop" through the shingles above, leaving holes and allowing water entry. This condition is common when multiple layers of roofing are installed without using longer nails or staples, and is a significant defect. The nail holes can typically be sealed with roof patching compound or mastic.

**R8. Pitch Too Low:** Pitch, or roof slope, is necessary for adequate drainage to avoid roof leaks in shingle or shake roofing materials. An insufficient roof pitch may result in a shortened life span, increased likelihood of roof leakage, and the necessity for roof repair. Most roofing materials can be installed on a lower-than-normal slope if special, or extra, underlayments are used. These underlayments may not be visible to inspection.

**R9. Three or More Roof Layers:** Most jurisdictions now limit the number of roof surfaces to two layers. Three or more layers create a roof that is very heavy and possibly more susceptible to seismic damage. The third roofing layer is typically uneven or lumpy due to the uneven surfaces below. This layer often has a significantly reduced life span. The need to remove all old roof layers and possibly install new sheathing should be anticipated.

**R10. Comp Shingles without Felt :** Most manufacturers require their composition shingles to be installed over roofing felt (tar paper). Roofs were once commonly installed over existing roof surfaces without a layer of felt beneath the new shingles. Properly applied felt provides a smoother looking roof and reduces the potential for leaks should shingles be damaged by wind or other damage.

**R11. Degranulation:** Degranulation is the term for the wearing off of the surface granules that protect the shingles from sun damage. Minor degranulation is common with new roofs. Small worn areas can be coated for protection. Extensive degranulation typically indicates the roof may soon need replacement.

**R12. Woven Valleys Improper:** The appropriate methods for creating a valley in a roof are typically specified by roofing manufacturers and building codes, but many nonstandard methods are often employed. A nonstandard valley can fail prematurely and require repair by a qualified roofing contractor.

**R13.** **Shallow Valley: Center Cut — Unsealed:** The valleys of composition shingle roofing are often formed by running the shingles from one side of the valley over to the other side, and by cutting a straight line in the shingles that overlap at the valley. This cut should be approximately two inches above the center of the valley. Valleys that are installed with the cut in the center are more prone to leakage and indicate a non-standard installation.

**R14.** **Tabs Obstruct Flow at Valley:** Valley shingles installed at right angles to the flow of water will trap debris, significantly reducing the waterproofing effectiveness in an area subject to substantial water flow.

**R15.** **Wood Roofing:** Wood roofing materials are susceptible to fire damage unless specially treated for fire resistance. Chemical treatments that reduce flammability may lose their effectiveness with time and, in some cases, have shortened the potential life span of the roofing material. Upon roof replacement, we advise the installation of a roof with a Class A fire rating.

**R16.** **Shake Repair:** Every year, a small amount of the shake surface is worn away by sun and weather. Shake roofs have a layer of felt (tar paper) under each course (row) to serve as a waterproofing barrier. Holes eventually develop in the shakes, exposing this felt to damage from the sun. Damaged shakes can be repaired by inserting a thin wood shingle, composition shingle, or piece of sheet metal beneath them to protect the exposed felt from the sun. This method can also be used to repair leaks. To repair a leak, the shingle (or metal shim) must be long enough to extend upward, beneath the shakes and felt in the row above. In general, it is best to avoid using nails when repairing a wood roof (except when renailing loose ridge shingles), as this can cause leakage.

**R17.** **Synthetic, Consult Manufacturer:** Some manufactured shakes, shingles, and other roofing materials have been subject to premature failure and we recommend the manufacturer be consulted for maintenance and/or product defect information.

**R18.** **Loose Tiles:** Modern roofing specifications and codes require all roofing tile to be secured to the building to keep them from falling and causing injury. Loose tiles can be held in place by nails, wires, or special adhesives designed for this purpose.

**R19.** **About Tile Underlayment:** Tiles are typically installed over roofing felt, which prevents leakage if the tiles break or become dislodged. The water-tightness of the roof may depend on this felt, which is largely inaccessible to inspection. To determine the condition of the felt, it may be necessary to retain a roofing contractor with special skills to lift a representative sampling of the tiles and inspect the felt beneath.

**R20.** **Tile Felt Worn Where Visible, Replace Soon:** Typically, only the lower edges of the felt underlayment are visible to inspection. Substantial wear in these areas may mean the felt is in need of replacement. Most tile roofs require complete felt replacement after 40 to 50 years of wear. The typical approach is to remove the tiles, apply new felt, and then reinstall the tiles. We advise upgrading to heavier felts or modified-bitumen membranes to achieve longer service life.

**R21.** **No Felt Underlayment:** In the 1970s and 80s, many concrete tile roofs were installed without felt underlayments. This installation method is no longer approved and tile roofs without felt underlayments have a greater potential for leakage. The only effective repair may be to remove all the tiles, install plywood sheathing and roofing paper or felt, and reinstall the tiles.

**R22.** **Blisters:** Blisters in built-up roofing are pockets of water vapor trapped within the roofing material. Blisters are typically caused by moisture or inadequate coverage of asphalt at the time of installation. Blisters may increase in size with time. Minor blistering is common in built-up roof systems. Major blistering is a significant defect, which may necessitate roof replacement. Special care should be made to avoid stepping on blisters as this can cause leakage.

**R23.** **Exposed Membrane:** The gravel is not properly embedded in several places leaving the membrane exposed. We recommend the gravel be properly distributed or new gravel or coatings be applied as needed to protect the roof from the sun.

**R24.** **Coating Worn:** The roof surface is worn in several places. We recommend new proper protective coatings such as hot mopped asphalt or aluminized asphalt emulsion be applied to the exposed areas.

**R25.** **No Coating:** Built-up and Modified-bitumen roofing systems need to be protected from sun damage by the application of appropriate reflective coatings. A qualified roofer or manufacturer should be consulted to be sure the added coating is compatible and will adhere properly to the roof surface.

**R26.** **Unwelded Modified Bitumen Seams:** The seams and edges of modified bitumen membrane roofing materials need to be fully welded to prevent looseness and water entry. Any seam that can be separated by hand was not properly welded when the material was installed.

**R27.** **Exposed Perimeters:** Exposed perimeter areas may wear out sooner than the covered portions. Exposed areas can be recoated every few years with hot or cold asphalt or other suitable coatings to extend the life of the roof surface.

**R28.** **Gravel Displaced — Missing:** The gravel on a built-up roof is typically placed in the hot wet asphalt when the roof is installed. The general rule is for 50% of the gravel to be embedded or adhered to the roof surface. Improper embedment or subsequent repairs may leave loose gravel that can be moved by wind and rain to expose the membrane below to the sun, which is the primary cause of roof surface wear. Roof surfaces should be examined periodically to be sure the membrane is covered. It may be necessary to occasionally add gravel or redistribute existing gravel to maintain good coverage. Exposed perimeter areas may wear out sooner than the covered portions. Exposed areas can be recoated every few years with hot or cold asphalt, or other suitable coatings, to extend the service life of the roof.

**R29.** **Surface Uneven — Lumpy:** Uneven roofing surfaces typically indicate poor surface preparation or an excessive number of roofing layers. These conditions will likely result in a reduced life span for the roofing system.

**R30.** **Unusual System, Contact Installer:** This is an unusual roofing system, not common on residential structures. We are not familiar with proper installation techniques for this system. We recommend the installer be contacted to determine the type and brand name of the system installed and a copy of the manufacturer's installation and maintenance specifications.

*end of section*

## Roof Flashings

**R31.** **Mastic:** Mastic is the general name for a thick, roof patching compound or cement. It is considered a temporary method to seal connections. Mastic dries out and cracks, typically requiring a new application every two to four years. Painting the mastic can help protect the roof from the sun and give a better appearance. The best procedure is to replace old metal flashings when a new roof is installed. It is common practice in some areas to leave old flashings in place and to cover them with mastic when applying new roofing over an existing roof surface. New or recently applied mastic may indicate recent maintenance or leak repairs.

**R32.** **Mastic over Stucco:** The roof-to-wall connections are sealed with mastic applied over the stucco siding. This flashing method is common when a new roof is added to an existing roof and the older metal flashings are left in place. Whether these connections are water-tight depends on the integrity of the stucco above the older flashings. The preferred method is to install new metal flashings. These connections should be checked periodically and carefully maintained by a qualified roofer.

**R33.** **Mastic on Wood Shingles — Shakes:** Asphalt-based patching compounds do not adhere well to wood surfaces and their use is considered to be a substandard roofing practice. The asphalt should be removed and proper metal flashings be installed, if necessary, to prevent water entry and damage in these areas.

**R34.** **Stucco over Flashings:** Stucco has been applied over the roof-to-wall connections and over any metal flashings that may be present. The preferred installation method is to leave the metal flashings exposed to allow easier roof surface replacement.

**R35.** **Insufficient Siding-to-Roof Separation:** The siding on the walls above the roof is too close to the roof surfaces below. The proper installation method is to provide a space about one to two inches below the siding to prevent rainwater flow against the siding and to keep these connections free of debris accumulation. We recommend the siding-to-roof connections be modified as needed to provide adequate separation.

**R36.** **Kick-out Missing — Improper:** A kick-out flashing is a small piece of sheet metal that is required to be installed where a lower roof edge, rain gutter, and upper wall intersect. Its purpose is to direct the flow of rainwater from the roof into the rain gutter and away from the adjacent wall. Missing or improper kick-outs can allow rainwater to flow against the siding and possibly inside the wall itself.

**R37.** **Exposed Sheathing:** The sheathing material below the roof at its edges should be protected against the weather. The lip of a rain gutter may accomplish this in some areas of the roof. At the rake edges (gables), a metal flashing or piece of wood trim is typically used. Metal flashings can also be used to cover the edges of wood sheathing below composition shingles.

**R38.** **Moss Growth:** Moss and lichen may trap moisture, which can damage the roofing material. Moss growth at the edges of the roof may be prevented by installing proper flashings. Substantial moss growth can be removed by a company that specializes in cleaning roofs.

**R39.** **Damaged Wood Shingles at Edges:** Older wood roof shingles may absorb water along the low roof eaves and are often damaged or decayed. The preferred practice is to cover these with metal flashing when a new roof is added. The eave framing in these areas is also subject to damage. Any damaged shingles or sheathing in these areas should be repaired.

**R40.** **Felt Under Edge Metal or Gutter:** The roofing felt below the shingles or shakes should be placed over, and not under, the L-shaped flashing or rain gutter flange. Placing it below the edge flashing could direct rainwater to flow onto the sheathing or behind the rain gutter.

**R41.** **No Lower Edge Metal:** The edges of the roof sheathing that are exposed to the weather and are not protected by sheet metal flashing are subject to moisture entry and damage. The exposed sheathing edges should be painted or covered with plastic or metal flashing.

**R42.** **Loose Edge Metal:** The sheet metal flashing typically installed at the roof perimeter tends to work loose with time and may need to be periodically re-nailed and sealed as part of routine maintenance.

  

**R43.** **Water Flows over Edge Metal:** Some low slope roofs are constructed so that water flows over sheet metal at the lower roof edges. Changes in temperature cause the metal edge flashings to expand and contract, resulting in gaps that can allow water entry. The preferred method is to install the roofing membrane to avoid the flow of water over metal. The metal edges should be reviewed by a qualified roofer and redesigned or sealed periodically as needed to prevent leakage in these areas.

**R44.** **Stucco-Topped Parapets:** Horizontal stucco surfaces may not shed water adequately and can allow water entry at cracks or connections. Sheet metal caps are typically used in commercial construction to protect the tops of parapet walls. Stucco parapets can be sealed with a roofing material or other waterproof coatings.

**R45.** **Cricket Needed:** A cricket is a small, drainage-diverting roof structure. A cricket, or sheet metal flashing, was not used behind the wide chimney to divert water and debris away from this area. We recommend the chimney area be monitored for debris accumulation or leakage and a cricket or metal diverter be installed to direct rainwater away from this area.

**R46.** **Debris Traps:** Improperly constructed roof connections may trap leaves and other debris. These areas require special maintenance to prevent debris from accumulating and causing leakage, and modifications should be considered.

**R47.** **Separations:** Exposure to heat and the normal expansion and contraction of metal may cause separations at metal flashings. All flashings should be checked annually and secured or sealed as necessary to prevent rainwater entry. Plumbing vent pipes may need to be routinely patched at their flashing collars.

**R48.** **Rusty Flashings:** Sheet metal flashings should be kept well painted with a good quality rust-inhibiting paint. The flashing should last as long as the roofing surface and rusty flashings should be replaced when a new roof is installed.

**R49.** **Low Curb:** Skylights should be installed on a curb that raises the skylight at least four inches above the plane of the roof, unless the roof is sloped at an angle of $45^{o}$ or more, in which case, the skylight can be installed in the plane of the roof surface.

**R50.** **Flue Enclosure:** Stucco or wood sided, wood-framed enclosures are often used to encase one or more vents or flue pipes for the water heater, furnace, or stove. The vents at the top should have rain caps. The metal enclosure caps are often rusty and require periodic painting.

**R51.** **Brick Flue:** Brick flues were once commonly used to vent furnaces, water heaters, and kitchen stoves. Modern gas-fired appliances typically require sheet metal vents or flues because they are more effective. Many old brick flues are not lined, or their lining has deteriorated to the point where fumes could leak in the living space. Removal of old unused brick flues should be considered as they can fall in an earthquake, causing injury or damage. Brick flues that are in use can be replaced with metal Type-B vent piping to provide a safer installation.

**R52.** **Patent or Transite Flues:** Patent flues are tile-lined metal. Transite flues are typically cement asbestos. Both are considered outdated and may not perform effectively, especially with newer furnaces. These flues are heavy and may need to be braced if they extend more than a couple feet above the roof surface.

## Roof Drainage

**R53. Standing Water — Ponding:** Standing water or ponding on a roof surface may damage the membrane. Roofs should be designed to drain so that any remaining water can evaporate within 48 hours.

**R54. Rust:** Rust forms inside steel gutters as they age and rust spots or holes eventually appear on the undersides and joints of the gutters. Rusting typically indicates the gutters will soon need replacement. Coating or painting the gutter interior can reduce rusting. Holes can be patched with fiberglass mesh tape and asphalt emulsion. It is generally best to replace old gutters when a new roof surface is installed. Gutter joints and other connections should be checked regularly after rains and be caulked or repaired as needed.

**R55. Gutters Tight to Wall:** Some roofs do not have eaves that extend out past the building wall. The rain gutter is attached to the roof edge and the wall below. Any leaks that occur either at the connection between the gutter and the roof or at the back of the gutter can allow water to enter the wall and cause moisture-related damage to the framing and siding below. It is especially important to keep gutters of this type clear of debris and in good repair.

**R56. Stains behind Gutters:** Water leaks behind rain gutters typically indicate failed or missing flashings at the roof-to-gutter connection. These areas should be sealed or repaired to prevent damage.

**R57. Old, Worn Wooden Gutters:** Wood gutters are rarely used today, due primarily to their expense. Most existing wood gutters are 50 to 80 years old and should be considered at or near the end of their service life. It may be possible to carefully examine and repair old wooden gutters and keep them functional with regular maintenance. The best time to install new gutters is at the same time the roof is replaced. It is best to try to match the original style; fortunately metal gutters are available that are similar in appearance to wood gutters.

**R58. Missing Flashing at Eave Connection:** The connection between the rain gutter and roof edge should be provided with flashing, typically L-shaped metal or plastic strips, to prevent water entry behind the rain gutters and damage to the roof eave framing.

**R59. Roofing Extends over Gutter:** The roofing should extend only about one-half inch over the inside edge of the rain gutter. Roofing that extends over a substantial portion of the gutter may allow rainwater to spill past the gutter during heavy rains.

**R60. Gutter Spillage:** Signs of water flow over the gutter edge may indicate clogged gutters, improper gutter slope, or an insufficient number of downspouts.

**R61. No Gutters:** The absence of gutters may lead to water splashing against the building, localized ponding, or inadequate control of site drainage.

**R62. Composition Shingles Level at Gutters:** Rain gutters are often installed too high, causing the slope of the shingles above the gutters to be almost level. Shingles must have a good slope, ideally four-inches vertical to twelve-inches horizontal, in order to shed water properly. The lower roof edges receive the greatest volume of water. The roof-gutter juncture is an area of potential leakage.

**R63. Membrane Fascia:** This is a roof drainage system where the gutterway is formed by the roof membrane as it wraps up over the higher perimeter roof trim or fascia. Rainwater that collects behind the fascia ideally flows to the downspout openings in the roof surface. This portion of the roof typically experiences the greatest amount of wear because it is exposed to the full volume of rainwater flow. The perimeter areas may need to be periodically coated with aluminized asphalt emulsion or other suitable coatings to provide protection from the sun and excessive surface wear.

**R64. Parapet Scupper:** A parapet is a wall that extends above the roof surface. A scupper is an opening in this wall for roof surface drainage. The scupper usually empties over a bucket-like receptor connected to a downspout below. It is especially important to keep scuppers clear of debris to prevent deep flooding of the roof surface. Scuppers are required to have overflow drains to prevent deep flooding should the primary drain become clogged.

**R65. Surface Ponding:** Ponding water on the roof can lead to premature wear and increases the potential for roof leakage. Areas where water is ponding should be monitored periodically for excessive wear by a qualified roofer. Low slope roofs should be designed to drain freely. Roofs should be designed to drain so that any remaining water can evaporate within 48 hours.

**R66. No Secondary Drains:** A parapet is a wall that extends above the roof surface. If the primary drain opening in a parapet wall drain becomes clogged, deep flooding and substantial damage can occur. In new construction, secondary drains—typically located two inches higher than the nearby primary drains—are required to prevent deep flooding if the lower drain becomes blocked. These drains should be checked frequently for debris, especially if there are overhanging trees.

**R67. Shallow Gutterways:** The gutterways are too shallow and water can easily flow over the roof edge. We recommend the roof drainage system be modified as needed to function properly.

**R68. Extend Downspouts Away:** Substantial water will flow from the roof and enter the foundation area unless it is directed away from the building perimeter, which is usually done by installing extensions or splash blocks for the downspouts. Subsurface drain piping may be needed in some areas to provide adequate drainage.

**R69. Clear Debris:** Leaves and other debris that accumulate in downspouts or other drain system openings should be routinely cleared to prevent blockage in rain gutters or drainage systems. A blocked downspout can sometimes be cleared by water from a garden hose inserted in the upper end of the downspout.

**R70. Subsurface Piping:** Rain gutter downspouts are sometimes connected to underground drainage systems to prevent water from ponding adjacent to the foundation where it could adversely affect the soils supporting the house. Catch basins or surface-mounted drains may also be connected to this piping. Subsurface drain piping can become clogged with debris and should be checked periodically in rainy weather or by using water from a garden hose to be sure the drains are free flowing.

**R71. Outdated Drains:** Clay tile drainage piping is especially susceptible to blockage from root entry and breakage from movement. Damaged tiles could allow roof water to flow beneath the building, resulting in a defective drainage condition. It may be necessary to disconnect any downspouts leading to clay subsurface drain lines and to provide another means to carry roof water away from the foundation. We recommend all subsurface drain piping be tested periodically.

**R72. Drainage System Maintenance:** Roof surfaces, rain gutters, downspouts, and subsurface drain lines should be checked regularly. Leaves and other debris should be removed as needed. Gutter corner joints and connections may need periodic caulking or sealing. Screens can be put at the downspout gutter connections to keep debris from blocking the downspouts. To check for adequate drainage walk around the building during or shortly after a heavy rain and observe the adequacy of the roof and area drainage systems.

## Foundation and Basement

**S1.** **Percentage Observed:** This number represents an approximation of the amount of interior foundation wall-area we were able to observe during the inspection (see item S3 below). In some cases, we can return to the building site after additional access has been provided and reinspect newly accessible areas for an additional fee.

**S2.** **Needs Lock:** Hatches or doors that open into the area below the building from the exterior should be provided with secure latches and locks to prevent undesired access.

**S3.** **Portions Inaccessible:** Access may be obstructed by insufficient clearance beneath the floor framing, by ducting, pipes, stored items, finished wall surfaces, water, or other obstructions to visual examination. Wherever possible, access should be provided to these areas so an inspection can be made. With access and opportunity for inspection, defects may be found in areas that were inaccessible.

**S4.** **Brick Foundations:** Brick and other unreinforced masonry (URM) foundations are highly susceptible to structural failure in an earthquake. The need to replace brick foundations with modern steel reinforced concrete should be anticipated. We recommend review by a qualified engineer.

**S5.** **Likely Steel Reinforced:** Modern foundations typically have internal steel reinforcing, which makes them substantially stronger than older, unreinforced foundations. A determination as to the presence or extent of steel reinforcing is beyond the scope of this home inspection.

**S6.** **Likely Unreinforced:** Older unreinforced foundations are not typically steel reinforced and probably do not have footings that extend deeply into the soil. Foundations of this type are more susceptible to cracking, settlement, deterioration from moisture entry, and earthquake damage.

**S7.** **Substandard Pier Foundation:** Rooms are often added to existing buildings without the full perimeter concrete foundations required in new construction. The installation of a proper steel-reinforced perimeter concrete foundation should be considered. Modern steel-reinforced concrete foundations resist movement partly because all sections are connected together. Foundations where the perimeter, primary load-supporting portions are not continuous, and that have independent portions or isolated piers, may be more subject to settling and differential movement.

**S8.** **Engineered:** Modern complex foundations are typically engineer-designed. All available building permits, plans, and specifications for engineered installations should be obtained. It can be helpful to contact the designing engineer for information on particular aspects of this foundation and structure.

**S9.** **Foundation Cap:** Concrete foundation caps are typically installed on top of an existing older foundation wall by pest control companies to elevate the top of the foundation above the outside soil level, and to prevent moisture entry and damage in the wood framing above the foundation. Modern foundation caps are typically steel reinforced and should improve the strength of the foundation system. They should not, however, be considered as strong as a new foundation.

**S10.** **Saddle:** A saddle is a U-shaped cap that wraps over and around an older foundation. Saddles are sometimes used over deteriorated, weak concrete or brick foundations. In some installations, the additional weight of a cap saddle can cause settling, especially if the footings are inadequate and the soil is too weak to support the added weight. Saddled foundations should be monitored periodically for settlement.

**S11.** **Cracks:** Cracking is common in concrete or masonry foundations. Minor cracks caused by shrinkage or settling can be found in even relatively new foundations. Moderate or larger cracks may indicate ongoing settling or movement and the eventual need for underpinning or foundation repair. There is no way to determine if a crack will grow in size or if new cracks will form. Most large cracks were once small. The best way to estimate the likelihood of future movement may be to monitor the number and size of cracks over a period of time. Cracks in floors may need to be repaired if they become large enough to become a trip hazard.

**S12. Foundation Rotation:** Many older foundations do not have reinforcing steel or deep concrete footings, and the weight of the building on the outside part of the foundation wall can cause the wall to tilt or lean. The amount of leaning can be influenced by damp soil beneath the foundation walls caused by poor drainage. This movement may continue until foundation repair, reinforcement, or replacement becomes necessary. Some contractors and engineers are of the opinion that foundation walls that have rotated more than six degrees will require replacement before seismic bolts can be installed. Any determinations as to the need for foundation replacement should only be made by a qualified engineer and are beyond the scope of a basic home inspection.

**S13. Efflorescence:** Efflorescence is a white powdery deposit that occurs on masonry or concrete. Efflorescence indicates the presence of moisture in contact with masonry or concrete. Minor efflorescence is common even in new construction. Substantial efflorescence indicates a defective drainage condition.

**S14. Non-Continuous Foundation:** Modern steel-reinforced concrete foundations resist movement partly because all sections are connected together. Foundations where the perimeter, primary load-supporting portions are not continuous, and have independent portions or isolated piers, may be more subject to differential movement.

**S15. Poor Quality Concrete:** Concrete is a mixture of sand, cement, and rocks (aggregate). Too much rock was used in many older foundations, making them porous and weak. Round beach sand was often used instead of sharp sand from a quarry. Old, poor quality concrete is susceptible to moisture entry and will often crumble and deteriorate with age, causing settlement. Some building departments do not permit the installation of earthquake bolts into poor quality concrete. In order to adequately reinforce these buildings against seismic activity, it may be necessary to install new concrete foundation walls.

**S16. Portions Appear Parged:** Parging is a coating of mortar or cement plaster over the face of concrete or brick foundation walls. Parging can reduce efflorescence and surface deterioration. Parging can also obscure deteriorated or poor quality concrete. New parging is sometimes applied to old concrete to hide cracking or deterioration, or even the presence of a brick foundation.

**S17. Deterioration:** Concrete deterioration and spalling are usually the result of prolonged moisture penetration. As moisture moves through the concrete and dries on the surface, mineral salts dissolved in the water form crystals, which expand and cause surface crumbling (spalling). Minor surface deterioration is common in older foundations. With continued moisture penetration over many years, the concrete may deteriorate to the point where replacement becomes necessary.

**S18. Recommend Evaluation by Engineer:** A qualified engineer should be retained to examine the foundation and structure to determine the extent of repairs and/or upgrades needed. The engineer will provide information to help you determine the most cost-effective and structurally sound means to improve the building's resistance to settlement, movement, and earthquake or wind forces.

**S19. Floor Cracks:** Basements and other below-grade concrete floors are often subject to cracking due to changes in soil moisture, or structural settlement and movement over time. Below-grade slabs are usually designed to serve only as walking surfaces and are not a part of the foundation support system. Cracks that are large enough to create a trip hazard or allow water entry should be repaired.

**S20. Below-Grade Floors:** Floors that are below the exterior soil level may be subject to water or moisture entry, especially in very rainy weather. It is not unusual to find occasional or unexpected water entry in below grade areas that have been dry for years.

**S21. Wood Basement Floor:** There is a potential for hidden decay or termite damage beneath wood floors when they are placed directly over concrete or soil. A destructive examination may be the only way to determine the condition of the inaccessible areas. A qualified pest control firm should be retained to examine these areas. If the wood floors have been in place for many years and there are no obvious signs of damage or pest activity, the odds are good that all is well.

**S22.** **Carpeting:** Concrete slab floors located below the exterior soil level tend to absorb moisture from damp soils below the concrete. Carpeting, especially wall-to-wall, placed on the slab floor will restrict evaporation and create a potentially attractive place for mold growth. These areas should be checked regularly for dampness, stains, visible mold, or musty odors. Applying a waterproof coating, such as Dryloc Masonry Sealer, to the concrete can prevent or reduce moisture entry. Carpet removal is sometimes the most effective solution. One alternative is to have the concrete painted and to use loose area rugs, which can be easily lifted and dried should moisture entry occur.

**S23.** **Floor Drain(s):** Floor drains are not normally tested during an inspection. We suggest the floor drains be checked for blockage periodically and water be poured into floor drains to prime any traps that may be present. A floor that emits an odor of sewer gas may be connected to waste system piping, and the water that seals the trap may have dried out. The drain trap (U-shaped fitting that holds water) can be filled by pouring water into the drain, and the trap seal can be maintained by pouring a small amount of mineral oil into the trap over the water to reduce evaporation.

  

## Framing

**S24. Outdated Framing:** Several aspects of the substructure framing are outdated and would be considered substandard according to modern construction practice. This framing may need modification during future seismic upgrading.

**S25. Insect Pest Damage:** Wood can be damaged by wood-destroying insects or from prolonged contact with moisture. To determine the presence of pest damage, decay, or other wood-destroying organisms, we recommend a thorough inspection be performed by a qualified pest control firm.

**S26. Wood-Soil Contact:** Adequate clearance between soil and wood should be maintained to prevent moisture or insect damage to wood supports and framing. Wood that has been in contact with the soil should be examined by a qualified pest control firm after clearing the soil away from the wood.

**S27. Stains Dry — Wet:** Moisture stains indicate previous water penetration. Stains are commonly found around bathroom and kitchen waste piping or at the building perimeter walls and may also indicate previous leaks that have since been repaired. Any indications of active water entry or moisture-related damage should be promptly repaired by a qualified contractor.

**S28. Deterioration — Moisture Damage:** Wood can be damaged by wood-destroying insects or from prolonged contact with moisture. To determine the presence of pest damage, decay, or other wood-destroying organisms, we recommend a thorough inspection be performed by a qualified pest control firm.

**S29. Piers without Footings:** Poured concrete footings are typically required beneath pre-cast concrete piers to secure the pier in place and to provide a wide surface area to carry the weight of the framing above.

**S30. Soft Story:** "Soft story" is the general term for a lower building wall that has little or no significant bracing to prevent its collapse in an earthquake. Soft stories that support one or more floors are particularly susceptible to failure in an earthquake. A common reinforcing method is to install a steel "moment frame" around any large openings at the first floor level. Such structures should be examined by a qualified engineer to determine if modifications are needed to provide adequate structural support and earthquake resistance.

**S31. Insulation:** Floor framing insulation is important over unheated basements or crawlspaces in cold winter areas. In areas with moderate winters, flooring insulation is preferred but not always required. Insulation obscures portions of the floor from inspection, and there may be hidden defects in these areas.

**S32. Inverted Vapor Barrier:** Batt insulation typically has a paper or foil vapor barrier on one side to prevent the movement of moist air from the house interior into the wood framing. The vapor barrier should be installed facing the heated area, typically downward in an attic or upwards in floor framing. The general rule is the vapor barrier should not normally be seen from either the attic or crawlspace areas. It is probably incorrect if the paper or foil can be seen. One method to prevent moisture accumulation where the barrier is inverted is to cut slits in the paper or foil backing. In moderate climates, vapor barriers typically have little effect, and correction of an invented vapor barrier is usually not necessary.

**S33. Stucco without Sheathing:** This is a framing method, sometimes called "line-wire stucco," which was popular during the 1940s and is still in use in some areas today. The stucco siding is applied directly over the building paper, which is supported on horizontal wires secured to the framing, omitting the wood board or plywood sheathing found in both older and most newer buildings. The absence of sheathing may make the building more vulnerable to seismic forces. Plywood sheathing can often be added to the inside of the walls to reinforce them. A qualified seismic engineer should be consulted to determine if, where, and what type of reinforcing is advisable.

**S34. Stucco over Fiberboard:** Fiberboard has little strength and produces conditions similar to "line-wire stucco" (see item S33 above.)

**S35. Sheathing behind Stucco Removed:** The old, damaged wood boards or sheathing that originally supported the stucco often becomes decayed from moisture entry and is removed by pest control contractors to eliminate the presence of fungus or decayed materials. Removed sheathing is common below exposed concrete porches and stucco railings. Old stucco is usually strong, and the absence of sheathing may present no problems. In some areas of the building, this sheathing may be necessary to provide adequate bracing against earthquakes and areas where a substantial portion of the sheathing has been removed may need additional reinforcing by a qualified contractor.

**S36. Bracing Panels:** The installation of plywood bracing (often referred to as "shear paneling") on wall framing provides earthquake and wind resistance. It is typically used on the walls between the foundation and floor framing and around garage door openings. The panels should be nailed at all edges and at the intermediate members. It may be necessary to add blocks between the vertical studs to get bearing on all edges of the plywood. Minimum nail spacing is usually six inches and engineers often recommend nailing at three or four inches for greater strength. Ventilation should be provided in each stud space when shear paneling is added to the inside of exterior subarea walls. Ventilation is usually provided by drilling two-inch diameter holes in the plywood at the top and bottom of each stud bay.

**S37. Bracing Panels Stained — Damaged:** The seismic reinforcing (shear) panels on the walls above the foundation will sometimes get wet and can be damaged by water or decay. Treating the panels with a good quality wood preservative can reduce the potential for decay. Any damaged panels should be replaced.

**S38. Too Thin?:** Plywood, and other structural panel materials used for seismic bracing, is typically ½- to $^{5}/_{8}$-inches thick. Three-quarter-inch thick panels are also common. Thinner panels may have significantly less strength and ¼- or $^{3}/_{8}$-inch panels are usually considered substandard. The appropriate style and thickness for seismic panels should be determined by a qualified professional and is beyond the scope of a basic home inspection.

**S39. Anchor Bolts:** The board (sill plate) on top of the concrete foundation is bolted in place to resist displacement during earthquakes and high winds. When a house is not bolted, it is sometimes possible to add bolts or other hardware that accomplishes the same result. If the concrete is of poor quality, or the foundation is brick, this may not be possible. The modern standard is bolting at least every six feet, with bolts within the last twelve inches of each piece of sill plate. Houses greater than one story or on hillsides may require more bolts. Many older houses have fewer bolts than would be recommended by modern standards.

**S40. Wedge Anchors:** Expansion or wedge type foundation anchor bolts may be subject to loosening with time and periodic vibration. We recommend they be checked annually and tightened as necessary. In the course of future anchor bolt installation, we recommend adhesive bolts be used, as these are less susceptible to looseness from vibration.

**S41. Hold-Downs** are metal connectors designed to secure the building to the foundation. They typically have bolts that should be checked periodically for looseness.

**S42. Metal Straps:** There are many metal strapping systems used to reinforce the connection between the concrete foundation and the wood floor framing above. We do not normally provide any engineering analysis to determine if these devices will perform as intended.

**S43. About Washers:** Small round washers, commonly used beneath the nut that secures the sill plate down to the foundation, are being replaced in many jurisdictions by heavy duty square "bearing plates," which are less likely to come loose in an earthquake. In Seismic Zones 3 and 4, special three-sixteenths-inch-thick plate washers measuring two by two inches square are now required. We recommend upgrading with modern connectors for increased seismic safety.

**S44. Old Rusty Bolts:** Rusty foundation anchor bolts are common in pre-1960 homes. The foundation concrete absorbs moisture, and the hidden portions of the bolts below the sill plate or mud sill can become significantly weakened by rust as they age. The installation of new, larger rust-resistant bolts should be considered as a seismic upgrade.

*end of section*

## Substructure Area

**S45.** **Ventilation:** Under-floor areas should be provided with ventilation openings that have an area not less than one square-foot for each 150 feet of under-floor area. Openings close to the corners should be provided for cross ventilation. The vent openings should be distributed equally along the length of at least two opposite sides and should be covered with one-quarter-inch wire mesh. Four-by-fourteen-inch vents are typically installed every six to eight feet. There are many ways to provide ventilation, and the best method should be decided after consulting a qualified contractor or the local building department. If natural cross-circulation is not obtainable with vent openings, it may be necessary to install a mechanical venting system with fans, ducts, and a soil vapor barrier (see item S53 below).

**S46.** **Musty:** Musty odors in subfloor areas or below-grade rooms typically indicate excessive humidity and mold activity (see item N4 on mold in the Interior section that follows).

**S47.** **Louvered Vents:** Louvered vents may reduce the flow of air and sunlight necessary for good subfloor ventilation. Screened vents with one-quarter inch corrosion-resistant mesh are preferred for proper ventilation.

**S48.** **Exposed Soil:** The soil below most homes in California is exposed to the air to help it dry out when it gets wet or moist. Subfloor areas subject to periodic dampness and minimal ventilation may produce excessive humidity, musty odors, and potential mold-producing conditions at various times during the year. Some experts are now of the opinion that covering the soils with plastic sheeting, and possibly poured concrete, can substantially reduce these potentially problematic conditions. A determination as to whether such measures are appropriate for this building is beyond the scope of a home inspection.

**S49.** **Expansive Soil:** Expansive soils typically expand when wet and shrink upon drying, which can cause seasonal movement in the foundations, walls, and floors. Modern foundations designed for expansive soils have piers that penetrate the soil to a deeper level where there is a more consistent moisture content. Maintaining a consistent soil moisture content by periodic watering of adjacent planted areas in summer, and avoiding excessive subarea dampness in winter, can help reduce seasonal movement. We are not qualified to determine soil types or conditions. For a determination of the soil type and conditions in this area, a geologist or soils engineer should be consulted.

**S50.** **Moisture:** Minor periodic moisture beneath many structures is common. Frequent or continuous water entry can damage old porous concrete (see item S15 above), cause wood decay, create conditions conducive to harmful molds and fungus, erode the soil, or create other problems, and should be eliminated. It may be necessary to install a drainage and vapor barrier system to correct a significant moisture problem.

**S51.** **Debris:** Wood scraps, plant materials, and other debris containing cellulose may attract and support termite activity beneath the house and should be removed from subarea soils.

**S52.** **Rodent Activity:** Droppings and other indications of rodent activity should be examined by a pest control company specializing in rodent abatement.

**S53.** **Embedded Form Wood:** The wood form boards and stakes for a poured-concrete foundation are sometimes partially left in place. These boards should be removed, as they encourage termite activity.

**S54.** **Soil Moisture Barriers:** Moisture and vapor barriers are typically sheets of plastic laid over the soil in a crawlspace to reduce humidity in the crawlspace and lower the potential for moisture to be drawn up into the living space, which can contribute to molds and other problematic moisture-related conditions. For vapor barriers to be most effective, they should be sealed to the foundation walls and around any interior piers. Many indoor air quality experts now advise homeowners to place effective vapor barriers over all exposed subfloor area soils to reduce the potential for moisture intrusion and excessive subfloor area humidity.

**S55.** **Concrete Covered — Rat Proofing:** One method to provide a cleaner and dryer area beneath a building is to cover the soil with concrete. This procedure is often referred to as rat-proofing, because it can reduce the activities of tunneling rodents.

**S56.** **Unsupported Cut in Grade:** The soil in a crawlspace is often cut back, forming a wall or "cut" in the soil surface that is steeper than the original slope. With many kinds of soil, a retaining wall is required to hold the soil in place. In newer construction, the local building department often specifies which cuts require retaining wall support and which cuts require the decision of a qualified engineer. Older cuts should be examined periodically for indications of erosion or soil slippage.

**S57.** **Sump Pump:** The presence of a sump pump is an indication of insufficient natural drainage. It is important to check sump pumps regularly to be sure they are functioning properly. Keeping a spare pump on hand is advisable if the pump fails. Sump drain piping should have a one-way or anti-backflow to prevent outside water from being drawn into the sump. The drain piping should also discharge well away from the building and should not be connected to the house waste piping. A failed sump pump can lead to basement or subfloor area flooding and it is a good idea to install a moisture alarm to warn the building occupants when the sump fails to operate, so repairs can be made before damage occurs.

## Attic

**A1.** **View Limited:** Our inspection of attic areas may be limited to a view from the access opening. Many attics do not have walkways to facilitate moving through the attic without damaging ceilings below. Defects may be present that were not visible during our inspection. We can return to the site with special equipment and examine such areas for an additional fee, upon request.

**A2.** **Trusses Cut:** Engineer-design manufactured roof trusses typically have no redundant members, and modification should not be made without the approval of an engineer. Cut trusses should be reviewed by a qualified engineer.

**A3.** **Undersized Outdated Framing:** The framing in older attics is often undersized by modern standards. Structural members such as rafters, purlins, collar ties, or ridge boards may be too small or missing. Multiple roof layers can be quite heavy, causing the rafters to sag. The framing should be examined and reinforced or repaired as needed by a qualified contractor before a new roof surface is installed.

**A4.** **Ventilation Possibly Inadequate:** Adequate attic ventilation is important to prevent the accumulation of moisture, which can cause decay and damage, and to prevent excessive attic temperatures. Improved ventilation can reduce attic and interior room temperatures.

**A5.** **Vent Screens:** Attic vent openings should be screened to prevent animal entry. Screening with a one-quarter inch mesh should be used, as it does not become clogged as easily as finer screening. Insulation should be held clear of vents with cardboard or metal barriers where needed.

**A6.** **Exhaust Fan Terminates in Attic:** Bathroom and other exhaust vents should be extended to the building exterior. Allowing them to terminate in the attic can allow excessive moisture accumulation.

**A7.** **Insulation:** We recommend upgrading the insulation to modern energy standards, where needed, to reduce heat accumulation in the summer and to prevent heat loss in winter. The standard for new construction is eight to ten-inch insulation to achieve a value of R-30. The attic wiring should be checked by an electrician before insulation is added.

**A8.** **K&T Wiring Present:** Special procedures should be followed prior to insulating an attic where knob and tube wiring is present. The wiring should be inspected by a qualified electrician, and a warning notice should be posted stating live wiring is present beneath the insulation.

**A9.** **Cellulose on K&T Wiring:** Knob and tube wiring, common in older houses, should ideally be installed in open air. Covering the wiring with insulation can lead to overheating and, in some cases, creates a potential fire hazard. One method to reduce the risk of overheating in these wires is to be sure that only 15-amp fuses or breakers are used on these circuits. An electrician should be retained to examine attic wiring before covering it with insulation.

**A10.** **Against Non-IC Light Fixtures:** Insulation should be kept clear of ceiling-mounted light fixtures to prevent heat build-up, which can be a fire hazard, unless the fixtures are clearly marked with a special IC or "insulation compatible" rating.

**A11.** **Rodent Activity:** Droppings and other indications of rodent activity should be examined by a pest control company specializing in rodent abatement.

**A12.** **Skylight Enclosures:** A proper skylight installation has wood framing in the attic to form a shaft or enclosure between the ceiling and roof framing. The enclosure walls should be provided with the same insulation as the ceiling to prevent excessive heat loss or gain. Sometimes the enclosure is present but is not insulated. Skylights need properly insulated enclosures to prevent excessive heat loss or gain through this opening in the ceiling insulation.

**A13.** **Vapor Barriers:** Vapor retarders or moisture barriers are installed at wall, ceiling, and floor surfaces to prevent moisture movement from conditioned areas (rooms) into the insulated framing areas. Vapor barriers are especially important in cold winter climates because the temperature differential can cause excessive condensation to form. Vapor retarders are not typically installed in uninsulated floor framing or where attic insulation is added in moderate climates.

**A14.** **Inverted Barriers:** The proper installation method is to place the foil or paper facing so it is adjacent to the conditioned surface, typically down and against the ceiling in an attic. An inverted vapor barrier can allow moisture to collect in the insulation and may lead to framing damage. One method to prevent moisture accumulation is to cut slits in the paper or foil backing. In moderate climates, vapor barriers typically have little effect, and correction of an inverted vapor barrier is usually not necessary.

**A15.** **Touches Knob & Tube Wiring:** Paper or aluminum foil facing on attic insulation should not be in direct contact with older knob and tube wiring, and poses a fire hazard. Any direct contract of the wiring and facing should be eliminated.

**A16.** **Improper Wiring:** Open junction boxes, unstapled or loose wiring, and improper splices are common defects found in attic wiring. A qualified electrician should be retained to examine and repair the attic wiring as needed for safety.

**A17.** **Wires on Framing near Access:** Electrical wires have been placed on the top of the framing near the attic access opening without proper protection. Protective strips should be installed next to the wires to protect it from boxes or other items often stored in attics.

  

*end of section*

## Electrical Service

**E1.** **In Tree(s):** Tree trunks and branches can damage overhead electrical wiring. The wiring between the main power pole and building is often the property of the local utility provider who, in some cases, trims trees away from the wires. Before working near these wires, the power company should be contacted to disconnect the power.

**E2.** **Worn Service Drop:** The wiring between the power pole and the building is typically owned and maintained by the utility company. The company should be contacted and urged to repair or replace any damaged or frayed wires.

**E3.** **Too Low:** Exterior overhead wiring should be at least ten feet above a pedestrian walkway, twelve feet above a driveway, and eighteen feet above a swimming pool or street. Overhead electrical wires should also be no closer than three feet from the side or bottom of any openable window. Wires passing over a low to medium slope roof should clear the roof by eight feet. There are some exceptions to these rules, and the utility provider typically has jurisdiction in such matters.

**E4.** **Weatherhead Wiring Improper — Worn:** The connection between the utility company's wires and the wires at the weatherhead should be insulated and secure. The conductors entering the weatherhead should be in separate holes of an insulating bushing, and should be arranged with a “drip loop” so water does not run into the service mast. Wiring running to a power pole is typically the property of the local utility company and the company should be contacted regarding damaged wiring. A qualified electrician should be retained to examine any worn or damaged wires near the weatherhead for repair or replacement.

**E5.** **Taped Connections:** The service entry connections are wrapped with plastic tape, which is exposed to the weather and may come loose over time, exposing the “hot,” energized connections. We recommend the local utility or an electrician be contacted to provide safer and more permanent weatherhead connections.

**E6.** **Fuses:** Fuse panels are considered outdated and some insurance companies now require upgrading to circuit breakers in order to obtain homeowner’s insurance or to secure a better rate.

**E7.** **Panel Obstructed:** The meter and main panel should be accessible. At least three feet of clearance should be maintained in front of the panel to provide for safe operation and repairs.

**E8.** **Meter Not Sealed:** Electric meters (and sometimes certain covers on the service panel) are sealed by the utility company to prevent tampering. A broken or missing seal on the meter or other panel components may indicate an attempt to bypass the meter or past alteration of the service without notification to the utility provider. We recommend the utility company be contacted to reseal the meter.

**E9.** **Over Six Breakers:** Main panels should be designed to provide a maximum of six individual hand operations to shut off all power to a building to provide convenient electrical shutoff in the event of an emergency (USA rule; Canada allows only one main shutoff). More than six breakers indicate a nonstandard modification, which should be corrected.

**E10.** **Lever Main, No Inside Cover:** Lever operated, fuse-protected panels and equipment disconnect boxes have a disconnect lever located on the outside of the panel and it is not necessary to open the panel cover to shut off the power. We recommend locks be installed on the covers of this kind of panel or box to keep persons from opening the cover and coming in contact with the energized ”hot” components inside.

**E11.** **Service Capacity:** In older houses that have not been upgraded, it is not uncommon to find a 30-amp or 60-amp service. A 30-amp main capacity is not adequate and should be upgraded. Sixty-amp services are generally considered to be minimal, but may suffice if there is no air conditioning and if gas is used for the major appliances. The minimum capacity allowed for a detached dwelling since 1960 is 100 amps. Modern single-family residences typically have an electrical capacity of 125 amps. Larger new houses may have capacities of 200 amps or more.

**E12.** **Insufficient Circuits:** The number of circuits is fewer than required in modern construction, and we recommend an electrician be retained to analyze this system to determine how it needs to be upgraded to comply with modern safety standards. Insufficient circuits often lead to overloading and excessive use of extension cords.

**E13.** **120 Volt Only:** Older electrical services providing only 120-volt service were once common, but are not adequate to provide power for a normal number of modern appliances. Even if the house wiring has not been altered since original construction, the service will need to be upgraded.

**E14.** **Grounding and Bonding:** Modern electrical services are typically grounded to the water piping, a driven rod in the earth, and/or steel rods embedded in the foundation. Older electrical services were typically grounded only to the water piping. In many houses, a grounding conductor is visible at the main panel, but it is not possible to locate the grounding connection. When metal water-piping functions as the ground, and the main incoming pipe has been replaced with plastic, the grounding system should be upgraded with a driven rod. The gas piping and other metallic interior piping should be bonded to the grounding system. Bonding (a secure joining together to maintain electrical continuity) is typically done at the water heater, but is often not present in older homes. When a dielectric union is installed between dissimilar metals (such as copper and steel), bonding should be restored by a jumper wire. Though the jumper may reduce the capacity of the dielectric union to prevent corrosion, electrical safety is a greater priority.

**E15.** **Ground Wire Unsecured:** The grounding wire between the service panel and a grounding rod or pipe should be protected against mechanical damage. The wire should be installed in conduit or securely fastened to the building surface to reduce the possibility of damage.

**E16.** **Loose – Improper Clamp:** The wire to the grounding rod or pipe should be firmly secured with a clamp made for this purpose. The proper clamp is a round acorn-type clamp. The larger square-ish clamp with wings is not designed for this use.

**E17.** **Ground Conduit Not Bonded:** When a metal conduit is used for protection of the grounding wire, the conduit itself must also be bonded to the grounding rod. Lack of bonding can cause the grounding wire to fail.

**E18.** **Rod Not Fully Driven:** Grounding rods should be fully driven into the earth. They are typically eight feet long. If the rod has been cut or not fully driven, it will not be as effective as it should be. It is possible to correct inadequate grounding by adding a second grounding rod.

**E19.** **Outdated:** Modern electrical grounding systems typically include a copper wire bonded to the water piping, a driven grounding rod, and the foundation steel. Older grounding electrode systems should be checked by an electrician and upgraded as needed to meet modern safety standards.

**E20.** **Service Panel Not Bonded:** The service panel enclosure, neutral wires, and grounding wires should be bonded (securely connected together) in the main service panel.

## Distribution Panels

**E21.** **Federal Pacific:** Concerns have been raised over the safety of some models of Federal Pacific circuit breaker panels. In these and possibly other brands of older breaker panels, the breakers may malfunction, fail to disconnect the power when turned off, or fail to reset properly once they have been tripped. We recommend the installation of new panels be considered to eliminate potential risks associated with outdated panels.

**E22.** **Old – Outdated:** Circuit breakers wear out with age and use and become less reliable. Replacement parts may not be available for some old brands and many older panels do not meet modern safety standards. We recommend complete replacement of older outdated panels be considered as a safety upgrade.

**E23.** **In Clothes Closet:** Since the early 1980s, the installation of electrical panels in clothes closets or other areas where flammable materials might be stored has not been permitted by most building departments. Clothing or stored belongings may also block panel access in an emergency. Clearance should be maintained between the panel and any stored items.

**E24.** **Insufficient Clear Space:** The covers of electrical panels should be removable, and should not be blocked by shelving, personal property, or other building materials. At least three feet of clearance should be maintained in front of electrical panels to provide for safe operation and repairs.

**E25.** **Painted Over:** To avoid wall damage, we do not remove panel covers that are adhered to the wall with a heavy coat of paint. We recommend access be provided and the panel wiring be examined.

  

**E26.** **Missing inside Cover:** The energized wiring and terminals inside modern panels should not be accessible when the panel cover is open. The "deadfront" is an inside cover designed to protect panel users from electrical shock when operating a breaker or replacing a fuse. Missing covers should be replaced. Older fuse panels sometimes do not have deadfront covers, and panel replacement should be considered as a safety upgrade.

**E27.** **Opening(s) in Face:** The inner covers of circuit breaker panels have twist-out tabs that are removed for each breaker location. Unused openings can allow contact with live electrical components behind the panel cover. Clips can be purchased to fill such openings. A similar danger exists in fuse panels with empty fuse sockets. Empty sockets should be filled with fuses even though not in use.

**E28.** **Rust — Corrosion:** Rusting indicates the panel may not be adequately moisture-tight. Minor rust is not unusual in exterior panels. Substantial rusting can cause the panel to malfunction, and should be examined by a qualified electrician.

**E29.** **Scorching — Melting:** There are indications of excessive heat at wiring connections in this panel. This condition indicates a potentially hazardous defect requiring immediate correction. We recommend this panel be examined and repaired if necessary by a qualified electrician.

**E30.** **Open Knockout Hole(s):** Panel boxes have knockouts in the sides, bottom, and top that can be removed to provide holes for the wires to enter. Open, unused holes should have proper covers to maintain the fire integrity of the panel and to keep insulation, animals, or insects out of the panel.

**E31.** **Double Wiring:** Also known as "double lugging," the attachment of more than one wire to a single breaker, fuse, or bus bar terminal can cause looseness, arcing, and overheating. Most terminals are designed to hold only one wire, and more than one may be hazardous. In many instances, repair is relatively simple. A full panel may indicate the need to upgrade the equipment.

**E32.** **Same Pole Multi-Wire Circuit(s):** Multi-wire branch circuits are pairs of 120-volt circuits that share a common neutral wire. To prevent overloading the neutral, the pairs of hot wires must originate from opposite poles in the panel (so there is 240 volt potential between them). This condition typically can be corrected by relocating the wires to different breakers or fuses within the panel.

**E33.** **Ground-Neutral Improper:** Subpanel neutral wires should be isolated from the panel enclosure and grounding wires to prevent current from being carried on the grounding wires and components. Grounding wires should not connect to the neutral wires, and should have their own bus or terminal attached to the panel. Older subpanels installed before the use of three-hole outlets may need new feed wires to provide separate paths for the neutral and grounding wires.

**E34.** **Loose Wiring near Panel:** Wires entering panels and boxes should be secured to adjacent framing within twelve inches of the panel or box. Loose wiring may indicate installation by a non-professional.

**E35.** **Excess Wire in Panel:** An excessive amount of wiring in a panel can cause over heating and wire damage, creating a potentially hazardous condition.

**E36.** **Cover Pressing on Wiring:** The wiring in this panel is too close to the front and the panel cover presses against these wires, creating a potentially hazardous condition. We recommend the wiring in this panel be properly installed by a qualified electrician.

**E37.** **Damaged Insulation:** Damaged wiring insulation is potentially hazardous. Damaged wiring should be repaired or replaced by a qualified electrician.

**E38.** **Loose End Wire(s):** Loose wires can come in contact with energized components, creating a shock or fire hazard.

**E39.** **Wires Unprotected at Hole(s):** Wires should be provided with bushings and/or strain relief clamps where they enter panel box holes or openings.

**E40.** **Excess Cable Sheathing:** Excessive wrapping or sheathing on electrical cables is substandard practice and may indicate work by a non-electrician.

**E41.** **Improper Wire Color Coding:** We observed wiring that is not the proper color for its use. Improper color coding may indicate modifications by a non-electrician. We recommend the panel wiring be properly installed by a qualified electrician.

  

**E42.** **Improper Wiring:** Several aspects of the wiring in this area are improper or substandard. A qualified electrician should be retained to examine this wiring and to repair it as needed to comply with modern safety standards.

**E43.** **Missing Handle Ties:** When two breakers are used to protect a single 240-volt circuit, the breaker switch handles should be mechanically connected to operate in unison. A simple connector can be installed by an electrician to ensure that both breakers trip at the same time. Handle ties are also required when two breakers protect the double circuit for a combination dishwasher and disposer receptacle.

**E44.** **Fused Neutrals:** Fuses are installed on both hot and neutral wires in some older fuse panels. While this might seem to provide added safety, the opposite is true. If the neutral fuse blows, the circuit would be “hot” but would appear “dead,” creating a hazardous condition. This condition indicates an outdated and potentially hazardous system. Fused neutral panels often also have exposed electrical connections, creating an additional safety hazard. We recommend all old, outdated, and unsafe panels be replaced.

**E45.** **Oversized Breakers — Fuses:** Fuses and circuit breakers are rated to allow a specific amount of current in the circuit before tripping or burning out. When the wrong size breaker or fuse is used, there is a potential for the wiring to overheat, creating a fire hazard. For example, a 14-gauge wire is rated to safely draw 15 amps, and a 15-amp fuse or circuit breaker on this circuit will blow or trip when overloaded. Using a larger breaker or fuse, such as one rated 20 or 30 amps, will not provide adequate protection.

**E46.** **Access Obstructed:** It is important to maintain a clear space, free of obstructions, at the front of electrical panels to provide for safe access and servicing. The standard requirement calls for a clear space 30 inches wide, 36 inches deep, floor to ceiling.

## Wiring and Fixtures

**E47. Knob and Tube:** Most houses built before 1950 were wired with knob and tube systems. In some building jurisdictions, knob and tube wiring with plastic insulation was used until the 1960s. Existing knob and tube wiring may be safe to use if it is not overloaded. Over time, the brittle insulation on older wire breaks down, and the wire may sag between supports. A splice in a knob and tube system is soldered; an overload can melt the solder, causing a loose connection and possible fire hazard. Knob and tube wiring may not be appropriate for circuits and appliances requiring grounding. It is generally best to install new wiring for such circuits. As rooms using more electricity are remodeled, old wiring is replaced. Many older homes have modern wiring installed for kitchen circuits and other areas where you see three-hole outlets. Installing all new wiring is not seen as practical, and the older knob and tube wiring is often left in place for low-use areas such as bedroom light fixtures and rarely used outlets.

**E48. Aluminum 120-Volt Wiring:** Aluminum wiring in general lighting and receptacle circuits is prone to mechanical failure and overheating at its terminations. Special connectors should be used. Outlets and switches rated for aluminum can sometimes be installed on an older aluminum wire system. Systems with aluminum 120-volt branch circuit wiring should be examined in depth by a qualified electrician familiar with proper aluminum wiring methods.

**E49. Unprotected Wiring:** Wiring in living areas, storage areas, or accessible exterior locations should be protected from damage. Protection is typically achieved by enclosure within wall cavities surfaced with gypsum board (sheet rock) or paneling, or by placing the wiring in rigid or flexible metal conduit. Metal-sheathed cable (BX) or flexible metal conduit can be used in dry areas. Moisture-tight conduit should be used at exterior locations.

**E50. Exposed Splices:** All electrical connections of non-metallic cable (“Romex”) or conduit should occur in properly covered junction boxes. Visible splices are potentially hazardous and an indication of substandard work.

**E51. Loose Wiring:** Electrical wiring should be properly supported to prevent wiring damage at the attachments. We recommend all loose wiring be reviewed by a qualified electrician and proper supports be provided where necessary.

**E52. Abandoned Wiring:** Apparently abandoned wiring should be removed by a qualified electrician to prevent it from being accidentally energized and creating a hazardous condition.

**E53. Extension or Zip Cord Wiring:** Extension cords, lamp cord wiring (zip cord), and other temporary wiring should not be used for permanent installations. Such wiring should be replaced by a qualified electrician.

**E54. Missing Box Covers:** Electrical junction boxes are often left uncovered, either through simple omission or because the box is too small to hold all the wires. Over-full boxes may need extensions or to be replaced with a larger size. All boxes should be properly covered for electrical safety.

**E55. Boxes Missing Knockouts:** Outlet, switch, panel, and junction boxes often have holes for the wires to enter. These holes should be provided with special covers if they are not used for wiring.

**E56. Wires Unprotected at J-Box Holes:** Wires are not properly installed at electrical junction box openings. We recommend proper bushings and/or strain relief clamps be installed where wires enter box holes or openings.

**E57. Openable Fuse Switch Box:** Fused switch boxes should be provided with a safety lock to prevent access by children or others unaware of the shock hazard from contact with the exposed energized components inside.

**E58. Paddle Fan Added:** Ceiling paddle fans typically require special boxes for support, and should not be supported solely by a lighting receptacle box. In most installations, an inspector cannot directly view the box supporting the fan. To determine if a paddle fan is properly supported, it may be necessary to consult a qualified electrician.

## Receptacles and Exterior Electrical

**E59. Insufficient Outlets:** Older buildings often have insufficient electrical receptacles by modern standards. We recommend the anticipated electrical use be reviewed by a qualified electrician to determine where additional outlets are needed. Appliances, such as refrigerators, computers, microwave ovens, and clothes washers typically have three-prong plugs and need conveniently placed three-hole grounded outlets. Modern kitchens require receptacles every four feet along countertops and within 24 inches of the kitchen sink. Each individual countertop area should have at least one receptacle.

**E60. Ungrounded 3-Hole Outlets:** Also known as an "open ground," this defect is common in older buildings and typically occurs when two-hole outlets are replaced with three-hole types without adding a grounding wire. Properly installed three-hole outlets have a third grounding wire and are necessary for appliances with three-prong plugs. Using a three-prong plug in an ungrounded three-hole outlet is potentially hazardous. The accepted means of correcting this condition include replacement with a two-hole receptacle, installation of a proper grounding wire to the outlet, or replacement with a GFCI receptacle (see item E64 below).

**E61. Reverse Polarity:** Reverse polarity is a defect where the hot and neutral wires to an outlet are reversed (or cross wired). This is a potential safety hazard, but is usually easily corrected. The smaller outlet slot (brass terminal) should be connected to the hot wire (black) and the large slot (silver terminal) to the neutral wire (white). The standard since 1948 has been to provide electrical equipment with polarized plugs.

**E62. 3-Hole Adapters in 2-Hole Outlets:** These adapters allow a three-prong plug to be installed into a two-hole outlet and may not provide an effective ground connection. A proper grounding wire and a three hole grounded outlet should be installed to be sure safe grounding is provided for all appliances with three prong plugs.

**E63. Improper Floor Type:** Floor-mounted receptacles should be a special type designed support a person's weight. Standard outlets can break easily when stepped on, creating a hazardous condition.

**E64. GFCI Protection:** Ground fault circuit interrupters are breakers or receptacle outlets designed to protect against electrical shocks. In recent years, most jurisdictions have required ground fault circuit protection for outlets in bathrooms, exteriors, basements, and garages (except those in designated appliance locations, such as for laundry equipment). Recent regulations also require GFCI breakers for kitchen countertop outlets within six feet of a sink and for wet bars. A single GFCI receptacle may be used to protect other outlets downstream from it on the same circuit. GFCI outlets and breakers have test buttons that should be operated periodically to assure the devices are functioning properly.

**E65. Line-Load Reversal:** GFCI outlets have a second set of terminals to feed other outlets on the load side of the outlet, and provide GFCI protection for them. If the line and load connections are reversed (a common defect), the GFCI test button operates properly and the downstream outlets are protected; but the GFCI outlet itself is not protected, which could lead to the assumption that a safety device is operable when it is not. This condition can be easily corrected by a qualified electrician.

**E66. Improper Exterior Electrical Components:** Wiring, boxes, outlets, switches, and light fixtures that are exposed to weather must be rated for such a location to prevent water entry, hazards, or damage.

## Plumbing

**P1.** **Well:** A qualified well specialist should be retained to check the well equipment and flow rate. Water quality can be tested at laboratories approved by the local health department.

**P2.** **Main Valve Not Found:** We were not able to locate a readily accessible main shutoff valve for the water supply system. We recommend that it be located or that one be installed in a readily accessible place so the water can be shut off easily in an emergency.

**P3.** **Half-Inch Supply:** Three-quarter inch copper or plastic is the minimum standard in modern construction and one-inch diameter piping will provide even better water flow. Smaller piping will deliver substantially less water to interior fixtures and a reduction in water flow at showers should be expected when multiple fixtures are used at the same time. We recommend replacement with larger diameter piping as part of future plumbing upgrades.

**P4.** **Reduced to Half-Inch:** Installing a one-half inch fitting on three-quarter inch, or larger, piping significantly reduces the amount of water entering the system. The capacity of piping water supply to deliver sufficient volume and prevent a significant drop in flow at showers and other fixtures is determined primarily by the diameter of the piping.

**P5.** **Water Pressure:** Normal water pressure is between 30 and 80 pounds. Higher pressure can damage pipe fittings, valves, appliances, and fixtures. A regulator is required in new construction to reduce pressures over 80 pounds. If the piping is old and restricted, the addition of a regulator may noticeably reduce the available water flow when fixtures are used simultaneously.

**P6.** **Excessive:** Water pressures over 80 pounds are considered excessive and can cause premature wear and damage the piping, fixtures, and appliances. We recommend a water pressure regulator be installed to lower the pressure to the normal range. High pressure can damage pipe fittings, valves, appliances, and fixtures. A regulator is required in new construction to reduce pressures over 80 pounds. If the piping is old and restricted, the addition of a regulator may noticeably reduce the available water flow when fixtures are used simultaneously.

**P7.** **Has Regulator:** Water pressure regulators are typically installed when the incoming pressure exceeds 80 pounds. The regulator has an adjustment screw to raise or lower the water pressure. Regulators should be on the house side from the main shutoff valve. Modern regulators should have a sand screen to prevent the regulator from becoming clogged. Such screens require routine cleaning to prevent a reduction in available water flow.

**P8.** **Interior Piping Galvanized:** Galvanized steel piping, common in older homes, is prone to rusting and the build-up of minerals that restrict water flow. Water hardness and pipe quality are major factors affecting the useful life of the piping. The need for eventual replacement of galvanized piping should be anticipated.

**P9.** **Polybutylene Supply:** Polybutylene piping was used for a short time as interior supply piping. It is prone to leakage at fittings, and there has been a well-publicized settlement between a pipe manufacturer and consumers. Polybutylene piping with defective fittings is prone to rupture or leakage at any time, and complete replacement may be necessary.

**P10.** **Cross Connections:** A cross connection is an improper plumbing configuration that could allow waste water to enter the supply piping. Cross connections should be eliminated by a qualified plumber.

**P11.** **Unbonded Dielectrics:** Dielectric fittings have plastic or rubber washers to prevent direct contact between copper and galvanized supply piping that can cause the galvanized steel piping to rust. Water supply piping is often used to provide electric grounding for appliances, and the plastic washer in the union breaks the continuous connection necessary for an effective connection. Copper jumper wires should be secured to clamps placed on both sides of the fittings to provide grounding or bonding of the system. The copper jumper wire may still contribute to galvanized pipe corrosion, but is advised for greater electrical safety. The only way to completely eliminate the corrosion potential is to eliminate the galvanized piping.

**P12.** **Hammer — Noise:** Pipes that are not properly secured or supported may vibrate with water flow, creating a rattling sound. Water hammer is caused by the absence of adequate air cushions in the piping. A hammering sound typically occurs when water is shut off at a valve, causing vibrations in loose piping. Additional pipe supports may prevent movement and vibration. The installation of air cushion devices in the water supply piping can also reduce water hammer.

**P13. Direct Copper-Galvanized Connections:** A direct connection between copper and steel piping can cause rusting or corrosion in the galvanized steel piping. The standard procedure is to install a brass pipe, brass fitting, or dielectric union to separate copper from galvanized steel.

**P14. Piping in Concrete:** Concrete should not be poured directly against exposed piping. Movement in the concrete can damage the piping causing leakage. The concrete should be removed and proper separation provided by a qualified contractor.

**P15. Angle Stops:** The shut-off valves at the supply piping to individual fixtures, such as below a sink, are not often operated, and may "freeze" in place or leak when operated. They are not tested in a home inspection.

**P16. Backflow Preventers Needed:** In new construction, backflow preventers are screwed onto each exterior hose bib (faucet) to prevent lawn fertilizer or other undesirable substances from being drawn up a garden hose and into the house water supply system should there be a drop in water pressure, causing a reversal in water flow.

**P17. Exposed PVC:** Plastic piping breaks down from exposure to sunlight and should be wrapped or painted for protection.

**P18. Needs Anti-Siphon Valves:** Anti-siphon valves are designed to prevent outside water from being drawn into the sprinkler heads and into the house water supply system. They are necessary to prevent an accidental cross connection, which could contaminate household drinking water.

**P19. Water Flow at Fixtures:** The interior of older galvanized piping is often restricted by rust or mineral deposits. This restriction reduces the water volume provided to the house fixtures. To repair major flow restriction, it may be necessary to replace all or part of the galvanized piping. It may be sufficient to replace the horizontal hot water piping before going to the extra expense of opening up interior walls to replace the vertical piping within them. It is advisable to install new piping whenever old piping is exposed, such as when new shower walls are installed.

**P20. Water Softener:** The functionality of water treatment systems is not typically included in a home inspection. We suggest testing the water quality to determine if treatment is advisable.

**P21. Improper Softener Drain:** Permanently installed water softeners have a brine drain, which typically functions automatically during the operating cycle of the water softener. The drain tubing should discharge into a plumbing fixture with a proper air break. These are often tapped directly into drain piping or installed in other ways, creating a cross-connection and allowing potential contamination of the supply water.

## Drains and Vents

**P22. Potential Cross Connection:** Plumbing fixtures should be designed to prevent a direct connection between the water supply and waste piping to prevent contamination. This is usually achieved by providing a gap between the sink faucet opening and the sink below.

**P23. Drain Piping Supports: Missing — Broken — Substandard:** Drain piping should be securely supported from the structure, and not simply set on blocks on the soil. Plastic drain pipes require support every four feet. When metal strapping is used to support plastic piping, the piping should be insulated from the strapping to protect it from abrasion and damage.

**P24. Old, Rusty Cast iron Piping:** As old cast iron piping ages, small leaks form, causing rust spots, which eventually lead to piping cracks, leaks, and failure. This condition is not uncommon in the old horizontal pipe runs found in subfloor area crawlspaces of 1930s and older buildings.

**P25. Open Waste Pipe:** The waste pipe system should be air tight to prevent both sewage leaks and the escape of sewer gas into the building.

**P26. Insufficient Fall:** Horizontal waste piping should be installed with a uniform slope of at least one-quarter inch per foot downward towards the drain outlet to allow an adequate discharge of both solid and liquid wastes. This slope can be reduced to one-eighth inch per foot in some installations when approved by the local jurisdiction.

**P27. Trap Improper — Missing:** A trap is a U-shaped drain line required on all plumbing fixtures (except toilets). The trap holds water to block sewer gas, which otherwise could flow up from the main sewer piping into the building. Sewer gas (methane) may have an odor or it may be odorless, and it can be explosive. If a trap is not properly arranged the water can be siphoned out, allowing sewer gas into the building. The horizontal pipe or "arm" should flow downward at a gentle slope (one-quarter inch per foot) to the vertical drain-vent connection.

**P28. Exposed Exterior ABS Piping:** ABS plastic waste piping is designed for interior use only and should not be used at the exterior of a building, where it is exposed to physical damage or to damage from the sun.

**P29. Vent Missing — Improper:** Plumbing vents allow sewer gases to escape and air to enter the waste piping system. Air is necessary to allow water to flow freely through the pipes. Improper venting can cause siphonage that draws the water out of fixture traps. Vent piping should be installed near every fixture. The vent pipes should terminate at least six inches above the roof surface and away from any openable windows or other building openings.

**P30. Plastic Pipes Supporting Metal Pipes:** Plastic piping may not be strong enough to support heavier metal piping such as cast iron or steel, and may crack or leak. The proper method is to place plastic piping above, not below, metal waste piping.

**P31. Cleanout:** A cleanout is a special fitting with a cover that can be removed in order to allow access for a plumber's snake to clear blockages.
Added cleanouts at the building exterior may indicate previous modifications to the waste or sewer piping system or previous blockage in the buried piping. We advise obtaining information on the extent of recent repairs and a history of any previous leaks or blockages.
None Found at Main typically indicates an outdated system where adding a new cleanout is advised to perform routine maintenance or a video camera check of the buried waste piping.
Missing Cleanouts occur when the waste piping is modified or extended by a nonprofessional unaware of the standard requirements for adequate cleanouts where the piping makes a number of turns.

**P32. Rx Add Cleanout:** A cleanout is needed to allow periodic waste piping maintenance and video inspections of buried piping.

**P33. Piping in Concrete:** Movement in the concrete can damage piping unless the piping was wrapped with a flexible material before the concrete was poured. These areas should be checked periodically for movement or leaks, and the concrete removed if necessary to prevent damage to the piping.

**P34. Septic Not Inspected:** A qualified septic specialist should be retained to locate and examine the septic tank, leach lines, and any control valves that may be present in the system. The septic system capacity should be determined or estimated if possible. Tanks typically require cleaning about every five years.

**P35. Potentially Defective ABS Piping:** There has been a history of failure in some batches of certain brands of ABS plastic piping manufactured in 1985 and 1986. These brands include Centaur, Gable, Polaris, Apache, and Phoenix. We recommend ABS piping of these brands and years be monitored periodically for leaks. Additional information can be found on the internet at www.abspipes.com.

**P36. Old Sewer Piping:** Clay tile piping was used in many waste systems installed before 1960 between the building and main sewer. These pipes are buried in the ground and are not accessible to inspection. Clay pipes are easily damaged and can be blocked by tree roots or may crack from soil movement, causing sewage to back up into house plumbing fixtures. Older cast iron or steel waste piping is susceptible to rusting and also may need replacement. If possible, determine if there is any history of clogged drains or waste system repairs. Eventual replacement of old buried waste piping should be anticipated. We advise having old sewer laterals examined for defects by a qualified plumber using special video equipment designed for this purpose.

## Fuel-Energy Source

**P37.** **Gas Shut-Off Valve:** A large wrench should be stored near the main gas valve so the gas can be shut off quickly in an emergency. To shut off the gas, turn the valve 90$^{o}$ so the handle is at a right angle to the pipe. Gas valves are often difficult to turn and the small earthquake wrenches sold at hardware stores may be too small to operate these valves easily. We recommend testing the valve periodically by turning it slightly to see if it moves. A plumber or the local utility company could adjust or lubricate this valve if necessary to allow for easy operation. Automatic seismic gas shutoff valves are now available that are triggered by movement, which will disconnect the gas supply to the building in an earthquake. They usually cost about $500 installed and may eventually become legally required.

**P38.** **Gas Piping Not Protected from Vehicles:** Gas meters and piping in driveways or garages should be protected from vehicles by permanent barriers. Concrete-filled steel poles are often used for this purpose.

**P39.** **Has Seismic Shut-Off:** An automatic seismic gas shutoff valve is a good safety feature. It is designed to be triggered by movement and to disconnect the gas supply to the building in an earthquake. The manual for seismic shutoff devices should be obtained for information on proper maintenance and resetting procedures.

**P40.** **Uncapped Fitting:** Gas valves that are not in use should be capped off to prevent the escape of gas into a room should someone operate the valve.

**P41.** **Improper Union Location:** Unions are a kind of coupling that join threaded piping by pressing metal surfaces against each other. They are approved for gas piping only when adjacent to a meter or appliance and should not be used in other areas, particularly crawlspaces, as they are prone to leakage. Where unions would otherwise be necessary, couplings with left-hand threads can be used.

**P42.** **Underground below Building:** Gas piping should not be installed so that it runs underground or below a concrete slab when the piping is in or below a building.

**P43.** **Unprotected in or near Ground:** Metal gas piping within soil should be wrapped or coated for protection against corrosion. Unprotected piping should be at least six inches from the ground. Gas piping within a slab should have a protective sleeve.

**P44.** **Gas Piping in Concrete:** Concrete should not be poured directly against exposed piping. Movement in the concrete can damage the piping. If this happens, the concrete should be removed and proper protection provided by a qualified contractor.

  

## Water Heater

**W1.** **Laundry:** Special care should be taken to avoid lint accumulation near the water heater. It is especially important to keep fabric and other combustibles well away from the water heater to avoid a potential fire hazard.

**W2.** **Needs Catch Pan:** Water heaters eventually leak with age. A water heater near or above wood-framed flooring should have a sheet metal or plastic pan beneath with a drain to the exterior to prevent damage when leakage occurs.

**W3.** **Insufficient Garage Elevation:** Gas-fired water heaters should not be is installed on a garage floor and should be elevated so the flame is at least 18 inches above the floor. The 18 inches nearest the garage floor are considered a “hazardous zone.” Any source of combustion, such as an open flame or electrical switch, is typically prohibited in this area because gasoline, paint, and other flammable materials are often stored in garages. The 18-inch elevation allows fumes that evaporate from spilled gasoline or other combustible liquid to dilute with air. Most jurisdictions require water heaters, furnaces, clothes dryers, and other such appliances to be installed on platforms of sufficient height to provide adequate clearance.

**W4.** **Vehicle Barrier Needed:** The water heater is not protected from vehicle damage. Water heaters or furnaces installed in garages should be protected from vehicle impact, which could damage the attached fuel piping and result in a fire or serious injury. We recommend an adequate barrier be installed to protect the garage gas piping from vehicle impact. The best protection is concrete-filled steel pipes set into the garage floor.

**W5.** **Platform Substandard:** A weak or poorly constructed platform can fail, causing the water heater to fall, resulting in damage or injury. Sturdy platforms are available at many building supply stores. We recommend a sturdy platform be constructed or provided for safety.

**W6.** **Water Heater Maintenance:** It is important to avoid storing combustible items near water heaters and other gas-fired appliances. The life of a water heater may be extended by periodically removing the sediment that builds up in the tank. Attach a garden hose to the drain valve at the bottom and open the valve until the water runs clear. Drain valves commonly drip, and can be repaired by installing a plastic cap. The temperature adjustment control should be kept in the middle range; the water temperature should never be set hot enough to scald someone accidentally. The life of a water heater may also be extended by replacement of the sacrificial anode. These are generally designed to last only five years, and replacement anodes can be obtained at plumbing supply stores.

**W7.** **Water Hookups Rigid:** This water heater has rigid water supply piping instead of the flexible connectors typically required in new installations. We recommend approved flexible water supply connectors be installed as a safety upgrade. Rigid water supply connections may break during earthquakes.

**W8.** **Bonding:** Most jurisdictions now require water and gas piping to be connected electrically using a copper bonding wire secured to clamps on the piping near the water heater. The purpose is to provide a safe path to the ground for any stray electrical current.

**W9.** **Gas Connector Outdated:** Brass gas connectors, copper tubing, and aluminum tubing are no longer approved for use as they may be subject to damage or gas leakage. We recommend all outdated gas connectors be replaced when the equipment is next serviced. Proper gas connectors are relatively inexpensive.

**W10.** **Gas Connector Rigid:** Rigid piping is more likely to leak or break in an earthquake. We suggest upgrading with modern flexible gas connectors.

**W11.** **Too Short:** The flexible connector between the gas piping and the water heater or other gas appliance should be long enough to allow some movement. Short, tight connectors are susceptible to leakage and should be replaced.

**W12.** **Undersized:** Three-eighths or one-half inch diameter gas connectors may be undersized, reducing the available amount of gas that can reach the appliance. The connector should be the same diameter as the fitting on the appliance.

**W13.** **In Tandem:** Two flexible gas connectors should never be connected in tandem, but should be replaced with a single connector of sufficient length.

  

**W14. Kinked:** Kinked, flexible gas connectors can reduce the flow of gas supply and should be replaced.

**W15. Through Wall — Floor:** Flexible gas connectors should not be routed through floors or walls. These portions should be piped with rigid piping and the flexible connector used only adjacent to the appliance.

**W16. Insulating Blanket:** Insulating blankets can help conserve energy for water heaters in cold locations, such as garages or exterior closets. Blankets should not block the air openings to the burners or draft hood, and should be securely taped. Seismic straps should not be applied over the blanket. Modern water heaters have relatively good interior insulation. Most water heater manufacturers now recommend that blankets not be installed on new water heaters.

**W17. TPR Valve:** A temperature and pressure relief (TPR) valve is a safety valve that releases excess pressure from the water heater in the event the regulator fails. A TPR valve is an important safety device that can prevent a dangerous explosion. TPR valves are required for safety on all water heaters and boilers. The temperature sensor of the TPR valve should extend into the upper portion of the water heater tank. Hot water may occasionally drip or spray from the valve discharge pipe, triggered by changes in water pressure. Leaky valves may fail from encrusted mineral residue, and should be replaced. Most TPR valve manufacturers recommend the valve be tested once a year.

**W18. Pressure Valve:** A pressure relief valve operates only under pressure. Modern water heaters typically require safety valves that respond to both temperature and pressure.

**W19. Has Watts 210:** This water heater is provided with a Watts 210 valve instead of a standard temperature and pressure relief (TPR) valve. A Watts 210 valve shuts off the gas to the heater when the water temperature exceeds $210^{o}$ and does not need discharge piping.

**W20. TPR Discharge:** Temperature pressure relief valves should have discharge piping to carry hot water or steam safely to the exterior. In some building jurisdictions, the discharge piping is permitted to terminate onto the garage floor. Rigid steel, copper, approved aluminum, or special CPVC piping should be used. Other plastic pipe, most aluminum tubing, and flexible tubing are not generally approved. The end of the pipe should point downward and must not be threaded (so that it cannot be capped). The piping must be at least the same diameter as the outlet of the TPR valve (typically three-quarters inch), and should drain by gravity. If the drain runs upward, the pipe can fill with water, causing the valve to malfunction.

**W21. Seismic Restraints:** Adequate water heater strapping or bracing can significantly reduce damage occurring from water heater movement. The best braces are rigid and support the water heater both at the top and the bottom. Plumber's tape is no longer considered an adequate restraint according to the *Guidelines of the California Seismic Safety Commission*. As of January 1, 1996, home sellers in California are required to certify that their water heater complies with current guidelines upon transfer of the property.

**W22. Improper — Outdated Vent Material:** Various materials have been used to vent gas-fired appliances. The earliest were brick or masonry chimneys built on-site. They were followed by tile-lined sheet metal flues (patent flues) and cement asbestos flues (transite). These materials heat up slowly and the low temperature may restrict the upward flow of flue gases. For this reason most manufacturers specify modern galvanized sheet metal vents that terminate above the roof line. Older vent pipes are not recommended with new equipment and may result in corrosion or malfunction. Aluminum and blue or black metal "stove pipe" vent piping is not suitable for modern appliances as it is easily damaged by chemicals in the flue gases. We recommend upgrading to galvanized-steel Type-B double-wall vent piping.

**W23. Duct Tape:** Duct tape is not rated for the high temperatures of vent piping, and can melt or become brittle and loose. Foil tapes rated for high temperatures are approved for vent piping.

**W24. Spillage:** Back venting, also known as "spillage," occurs when normal venting is obstructed by improper configuration, improper vent piping materials, vent blockage, or insufficient combustion air. The flue gases, which contain hazardous byproducts of combustion, can spill from the draft diverter, or draft hood, at water and space heating systems. Spillage may also cause incomplete combustion. This condition is potentially hazardous and should be corrected immediately.

**W25. Remove Foam Insulation:** Plastic foam insulation on water piping will melt if too close to the hot draft diverter or vent piping above the water heater. This insulation should be trimmed or removed to provide adequate clearance.

**W26. Inadequate Clearance:** Single wall metal vent pipes can get very hot and should have at least six inches clearance from combustibles. Double wall metal vent pipes (Type B) can be installed as close as one inch from a combustible surface.

**W27. Insufficient Rise:** Vent connector piping should be installed with at least one-quarter inch per foot of upward slope for fumes to vent property, with no downhill dips in the vent connector. Poor rise can cause flue gas spillage (see item W24 above) and corrosion in the vent piping.

**W28. Improper Horizontal-to-Vertical Ratio:** The vertical length of a vent or flue should be at least one-third longer than the horizontal portion. An excessively long horizontal run can cause poor venting of flue gases and spillage (see item W24 above).

**W29. Improper Termination:** The end, or termination, of a water or space heating system vent should be at least four feet below, or four feet horizontally from, and at least one foot above a doorway or openable window. The cap on the top of a vent pipe should be a material that is listed for this use. Older vent caps often rust and may need replacement. Vents should have adequate clearance from roofing materials. Direct-vent appliances that are rated less than 50,000 BTUs, with vent terminations through a wall, may be located as close as nine inches from a building opening.

**W30. Draft Diverter Improper:** Water heaters are supplied with a draft diverter between the water heater and vent piping to prevent downdraft into the water heater and to allow intake of dilution air to the flue gases. Only a single draft diverter should be used, and it must be the one manufactured for the water heater. Double draft diverters are prone to spillage (see W24). The draft diverter should fit securely over the center of the flue opening on top of the water heater.

**W31. Inadequate Combustion Air:** Inadequate air supply can cause incomplete combustion in a furnace or water heater, and may produce hazardous byproducts of combustion, such as carbon monoxide. A furnace or water heater compartment should have two air openings leading to the outside, one near the floor and the other near the compartment ceiling. Combustion air openings should be screened, except for those terminating in an attic. Screening may require periodic cleaning to prevent blockage from dust buildup. Openings should not be blocked by personal property.

*end of section*

## Heating — Distribution — Air Conditioning

**H1.** **Attic Platform / Protection Needed:** Horizontal furnaces in attics should be placed on noncombustible platforms for safe access and for fire protection. The Consumer Products Safety Commission (www.cpcs.gov) and most furnace manufacturers recommend horizontal attic furnaces be supported on risers to create air space beneath. They also recommend noncombustible cement board or sheet metal be installed, extending at least twelve inches past the firebox or louvered furnace. We recommend the manufacturer's installation specifications be consulted and adequate fire protection surfaces be installed as needed. The installation of an ionization-type smoke detector inside the attic is also advised to provide an early warning of smoke or fire.

**H2.** **Non-Central Heat:** Older buildings in moderate winter areas may be heated by a single heat source, such as a space heater or floor furnace, and the doors to individual rooms must then be left open for the rooms to receive heat. Portable electric heaters are often used to provide heat to unheated bedrooms. Care should be taken to assure the electrical system is adequate to support the electrical load of multiple portable electrical heaters if they are needed.

**H3.** **Gas Heater Safety:** Wall furnaces, floor furnaces, and other gas-fired heaters need regular cleaning and maintenance. These units may not function safely when the burners or grills are obstructed by dust, lint, or personal property. Room heaters can get very hot, and special care should be taken to keep children and combustible items, such as papers and curtains, well away from these potentially hot surfaces. Gas heaters should be routinely inspected for safety by the utility provider or a heating specialist.

**H4.** **Direct Vent:** Direct vent wall furnaces are relatively modern heaters that vent directly through the exterior wall. These heaters are considered safer than other kinds because they draw the air used for combustion directly from the building exterior instead of from the living space as do other heaters. Some heaters of this type have failed prematurely by developing large cracks in the heat exchangers. These cracks could allow fumes to enter the living space. Direct vent wall furnace heat exchangers should be checked periodically. These units can get very hot and special care should be taken to keep children and combustible items well away from them when they are in use.

**H5.** **Floor Furnaces:** Care should be taken to assure the cap over the burner port is in place or fumes can escape into the living space. Floor furnaces should be considered outdated and upgrading to a modern, safer heating system should be considered. Clothing or paper left on or near floor furnaces can ignite easily, creating a potential fire hazard. This equipment should be routinely inspected for safety by the utility provider or heating contractor. Floor furnaces have hot surfaces and barriers may be needed to prevent small children from touching them.

**H6.** **Room — Space Heaters:** Gas room heaters, sometimes called space heaters, are typically outdated and often do not have modern safety features. Replacement of old, outdated gas room, or space heaters, should be considered.

**H7.** **Too Close to Wall — Door:** It is important to assure that doors do not swing so close to gas furnaces or heaters that they create a fire hazard. A door should not swing over the top of a floor furnace, as the heat could cause it to ignite. Walls that are too close can also create a fire hazard and should be checked carefully for signs of heat damage. A qualified heating contractor should be consulted to determine the best methods for achieving a safe installation. Any indications of heat damage or discoloration should be reported immediately to the gas utility company or fire department.

**H8.** **Exposed Heat Exchanger:** Some older wall furnaces have heat exchangers with no protective covers. The exposed heat exchangers get very hot and can start a fire if in contact with or near paper or clothing, or could burn someone who gets too close. We recommend these unsafe units be disconnected and replaced with modern, safer equipment.

**H9.** **Gas Heater in Bedroom:** Some jurisdictions do not permit the installation of older type gas heaters in bedrooms. These furnaces get very hot and can be a fire hazard if combustibles such as fabric are placed nearby. Gas heaters also need air from the room to burn. Any obstruction to the airflow can cause poor combustion and spillage of hazardous fumes into the room. We recommend this unit be disconnected and a safer heat source be provided for this space.

  

**H10. No Disconnect Switch:** Gas-fired furnaces should have a switch to shut off power to the unit so it can be serviced safely.

**H11. No Pilot Safety:** A pilot safety control is an important safety device designed to prevent gas entry into the living space if the flame in a gas heater is extinguished. A pilot safety control-device has a thermocouple and generator that closes the gas valve automatically when no pilot is present. We recommend a pilot safety control valve or a new central heating system be installed.

**H12. Gas Connector Outdated:** Brass gas connectors, copper tubing, and aluminum tubing are no longer approved for use, as they may be subject to damage or gas leakage. We recommend all outdated gas connectors be replaced when the equipment is next serviced. Proper gas connectors are relatively inexpensive.

**H13. Gas Connector Rigid:** Rigid gas supply piping is more likely to leak or break in an earthquake. We recommend installing modern flexible gas connectors to provide a safer connection between the rigid piping and gas appliances.

**H14. Gas Connector Improper — Too Short:** The flexible connector between the gas piping and the heater or other gas appliance should be long enough to allow for some movement. Short, tight connectors are susceptible to leakage and should be replaced.

**H15. Undersized:** Three-eights or one-half diameter gas connectors may be undersized, reducing the available amount of gas that can reach the appliance. The connector should be the same diameter as the fitting on the appliance.

**H16. In Tandem:** Two flexible gas connectors should never be connected in tandem, but should be replaced with a single connector of sufficient length.

**H17. Kinked:** Kinked flexible gas connectors can reduce the flow of gas supply and should be replaced.

**H18. Through Wall — Floor:** Flexible gas connectors should not be routed through floors or walls. These portions should be piped with rigid piping and the flexible connector used only adjacent to the appliance.

**H19. Heat Exchanger:** Fossil-fuel-fired furnaces have metal chambers to enclose the flame and transmit heat to the circulating air. With age and use, cracks or rust holes may develop in heat exchangers. Fumes from the flame then have the potential to enter the air flowing to the living area. Heat exchangers should be carefully examined as part of routine servicing. Only a small portion of the heat exchanger is accessible during a typical home inspection.

**H20. Inadequate Combustion Air:** Inadequate air supply can cause incomplete fuel combustion and may produce hazardous byproducts of combustion, such as carbon monoxide. A furnace or water heater compartment should have two air openings leading to the outside, one near the floor and the other near the compartment ceiling. These openings should provide be at least one square inch of ventilation for each 1,000 BTUs input listed on the appliance rating plate. Combustion air openings should be screened, except for those terminating in an attic. Screening may require periodic cleaning to prevent blockage from dust buildup. Openings should not be blocked by personal property.

**H21. Poor Separation:** A ten-foot separation is typically required between combustion and return air openings to keep vent fumes from being drawn into the circulating air system by the furnace blower. Insufficient separation is a potentially hazardous condition that can deprive a gas appliance of sufficient combustion air.

**H22. Furnace in Closet, Keep Door Closed:** It is important to keep the door closed when a furnace is installed in a closet. The air return blower can cause the vent system to malfunction and spill flue gases into the living area. We recommend the furnace room or compartment door be kept locked or equipped with a self-closing spring. The installation of weather-stripping on the door is also advised and may be required by the local building department. It is also important to avoid using a furnace closet for storage.

**H23. Induced Draft:** Almost all furnaces installed within the last ten years have fan-powered, induced-draft, venting systems. The purpose of the fan is to draw the exhaust fumes through the heat exchanger to increase furnace efficiency. Induced draft furnaces are typically rated in the 80% to 85% efficiency range, and are often referred to as "Plus-80" systems. The heat from burning natural gas and the non-combusted gases or fumes are drawn through tube-like or serpentine heat exchangers, which have a large surface area. The more efficient furnaces tend to operate at higher internal temperatures, and the heat exchangers are exposed to moisture created by natural-gas combustion. These conditions have led to premature heat exchanger failure in some furnaces after only five or ten years of use. These heat exchangers are almost completely inaccessible to inspection without furnace disassembly. We recommend annual inspections of these furnaces be made by a qualified heating contractor. Some manufacturers cover the cost of heat-exchanger replacement and we suggest copies of any warranties be obtained for future reference.

**H24. Condensing:** High-efficiency, condensing-type, induced-draft furnaces provide increased efficiency. These furnaces are typically rated in the 90% and above range, and are often referred to as "Plus-90" systems. The increased efficiencies create lower flue temperatures and allow plastic piping to be used in the venting system. These furnaces also have special piping to carry away the condensate or moisture that accumulates when natural gas burns. The heat from burning natural gas and the non-combusted gases or fumes are drawn through tube-like or serpentine heat exchangers, which have a large surface area. The more efficient furnaces tend to operate at higher internal temperatures and the heat exchangers are exposed to moisture created by natural-gas combustion. These conditions have led to premature heat-exchanger failure in some furnaces after only five or ten years of use. These heat exchangers are almost completely inaccessible to inspection without furnace disassembly. We recommend annual inspections of these furnaces be made by a qualified heating contractor. Some manufacturers cover the cost of heat-exchanger replacement and we suggest copies of any warranties be obtained for future reference.

**H25. Duct Tape:** Duct tape is not rated for the high temperatures of vent piping, and can melt or become brittle and loose. Foil tapes rated for high temperatures are approved for vent piping.

**H26. Spillage:** Back venting, also known as "spillage," occurs when normal venting is obstructed by improper configuration, improper vent piping materials, vent blockage, or insufficient combustion air. The flue gases, which contain hazardous byproducts of combustion, can spill from the draft diverter or draft hood at water and space heating systems. Spillage may also cause incomplete combustion. This condition is potentially hazardous and should be corrected immediately.

**H27. Inadequate Clearance:** Single wall metal vent pipes can get very hot and should have at least six inches clearance from combustibles. Double wall metal vent pipes (Type B) can be installed as close as one inch from a combustible surface.

**H28. Insufficient Rise:** Vent connector piping should be installed with at least one-quarter inch per foot of upward slope for fumes to vent property, with no downhill dips in the vent connector. Poor rise can cause flue gas spillage (see item H24 above) and corrosion in the vent piping.

**H29. Improper Horiz-to-Vert Ratio:** The vertical length of a vent or flue should be at least one-third longer than the horizontal portion. An excessively long horizontal run can cause poor venting of flue gases and spillage.

**H30. Improper Termination:** The end, or termination, of a water or space heating system vent should be at least four feet below, or four feet horizontally from, and at least one foot above a doorway or openable window. The cap on the top of a vent pipe should be a material that is listed for this use. Older vent caps often rust and may need replacement. Vents should have adequate clearance from roofing materials. Direct-vent appliances that are rated less than 50,000 BTUs, with vent terminations through a wall, may be located as close as nine inches from a building opening (see item W29 in the preceding Water Heater section).

**H31. Inducer Deposits:** Many newer furnaces have supplemental inducer fans on the vent (flue) to control the flow of air through the burners and improve the efficiency of the furnace. Mineral deposits may form within the inducer as a result of condensation within the vent piping. This can indicate improper venting. It may be possible to improve venting effectiveness by modifying the piping material or configuration. We recommend inducers be checked annually by a qualified heating contractor.

**H32. Improper — Outdated Vent Material:** Various materials have been used to vent gas-fired appliances. The earliest were brick or masonry chimneys built on-site. They were followed by tile-lined sheet metal flues (patent flues) and cement asbestos flues (transite). These materials heat up slowly and the low temperature may restrict the upward flow of flue gases. For this reason most manufacturers specify modern galvanized sheet metal vents that terminate above the roof line. Older vent pipes are not recommended with new equipment and may result in corrosion or malfunction. Aluminum and blue or black metal “stove pipe” vent piping is not suitable for modern appliances as it is easily damaged by chemicals in the flue gases. We recommend upgrading to galvanized steel Type-B double wall vent piping (see item W22 in the preceding Water Heater section).

**H33. Electric Heater Safety:** Electric wall and baseboard heaters should not be covered by draperies, furnishings, or other items. Proper clearances vary by make and model. We recommend the appropriate owner’s manual be consulted for clearance requirements. Care should be taken to prevent electrical cords from falling into the heaters. In modern construction, electrical outlets are not allowed directly above a baseboard heater. Electric wall or baseboard heaters may have hot surfaces, and barriers may be needed to prevent small children from contacting them.

**H34. Ducting Separations — Gaps:** Separations or gaps in the ducting system can allow heated or conditioned air to escape, significantly reducing efficiency.

**H35. Air Return — Gaps:** Openings in the air return ducting can allow the blower to draw fumes into the ducting, creating a hazardous condition. This ducting should be modified as necessary to provide airtight installation.

**H36. Dark Stains on Ducting Fiberglass:** These stains often indicate leaks in the ducting joints and connections. These leaks can reduce heating system efficiency and can also cause the building to become depressurized leading to poor indoor air-quality. To eliminate this condition, it may be necessary to remove the fiberglass and have the joints taped or sealed with a special mastic or have new ducting installed.

**H37. Air Filters:** Air filters prevent the accumulation of dust and dirt on the blower fan blades, which can significantly reduce efficiency. Air filters should be checked monthly and changed or cleaned, depending on type, as necessary. A clogged air filter can lead to reduced airflow over a furnace heat exchanger, resulting in premature heat exchanger cracking or failure. Some furnace manufacturers prefer that filters not be used on their equipment, as poor filter maintenance is common. Filters are required in air conditioning systems to prevent dust or dirt accumulation on the evaporator coils.

**H38. Filter Cover Missing:** In some furnaces, the filter slides into an opening in the air return duct. Once the filter is in place, the opening in the duct should be sealed with a sheet metal cover. Any openings in the ducting near the furnace can allow the entry of unheated air into the ducting and reduce furnace efficiency. Openings can also lower air pressure near the furnace and cause spillage of flue gases that could then be drawn into the ducting, creating a hazardous condition. Any duct openings should be properly sealed or covered.

**H39. Blower Gaps at Floor:** The bottom of a furnace blower compartment should be air tight. Openings allow unconditioned air to enter the ducting, reducing system efficiency. The airflow can also interfere with proper combustion or venting, creating a hazardous condition. We recommend a metal cover be installed on the floor of the blower compartment or this area be otherwise sealed to prevent air leakage.

**H40. Loose Blower Door:** The blower compartment door should be securely in position to prevent the intake of air from the burners and vent system. If air from these areas is drawn into the blower, there is a potential for improper combustion and the entry of carbon monoxide into the airflow to the building. It may be necessary to fasten the door by taping, or other means, to assure that it stays tightly sealed.

**H41. Have Piping Pressure-Tested:** Slab-encased radiant heat piping should be periodically pressure tested by a qualified contractor to determine if there is any leakage. There is always a potential for undetected leakage in this piping as it is inaccessible.

  

**H42. Heating Adequacy in Habitable Rooms:** Most jurisdictions require that all habitable rooms (not bathrooms) are provided with a permanent heat source capable of maintaining a temperature of $70^{o}$ three feet above the floor. Older buildings in moderate winter areas may be heated by a single heat source, such as a space heater or floor furnace, and the doors to individual rooms must then be left open for them to have heat. Portable electric heaters are often used to provide heat to unheated bedrooms. Care should be taken to assure the electrical system is adequate to support the electrical load of multiple portable electrical heaters if they are needed.

**H43. Split System:** Residential air-conditioning systems are typically equipped with separate indoor and outdoor units called "split systems" with an indoor coil at the furnace and outdoor condenser mounted on a pad outside the home. Split system air conditioners share the same ducting with forced-air furnaces.

**H44. Package Unit:** Air conditioning systems in which both evaporating and condensing coils are located at the exterior in a single sheet-metal box, and which also typically include a gas-fired furnace, are referred to as "package" systems. These units are often placed on the roof and are common in commercial installations.

**H45. Disconnect Not in Sight of Condenser:** The exterior air conditioning condenser should be provided with an electrical disconnect switch within the line of sight from the condenser to provide for safe repair and periodic maintenance.

**H46. Below 65°— Not Operated:** Inspectors, as a rule, do not operate air conditioning systems below $65^{0}$ to prevent damage to the equipment. Specialty contractors with special equipment sometimes may operate A.C. equipment below this temperature during normal servicing.

**H47. Condenser Not Level:** Exterior condensers and compressors for air conditioning systems need to be installed in a level position to prevent excessive wear, inadequate interior lubrication, and premature failure.

**H48. Insufficient Grade Clearance:** Exterior condensers should be mounted on stable platforms or concrete pads that are at least several inches above the adjacent soil level.

**H49. Too Close to Wall — Fence:** Most manufacturers require air conditioning (A.C.) condensers to be installed at least twelve inches (and sometimes 18 inches) away from any wall or fence that can obstruct good airflow necessary for proper cooling.

**H50. Condensate Drain Piping:** A substantial amount of water may flow from the air conditioning evaporator coils that are typically located near the furnace. The discharge piping for this condensate should be sloped and supported in the same manner as any other drain piping. Many modern air conditioning units have a second condensate drain opening that requires a second drain line, especially when installed over wood framing. Condensate drain piping should discharge to a plumbing fixture or a location approved by the local building jurisdiction. Many jurisdictions require a rock-filled pit into which the condensation can seep. The drain should be checked periodically to assure that water flows from it when the air conditioning system is in operation. The absence of water at the condensate drain, commonly caused by clogged or improper piping, may allow water to spill inside the evaporator and damage the equipment.

**H51. Catch Pan Needed:** When an evaporative coil of an air conditioner is installed over a space where water leakage could cause damage to the building (such as an attic installation), a catch pan should be installed beneath it. The catch pan should have a drain pipe to a visible location.

**H52. Temperature Split:** Air coming from the cold air registers that is either too warm or too cold indicates a malfunctioning system. Air condition systems are specifically designed to provide a difference of $14^{o}$ to $21^{o}$ between the air return and air supply registers.

**H53. Servicing and Evaluation:** Heating, ventilating, and air conditioning equipment requires routine servicing for continued safe and efficient operation. Significant defects may be revealed during a thorough evaluation, especially with older systems.

**H54. Do Not Store near Heating Equipment:** The air spaces near heating equipment need to be kept clear or the equipment could be deprived of necessary air. Flammable materials should be kept away from heating equipment.

  

*end of section*

## Interior

**N1.** **Common Cracks:** Wall and ceiling surface cracking is common, especially in older buildings. Periodic repair may be needed as part of routine property maintenance.

**N2.** **Low Ceilings:** Rooms with ceilings lower than seven feet, six inches may not be considered "habitable" by local building departments. Exceptions to the general rule allow for sloping ceilings and low beams. A new, international residential code, or IRC, which is being adopted in many areas, now allows seven-foot ceilings for habitable rooms. The local building department should be consulted to determine its requirements as to proper room ceiling height. Rooms with ceilings that are too low according to local jurisdiction requirements should not be counted as bedrooms in a property description.

**N3.** **Stains:** To determine the presence of active leakage, it may be necessary to observe these areas after heavy rains or to water test using a garden hose. We can water test specific areas for an additional fee upon request.

**N4.** **Mold:** Some people are allergic to molds, and some molds may actually be toxic or hazardous, especially for the very young or people with illness. The presence of visible mold typically indicates excessive interior humidity, moisture entry, and/or insufficient ventilation. Mold growing on hard surfaces such as glass, tile, aluminum window-frames, painted wood, or plaster can usually be removed with soap and water, or with a standard household surface-cleaner. Moldy porous materials, such as sheetrock or gypsum board, fabric, soft furniture, etc., may not be cleanable and may need to be discarded. Surface mold activity, especially on walls, may indicate growth in hidden areas, such as inside walls.

**N5.** **Cathedral Ceiling Unvented:** Enclosed ceilings may need ventilation to prevent moisture accumulation, which can lead to decay in the framing. Most experts now recommend adding vents along the upper and lower roof edges to allow any moisture to escape.

**N6.** **Interiors Recently Painted:** Recently painted interior surfaces may obscure moisture stains or cracks that have been patched. We advise asking previous owners (if applicable) if there has been any previous significant cracking or moisture entry. New cracking will likely occur in patched areas.

**N7.** **Floor Sloping Observed:** Some sloping or unevenness in the floors is not unusual, especially in older homes. Unevenness or sloping in the floors can be caused by several factors, from expansive soils that raise the floors when wet and lower them again in dry weather to soil that is too soft to carry the weight of a portion of the building. In many buildings, the majority of settlement occurs within the first few years. Floor sloping should be monitored periodically, and movement over a period of time may indicate the need for foundation repairs. Recent movement usually indicates the potential for ongoing and future settlement or movement, which will eventually necessitate corrective repairs. We do not perform a detailed survey of the floors for slope or uniform elevation as part of our standard inspection. We can return with special equipment and provide a floor level survey to determine the extent of floor slope for an additional fee upon request.

**N8.** **Below-Grade Floors:** Floors that are below the exterior soil level may be subject to water or moisture entry, especially in rainy weather. It is not unusual to find occasional or unexpected water entry in below-grade areas that have been dry for years.

**N9.** **Low Laundry Chute Door:** Laundry chute openings that are too close to the floor can be hazardous to children and child safety latches should be installed.

**N10.** **Uneven Steps:** Individual steps in staircases should have a consistent height and depth for safe use. The difference between one step and any other step in the same staircase should not be more than three-eighths inch. Uneven steps are a potential trip hazard and should be corrected.

**N11.** **Stair Compartment Not Fire Rated:** The walls and ceilings of enclosed storage areas beneath stairways are typically covered with fire-rated materials in new construction. Openings that have been created in fire-rated surfaces should be repaired. Special care should be made to avoid storing flammable materials in compartments without fire-rated surfaces.

**N12. Stair Railings:** Modern building standards call for railings at least 36-inches high for any deck, stair, or landing more than 30-inches above an adjacent surface, and for openings in the rail to be fewer than four inches in diameter. Large railing openings that may allow a child to fall through should be modified for safety. This standard was recently changed from six inches to four inches, as it was found that small children can slip through a six-inch opening. Staircases with four or more steps should have handrails that are between one and a half and two inches wide. Handrails should be placed and shaped so they can be readily grasped for safety. Handrails should be 34 to 38 inches above the leading edge of the stairway treads. Handrails should return to the railing or post or to the ground. Handrails should not end in a projection that could be hooked by clothing.

**N13. Exposed Metal Gas Vent:** Gas appliance vents get very hot and should be properly enclosed in wall framing, or by other means, to prevent accidental contact with combustible materials or items.

**N14. Exposed Ducting:** Ducting is sometimes routed through closets to provide heating or cooling to new areas. This ducting should be enclosed with framing covered with a finished wall surface.

**N15. Smoke Detectors:** Smoke detectors should be installed on every floor and in hallways near sleeping areas. Most jurisdictions now require that smoke detectors also be installed in each bedroom in new construction. Direct-wired smoke detectors should also have backup batteries, so they will function in a power outage. Smoke detectors should be tested routinely, as they are important safety devices that can save lives. It is good practice to change smoke alarm batteries at least twice a year.

## Windows and Doors

**N16. Wood, Older:** Worn and decayed wood sashes are common in older, pre-1935 homes. Older wood windows tend to stick with time as the building settles and are often painted over, making them inoperable. Rope sash cords that support the windows wear out and break with time. The best time to fix old windows is often just before moving in after buying a home, before furniture gets in the way. Ideally, each old window should be checked by a contractor specializing in wood window repair. Some older worn windows that don't need to be opened can best be left painted shut because they aren't strong enough to operate regularly and will come apart at the joints. The general rule is that bedrooms require a window large enough for escape in a fire, and that all rooms have an openable window to provide sufficient fresh air.

**N17. Jalousie Windows:** Jalousie windows are very good for ventilation, especially in tropical climates. They leak a lot of air in cold weather and should not be used in areas that require heat in winter. They are difficult or impossible to effectively weather-strip and replacement with energy efficient windows should be considered.

**N18. Dual Glazing:** Dual-glazed windows reduce energy loss and noise transmission. A common problem with dual-glazed windows is a failure in the seals that allows moisture entry, and condensation or fog to form between the panes of glass. This condition is often not visible during our inspection and can occur at different times due to changes in temperature. It is possible to have each window tested for seal failure. This determination is beyond the scope of our inspection. The only typically effective repair is window pane replacement. Newer windows may be covered by the manufacturer's warranty.

**N19. Bedroom Emergency Egress:** Basements and sleeping rooms below the fourth story need one escape or rescue window for emergency egress. Most building codes require this to be at least 5.7 square feet in size, at least 24 inches high, at least 20 inches wide, and with a sill not more than 44 inches from the floor. This is a very important safety requirement.

**N20. Security Bars:** We strongly urge that all security bars in bedrooms that do not open easily be removed or replaced with proper openable types. Windows may be the only available escape in a fire. Security bars over escape windows should have release mechanisms. The general rule is that one window in each bedroom must be easily openable from the inside without the use of a key or special tool. We recommend openable security bars be operated periodically by anyone sleeping nearby to be sure they can be opened easily. Inspectors do not normally test these devices as they are often difficult to close once opened.

**N21.** **Untempered Glass:** The general rule for new construction is to require safety glass when fewer than 18 inches from the floor (and larger than nine square feet), when adjacent to a door, or when in a door (unless smaller than three inches in diameter). While there is no requirement to change existing glass, safety glass is recommended for replacement in such areas. Special care should be taken in these areas until safety glass is installed. Furniture can often be arranged to direct traffic away from non-safety glass windows. Applying decals to sliding glass doors and large windows can help prevent accidents caused by persons who may think they are walking through an open door. Special plastic films are available, which can be applied to the glass to reduce the likelihood of injury should the glass break.

**N22.** **Unsquare Frames:** Out-of-square door frames can be caused by foundation settling or movement.

**N23.** **Inside Key Locks:** Deadbolts, and other locks with removable inside keys, can prevent escape in a fire emergency and are prohibited in many jurisdictions. Always leave inside keys in the locks when the building is occupied. Thumb latches are safer and lock replacement should be considered.

**N24.** **Opens over Step(s):** Doors should have a landing at least as long as the width of the door. A door swinging over a step is a potential safety hazard, especially to persons unfamiliar with the door. Many garage and basement stairs have been constructed in this manner before this practice was prohibited. It is sometimes possible to reverse the direction of the door swing or to install a landing and new steps to replace existing steps.

**N25.** **French Doors:** Double or French-type exterior doors have a greater potential for leakage and should be monitored for water entry in wet weather.

**N26.** **Slider Difficult to Operate:** Sliding doors typically roll on small wheels that can wear over time. It may be possible to replace them. Doors that bind may indicate damaged frames or tracks, or distortion of other building components.

*end of section*

## Fireplace

**F1.** **Soft — Missing Mortar:** A common repair method for deteriorated mortar is to repoint the brickwork, where soft mortar is removed and replaced with fire clay mortar. Small mortar cracks can be patched with silicate cement formulated especially for fireplace repairs. A qualified contractor should be retained to determine the appropriate repair method.

**F2.** **Spalling:** Over time, masonry may deteriorate from the effects of moisture and heat, causing the surfaces to crumble. Masonry with significant spalling should be replaced.

**F3.** **Throat Needs Parging:** The "throat" is the area above the firebox. Exposed brickwork, gaps, or damaged plaster in this area can trap soot or combustible creosote, creating a potential fire hazard. The surfaces above most modern masonry fireboxes are covered with special fire-rated plaster called "parging." In many fireplaces the throat is obstructed and is not accessible to inspection. We recommend all old fireboxes and flues be examined carefully by a qualified chimney repair contractor.

**F4.** **Damper:** The purpose of a damper is to block the flow of warm room air up the chimney when the fireplace is not in use. An open flue is comparable to an open window, and will substantially reduce heating-system efficiency. Dampers should be kept closed when fireplaces are not in use. Glass doors can also be used to serve the same function.

**F5.** **Gas Lighter:** Gas lighters should have removable keys that are stored out of the reach of children. The gas valve should not be located inside the fire box except for decorative fireplaces that burn gas and not firewood.

**F6.** **Block Damper Open:** Dampers in fireplaces with gas devices should be kept open. Gas could enter the living space if the valve leaks or is turned on accidentally. Some jurisdictions now require that new dampers have clips to keep them from closing fully when a gas device is present. The safest procedure may be to block the damper open permanently and to install glass doors on the fireplace opening to prevent heat loss when the fireplace is not in use.

**F7.** **Improper Gas Piping in Firebox:** Flexible gas piping should only be used in fireplaces that are designed solely to burn gas. Gas log lighters in wood-burning fireplaces should have rigid piping and the shutoff valves should be located outside the fireboxes. Fireplaces containing imitation or ceramic logs should also have rigid gas piping, as the logs get hot and can fall and damage exposed flexible type gas connectors. Homeowners often remove these ceramic logs and burn wood in the fireplace, using the flame-producing device as a log lighter.

**F8.** **Fireplace May Smoke:** Stains on the fireplace facing may indicate poor draft at the flue due to faulty design or an obstruction, or may have been caused by improper fire building methods. It may be necessary to have the chimney checked by a specialist to determine if it draws properly. Glass doors may improve the draw up the chimney.

**F9.** **Hearth Supported by Wood Framing:** Older hearth extensions (the portion of the hearth that extends into the room) were commonly supported by wood framing that is visible in the subarea. This practice was discontinued in the 1950s. The wood framing may ignite if hot coals or ashes are allowed to spill onto the hearth extension or if these wood supports extend to the area under the fire pit. Removal of the wood support could cause the hearth extension to crack or fall. A qualified fireplace contractor should be contacted to determine how best to support the hearth extension. The support for fireplace hearths above the first floor may not be visually accessible and should be examined by a fireplace specialist.

**F10.** **Insert — Stove:** An insert is a wood-burning stove installed inside a fireplace. A common problem with this installation is the absence of a sheet metal liner inside the masonry flue. The colder masonry flue may cause an accumulation of soot or creosote at the insert connection, creating a potential fire risk. The proper procedure is to run a sheet metal flue pipe completely through the fireplace and chimney, terminating above the roof. To do this, it is usually necessary to remove the damper and portions of the brickwork in the fire box. If the insert is removed, it may be necessary to rebuild the fire box and install a new damper before the fireplace can be safely used. Inserts should be checked annually by a qualified chimney sweep or fireplace contractor.

**F11. Inadequate Clearance:** Fireplaces, stoves, and chimneys require adequate clearance from combustible surfaces for fire safety. The required clearances vary and the manufacturer's specifications or the local building department should be consulted for their requirements. The normal minimum clearance between the front of a fireplace and combustible flooring is 16 inches. Inserts that rest on the hearth extension of the fireplace may require an additional hearth extension.

## Chimney

**F12. Masonry Chimney:** Modern brick or concrete block chimneys are lined with clay tile or concrete sections mortared together. The purpose of the liner is to contain a potential chimney fire. Liners and the mortar that joins them together may deteriorate with age and use, reducing their effectiveness. Flue liners are not typically accessible to visual examination. Tall chimneys that extend above the roof line may need to be braced to prevent movement that can break the mortar, bricks, or liner. Most older masonry fireplaces and chimneys installed before 1970 do not have steel reinforcing and lack the strength or resistance to earthquakes of modern masonry or prefabricated chimneys. Older chimneys may have been subject to multiple seismic events and often have hidden cracks, breaks, damaged flue tiles, and other weaknesses not apparent during a general home inspection. The only way to determine if a fireplace and chimney are safe to use is to have a detailed inspection of the chimney and flue interior by a qualified specialist. We recommend all older chimneys be carefully checked by a qualified chimney contractor before building a fire (or before the close of escrow). Any inaccessible flue may contain a defective flue liner or may even be unlined (see item F22 below).

**F13. Short, May Smoke:** A chimney should terminate at least two feet above any building surface and within ten feet horizontally from the chimney. Proper height is necessary for fire safety and adequate draft. Smoke may enter the room at the fireplace if there are poor draft conditions. Smoking at the fireplace can sometimes be corrected by increasing the height of the chimney or by installing glass doors on the fireplace opening.

**F14. Mortar Deterioration:** The mortar between chimney bricks may become soft from age and moisture penetration. The standard repair method is to repoint the brickwork by scraping away old mortar and replacing it with new. Repointing is best performed by a qualified masonry contractor.

**F15. Settlement:** Settling and differential movement between the chimney and the rest of the building is common in older buildings. Minor settling can cause cracks between the chimney and building exterior, allowing rainwater entry. Substantial settling may open cracks between the firebox and chimney, creating a potential fire hazard. Chimneys that have settled should be checked annually by a qualified chimney contractor to determine if they are safe to use. Small or moderate settling cracks in the firebox or chimney interior may be relatively simple to repair. Larger cracks or substantial settlement may require chimney replacement or removal.

**F16. Chimney Not Pushed:** We did not push the chimney to test for looseness. Older masonry chimneys should be checked by a qualified contractor. Homeowners should be aware that some chimney sweeps (or persons who clean chimneys) are so large and strong they can move almost any older chimney by pushing on it from the roof. Some sweeps actually push on an old chimney so hard that it breaks and then tell the homeowner the chimney is unsafe and needs to be replaced. Some looseness is not uncommon and does not, in itself, indicate a chimney is unsafe. All chimneys should be checked periodically by a qualified contractor.

**F17. Chimney Pushed, OK:** We applied moderate pressure on the chimney and observed no looseness or movement. Homeowners should be aware that some chimney sweeps (or persons who clean chimneys) are so large and strong that they can move almost any older chimney by pushing on it from the roof. Some sweeps will actually push on an old chimney so hard that it will break and then they tell the homeowner the chimney is unsafe and needs to be replaced. Some looseness is not uncommon and does not in itself indicate a chimney is unsafe. All chimneys should be checked periodically by a qualified contractor.

**F18. Minor Movement:** There appears to be some minor looseness in the above-roof portion of the chimney. The chimney may have been damaged in an earthquake. We recommend the chimney be examined by a qualified contractor.

**F19. Loose above Roof:** We observed looseness in the portion of the chimney that extends above the roof. Loose chimneys can pose a seismic or fire-safety hazard. We recommend the chimney be examined by a qualified contractor and braced, reinforced, or replaced as needed.

  

**F20.** **May Need Bracing:** Chimneys that extend well above the roof surface may need bracing to prevent damage or failure in an earthquake. The installation of steel bracing can reduce the potential for property damage or injury. Such bracing should be designed to prevent movement in all directions and conform with local ordinances. Modern chimneys are typically tied to the ceiling framing. These connections are usually not visually accessible.

**F21.** **Concrete — Pumice Liner:** Flue liners manufactured of concrete or pumice are more porous than traditional terra-cotta flue liners, and may absorb creosote. These flues must be cleaned more frequently than terracotta flues. Over time, this material can absorb enough creosote to become unsafe. Care should be taken to avoid burning soft woods, which burn dirty, and to avoid excessively hot fires. Porous flue liners are no longer approved in new construction.

**F22.** **No Liner:** Unlined flues may not be safe to use and should be checked by a qualified contractor. Some jurisdictions allow the installation of a sheet metal or concrete liner inside existing unlined flues, and others may require chimney replacement. An unlined flue indicates the chimney was constructed without reinforcement, and the risk of damage during earthquakes is greater than with modern reinforced chimneys.

**F23.** **Flue Liner Damaged:** An excessively worn or damaged flue liner could be hazardous if a chimney fire were to occur. The ceramic tile sections lining masonry chimneys are mostly inaccessible to normal visual inspection. Some fireplace contractors have special video equipment and are able to inspect flue interiors.

**F24.** **Mortar Cap Worn, Damaged, Missing:** Mortar is typically applied at the top of masonry chimneys to form a transition between the flue liner and the surrounding brickwork. The mortar cap is designed to shed rainwater and prevent water entry into the brickwork at the top. Cracks often form in this mortar and should be caulked or patched with mortar. Loose or damaged mortar should be replaced.

**F25.** **Metal Cap Embedded in Stucco:** The bottom edge of the metal chimney cap should terminate in a drip edge that is not buried in the stucco below to prevent water entry to the wood framing behind the stucco.

**F26.** **Rain Cap and Screen:** A proper rain cap and spark arrester screen should be provided for each fireplace flue to prevent water entry. Water entry can damage the fireplace or chimney masonry. A screen will prevent the escape of flaming embers, which can be a fire hazard. Manufactured rain cap spark arresters are available in building supply stores or can be installed by a qualified chimney sweep.

**F27.** **Screen Improper:** Sparks escaping from a chimney are a potential fire hazard. Spark arrester screening must be corrosion-resistant and should have a mesh between three-eights and one-half inch, and the overall area of the screen should be at least four times that of the chimney opening. This means the screen must be an extension of the sides of the flue, and not simply rest on top of the flue, or be inserted within flue.

**F28.** **Has Shroud:** A decorative sheet metal cover over a prefabricated chimney top or shroud is installed to hide the termination provided by the fireplace manufacturer. There have been instances where fires have occurred due to overheating in these shrouds. The chimney top should be checked regularly for soot accumulation or indications of excessive heat. The fireplace manufacturer can be contacted to determine what type of cap or cover is safe for this particular fireplace and chimney.

*end of section*

## Bathroom

**B1.** **Needs Grout — Caulking:** Bathroom fixtures and connections need periodic caulking to prevent water entry and damage, including bathtub and shower valves, the base of the toilet, floor-tub and floor-shower base connections, and other areas where moisture can enter and cause damage. These surfaces should be carefully cleaned and old, poor quality caulking removed if necessary before new high-quality bathroom-grade caulking is applied.

**B2.** **Low Window:** Shower windows should be installed so the sill is above the showerhead. Lower windows require special care to prevent water entry and damage from the shower spray. Low windows should be periodically caulked and/or painted if necessary to prevent water entry and damage. Windows fewer than five feet above the shower pan or tub should be provided with tempered safety glass. One method to reduce water entry is to install a vinyl curtain over the window.

**B3.** **Escutcheons:** Escutcheons are round doughnut-shaped metal rings used to seal the connections between showerheads or faucets and the wall surface. Escutcheons often loosen and need periodic adjustment and caulking.

**B4.** **Loose in Wall, Showerhead, Valve, Spout:** Shower fixtures should be firmly secured to the framing inside the wall before the surface is installed. We often find these fixtures are loose, either because they were not properly installed, or because they have come loose with time. It is especially important to keep loose fixtures well caulked or sealed where they are attached to the shower wall surface to prevent water entry and wall damage. It may be necessary to open up the wall to expose the framing in order to properly secure these fixtures.

**B5.** **Noticeable Drop in Water Flow:** A reduction in water flow at the shower when other valves are operated at the same time may indicate low water volume from obstructions in older galvanized piping or may indicate a clogged showerhead.

**B6.** **Apparently Untempered:** Tempered glass has been required in shower stalls and enclosures since the late 1960s. Older tempered glass was not always identified with a label etched in the corner of the glass. Tempered glass labels are often very faint or obscured by soap film. Many untempered shower doors were installed even after the requirements for tempered glass went into effect. Untempered shower doors, enclosures, and windows should be replaced with modern tempered glass for safety. Wire-reinforced glass is not a substitute for safety glass.

**B7.** **Cracked Sink:** Cracks in china sinks usually increase in time, eventually necessitating replacement. Cast polymer sinks (cultured marble or onyx) develop unsightly cracks in the bowl around the drain opening, sometimes called “heat shock cracks,” which may be caused by the effects of hot water. These cracks typically increase with time and exposure.

**B8.** **Flex Plastic Supplies:** We have observed that flexible plastic connectors or tubing, commonly used to connect sinks and toilets to the water supply piping, tend to swell with time and some eventually leak or actually burst, causing water damage. We advise upgrading these connections by installing metal sheathed “burst-proof” type flexible connectors.

**B9.** **Flexible Drain:** Corrugated drainage connectors are often installed by non-professionals to form drain traps or fixture tail pieces. These materials do not have smooth interior waterways and they collect sludge. They are not approved and should be replaced with conventional drainage fittings and materials.

**B10.** **Slow To Drain:** The drain piping appears to be clogged and should be cleared. If this condition occurs regularly, it may be necessary to have the waste piping checked by a qualified plumber.

**B11.** **Toilet Loose:** A loose toilet can cause water leakage and damage to the flooring. The seal at the base of the toilet also prevents entry of sewer gas (methane) into the living area. To reset a loose toilet, first disconnect the water supply, flush the toilet, and then remove the nuts from the bolts at the toilet base. Tilt the toilet and pour the water trapped in the toilet into a bucket, turn the toilet over and expose the wax seal at its base. Remove the old wax seal and install a new one. Before resetting the toilet, examine the flooring for damage, and repair if needed. Then, rest the toilet on the bolts, and tighten these carefully to avoid cracking the base. The toilet base and floor connection should be caulked with a bathroom grade sealant.

  

**B12. Insufficient Clearance:** Modern building standards require two feet of clearance in front of a toilet, and the center line of the toilet be at least 15 inches from the wall at each side (an alcove for a toilet must be at least 30 inches wide). Older bathrooms often do not have these clearances.

**B13. Fill Valve Submerged:** The ballcock valve (fill valve) within the toilet tank should be above the water level of the tank. This is required to prevent potential siphoning and cross connections. Many unapproved valves are available that are designed to be submerged. Such valves should be replaced. They are relatively inexpensive and simple to replace.

**B14. Carpeted:** The area below bathroom carpets is not typically accessible to inspection. Carpets can trap moisture below, causing decay in the subfloor framing. Special care is necessary to avoid spilling water on carpeted bathroom floors.

**B15. Vinyl-Lino:** Vinyl is a synthetic flooring material and linoleum is made of natural resins and other materials. These materials can be laid flat, coved, or installed in squares or tiles. Moisture entry beneath the flooring can cause the underlayment to become discolored or to swell. This condition can usually be repaired by caulking all joints or seams where water can enter. Major swelling may indicate damage to the subfloor or framing below and the need for repairs, as well as floor surface replacement.

**B16. Electric Heater Hazardous:** Outdated bathroom electric wall heaters may not meet modern safety standards. Many are not electrically grounded and many old heaters have exposed heating elements, which can be a fire hazard. We suggest old, outdated electric heaters be disconnected, replaced, or removed. Heating is commonly provided for bathrooms in new construction, but it is not required by many building jurisdictions.

**B17. Metal Light Fixture or Fan in Shower:** Metal light fixtures or fan enclosures inside a shower have the potential to be a shock hazard, and are required to be on a GFCI-protected circuit. Most such fixtures in older construction are not adequately protected, and their replacement is advised. Modern fixtures typically have only plastic exposed external parts.

**B18. Reachable Switch:** Switches that can be easily reached from a tub or shower can be hazardous, especially if worn or defective. Such switches should be relocated, ideally at least four or five feet away. Installing GFCI protection on the circuit that provides power to this switch could also provide a safer installation.

**B19. Outlet on Fixture:** Bathroom light fixtures equipped with outlets are not permitted in new construction. We recommend any fixture outlets be disconnected and proper three-hole GFCI-protected outlets be installed as necessary.

**B20. No Outlet:** Each bathroom should be provided with at least one receptacle for convenience. This outlet should be the GFCI-protected type.

**B21. 2-Hole Only:** Two-hole receptacles do not have a separate ground wire and are not considered as safe as modern grounded three-hole receptacles. The easiest way to upgrade two-hole bathroom outlets is to replace them with GFCI receptacles, which can be installed in ungrounded outlet boxes because the ground fault safety device provides a higher level of protection from shock.

## Kitchen

**K1.** **Exhaust Fan:** A damaged, missing, or greasy exhaust fan screen can be a fire hazard. We recommend screens be cleaned periodically along with the fan motor and vent pipe above, if necessary. Damaged screens should be replaced.

**K2.** **Unducted Fan:** Newer exhaust fans are often unducted and are not connected to the exterior. The fan returns the filtered air back into the living space.

**K3.** **Door Spring Defective:** Dishwasher doors can be very heavy and require a strong spring to keep them from falling and causing injury. Washer doors that fall open easily usually need a new spring installed.

**K4.** **Air Gap:** Air gap devices are required for dishwashers to assure separation between disposer or sink waste water and the dishwasher. An air gap is typically mounted in a hole on the sink, and has flexible hoses that run to both the dishwasher and the disposer (or sink drain pipe if there is no disposer).

**K5.** **Disposer Wiring Loose:** The disposer power cord should be firmly clamped to the base of the disposer. This clamp is often left off, creating a hazardous condition where the cord could be easily pulled out, exposing the “hot” end.

**K6.** **Romex Wiring:** Romex wiring (non-metallic sheathed cable) has a solid copper wire and is not suitable for use as an appliance cord. A standard appliance cord is flexible and will not break with repeated movement.

**K7.** **Switch Location Hazardous:** Disposer switches should not be placed on the front of a cabinet as they can be reached by children or turned on accidentally. A preferred location is above the countertop or behind a cabinet door.

**K8.** **Batch Feed Type:** Batch feed disposers can only be operated by closing the opening to the disposer using a special cover that has a built-in switch mechanism. Batch feeds are considered safer because they will not run until the opening is covered.

**K9.** **Flex Plastic Supplies:** We have observed that flexible plastic connectors or tubing, commonly used to connect sinks and toilets to the water supply piping, tend to swell with time and some eventually leak or actually burst, causing water damage. We advise upgrading these connections by installing metal-sheathed “burst-proof” type flexible connectors (see item B8 in the preceding Bathroom section).

**K10.** **Flexible Drain:** Corrugated drainage connectors are often installed by non-professionals to form drain traps or fixture tailpieces. These materials do not have smooth interior waterways and they collect sludge. They are not approved and should be replaced with conventional drainage fittings and materials (see item B9 in the preceding Bathroom section).

**K11.** **Trap Seal Too Deep:** The sink trap is too deep and may not function properly. We recommend a proper trap be installed by a qualified plumber. The general rule is the seal, or water-filled portion of the trap, should be no more than four inches deep.

**K12.** **GFCI Protection:** Ground fault circuit interrupters are breakers or receptacle outlets designed to protect against electrical shocks. In recent years, most jurisdictions have required ground fault protection for outlets in bathrooms, exteriors, basements, and garages (except those in designated appliance locations, such as for laundry equipment). Recent regulations also require GFCI breakers for kitchen countertop outlets within six feet of a sink and for wet bars. A single GFCI receptacle may be used to protect other outlets downstream from it on the same circuit. GFCI outlets and breakers have test buttons that should be operated periodically to assure the devices are functioning properly (E63).

**K13.** **Ungrounded 3-Hole Outlets:** Also known as an “open ground,” this defect is common in older buildings and typically occurs when two-hole outlets are replaced with three-hole types without adding a grounding wire. Properly installed three-hole outlets have a third grounding wire and are necessary for appliances with three-prong plugs. Using a three-prong plug in an ungrounded three-hole outlet is potentially hazardous. The accepted means of correcting this condition include replacement with a two-hole receptacle, installation of a proper grounding wire to the outlet, or replacement with a GFCI receptacle (see item E64 in the preceding Electrical section).

**K14.** **Insufficient Outlets:** Appliances, such as refrigerators, computers, microwave ovens, and clothes washers, typically have three-prong plugs and need conveniently placed three-hole grounded outlets. Modern kitchens require receptacles every four feet along countertops and within 24 inches of the kitchen sink. Each individual countertop area should have at least one receptacle.

**K15.** **Light Flickers:** Kitchen lights may dim when appliances are operated. Appliances and lights should be provided with separate circuits. Rewiring by an electrician may be necessary to eliminate this condition.

  

## Laundry

**L1.** **Vinyl — Flexible Dryer Vent Piping:** Flexible clothes dryer vent piping should be used only between the dryer and the wall or floor connection. Only smooth-wall metal vent piping is approved for attic or crawlspace use. Flexible piping can collect lint, which may obstruct airflow and cause overheating.

**L2.** **Dryer Vent Terminates in Subfloor Area:** It is not unusual to find clothes dryers that have been improperly vented directly into a subfloor area. Smooth-wall dryer vent-piping should be installed so it terminates outside the building at a proper weatherhead to prevent lint and moisture accumulation in the subarea.

**L3.** **Not Tested:** We did not test the dryer vent to determine if air flows to the exterior. We recommend airflow at the exterior vent weatherhead be checked before using it to dry clothing.

**L4.** **Dryer Vent Flows Upward:** Dryer vent piping that rises vertically upward may be conducive to lint accumulation and clogging. This vent should be checked regularly, as a clogged dryer vent can be a fire hazard. Ideally, the vent should be rerouted to flow in a more horizontal direction.

**L5.** **Too Long:** The clothes dryer vent piping is too long and may reduce dryer efficiency or possibly accumulate lint, creating a fire hazard. We recommend proper dryer vent piping be installed. The general rule for dryer venting is the piping should be no longer than 14 feet with a maximum of two $90^{o}$ bends. For each extra $90^{o}$, the length must be reduced by two feet. The manufacturer's instructions should be reviewed and implemented if different from the standard rule.

**L6.** **Gas Connector Outdated:** Brass gas connectors, copper tubing, and aluminum tubing are no longer approved for use, as they may be subject to damage or gas leakage. We recommend all outdated gas connectors be replaced when the equipment is next serviced. Proper gas connectors are relatively inexpensive (see item H11 in the preceding Heating section).

**L7.** **Improper Drain Piping:** The clothes washer waste water piping should be installed so the trap is located above the floor level. The vertical stand pipe should be between 18 and 30 inches in length. There should be a vent connection on the waste piping past the trap. The trap and vent piping are often not accessible to inspection. Older laundry drain pipes are typically one and one-half inches in diameter. Two-inch piping is required in new construction to provide adequate capacity.

**L8.** **Add Catch Pan and Drain:** Washers over wood flooring or on the second floor may leak and cause damage. Washers in such locations should be provided with a catch pan that has a drain pipe.

**L9.** **1½-Inch Drain:** Older clothes washer drain lines are often one and one-half inches in diameter and can only carry nine gallons per minute maximum. Some new washers discharge up to thirteen gallons per minute. If a new washer is installed, it may be necessary to install a two-inch drain line with a 15 gallon per minute capacity. A determination of waste piping adequacy is beyond the scope of this inspection.

**L10.** **Needs No-Burst Connectors:** The black rubber hoses that are often used to connect clothes washers to the water supply piping may weaken with age and fail. We advise upgrading to metal-sheathed "burst-proof" hoses to prevent leaks from broken hoses, which can cause substantial damage in a home.

**L11.** **Flexible Drain:** Corrugated drainage connectors are often installed by non-professionals to form drain traps or fixture tailpieces. These materials do not have smooth interior waterways and they collect sludge. They are not approved and should be replaced with conventional drainage fittings and materials

**L12.** **Gas-Fired Water Heater Nearby — Caution!:** When a water heater is located near the laundry equipment, special care is needed to avoid lint accumulation. It is especially important to keep fabric and other combustibles well away from the water heater to avoid a potential fire hazard.

**Wet Bar:** Please refer to entries in the Kitchen section starting on page 59.

*end of section*

## Garage

**G1. Protective Barrier Needed:** Gas meters and piping, water heaters, furnaces, or other appliances permanently installed in garages need protection from vehicle impact, which could damage the fuel piping or appliances. A wheel curb offers some protection. The best protection is concrete-filled steel pipes set into the garage floor.

**G2. Remove Firewood:** Firewood should be stored well away from the building for fire safety and to prevent infestation by termites or other wood-destroying insects, which are often present in firewood.

**G3. Not 18 Inches from Floor:** The bottom 18 inches of a garage near the floor is considered a "hazardous zone." Any source of combustion, such as an open flame, electrical switch, or motor, is prohibited in this area as gasoline, paints, and other flammable materials are often stored in garages. The 18-inch rule allows fumes from a spilled fluid to dilute with air. Water heaters, furnaces, clothes dryers, or other such appliances should be installed on platforms of sufficient height to provide adequate clearance. The lower portions of rooms adjacent to the garage should also be considered part of this "hazardous zone," unless they are separated from the garage by a very tight fitting self-closing door.

**G4. On Floor in Room Adjacent to Garage:** Gas-fired appliances, especially water heaters and furnaces, located in a room adjacent to or below the garage can present a hazard if gasoline, paint thinner, or other fuel commonly stored in garages is spilled near the door. The door should be carefully weather-stripped and/or the appliances should be elevated 18 inches (see the item above).

**G5. Non-Safety Springs:** Modern garage door springs are provided with safety retainers to keep the springs from flying loose and causing damage or injury if they break. We recommend older springs without retainers be replaced with the new safety-type or properly secured cables be installed to retain older springs.

**G6. No Auto Reverse:** Automatic garage doors should be provided with an automatic return mechanism that reverses the door automatically when its downward path is obstructed. Many older openers are not provided with this safety feature. Modern openers have photo-electric sensors for added automatic-reversal protection, and these sensors can be installed on older openers to upgrade them to modern safety standards.

**G7. Room over Garage Extension:** A room extending over a garage may experience structural failure in an earthquake, particularly if the opening of the garage doors does not line up with other walls of the building. This situation is commonly referred to as a "soft story." A qualified engineer should be consulted about reinforcing this area.

**G8. Faulty — Marginal Grade:** A faulty grade, where the exterior soil level is above the top of the concrete or masonry foundation, can allow moisture penetration, leading to decay and termite infestation. The standard in new construction is for the top of the foundation to be at least six inches above the soil level. Removal of soil adjacent to the foundation can eliminate a faulty grade condition, but it may also direct surface water toward the foundation. Typical repair methods include a concrete cap on top of the foundation to raise it above the exterior soil level, a concrete curb outside the foundation to act as a moisture barrier, or a low concrete or wood retaining wall to hold soil away from the foundation. A qualified contractor should be consulted as to the appropriate repair method (see item X61 in the preceding Grading and Drainage section).

**G9. Wood-Soil Contact:** Adequate clearance between soil and wood siding (typically six inches in new construction) should be maintained to prevent moisture or insect damage to wood siding and framing. It is important to avoid raising the soil level too close to the siding when gardening adjacent to the structure, and soils should slope away from the building. Fence posts should be separated from wood siding by an air space or flashing. Areas of potential wood-soil contact should be checked periodically as part of routine maintenance (see item X30 in the preceding Exterior section).

**G10. Fire Separation Walls — Ceilings:** The surfaces between the garage and house should be covered with five-eighths-inch thick fire-rated gypsum drywall or equivalent. The joints between sections of drywall should be taped unless the joints are over framing. Any holes or openings in fire walls should be repaired. Plastic piping should not be installed through a fire wall as it can melt from high heat and allow fire entry. Fire-rated surfaces might not be present between the house and garage in older construction. Garages that are attached to residences and do not have adequate fire-wall protection should not be used for storing flammable liquids or vehicles. Fires often start in garages due to the storage of flammable liquids such as paint, solvents, or gasoline.

**G11. Soft Flexible Ducting:** Flexible furnace ducting can burn easily in a fire, and allow smoke and flames to enter the living spaces. Proper garage ducting has either a special fire-damper installed in the house wall duct (expensive and not common in residences) or only utilize rigid, fire-rated ducting.

**G12. Fire Doors:** There should be a fire-rated, solid-core, self-closing door installed on any passageway between the garage and the house, attic, or subarea crawlspaces. We recommend upgrading for greater fire safety. Such doors should not have windows or pet doors. Sheet metal on the garage side of a door will provide some fire protection, but should not be considered adequate by modern standards.

## Environmental

**Z1. Presumed Asbestos:** Many materials are commonly known to contain, or consist primarily of, asbestos fibers. We refer to these as “presumed asbestos,” as there is little doubt that they actually contain asbestos. Other potential asbestos materials may contain asbestos that can only be determined by laboratory analysis. Asbestos is found on most gas heating systems installed before 1978. Exposure to asbestos may be a health hazard and should be avoided. It may be possible to significantly reduce or eliminate the dispersal of asbestos fibers by painting the material. Removal or containment of these materials should only be done by properly trained and equipped professionals. Contractors in various trades such as flooring, roofing, heating, plumbing, or electrical may require asbestos abatement at additional expense prior to performing repairs, replacements, or modifications. For a determination as to the need for, or costs of abatement, a qualified asbestos abatement contractor should be retained. The presence of asbestos can only be determined by laboratory analysis, which is beyond the scope of our inspection.

**Z2. Apparent Mold — Fungus Activity:** Damp, poorly ventilated areas can allow the growth of organisms that create musty odors or even in some cases toxic molds. A qualified specialist in mold detection and remediation should be consulted to determine appropriate methods to correct these conditions. A determination as to the presence or toxicity of specific mold species is beyond the scope of a standard home inspection. We can return to this site to collect mold samples for laboratory analysis upon request for an additional fee.

**Z3. Indications of Possible Buried Fuel Oil Tank:** Buried fuel oil tanks have unusual piping that, when observed, usually indicates that either a tank is present or that one has been removed and the piping left in place (not likely). A determination as to the presence or condition of a buried tank is beyond the scope of a home inspection. Removal of such tanks and soil testing may be required at some time by environmental health agencies. For information on local requirements, the County Department of Health and the local fire marshal should be contacted. A qualified contractor should be retained to determine if a buried oil tank is present and to perform any remedial measures required by local jurisdiction.

**Z4. Hazardous Materials:** Various potentially hazardous materials have been used in the construction of buildings over the years. Many naturally occurring materials and man-made building materials have been found to be hazardous or to have adverse environmental impact. These include but are not limited to asbestos, formaldehyde, lead paint, electromagnetic radiation, and radon. Buried fuel tanks may pose an environmental hazard. Hazardous materials, product liability, and environmental hazards are not included in the scope of our inspection. For information on hazardous materials, call the Environmental Protection Agency in San Francisco at 415-744-1500.

**Half Bathroom:** Please refer to entries in the Bathroom section starting on page 57.

  