

Gutter Management

A gutter system helps protect against excessive moisture, but only if it is properly designed and maintained.

- Overhangs should be at least 18 inches wide. Drip edge flashing should be installed at the roof edge.
- Gutters should be cleaned, inspected, and repaired regularly.
- Downspout to drainpipe systems are preferred for removing rain water from the gutters. Make certain they are clear of debris. Splash blocks are not recommended as they release water too close to the home.
- Clay tile or flexible pipe should be used to conduct gutter water underground to a suitable release outlet at least 10 feet downhill and away from the house.
- Suitable release sites from downspout drainage systems are storm water drains, dry wells, or surface outlets.

Landscape Planting

Landscaping can add beauty and value to your home as long as you plan ahead to avoid moisture problems.

- Landscape plants should not block free air flow through the crawl space vents.
- Plants should be placed beyond the drip edge of the roof, and foliage should be at least 5 feet from the foundation.
- Finished planting beds and mulches should be lower than the ground level in the crawl space and should slope away from the house.
- Keep any organic mulch or ground cover at least 12 inches away from the foundation.

Crawl Space Grading

- Crawl space grade should be higher than outside surface grade.
- Maintain an 18-inch minimum clearance from the bottom of joists to the soil surface, preferably 2 to 3 feet.
- CABO (Council of American Building Officials) Building Code requires that outside surface grade away from the foundation will

fall a minimum of 6 inches within the first 10 feet.

- Vent wells should be used if foundation vents are partially or fully below exterior grade.

Sump Pumps

- Install a sump pump only in extreme cases where drainage is too difficult or would cost too much to correct.
- Locate the sump pump at the lowest point in a basement or crawl space.
- Sump water must be discharged into a storm drain, dry well, or a surface outlet.

Insulating Heating and Cooling Ducts

- Insulate exposed heating and cooling ducts (likewise hot and cold water pipes) to at least R-6. This will prevent condensation that could wet the surrounding insulation. Wet insulation holds water next to structural parts of a house, which over time promotes wood decay.
- If you use central air conditioning over long periods of time, check for air leaks at joints in the duct work, which may cause ducts to “sweat.” Repair any leaks.
- Properly sealed ducts should all be insulated to R-6. This amount can be doubled to R-11 if only the outer layer of insulation is backed with a vapor barrier.

Controlling Moisture in the Crawl Space*

- Leave foundation vents fully open year round unless they must be closed in winter to prevent frozen water pipes. A better solution is to insulate water pipes to prevent freezing.
- CABO Building Code specifies ventilation openings of not less than 1 square foot for each 150 square feet of crawl space area.

*Currently, there is considerable debate in the building science community about the use of crawl space and attic ventilation. The guidelines presented in this publication are 1998 recommended practices for crawl space and attic ventilation.

There are exceptions to this rule, however. Ventilation openings may be reduced to 1/1,500 of under-floor area where the ground surface is treated with a vapor barrier and one ventilation opening is within 3 feet of each corner of the building. Review the CABO Building Code for other exceptions. You can get a copy of the building code from the North Carolina Department of Insurance.

- Vents should not be obstructed by duct work, items stored in the crawl space, or landscape plants.
- Cover the crawl space with 6 mil polyethylene to keep soil moisture from vaporizing and reaching the wood substructure.
- Floor insulation should be installed with the vapor barrier against the subfloor.

Other Sources of Moisture

- All dryer vent systems must be vented to the outdoors. Do not vent clothes dryers into basements, crawl spaces, or attics.
- Bathrooms, kitchens, and laundry rooms should be fitted with exhaust fans that vent moisture-laden air to the outside, not into attics or wall voids.
- Kerosene heaters, gas logs, and other combustible appliances should be vented to the outside, too, because they produce water vapor as a byproduct of combustion.
- Plumbing, both in the living area of the house and underneath in the crawl space or basement, should be inspected regularly for leaks.
- Pipe condensation from air conditioning units away from the foundation, and release it where it will run downhill away from the house.
- The moisture level in the home should fall within 25 to 50 percent. A hygrometer may be used to help monitor the relative humidity in a home. Use ventilation to control relative humidity. If ventilation fails to reduce humidity, a dehumidifier can be used.

Managing Rainwater Without Gutters

- Drip edge flashing should always be installed at the roof edge, even when gutters are used.
- Overhangs should be at least 30 inches wide to protect siding from rainfall and to keep roof water away from the foundation.
- To control back splash, the ground surface underneath the roof edge should be covered with gravel or some other ground cover that will absorb the runoff rain water and reduce the splash.
- Porches, patios, or decks should slope away from the house to promote good drainage.

Flashing

Flashing is sheet metal or plastic that is used to cover joints and openings and protect against water seepage.

- Drip edge flashing should be applied to all roof edges and the tops of all exposed windows and doors.
- Flashing should be installed wherever roofing meets siding. Siding should be cut short of the roofing shingles by approximately 1 inch, and any cut wood edges sealed against water entry.
- Joints in siding materials should be flashed, or the ends of the wood treated with a water repellent preservative to prevent water entry.
- Include flashing underneath all exterior doors and windows.
- Flash the top of foundation walls to prevent water from wicking up through the foundation block and wetting the wood in the substructure.
- Prefabricated chimneys should have a cap of flashing that extends several inches down on all sides.

Attic Ventilation*

- Soffit vents should be installed in combination with at least one other vent at the top of the roof. A combination continuous soffit and continuous ridge vent is preferred.
- Items stored in the attic should not interfere with cross-ventilation.
- Insulation must extend over the top plate of the wall and be fitted tightly to the top plate. Make certain that attic insulation does not block soffit vents. Use baffles to keep insulation from obstructing ventilation.

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Wood and Soil Contact

- Untreated wood siding should never be closer than 6 inches from the soil or mulch surface.
- Untreated wood, such as sills, joists, plates, etc., should be no closer than 8 inches from the surface of the soil or mulch.
- All pressure-treated wood is not the same. When pressure-treated wood is used, choose the proper retention level or exposure condition: above ground, ground contact, wood foundation, or salt water.
- Wooden stairs and decks and all other exposed wood should be built of the appropriate pressure-treated wood and sealed with a water repellent preservative or semi-transparent oil-based stain.

Adapted from

Redmann, L.L. and Rowe, R. (1991). *The Billion Dollar Thief: Moisture*, Cooperative Extension Service of Clemson University.

Additional References

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