

# Basements and Foundations: Guidelines for Moisture Control



## Getting Started

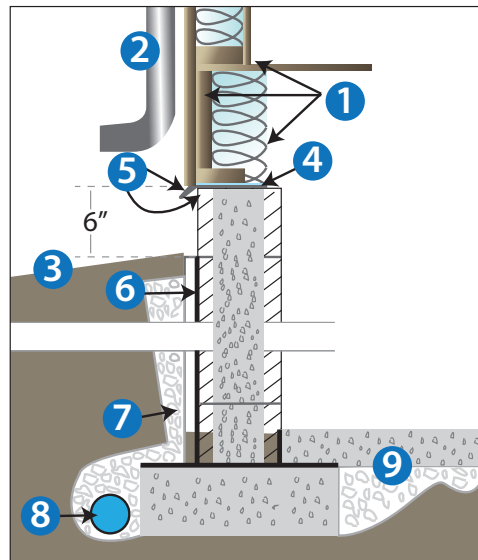
Moisture can enter the home through cracks or the vapor wicking from foundation materials. If moisture is a real problem in your area and you have enough money in your budget, it is best to dig around the **exterior** perimeter of an older home's foundation and seal the outside foundation wall to a height of several inches above ground level with painted (tar) sealant or polyethylene (10-mil plastic) sheeting. To do this, follow all the DOE measures outlined here.

According to the DOE<sup>1</sup>, there are general steps that builders can take to control moisture in foundations and basements. Many actions are only cost-effective during new construction, but if your program is breaking through existing slab to install French drains or gravel drain fields for your rehab/weatherization project, consider all of these measures:

- Keep all untreated wood materials away from contact with soil.
- Provide drainage, such as gutters, to conduct rainwater away from the house.
- Build and lightly pack down (tamp) an earthen slope at the foundation's exterior, away from the sides of the house, at a 5% grade (6 inches of height over 10 feet), extending a minimum of 5 feet.

**Note:** 10 feet is better.

- Add a sill gasket to provide air sealing.
- Install a protective membrane, such as caulked metal flashing or EPDM-type membrane, to reduce the wicking of water up from the masonry foundation wall. This membrane can also serve as a termite shield on top of foam board insulation.
- Damp-proof all below-grade portions of the foundation wall and footing to prevent the wall from absorbing ground moisture. If you upgrade the foundation with insulated concrete forms, do not use a petroleum-based tar waterproofing material as it will melt the foam insulation.



## Before You Begin

For rehab or weatherization work, first assess green practices for cost, difficulty, and impact on energy savings, moisture control, and home integrity. While creating specifications, conduct an energy audit and do comparative research. Make sure you are teaching and using lead-safe practices in compliance with EPA's Renovation, Repair and Painting Rule and HUD's Lead Safe Housing Rule.

1. Untreated wood that is protected from contact with earth
2. Drainage pipe on exterior of wall
3. Earth, sloped away from the wall
4. Sill gasket between the wall and the foundation
5. Protective membrane between the wall and foundation
6. Damp-proofing material on the exterior of the below-grade foundation wall
7. Drainage plane, or space below grade that directs water to the foundation plane
8. Round foundation drain below the drainage plane
9. Below the slab floor install a capillary break and vapor diffusion retarder over 4 inches of gravel

<sup>1</sup>From The DOE's Energy Efficiency and Renewable Energy office at: [http://www.energysavers.gov/your\\_home/insulation\\_airsealing/index.cfm/mytopic=11770](http://www.energysavers.gov/your_home/insulation_airsealing/index.cfm/mytopic=11770)



- Place a continuous drainage plane over the damp-proofing or exterior insulation to channel water to the foundation drain and relieve hydrostatic pressure (water and saturated soil pushing against the outside foundation wall).
  - Drainage plane materials include special drainage mats, high-density fiberglass insulation products, and washed gravel.
  - All drainage planes should be protected with a filter fabric to prevent dirt from clogging the intentional gaps in the drainage material.
- Install a foundation drain directly below the drainage plane and beside the footing, not on top of the footing. This prevents water from flowing against the seam between the footing and the foundation wall. Surround a perforated 4-inch plastic drainpipe with gravel and wrap both with filter fabric.
- Underneath the basement's slab floor, install a capillary break and vapor diffusion retarder consisting of a layer of 6- to 10-mil polyethylene over at least 4 inches of gravel.



## Link and Learn

Use this chart to help you assess your compliance with EPA's RRP and HUD's LSHR:  
[http://www.hud.gov/offices/lead/enforcement/lshr\\_rrp\\_changes.cfm](http://www.hud.gov/offices/lead/enforcement/lshr_rrp_changes.cfm)

EPA's Renovation, Repair and Painting Rule:  
<http://www.epa.gov/lead/pubs/renovation.htm>

HUD's Lead Safe Housing Rule:  
<http://www.hud.gov/offices/lead/enforcement/lshr.cfm>

The DOE has created a free downloadable software tool called MOIST that allows you to calculate the amount of moisture in a proposed building design. You can use it to help create control measures that are appropriate for the moisture in your home. MOIST Manuals and software are available at:  
[www.bfrl.nist.gov/863/moist.html](http://www.bfrl.nist.gov/863/moist.html)

*Builder's Guide - Mixed Climate; Builder's Guide - Cold Climate; Builder's Guide - Hot-Dry and Mixed Dry Climates.* By Joseph Lstiburek. 1998. Complete and well-illustrated, with a full range of recommendations for moisture control and all systems of the home. Available at your local or online bookseller.

General information on home insulation:  
[http://www.energysavers.gov/your\\_home/insulation\\_airsealing/index.cfm/mytopic=11470](http://www.energysavers.gov/your_home/insulation_airsealing/index.cfm/mytopic=11470)

Insulation charts and fact sheets from Oak Ridge National Laboratory:  
[http://www.ornl.gov/sci/roofs+walls/insulation/ins\\_06.html](http://www.ornl.gov/sci/roofs+walls/insulation/ins_06.html)

*The Complete Basement Treatment Guide for DIY* from the Department of Energy:  
<http://www.ornl.gov/sci/roofs+walls/insulation/fact%20sheets/basement%20Insulation%20Technology%20fact.pdf>

Estimating pay back on insulation choices:  
[http://www.energysavers.gov/your\\_home/insulation\\_airsealing/index.cfm/mytopic=11360](http://www.energysavers.gov/your_home/insulation_airsealing/index.cfm/mytopic=11360)