# Moisture Control in Homes

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Two basic types of moisture problems may exist in the home, insufficient or excess moisture. Insufficient moisture in the air can cause dry nasal passages, increased respiratory problems and excessive static electricity in clothing and carpets. Humidifiers or vaporizers will add moisture to the air when it's too dry.

Excessive moisture in the air is a far more complex problem, but one that can be solved. Excessive humidity can cause a number of undesirable conditions--some obvious, but others not always evident or visible. Some indications of excessive moisture in the home are:

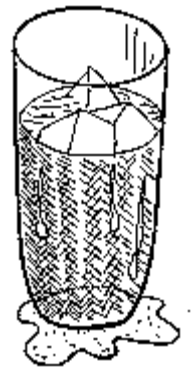
- Condensation, frost or ice on the inside surface of windows.
- Damp spots on ceilings or inner surfaces of exterior walls.
- Mold or mildew growth on walls and ceilings.
- Peeling or blistering of exterior paint.
- Ice or frost on the underside of roof sheathing in the attic space.
- Moisture on basement walls and floors.
- Sweating water pipes.

**AIR-WATER VAPOR PROPERTIES**

In order to solve excess moisture problems, you must first understand the properties of air-water vapor mixtures.

Air is a mixture of invisible gases--dry air and water vapor. Each exerts a separate pressure. The water vapor pressure controls moisture movement through walls, windows or ceilings of homes. The dry air pressure and water vapor pressure together will determine air movement through leaks and openings in the home. A higher pressure will always seek a lower pressure--somewhat like air escaping from a balloon.

The vapor pressure increases as the air's moisture content increases. The amount of moisture that a given volume of air can hold depends on the temperature of that air; the warmer the air, the more moisture it can hold.



Air's moisture content is normally given in terms of relative humidity. Relative humidity is the amount of moisture it could hold at that temperature. Therefore, 50 percent relative humidity means the air is holding half the amount of water it could hold at that temperature. This method of indicating moisture content in the air is misleading, because it doesn't give a true picture of the actual amount of water vapor in the air. As an example, air at 35 degrees and 75 percent relative humidity contains about half as much moisture as air at 85 degrees and 25 percent relative humidity.

As a given quantity of air is cooled, the relative humidity of this air increases. If the air is cooled sufficiently, it will reach 100 percent relative humidity. The air is then said to be saturated. The temperature at which saturation is reached is known as the dew point temperature.

Condensation will begin to appear at this temperature. This is why air coming in contact with a colder surface, such as a glass of ice water or cold window, will deposit water droplets on this surface.

**MOISTURE BALANCE**

Four factors dictate whether a home's moisture balance will become uneven enough to cause problems. The four balancing factors are source strength, temperature, moisture transfer rate and circulation-ventilation rate. In a home without moisture problems these forces are typically in balance. These factors are critical to understanding and solving home moisture problems.

*SOURCE STRENGTH* is often the most important factor because moisture problems can not exist without sources of moisture. Controlling the source of a moisture problem is usually the most productive and cost-effective approach to solving the problem. Examples of indoor source reduction solutions include: fixing plumbing leaks, reducing moisture from domestic activities and reducing the use of a humidifier. Outdoor source reduction solutions include improving drainage, fixing leaks and being aware of soaking and puddling from lawn sprinklers. If sources can't be reasonably or affordably controlled, then it is time to try another route.

*TEMPERATURE* differences which promote unwanted condensation should be remedied. Temperature solutions include: bringing warm air to cold surfaces through improved heating patterns, insulating surfaces against cold temperatures, installing vapor barriers and simply being aware of temperature differences and not allowing warm moist air to contact cooler surfaces such as walls, basements or crawl spaces.

The *MOISTURE TRANSFER* rate in a home can be altered in several ways. These moisture transfer solutions include: sealing air leaks from inside the home, weatherizing before insulating, using vapor barriers in crawl space areas, stopping all exterior leaks and puddling of water and increasing the moisture resistance of exterior wood.

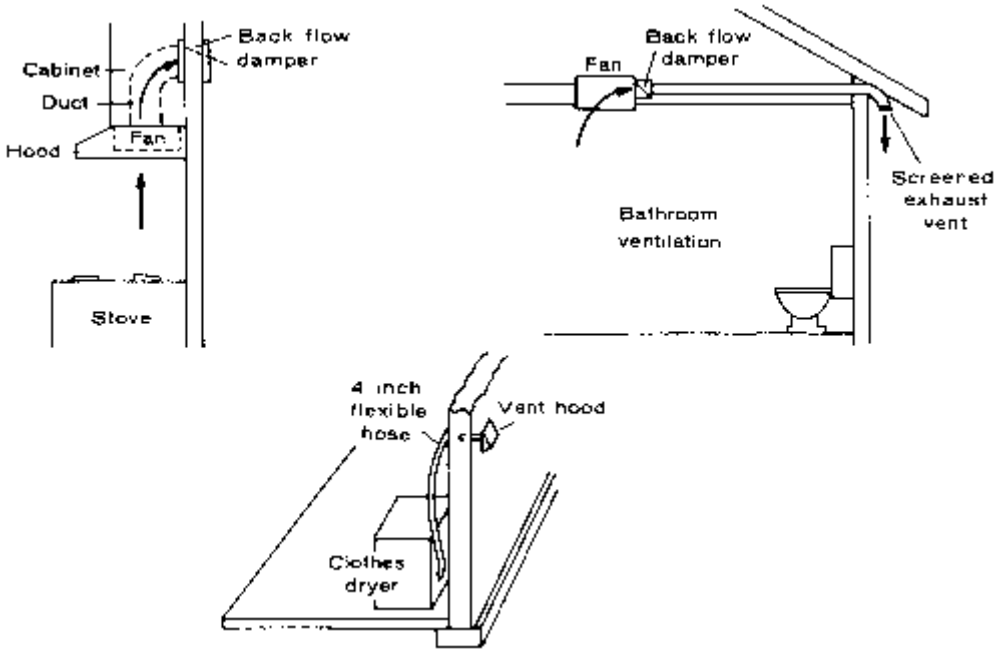
The *CIRCULATION-VENTILATION* rate of a home can be adjusted to help solve moisture problems. Venting the moisture out of enclosed areas is the usual solution. Increased circulation and ventilation are also back-up options when internal moisture sources can not be reduced sufficiently. Circulation and ventilation solutions include: installing properly-sized vents located to promote circulation, using materials

that can breathe on the cool side of moisture resistant surfaces, using spot ventilation in high moisture areas such as baths and kitchens, using small efficient fans to move internal air through a house or using air-to-air heat exchangers to reduce moisture but keep heat or coolness.

**CONTROLLING HOUSEHOLD HUMIDITY**

Occupants of households are usually very comfortable when the temperature and relative humidity are maintained within the ranges of 68 to 72 degrees and 25 to 50 percent relative humidity. Maintaining a proper humidity level isn't always easy.

Normal household activities such as cooking, cleaning, bathing, washing clothes and dishes, drying clothes, breathing and perspiring can raise the humidity level too high. It has been estimated that the typical family of four converts three gallons of water into water vapor per day. It takes only four to six pints of water to raise the relative humidity of a 1,000 sq. ft. house from 15 to 60 percent. To avoid the problems of excess moisture it is necessary to limit or control the amount of water vapor in the house. This can be accomplished by modifying lifestyle habits and by using mechanical means such as exhaust fans, dehumidifiers, and air-to-air heat exchangers.




Reduce moisture vapor production within the house by: 1) decreasing bath time, 2) not boiling water or liquids excessively when cooking, 3) washing only full loads of clothes, 4) using floor coverings that do not require wet mopping, 5) venting clothes dryers to the outside and 6) opening windows to allow moisture to escape.

Exhaust Fans

Exhaust fans in baths and kitchens will help eliminate moisture before it spreads throughout the house. Fans should be selected for the particular job needed. The fan capacity is measured in the numbers of cubic feet of air it will move per minute--CFMs. Determine the fan size in CFMs needed to do a particular job with this formula:

number of (crawl space) desired (room) air changes Cubic Feet(attic) X per hour CFM=---------- 60

Crawl spaces and basements need a minimum of 10 air changes per hour. Kitchens require a minimum of 10 to 15 air changes per hour. Bathrooms require a minimum of eight air changes per hour. A hood over a range on a wall should be rated at 40 CFM per linear foot of range top, while one placed over an island would require 50 CFM per linear foot. Attic fans may also be installed to force ventilation. Sizing attic fans is by the CFM formula with six to eight changes per hour for ventilation.

Dehumidifiers

If the moisture problem is confined to one area such as a basement or unvented storage area, or if the relative humidity inside the home in the summer often reaches or exceeds 60 percent, a dehumidifier can keep these areas dry and free of mildew and odor.

The capacity of a dehumidifier is expressed in pints of water condensed in 24 hours at 80 degrees and 60 percent relative humidity. Individual models have features such as an automatic adjustable humistat, an automatic shutoff and a signal light to indicate a full drip pan.

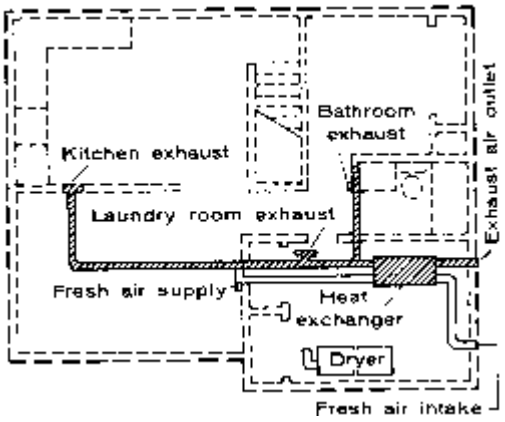
Table 1.
DEHUMIDIFIER SELECTION GUIDE*
(Pints Water Removed in 24 Hours)

| Condition Without Dehumidification | Room Area (sq. ft) | | | |
|---|---|---|---|---|
| | 500 | 1000 | 1500 | 2000 |
| Moderately damp-- Space feels damp and has musty odor only in humid weather | 10 | 14 | 18 | 22 |
| Very Damp--Space always feels damp and has musty odor | 12 | 17 | 22 | 27 |
| Wet--Space feels and smells wet. Walls or floors sweat, or seepage is present. | 14 | 20 | 26 | 32 |

*Recommendations by the Association of Home Appliance Manufacturers.

Air-to-Air Heat Exchangers

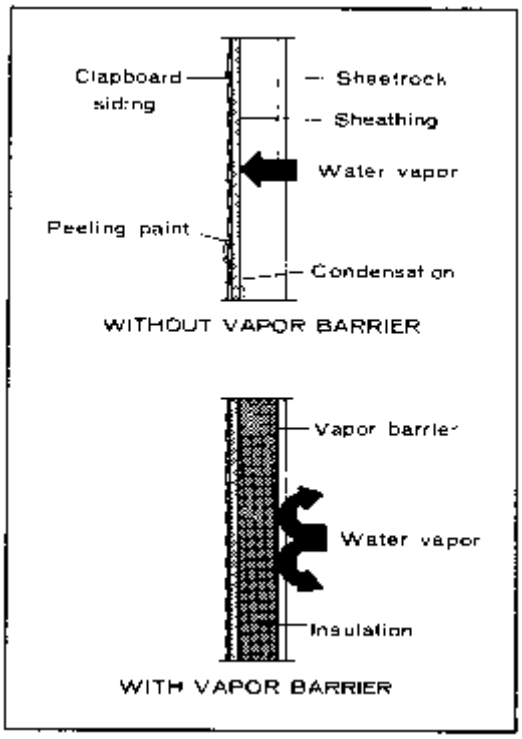
Air-to-air heat exchangers are sometimes used in tightly-constructed homes to lower humidity levels and supply fresh air. One fan forces warm moist air out of the home, while another fan brings in cold, dry air from outside. The air being moved passes through the heat exchangers. Here, the warm air heats up the cold air entering the house. The units usually run continuously, or are controlled by a time clock. Air-to-air heat exhchangers recover approximately 70 percent of the heat leaving the home, and reduce both heating costs and cold air drafts.



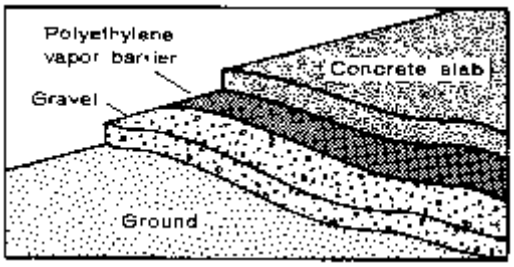
**VAPOR BARRIERS**

Many materials used as interior coverings for exposed walls, such as plastic dry wall, wood paneling and plywood, permit water vapor to slowly pass through them. When the relative humidity within the house at the surface of an unprotected wall is greater than that within the wall, water vapor will migrate through the plaster or other finish into the stud space, where it will condense if it comes into contact with surfaces colder than its dew point temperature. Vapor barriers are used to resist this movement of water vapor or moisture in various areas of the house.

All construction materials have some resistance to moisture flow, but only those materials highly resistant to vapor flow should be used as vapor barriers. The permeability of the surface to such vapor movements is usually expressed in perms, which are grains of water vapor passing through a square foot of material per hour, per inch of mercury difference in vapor pressure. A material with a low perm value (1.0 or less) is a barrier, while one with a high perm value (greater than 1.0) is a breather. Membranes which best serve this purpose include polyethylene film (four to six mil.), asphalt-coated or laminated papers and kraft-backed aluminum foil. Oil base or aluminum paints and /or vinyl wallpaper are often used in existing homes which did not have vapor barriers installed during their construction.

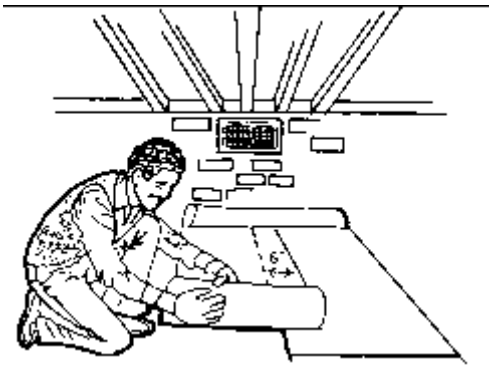



Apply vapor barriers on the warm side of the wall. In home construction this is usually between the framing and the interior sheathing or wall finish. For such uses it is a good practice to select materials with perm values of 0.25 or less. This vapor barrier can be a part of the insulation or a separate film. The membrane must present a solid surface with no holes in it, and where joints or layers are made, they must be formed over a framing member for backing. Openings for electrical outlet boxes should be sealed to prevent moisture flow.




Vapor barriers under concrete slabs resist the movement of moisture through the concrete and into the living areas. Such vapor barriers should normally have a maximum perm value 0.50. Heavy asphalt-laminated films, roll roofing and heavy films such as polyethylene are commonly used as vapor barriers under slabs. Figure 5 illustrates a standard construction procedure to install both gravel and polyethylene plastic sheet vapor barrier under the concrete. The function of the gravel is to slow capillary water movement toward the concrete. The polyethylene impedes vapor movement above the gravel.

Vapor barriers in crawl spaces prevent ground moisture from moving up and condensing on wood members or entering the home. A perm valued of 1.0 or less is considered satisfactory for such use. Asphalt-laminated paper and polyethylene (four to six mil.) are commonly used. The vapor barrier should be used to cover about 2/3 to 3/4 of the crawl space area. See Figure 6. Some ground area needs to be exposed, particularly if the house has hardwood floors. Some moisture is needed to prevent excessive drying of oak flooring and trim around doors and windows. If the floor begins to open, or the head joint in trim begins to open, expose more ground by rolling back the vapor barrier. When the floors in a house are covered with carpet or vinyl products, all the crawl space can be covered with a vapor barrier.



As a final step to the installation, one or two inches of sand may be placed on top of the vapor barrier. This step is optional, however it assists with the maintenance and inspection of the house. The sand weighs down the vapor barrier, preventing the condensation of moisture on the undersurface and absorbs the small water droplets that condense on the top surface in cold weather.

Installing a vapor barrier on crawl space surfaces will only assist in the control of excess moisture vapor and should be used in combination with an effective ventilation system.

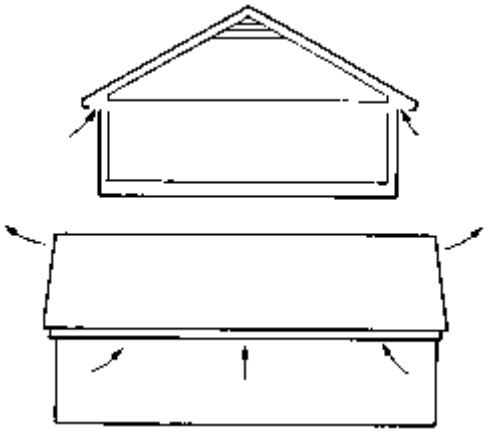
**VENTILATION**

Attics and crawl spaces are the predominant areas requiring ventilation. In both places it is necessary to have good distribution of air movement over the entire area.

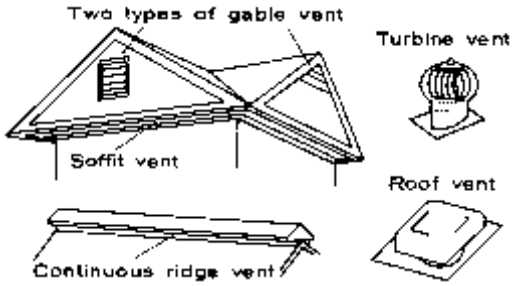
Attic ventilation is essential. Without it, moisture that moves through the ceiling will be trapped in the attic because most roofing materials prevent moisture from escaping. Basically, the idea of cold-side venting is to

relieve the vapor pressure in the attic by providing a vent to the outside air, which usually has a lower vapor-pressure.

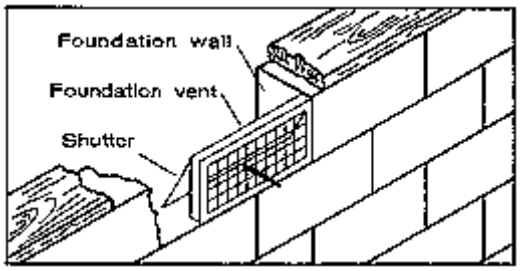
Ventilate the attic with inlet vents distributed along the eave and with the outlet vents near the ridge. You'll get the best results when the ventilation is uniformly distributed along the roof and is equally divided between the high and low. Warm air in the attic rises and escapes through the ridge vents: cooler outside air enters at the eaves. See Figure 7. In this way, ventilation is continuous and does not depend on the wind.



For proper ventilation, attics require one square foot of unobstructed ventilation area for each 150 square feet of attic area. Five vent types are common: eave (soffit), gable, turbine, roof or continuous ridge. See Figure 8.

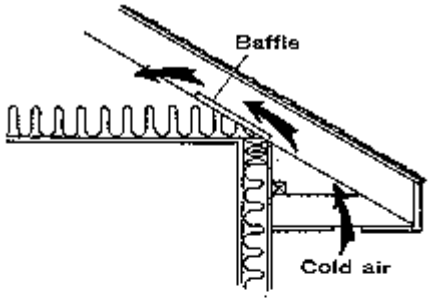



Crawl spaces should be vented to the outdoors to permit water vapor to escape. If the vents are located near each corner, the vents will permit good air movement through the crawl space. A standard metal foundation vent is eight inches by 16 inches and is usually located in the top eight inches of the foundation. It has a metal grid of one-inch squares, may have screen wire to elude mice, etc. and may have an operating metal shutter. See Figure 9. One standard suggestion for vent sizing is one square inch of unobstructed ventilating area for each square foot of crawl space area. Thus, each standard eight inch by 16 inch vent has about 60 to 75 square feet of unobstructed area and is adequate to ventilate about 75 feet of crawl space area. The function of the foundation ventilator is to dissipate the moisture vapor in the crawl space, therefore the ventilator should remain open year round except during the coldest few days.

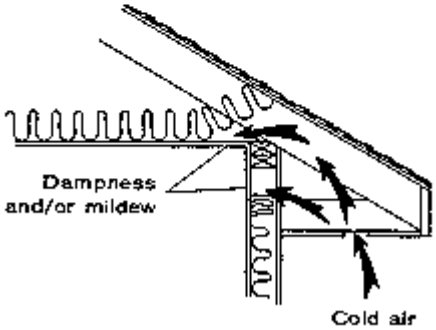



**INSULATION, STORM WINDOWS AND INSULATING WINDOWS**

Insulation is important in controlling moisture problems because it increases the temperature of the inside surfaces of walls, ceilings and floors, preventing condensation on those surfaces. In cases where mildew or dampness is appearing on the ceilings at its edges near the outside walls, there is a possibility that the ceiling insulation is not properly installed. Insulation must extend over the top plate of the wall and be fitted tightly to the top plate. Cold air can blow under insulation and chill the ceiling where vapor will subsequently condense. Similarly, wall insulation can settle, allowing cold spots to occur at the top of walls. In both cases, insulation must be repositioned or fitted in. See Figure 10.



PROPERLY INSTALLED INSULATION



PROBLEMS WITH INSTALLED INSULATION

In the average home, moisture condensation appears first on the glass in windows and doors, because these are usually the coolest surfaces in the house. This condensation can be reduced or eliminated by installing storm window units. The air space separating the storm unit from the regular window becomes an insulator. This space allows the temperature of the storm window unit to approach the temperature of the cold outside air, while the temperature within the house or at least stay above a temperature that will cause condensation to take place on the inner unit.

If you are building a new home or want to replace your window unit, double or insulating glass within the sash, coupled with weatherstripping, is another effective way of reducing or eliminating condensation.

Occasionally, after a storm unit has been installed, the regular or existing window will continue to have condensation. This means the storm unit does not have a tight fit and is permitting an excessive amount of cold air to reach the regular unit. Caulking around the storm unit usually corrects this problem. After a storm unit has been installed, if the storm unit begins to have condensation, it is an indication that the regular window does not have a tight fit and should be taped around the sash to reduce air leakage.

For further information on installing insulation, please request a copy of "How to Get the Most Insulation for Your Money," Miscellaneous Publication 41, and "Insulating Materials," Miscellaneous Publication 50, from your county Extension agent.

**MANAGING EXTERNAL WATER**

Neglecting moisture and water problems in and out around dwellings can produce conditions that support mildew within the house and wood-destroying fungus attack the structural members. Management of both surface water and moisture vapor can prevent the conditions required to support mold and fungi growth. Some of the most common external moisture problem areas and their suggested solutions follow.

Lot Drainage

The grading and landscaping plan for every dwelling should provide control of surface water on the lot. One minimum standard requires a 2 percent grade sloped away from the house in all directions for a minimum distance of 10 feet, or about 2½-inch drop in 10 feet. This is intended to prevent surface water from collecting alongside and under the house.

It is not unusual for the lots of the houses about 25 years old and older to need a complete renovation of the landscaping and grading. Additions to the landscape plan, maturity of shrubbery and some soil erosion tend to change drainage patterns and direction and too often surface water meanders against a foundation wall.

Figure 11 illustrates the most common drainage problem of a sloping lot. The uphill side of the house must have a drainage waterway (valley) to conduct the water around the house. This drainage valley should be at least 10 feet away from the house and sloped to conduct the accumulated water away from the dwelling efficiently.

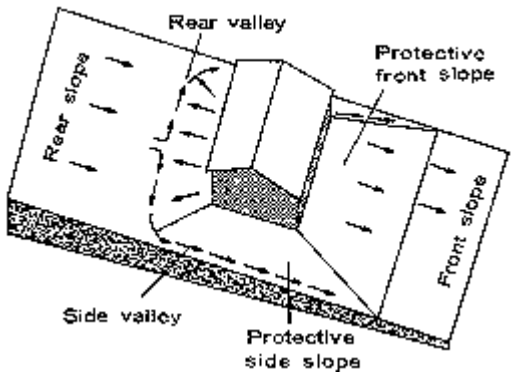



Figure 12-A illustrates the ease of obtaining drainage away from the foundation when the house is on the crown of a hill. Unfortunately, most houses are located on lots that have drainage problems illustrated in "B" and "C" below.

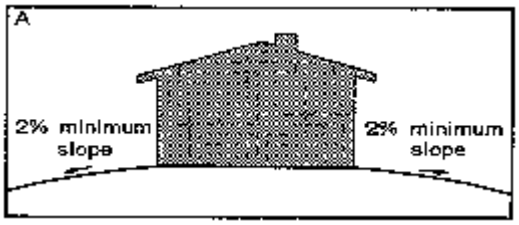



Figure 12-B illustrates a typical drainage problem of a house on a sloping lot. Field studies indicate most speculative houses have some seepage of water collecting under the house due to water accumulating on the uphill side and seeping through a foundation wall that is not waterproofed in any manner; nor is a footing drain installed. When the soil is saturated, the hydrostatic pressure tends to release a significant amount of water into the crawl space through the masonry foundation wall.

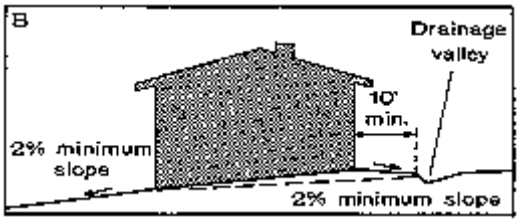
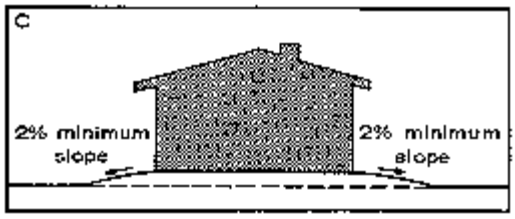



Figure 12-C illustrates a house on a "flat" lot. During construction, the topsoil is usually removed from the house site, making the finish grade around the house one or two feet above the soil level of the crawl space. "Flat" lots also tend to have high water tables, especially during long, rainy periods. Developers and builders would do the homeowner a lasting service if the soil in the crawl space was brought to a level equal to the outside finished grade. This, in turn, would require the foundation to be higher by a foot or so, but would permit effective footing drains with an outfall near the house.




Gutter Water Management

Two basic methods used to manage gutter water are illustrated in Figures 13 and 14.

Figure 13 shows a masonry splash block, a precast concrete product designed to receive the gutter water from the downspout. Its function is to prevent erosion and rapidly conduct and release the water at least two feet from the foundation wall. Positive drainage away from the house prevents water from accumulating near the foundation wall. Some splash blocks are made of plastic, but lack the sturdiness and durability of masonry concrete.

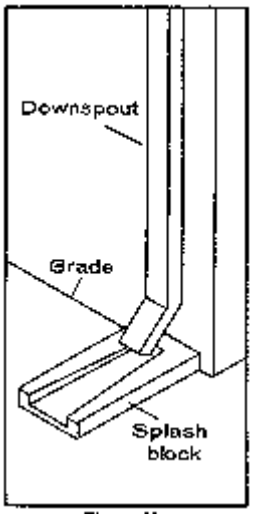
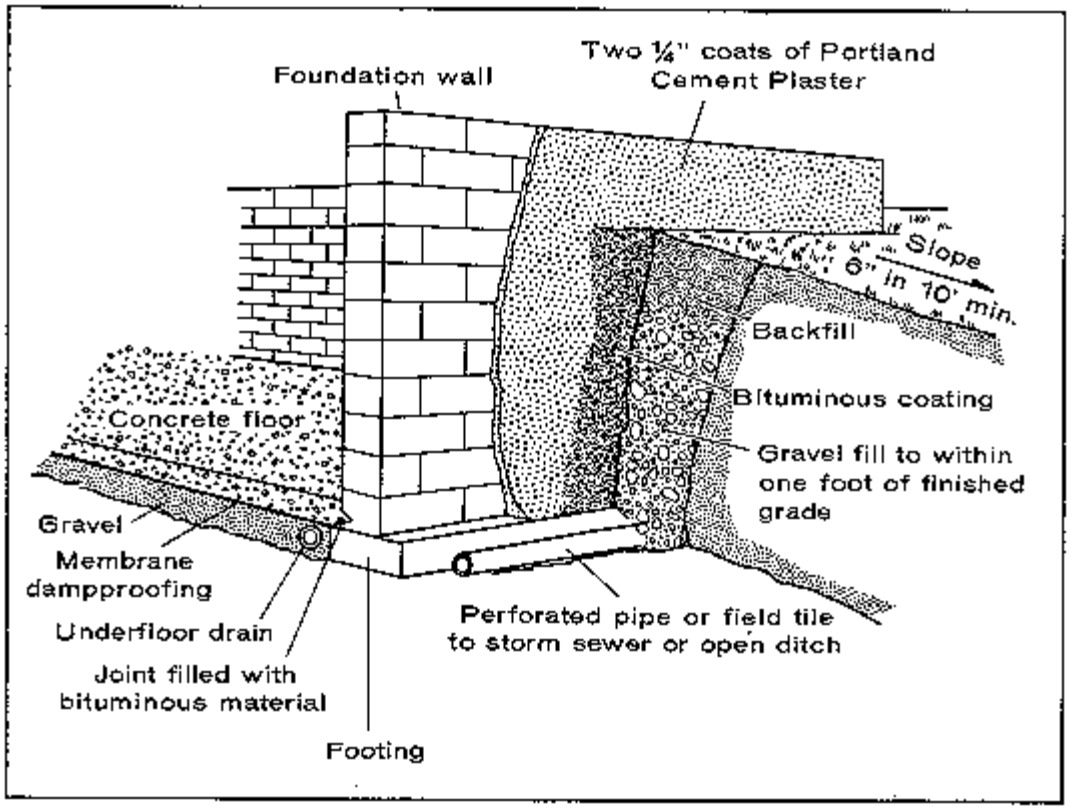



Figure 14 illustrates a clay tile or flexible pipe, which will conduct downspout water to a suitable release outlet. PVC plastic pipe may be used to conduct the water for some distance underground to a release point. Both rigid and flexible pipe are satisfactory underground and require minimal maintenance. Most gutters on a house need frequent inspections and need leaf accumulations removed. Gutter guards are partially effective in preventing leaf clogging. Larger downspouts, with a minimum of sharp turns from the gutter to the release near the ground line, have fewer stoppage problems than smaller, poorly maintained ones.

Foundation Waterproofing

Site selection, landscaping and waterproofing the foundation can prevent objectionable water problems around and under a residence. Figure 15 illustrates a standard construction procedure to effectively waterproof a masonry wall. Two thin coats of portland cement plaster are applied directly to the masonry surface. The cement plaster seals the voids in the mortar joints and establishes a dense, impermeable layer. The foundation wall below grade is mopped with one or two coats of bituminous foundation coating material. Always follow the manufacturer's instructions on the label. Some materials require a primer before the material is applied to the wall. The label will specify what is needed. A footing drain is installed level with the bottom of the footing as indicated. The footing drain is encased in gravel as indicated, and the underfloor drain is also encased in gravel as indicated. The drain pipe is extended to an outfall away from the house.




If the walls are in place without opportunity to dig around the foundation:

1) Be sure the lawn is well-graded away from the house. If the soil level close to the house is too low, apply top soil sufficient to have the lawn grade away from the house.

2) Mix a special cement-based, waterproof material to apply to the interior of the concrete wall. Pay particular attention to the crack between the wall and the concrete floor.

For further information on moisture problems, please request a copy of "Wood Rot in Home Structures--Causes and Control," Leaflet 231, and "Mildew Prevention and Removal," Circular 767, from your county Extension agent.

MOISTURE AUDIT PROCESS I. Identify The Symptoms The first step in the moisture audit process involves noting symptoms of excess moisture and identifying their locations, both inside and out. The following checklists can help identify locations where moisture problems may exist. Try to be as specific as possible when describing the location. Typical Symptoms Locations Strong or musty odors _____ Damp sensation _____ Mold or mildew _____ Discoloration, staining or texture changes on wood or masonry surfaces _____ Rot or decay _____ Water-carrying fungus _____ Fogging windows _____ Condensation or sweating _____ Frost or ice build-up _____ Paint peeling, blistering or cracking _____ Corrosion or rust on metal surfaces _____ Leaks or dripping noise _____ Deformed wooden surfaces _____ Concrete or masonry chipping _____ Drainage problems (interior and exterior)

_____ II. Background Information After the obvious symptoms of moisture problems have been identified, the next step is to obtain as much information as possible about the structure and its use patterns. Except in rare cases, moisture problems don't appear overnight, and the background information will help you to interpret the symptoms and diagnose the causes of moisture problems. A. Building Components and Operation The mechanical and structural components of a home all help to define its moisture balance. 1. What type of heating system is used? (Circle all appropriate answers.) Type of System: Central Forced Air Central Hot Water Fireplace Wood Stove Portable Space Heater Type of Fuel: Electricity Natural Gas Propane (LPG) Fuel Oil Coal Wood Kerosene 2. Are many rooms in the home closed off with only intermittent heat? Yes No
Comments:_____
_____ 3. What is the normal thermostat setting? Day_____ Night_____ 4. Does the heating system have poor distribution (cold spots)? Yes No Comments:_____
_____ 5. If wood is used for fuel, is it stored inside or directly against the side of your home outdoors? Yes No (Wet wood stored improperly can contribute to moisture problems.) 6. Is a dehumidifying device ever used? Yes No Type: Central Portable Season(s) used:_____
Hours/day:_____ Location:_____
Percent relative humidity setting 7. Is an air conditioner ever used? Yes No Type: Central Portable Season(s) used:_____ Hours/day:_____
Temperature setting_____F Location of use and
comments:_____
_____ 8. Is a humidifier ever used? Yes No Type: Central Portable Season(s) used:_____
Hours/day:_____ Percent relative humidity setting:_____ Location of use and comments:_____
_____ (Humidifiers contribute large amounts of moisture to a home.) 9. Is propane or natural gas used for cooking? Yes No If yes, is a vented range hood installed? Yes No (Cooking with propane and natural gas releases water vapor in a home.) Comments:_____
_____ 10. Do windows fog up even though they have two layers of glass? Yes No (If yes, generally this means the indoor relative humidity is high.) 11. Is indoor air circulation or ventilation curtailed in any way? Yes No
Comments:_____
_____ 12. Does the attic and/or crawl space have inadequate ventilation? Yes No Note total vent area:
Attic_____ Crawl space_____
13. Does the attic or ceiling insulation touch the roof sheathing, leaving no gap for circulation? Yes No 14. Are vapor barriers present in the home? Yes No Where are they
located?_____
_____ 15. Is a ground cover vapor barrier used in the crawl space area? Yes No B. Modifications to the Building Modifications to a home can sometimes lead to changes in ventilation and air circulation, which can affect moisture transfer patterns. Have any building changes been made in the last two years? If you answer yes to any of the following questions, further analysis should be made. 16. Have any of the following energy conservation/weatherization activities recently been conducted? Caulking/weatherstripping Yes No Insulation Yes No Vapor barrier installed Yes No Storm windows Yes No 17. Has any remodeling been done recently? Yes No Comments:_____
_____ 18. Has an attached greenhouse been added? Yes No
Comments:_____
_____ 19. Have any modifications to the heating/cooling system been made? (For example: new humidifier, air conditioner or furnace installed) Yes No
Comments:_____
_____ C. Occupant Behavior The lifestyle of occupants can also have a significant impact on moisture balance. "Yes" answers will

indicate that moisture is being contributed to the home from sources which can be controlled with behavior changes. 20. Is there now or was there in the past more than one occupant for every 250 square feet of floor area in the home? Yes No 21. Does bathing take place without the use of an exterior vented exhaust fan? Yes No 22. Are wet towels hung in a confined area indoors to dry? Yes No 23. Does the kitchen lack an exterior vented exhaust fan? Yes No 24. Are containers of food uncovered (without lids) during the cooking process? Yes No 25. Are clothes dried on a line indoors or with a clothes dryer vented in the living area? Yes No 26. Are floors mopped frequently? Yes No 27. Are large open terrariums or aquariums present? Yes No 28. Are large numbers of house plants present? Yes No III. The Search Now that background information has been obtained the obvious symptoms of moisture problems in the home have been identified. It's time to initiate a thorough search and begin diagnosing the problems. You will need to draw heavily on the principles which have previously been described in the text. You must also be careful because a single symptom of excess moisture may have multiple causes and multiple symptoms may result from a single cause. The most important tool for the analysis of moisture problems is the moisture balance principle. Refer to "The Moisture Balance" section of this publication. Begin searching for the causes of the symptoms of the moisture problems you have already identified. The search must be thorough and systematic. Make sure you have obtained the answers to all the questions in Section II of the audit. Start looking for causes at the location of the symptom, and move systematically away from it. Make sure you have covered the entire house from attic to basement or crawl space inside and out before you have finished. IV. Possible Solutions The following list of corrective and preventative options for moisture problems will be useful in providing possible solutions.

A. Reduce the sources: Stop water and plumbing leaks; repair or increase drainage; change occupants behavior; try dehumidification process. B. Watch temperature differences: Warm up cold surfaces with circulation or ventilation; try insulating cold surfaces, such as walls, windows, ceilings, basements, and crawl spaces. Use local heating with space heaters to help warm surfaces. Make sure temperatures are above the dew point to avoid condensation of moisture. C. Check moisture transfer rate: Seal inside surface air leaks. Stop capillary action with ground moisture barriers. Consider using tightly installed vapor barriers where needed in attic or crawl space or when adding insulation. Protect and seal exterior surface cracks and leaks to provide moisture proofing. Increase moisture resistance with wood preservatives and proper finishes. D. Increase air circulation and ventilation: Eliminate or reduce trapped moisture or damp air. Increase circulation first, using natural or mechanical means to accelerate drying and curtail the environment for deterioration. Allow enough room when placing home furnishings for proper air movement. Allow the cool side of insulated walls, ceilings, and floors to breathe with the use of proper materials and venting.

V. Corrective Measures Fill in the following chart as you proceed through the audit. Then prioritize the tasks necessary to complete in order to solve the moisture problems you identified. Remember these considerations:

A. Start with the easiest, lowest-cost remedies which address the most pressing problems. B. Lifestyle modifications are normally cheap and easy to make. C. After lifestyle modifications, consider making necessary mechanical adjustments or repairs to reduce moisture sources. D. As a last resort, make structural changes that are necessary to halt moisture problems. (retrofitting vapor barriers, damp proofing foundation walls. etc.)

Moisture Audit Form Name_____ Date_____

Problem/ Source/ Cost Symptom Location Cause Remedy Estimate

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Prepared by Dale Dorman, Extension Housing and Environment Specialist, and Bobby Tyson, Extension Engineer.

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Gale A. Buchanan, Dean and Director