Moisture Problems in Crawl Space and Basement of a Home

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HONEYCOMBED WALLS

Poured concrete walls sometimes are honeycombed or are otherwise porous enough to let free standing water through. Such openings can be closed and the inside wall decorated at the same time by using cement wash.

When you apply the wash, make sure that walls are clean and that water is not seeping through. The wash should not be applied during winter because the low relative humidity allows it to dry quickly and prevents it from setting. The best time to apply it is any part of the season when heat is not needed in your home.

A low cost cement wash repair can be made by mixing 4 parts white portland cement, 1 part hydrated lime, and water. Mix to a creamy consistency. Don’t try to apply this paint too thick. When the mixture is of the proper consistency, it goes on freely.

Persons using this wash for the first time usually think the correct consistency is too thin and is not covering the walls sufficiently. However, as the wash cures, it becomes much whiter and the covering quality improves. The best method is to use a thin wash and give two or even three coats at about three-day intervals.

Wet the walls before applying the paint. Walls should be damp but not dripping wet when the paint is applied. Use a garden sprayer or a brush to apply the water. After the painting is done, curing can be improved by closing the basement and wetting the floor to increase relative humidity of basement air.

A cement base paint such as this cures snow white. Additional coats of the same type of inexpensive masonry cement paint can be applied in later years. Coating the wall with a paint of this kind helps waterproof, smooth, and decorate the walls and makes the basement lighter.

If an oil or a rubber based paint has been used on basement walls, a cement base paint can’t be used satisfactorily over it.

RELATIVE HUMIDITY IN BASEMENT

The relative humidity in the basement air is nearly always higher than that of air on the first floor even if no water is coming through the basement walls and floors, because, even though there may be the same total amount of moisture in the air at the two floor levels, the cooler basement air has less capacity to hold moisture.

Capacity of air to hold moisture doubles when temperature is increased 20 degrees F. Therefore warming the air in the basement makes it drier. This happens during winter.

Usually the best way to reduce the relative humidity of air in the basement during summer is to use a dehumidifier.

One with automatic controls is better. Condensation is best disposed of in the basement drain. Keep doors and windows closed so that when the dehumidifier removes water from the air it remains in the basement and is not replaced by outside air containing extra moisture. Night ventilation of the basement is sometimes desirable. When basement windows are open, there is no point in running a dehumidifier.

CRACKED BASEMENT WALLS

Many basement walls crack and allow water to flow through freely. Permanent repair of these cracks generally is not possible because additional setting of the basement will cause hair cracks to develop at the same location. However, in many instances, it is desirable to close large cracks. Small cracks may be closed by using cement wash. About the most effective and easiest method of repairing large cracks is the following:

Chip the sides of the crack away with a hammer and chisel or star drill to make a "V" opening at least 1 inch wide and 1 inch deep on the back side of the wall. Mix a mortar of 1 part cement and 2 parts sand. Either portland or masonry cement may be used.

Masonry cement will be a little more plastic and sticky and, therefore, will work better. Immediately before applying the mortar, paint the groove with cement and water mixed to a creamy consistency. This coats every exposed particle in the groove with cement. Then when the mortar is applied, it is much more apt to stick.

This type of basement repair should be done during the time when the basement isn’t heated so that the mortar will cure. Covering with wet sacks, spraying, or other similar means may also be used to cure the thin layer or column of mortar. All repairs of this nature should be made before applying masonry paint, so that when paint is applied all repairs will be covered and the walls will be uniformly white.

The inside of the wall is suggested for this repair because it is more accessible and convenient. Also it is usually desirable to make it more attractive. The same repair made on the outside of the wall would be just as effective in repairing leaks.

Honeycomb basements are properly repaired with cement washes.

Figure 3. Cracked basement wall with repair on the inside surface.

In many houses, especially the newer and more tightly constructed ones, there are very serious moisture problems in the living area. During winter months, water condenses on the inside surface of windows and rains down on the sills, causing serious structural damage.

Where these conditions exist, the problem must be analyzed, the source of the moisture determined, and the situation corrected.

In homes without basements, the source of the moisture is usually the crawl space. If the soil is damp, as much as 20 gallons of water per 24 hours will evaporate into the air in a 1,400 square foot crawl space. This moisture passes through the floor in the form of vapor and raises the relative humidity of the air in the living area to the point that very serious condensation problems occur.

A 24-inch minimum clearance for crawl space (36 inches is desirable) under the floor joists of a home is convenient for inspection and care of electrical wiring, heat ducts, water pipes, sewer, etc. This results in the ground elevation in the crawl space being lower than the grade outside. This sometimes causes moisture problems in the crawl space. Some indications of excessive moisture in this area are:

1. Musty odor in the crawl space or living area of the home.
2. Mold on the foundation wall, floor joists or soil surface in the crawl space.
3. Standing water under the house.
4. Excessive condensation, especially on windows in the living area.

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AVOID WATER UNDER THE HOUSE

A seepy area, or wet weather spring, may cause pools of water in an excavated crawl space. This seep water should be intercepted by a drain tile around the footing with a surface outlet down slope from the house. Drain tile may be placed inside the footing (see Figure 1) as a convenient alternative or in addition to that outside the footing. Where the building site is flat with no natural outlet for tile, a sump pump may have to be used.

Sometimes the standing water in a crawl space comes from outside surface water finding its way down the foundation wall and under the footing.

Water should not stand against the foundation on the outside of the house. To prevent this from happening, provide a minimum slope of 6 inches in 10 feet away from the home on all sides. This can be done by grading soil against the foundation wall or by lowering the elevation of the yard, or both.

On the upslope side of the house, a swale or drain should be formed to intercept surface water flowing toward the house and that flowing away from the house. This drain should slope off 4 inches per 100 feet so that water will drain away. Sides should be sloped so that a lawn mower can be conveniently used. Where large quantities of surface water drain toward the house, the bottom of this drain should be more than 6 inches below the grade at the foundation wall.

INSTALL GUTTERS AND DOWNSPOUTS

A house should have gutters and downspouts with outlets on splash blocks or with horizontal outlets laid to discharge water on the ground at a point far enough away from the dwelling that it will not enter the crawl space.

STOP EVAPORATION IN CRAWL SPACE

Where the surface of the soil under the house is considerably lower than the outside ground, chances are good that it will be moist and that there will be plenty of evaporation. A polyethylene vapor barrier on the ground in the crawl space can prevent nearly all evaporation. A 6- or 8-mil thickness will be tough and will resist damage. Lap the sheets 4 inches and extend them 4 inches up on the side of the foundation wall. Joints need not be sealed but should fit snugly. Use sand, soil or other convenient material to keep edges together and also to force outer edges against the foundation wall.

Condensation may occur on the bottom of this polyethylene sheet, but this is not serious. The important function of this vapor seal is to prevent moisture from escaping into the air of the crawl space.

VENT FOUNDATION WALLS

Most authorities recommend vents in foundation walls to decrease moisture problems in the crawl space. Usual recommendations are one 8 x 16-inch screened vent in each of the four foundation walls for homes up to 1,400 square feet of crawl space. For each additional 350 square feet, provide one additional vent. Also, provide an access opening.

Vents should be installed in a new construction. However, they usually will be used only during warm weather. They will be closed in winter to avoid danger of frozen water pipes under the house, heat up warm air ducts and a colder floor. When the vapor barrier is properly installed, vents need not be open during cold weather.

Eliminating evaporation of moisture from the soil in the crawl space is quite important. Consequently, the surface of soil in the crawl space of all new construction should be covered with a polyethylene vapor barrier. Where problems occur in existing homes, the soil should be covered.

FLOOR INSULATION

Floor insulation is important, and it will save money regardless of the type of fuel used. Besides, the floor will be warmer. Correct installation is important.

Figure 2 shows two ways of installing insulation. Note that the vapor seal is up. The winter crawl space temperature will be lower than that in the living area of the house, and this puts the vapor seal on the warm side. Many builders install the insulation the opposite way.

Most batt insulation with vapor seals and other coverings are manufactured so that it is not convenient to install the insulation from the lower side with vapor barrier up. However, the tabs can be extended below the 2-inch insulation and stapled in place. For new construction, the most convenient installation is to work from the upper side before the sub-floor is installed.

The sketch at the right in Figure 2 shows a self-supporting insulation. When selecting an insulation of this kind, give special attention to the covering on the lower side (non-vapor barrier side), to be sure it is strong enough to support the insulation. If one is selected that is not strong enough, installation techniques shown in the sketch on the left must be followed.

BASEMENT MOISTURE PROBLEMS

Many homes have leaky basements, especially those in clay pan areas. Sometimes correcting the situation is not easy. The first thing to do is to try to determine cause of leaks. Inspect down spouts, grade of yard, etc. and see if water is properly draining away. Grading the yard properly or filling near the house so water flows away from the house sometimes solves the problem. Follow recommendations for filling and grading as described earlier in this guide.

In severe cases, water pressure builds up outside the basement walls with no means of escaping. It is nearly impossible to make the tile floors, and leists between the walls, footings, and floor watertight. Water outside the wall usually finds its way into the basement even though it is well constructed.

The solution is to relieve pressure on the outside. A tile around the footing, backfilled with gravel, is the best solution. A backhoe and a good operator make the excavation easy. Usually most shrubbery has to be reset after excavation, laying of tile, and backfilling.

Figure 1 shows tile around the footing for a crawl space. This also applies to laying tile around the footing for a basement or above the floor. By providing a good outlet for this tile and backfilling with gravel as shown, you'll relieve the water pressure on the outside of the wall.

Tile around the footing should have a slight grade. However, the objective is to avoid high and low places in the line. These conditions allow silt to settle in low places and reduce capacity of the tile, or may even plug it.

Some builders prefer to lay the tile on top of the footing. This makes laying easier, and while it is level, there are no high and low places. Also, the bottom of the tile is 4 inches below the floor of the basement. In theory, carefully laid tile to a grade on the side of the footing is best. In actual practice, however, a better job can usually be obtained by laying it on top of the footing. In either case, the gravel is very important.

If it is impossible or impractical to install tile outside, it may be laid on the inside of the footing as shown in Figure 1. The concrete slab would extend over the tile. Generous use of gravel backfill helps water to flow to the tile. A good tile outlet must be provided.

Either 4-inch clay drain or plastic corrugated flexible porous tile may be used.