

# CONTROLLING MOISTURE FROM BASEMENT SLABS

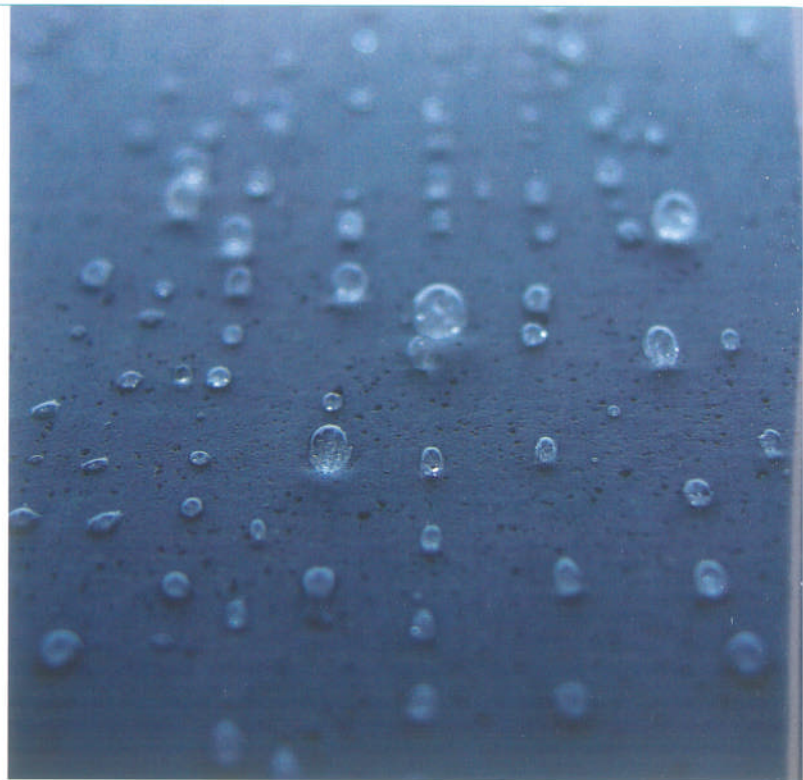
*Excess moisture emitted from the surface* of concrete slabs can cause problems for home owners in four key ways:

- IT MAY DAMAGE ITEMS STORED ON THE CONCRETE FLOOR.
- IT MAY TRANSPORT AND CONCENTRATE SULFATE RESIDUES ON EXPOSED SURFACES OF CONCRETE, LEADING TO SULFATE ATTACK OR SALT-HYDRATION DISTRESS.
- IT MAY PROMOTE MOLD GROWTH.
- IT MAY DAMAGE FLOORING SYSTEMS, INCLUDING PAINT, EPOXY COATINGS, VCT, WOOD FLOORING AND CARPETING.

The 2003 and 2006 International Residential Codes require a 6-mil vapor retarder over 4 inches of base course be placed below slab-on-grade concrete basement floors unless the local building official approves omitting the vapor retarder.

Currently in metropolitan Denver, concrete is placed directly on the soils. Slabs in direct contact with damp soil may absorb water in liquid form. A capillary break layer (several inches of clean sand and gravel) is often recommended if ground water is relatively shallow. While slabs over a capillary break still attract moisture vapor, the rate of wetting is slower. Historically, soils engineers in the area have not recommended the capillary break on expansive soil sites where ground water is not shallow because it could increase the risk of wetting the entire area below the floor if a water leak or spill occurs.

Despite a lack of vapor retarders in today's standard practice for local home building, very few slabs emit enough moisture to identify it as a problem. Most residential slabs-on-grade are acceptable for carpet and resilient flooring installations. However, moisture problems are unpredictable, and they are extremely difficult to mitigate on existing floors.



If a vapor barrier and concrete floor slab are installed properly, the home buyer will receive a premium product. Moisture emission will subside after the slab dries. Sulfate-related problems will not likely occur on the slab or interior surfaces of foundation walls, provided the walls are adequately damp-proofed. The traditional feel of "dampness" in a basement area will be reduced. Resilient flooring will adhere properly. Carpet will not be damp, thus lessening the risk of mold.

When vapor retarders are used directly below a slab, concrete finishing can be difficult because there can be more "bleed" water than normal. Slab curling also can occur. In non-residential construction, these problems have been addressed by placing a few inches of dry sand over the vapor retarder. However, this procedure can cause increased moisture problems if water collects in the sand layer, and it is recommended only when a water-tight roofing system is in place.

Even when a vapor barrier is used, excess mix water must leave the surface of a concrete floor slab. Problems associated with this moisture can be mitigated by not using sprayed-on curing compounds and by delaying covering the concrete with paint, floor materials and stored items. In most residential construction, this moisture does not pose a problem because there is sufficient time between the placement of the floor concrete and occupancy to allow the water to evaporate. The risk can be reduced further by avoiding or strictly limiting the amount of water added to the mix on-site. Use of a higher-quality mix (a water-to-cement ratio of 0.50 or less) is desirable.

*Bud Werner is a senior principal engineer with CTL|Thompson Materials Engineers, Inc. Email Bud at [owerner@ctltthompson.com](mailto:owerner@ctltthompson.com) or call (303) 825-0777.*