

UNDERSTANDING MOISTURE VAPOR TRANSMISSION AND ITS IMPACT ON RESINOUS FLOORING SYSTEMS

BY CALIFORNIA CONCRETE COATINGS

Concrete slabs are rarely dry. Even in facilities that appear clean and controlled, moisture vapor transmission (MVT) from below the slab can significantly impact the performance and longevity of resinous flooring systems.

Moisture-related flooring failures are one of the most common challenges encountered in industrial environments. When not properly evaluated and mitigated, excess moisture can lead to adhesion failure, blistering, delamination, and costly downtime.

Understanding how moisture moves through concrete — and how flooring systems respond — is essential for facility managers planning new installations or maintenance upgrades.

WHAT IS MOISTURE VAPOR TRANSMISSION (MVT)?

Moisture vapor transmission refers to the movement of water vapor from the subgrade or surrounding environment through the concrete slab and toward the surface.

Concrete is a porous material. Even slabs that have cured for many years can continue to transmit moisture due to:

- **Lack of an effective vapor barrier below the slab**
- **Changes in groundwater conditions**
- **Seasonal humidity fluctuations**
- **Washdown practices in industrial environments**
- **Temperature differentials between slab and air**

As moisture migrates upward, it can build pressure beneath impermeable flooring systems.



WHY RESINOUS FLOORS FAIL DUE TO MOISTURE?

Many resinous flooring systems - including epoxies, urethanes, and polyaspartics - are designed to form impermeable, dense, protective surfaces. While this improves chemical resistance and durability, it can also trap moisture beneath the system.

Common moisture-related failure mechanisms include:

- **Loss of adhesion between coating and concrete**
- **Osmotic blistering or bubbling**
- **Softening or discoloration of coatings**
- **Cracking or delamination**
- **Increased maintenance requirements**
- **Premature replacement costs**

These failures are often mistaken for installation issues when the underlying cause is excessive vapor pressure.



MOISTURE TESTING METHODS: ASTM F2170 VS CALCIUM CHLORIDE

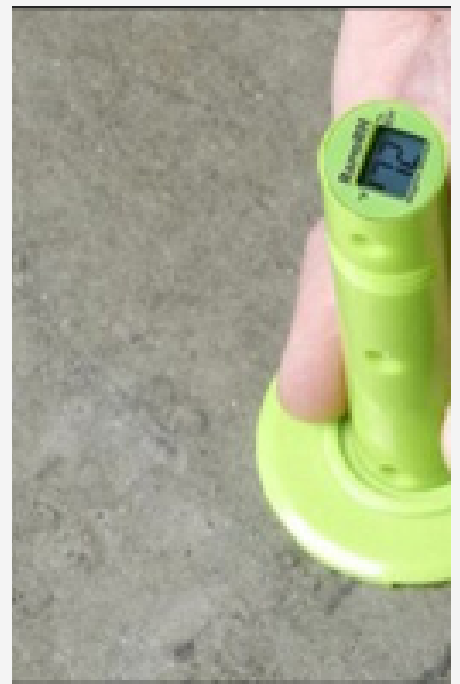
Proper moisture testing is a critical step before installing a resinous flooring system.

ASTM F2170 – Relative Humidity Testing

This method measures internal slab moisture by placing probes within drilled holes in the concrete. It provides a reliable indication of long-term moisture conditions.

Advantages:

- Measures moisture deeper in the slab
- Reflects future equilibrium conditions
- Preferred by most manufacturers
- Less influenced by surface conditions



Calcium Chloride Testing (MVER)

This surface test measures the rate of moisture vapor emission over a 24–72 hour period.

Limitations:

- Sensitive to ambient jobsite conditions
- May not reflect deeper slab moisture
- Can produce misleading results in certain environments

For industrial flooring applications, **relative humidity testing is widely considered the more dependable assessment method.**



OSMOTIC BLISTERING EXPLAINED

Osmotic blistering occurs when moisture vapor pressure builds beneath a dense flooring system and forces the coating upward, creating bubbles or domes on the surface.

This process can be accelerated by:

- Soluble salts or contaminants in the concrete
- Temperature fluctuations
- Washdown operations
- High humidity environments

Once blistering begins, the flooring system's integrity is compromised and localized repairs may not address the root cause.

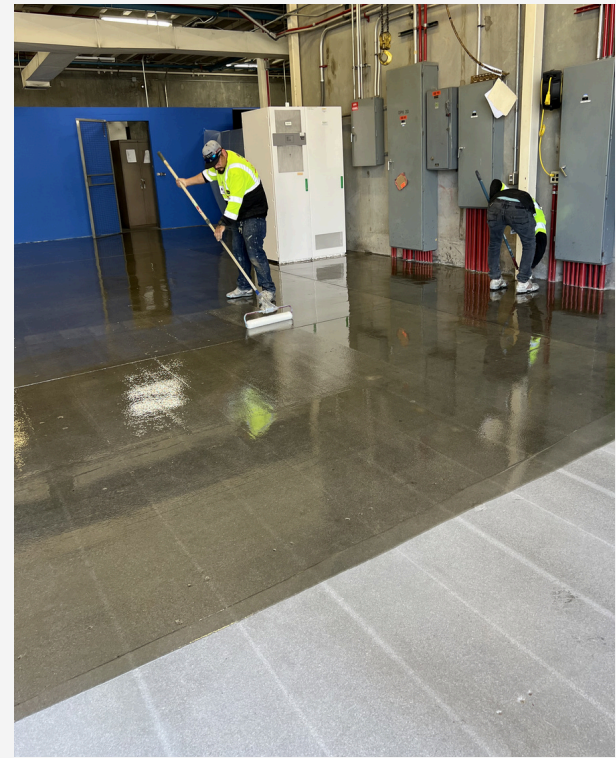


MOISTURE MITIGATION PRIMERS

Moisture-tolerant epoxy primers and vapor mitigation systems are designed to reduce vapor transmission and improve adhesion in challenging slab conditions.

Selecting between these approaches depends on slab moisture conditions, facility operating environment, and expected mechanical or chemical stresses.

Thin-film epoxy moisture-tolerant primers, typically applied in the 15–22 mil range, are designed to reduce vapor emission rates and create a bondable surface for subsequent flooring layers. These resin-based membranes fill surface pores and act as chemical vapor barriers, allowing resilient flooring installation within acceptable moisture thresholds.



WHEN TO SPECIFY URETHANE CEMENT SYSTEMS

In contrast, urethane cement or polyurethane mortar systems, installed at heavier thicknesses ranging from approximately 1/8" to 1/4", function as both a structural resurfacing layer and a moisture-tolerant base. These cementitious-resin hybrid systems more closely match the permeability and thermal movement characteristics of concrete, providing improved performance in environments exposed to persistent moisture, thermal cycling, and aggressive cleaning procedures.



KEY TAKEAWAY

Moisture vapor transmission is a critical factor in the success of resinous flooring installations. Proper testing, system selection, and installation practices are essential to achieving durable and reliable flooring performance in industrial environments.

Thin epoxy mitigation systems are often suitable where moisture levels are elevated but stable and where smooth resilient finishes are required. Urethane cement systems are typically specified in heavy-duty industrial environments or where long-term moisture exposure and thermal shock resistance are primary design considerations.

Facility managers who understand moisture behavior can make more informed decisions that protect both operational continuity and capital investment.

REQUEST A FACILITY EVALUATION

California Concrete Coatings provides moisture testing, system recommendations, and installation services for industrial and commercial facilities throughout Southern California.

Contact us to schedule a flooring evaluation

