



# Moisture + Flooring

Most Common Recurring Flooring Issue in Construction and for End Users



Course #106117

Sponsored by Fuse Alliance



# Tarkett

Bruce McNabb  
Evelyn Smith  
Andrea Daniels

CENTEX/ South Texas Team







# Tarkett

3

Tarkett, headquartered in Paris, France founded in 1886.  
All Tarkett North American companies were consolidated in January 2019 under one brand - Tarkett.

Tarkett purchased Tandus Centiva, formerly Tandus Flooring and Collins & Aikman Flooring, in 2012.

C&A was the first modular carpet tile manufacturer in the United States.

C&A created Powerbond to solve school flooring issues in 1967.





# Tarkett

4

Tarkett includes premier US brands.

- Johnsonite, a leading global brand of specialty flooring and accessories was acquired by Tarkett in 2005. Johnsonite products are utilized as standalone solutions and to supplement soft /hard surface flooring.
- Tarkett soft surface portfolio (Tandus) includes several recognized brands. PowerBond® Cushion, Powerbond® Cushion RS, ethos® with OmniCoat™ Modular, and other woven carpets.





# Tarkett

5

Tarkett hard surface portfolio includes several product brand trademarks; Centiva, Azrock, and Johnsonite. Rubber flooring, vinyl flooring, multiple LVT lines, and SVT providing coordinated solutions for the contract interiors market.

The Synergies achieved by the Tarkett family of brands further strengthens the Tarkett ***Solution SPECTrum***<sup>™</sup> flooring portfolio strategy.

Collectively, Tarkett offer a truly integrated multi-surface flooring solution for our clients in both design, performance and simplified sourcing.





# Tarkett

6

All Tarkett companies, are leaders in their commitment to sustainability. In the US, and most markets around the world, phthalate-free plasticizers product solutions are combined with on-going efforts in reclamation and recycling. Transparency with respect to our sustainability commitment is exemplified in our Environmental Product Declarations.

Our integrated approach is a true market differential: industry-leading product design, unrivaled service and a commitment to environmental and social stewardship.



# CEU Credit: AIA & IDCEC

7

Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

---

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.



This CEU is registered with the Interior Design Continuing Education Council (IDCEC) for continuing education credits. This credit will be accepted by the American Society of Interior Designers (ASID), International Interior Designers Association (IIDA) and Interior Designers of Canada (IDC).

This program is registered for 1 hour (0.1) CEU value.  
The IDCEC class-code is: 106117

This CEU will be reported on your behalf to IDCEC and you will receive an email notification. Please log in and complete the electronic survey for this CEU. Certificates of completion will be automatically issued once you have submitted the online survey for this CEU.





# Learning Objectives

8

1. Identify problems leading to flooring failure resulting from the presence of excess moisture.
2. Explain the difference between two moisture test methods for concrete used today.
3. Name two areas of concern as they relate to concrete and moisture.
4. Outline a plan of action for preventing or remediating concrete moisture issues.





# Moisture + Flooring

North American commercial property owners spend an estimated \$2.4 billion dollars on remediation of structures and floor coverings as a result of moisture-related flooring failures yearly.





# Moisture + Flooring

An additional \$1.2 billion dollars is spent on topical moisture treatments, of varying effectiveness, in an effort to address moisture issues prior to the floor covering being installed.





# Moisture + Flooring

11

Increased costs:

- project delays
- unplanned expenses – topical systems
- flooring replacement
- litigation
- business disruptions
- loss of reputation

Growing problem because:

- Construction timetables shorter
- “Greener” adhesives can’t contend as well with moisture





# Moisture + Flooring

12



## Protection: Test for Moisture ASTM F1869-16: Standard for Calcium Chloride Testing

- Extrapolated test data reported as pounds of moisture vapor being emitted from the concrete subfloor over a 1000 square foot area during a 24-hour period
- The subject building **must** be acclimated at or near the 'service' temperature and relative humidity levels anticipated during occupancy or use.
- Some floor covering manufacturers no longer recognize Calcium Chloride test results for determining concrete dryness.
- Tests only test top 1/4" - 1/2" of surface giving potentially false readings as greater volume of moisture may be present at the floor covering/concrete interface after installation is completed than was originally anticipated.
- **ASTM F 1869** specifically excludes calcium chloride tests from use on concrete containing lightweight aggregate and or gypsum screeds.



# Moisture + Flooring



## ASTM F-2170-16: Standard for In Situ Probe Testing

- This test method covers the quantitative determination of percent relative humidity in concrete slabs.
- The building **must** be acclimated at or near the “service” temperature and relative humidity levels anticipated during occupancy or use.
- Provides more predictive test data; test results appear less impacted by the type of, or lack of, floor coverings in place prior to testing.
- Testing performed with single-use probes has brought the cost down to a level comparable with calcium chloride type tests.
- Some resilient manufacturers exclusively require in-situ RH testing , others are listing it as the preferred test method.
- Probes cannot give ‘*certified*’ readings without meeting ambient service requirements. However, they can be put in early to monitor or watch the drying properties allowing earlier action if concrete drying will not meet the project’s schedule.
- Minimum wait time for RH equilibrium changed from 72 to 24 hours (per ASTM F2170)



# Moisture + Flooring

Both, the flooring contractor and general contractor have a vested interest in the test results.

This keeps the GC and Flooring Contractor from looking like they just want a change order by separating their interests.

The owner is less likely to be upset with the construction team.

***Let a 3<sup>rd</sup> Party  
Certified  
INDEPENDENT  
Testing Company  
Test and Offer  
Results.***



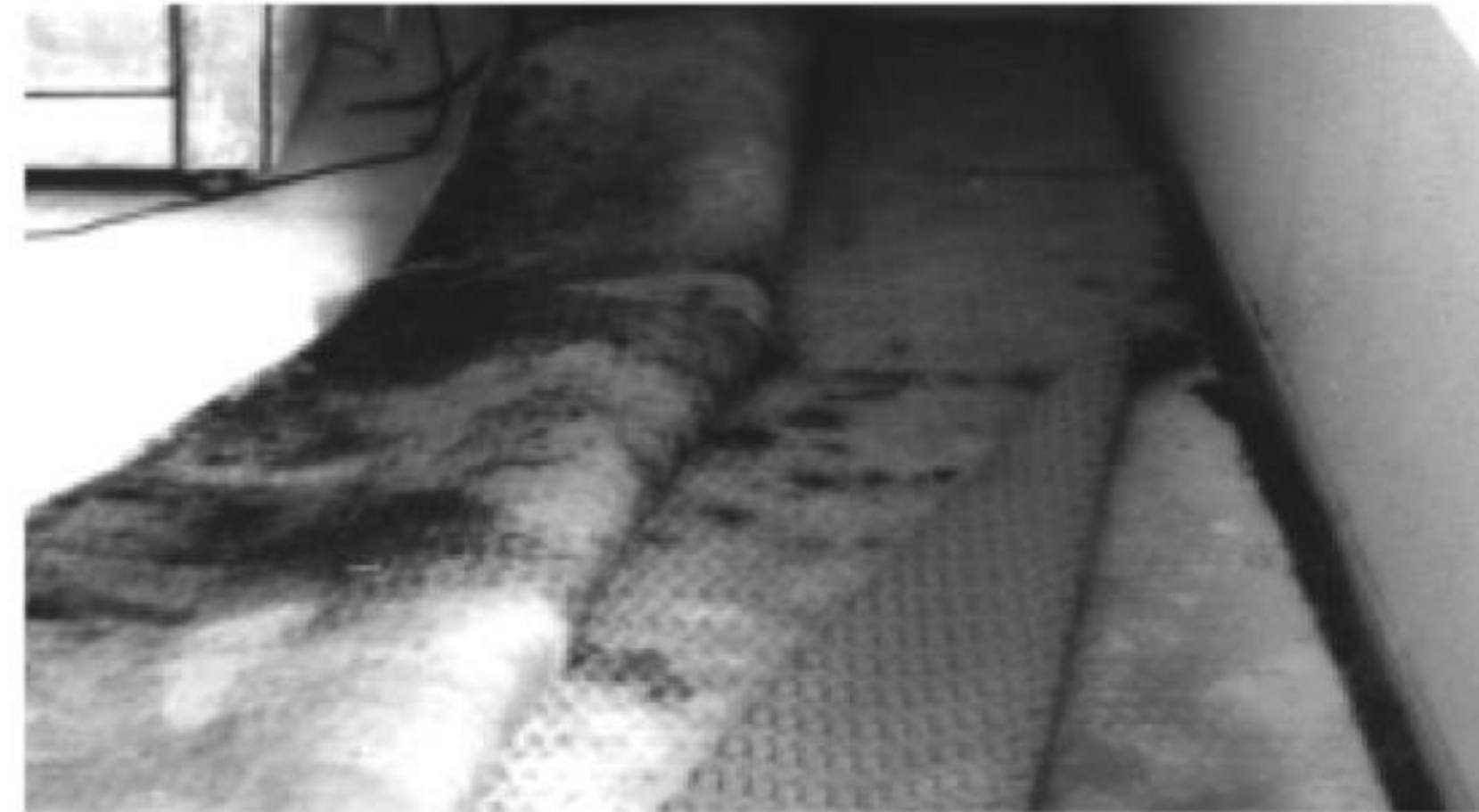
# Moisture + Flooring



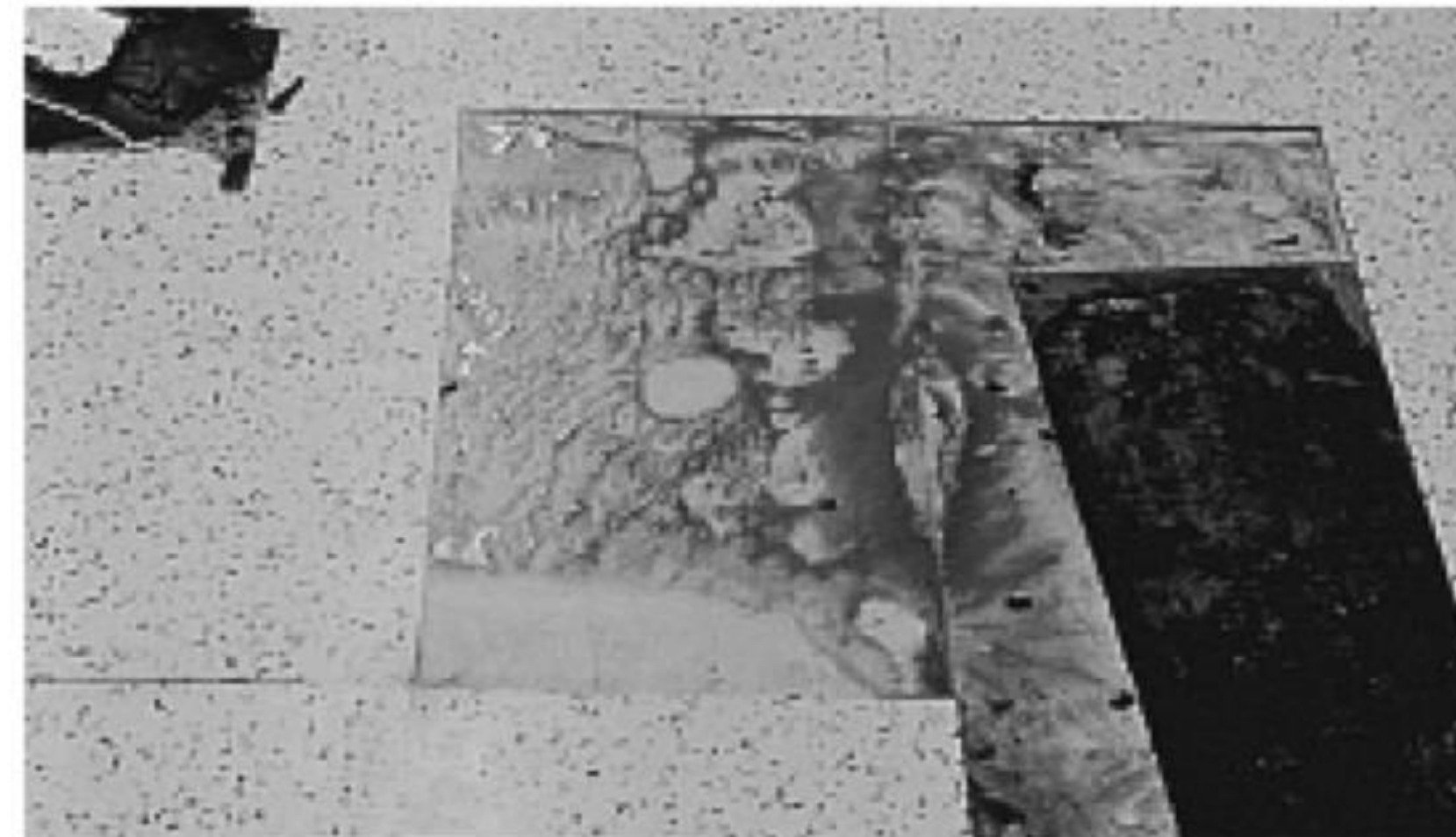
*Fig. 1.1—Debonded sheet flooring due to moisture in the concrete slab. (Courtesy of Peter Craig and Herman Protze III.)*



*Fig. 1.2—Blisters due to moisture in concrete. (Courtesy of Peter Craig.)*



*Fig. 1.3—Mold growth in carpet due to moisture in concrete. (Courtesy of Floor Seal Technology, Inc.)*



*Fig. 1.4—Adhesive degradation leading to debonded solid vinyl tile installed over asbestos tile. (Courtesy of Peter Craig.)*





# Moisture + Flooring

16

## Two Areas of Concern:

### New Construction Slab

- Water of Convenience or “Free Water”
- Curing Compounds
- Ineffective/Improperly placed Sub-slab Vapor Retarder
- Power-troweled concrete (burnished slab)

### Renovation Slab

- Moisture Vapor Emission of existing slab due to the lack of an effective sub-slab vapor retarder
- Trenches: Water of Convenience and Moisture Vapor Emission



# Moisture + Flooring

## New Construction Slab

- One month per inch drying time for normal weight or hard-rock concrete under optimal conditions:
  - Optimal water/cement ratio of between .45 and .50
  - Ambient conditions are a minimum temperature of 70° F
  - Maximum 50% relative humidity
  - Constant air movement at 15 m.p.h.
- 2-months per inch drying time for concrete batched with lightweight aggregate under optimal conditions.
- People often mistake curing with drying:
  - Curing is the chemical reaction creating the agglomerate we call concrete
  - Drying is the loss of water not needed to hydrate the cement





# Moisture + Flooring

## New Construction Slab (cont.)

- Water of convenience makes up the largest portion of water that must leave the slab during the drying process.
- High water/cement ratios (more water of convenience):
  - Substantially increase the concrete dry time.
  - Create a more porous and permeable concrete.
  - Greater the likelihood that the pores will be interconnected
  - Interconnected pore system from the bottom of the slab to the top will serve as an avenue of transport for liquid water or water vapor to move through the slab.
  - Creates higher chance of Moisture Vapor Emission in the future with vapor barrier break down/penetration or drainage
  - Creates concrete laitance or weak surface





# Moisture + Flooring

## New Construction Slab (cont.)

- Suspended slabs also have moisture problems
- Concrete used for suspended slabs often has a high water/cement ratio to make it more liquid and easier to pump
- Curing compounds, commonly used today as an alternative to keeping the concrete surface physically wet during the initial curing period, will substantially lengthen the drying period.
- Light weight aggregate concrete requires twice as much time to dry as normal weight concrete of the same thickness, due to pre-saturation of lightweight aggregates, approximately two months per inch of thickness.





# Moisture + Flooring

## New Construction Slab (cont.)

- Power troweled concrete:
  - Seals pores
  - Limits evaporation and drying
  - Limits ability for adhesive to bond properly as it needs pores to make a mechanical bond
- Propane and oil temporary heat:
  - Produces 'wet' heat, which inhibits drying of the slab. For every gallon of propane burned, a gallon of water is produced.
  - Creates an abundance of carbon dioxide which accelerates the formation of calcium carbonate and may inhibit or prohibit adhesive bond or create a '*dusty*' surface.





# Moisture + Flooring



**Construction schedules rarely contain sufficient time to facilitate natural drying of concrete.**





# What Do You Do?

---



# Moisture + Flooring

23

## Concrete Mix:

- Require a .4 to .5 water/cement ratio
- Limit fly ash additive content to no greater than 15% or 20% of cementing material.





# Moisture + Flooring

## Concrete Curing:

- GO OLD SCHOOL: Wet cure the slab - curing blankets are now available for this purpose.
- Negligible cost difference between Wet Curing and a Topical Material System.
- Most membrane-forming **curing compounds** do not degrade in time, if at all.
- If a curing compound does degrade, it is often late in the construction process and slows the drying time.
- If a curing compound is used, include removal of such within 30 days.
- Eventually curing compounds can degrade by breaking the adhesive bond and releasing the *'free'* water causing flooring failure.
- Avoid **cold** conditions or PLAN for heating blankets.
- **Never utilize reactive silicate**, cure and seal products (silicates are bond-breakers).





# Moisture + Flooring

## Concrete Finish:

- Have the concrete contractor leave a bull-floated finish which should cost less than burnishing.
- Pay the flooring contractor the cost difference to skim the floors – they are going to skim one coat anyway







# Moisture + Flooring

26

## Push for Closure of Building

- The sooner the slab is enclosed, the sooner some effective drying will start.
- Prior to HVAC:
  - Do not run propane or oil heat.
  - Run dehumidifiers – moisture vapor is the great equalizer, the lower the RH of the room the more moisture tries to equalize that pressure from the ground up.
- HVAC:
  - Work to have running as quickly as able.
  - Ensures stabilization of the concrete slab.
  - Creates an accelerated drying condition.



# Communicate Early





# Moisture + Flooring

## Architect – communication

- Concrete ratios and mix
- Concrete finishes
- Curing compounds
- Sub-slab Vapor Retarders
- Ask for the testing of the concrete to be certified third party
  - Allowance
  - Owner/architect obligation
- Ask for allowances to be in bid for moisture mitigation *'if'* needed.
  - Allowance for RH/In Situ readings above 90 RH (2 part 100 % solids epoxy)
  - Allowance for RH/In Situ readings between 80-90 RH





# Moisture + Flooring

## Communication with Flooring Contractor

- Confirm they either have testing included or let them know **3<sup>rd</sup> party** is covered.
- Ask flooring contractor to meet with concrete contractor prior to pour:
  - If curing compound must be used, discuss
  - Discuss concrete mix
  - Discuss concrete finish
  - Discuss sub-slab vapor retarder
- If they are testing floor, have them set RH probes months prior to scheduling. Calcium tests are a waste to test prior to proper conditioning as you don't get close to proper reading but probes will start to tell a story.
- If the potential of moisture mitigation is needed, have them price earlier than later so end user doesn't feel held hostage if not able to have in '*allowances*' up front.





# Moisture + Flooring

Renovation Slabs and Trenches

Existing Slabs





# Moisture + Flooring

## Existing Slab

- Existing slab can be flawed:
  - Lack of an effective moisture vapor retarder/barrier.
  - Degraded/broken down/torn barrier.
  - High ground water/irrigation/drainage.
  - High water to cement ratio creating continuous interconnected pores.
- Existing flooring:
  - Bonded existing flooring does not mean lack of moisture issue.
  - Many existing floors are layered with the original layer being installed with a solvent based adhesive.
  - Many existing materials will have been more permeable than the materials specified for installation.





# Moisture + Flooring

## Existing Slab

- Continual Moisture Vapor Emissions:
  - The source that is most troublesome in older buildings and can equally impact newer ones is moisture naturally available in the earth or added through irrigation and drainage.
  - The largest source of moisture transmission occurs when moisture is not properly inhibited from reaching the concrete slab.
- Moisture in a floor slab, which carries salts, always tries to equalize with moisture in the air above.
- Salts carried to a slab surface expand causing the break down of adhesive bonds.
- Tree roots, poor landscaping, improper gutter/drainage systems along with poor or no vapor retarder mixed with over watered, highly porous, concrete create the environment for a huge floor system failure.





# Moisture + Flooring

33

**Roughly 16 Gallons of Water Over a 7-Day Period Over an Area  
Approximately 31' x 31'**

**20lb MVER**

**7 Days of Extracted Moisture**



**Amount of Moisture Extracted**

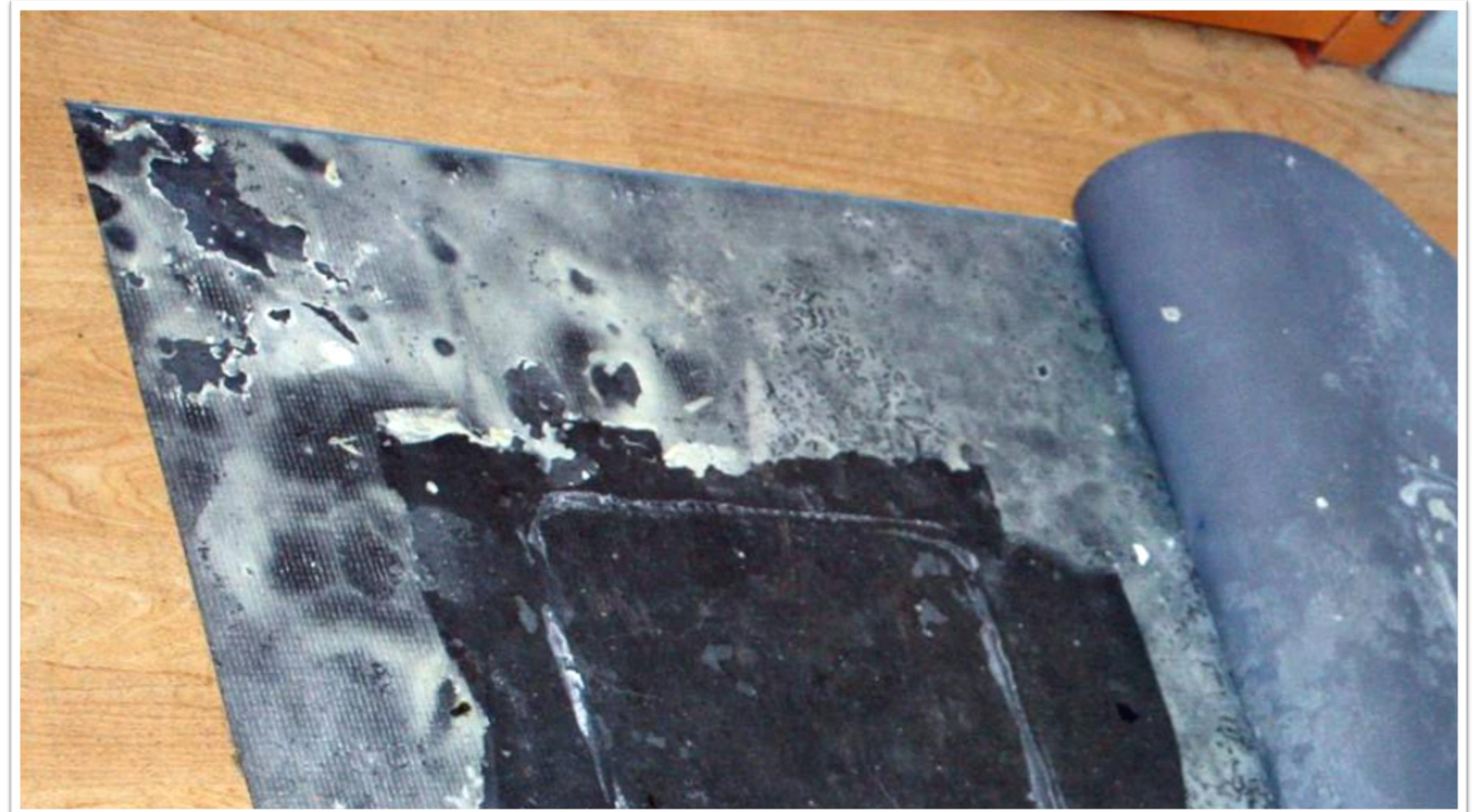
***MVE of 20 lbs./1,000 sq. ft. (9,07 kg per 92,9 m<sup>2</sup>)/ 24 hours***



# Moisture + Flooring

## Effect of Excessive MVT On Flooring

- Constant flow of moisture
- Alkaline salt migration
- Adhesive re-emulsification
- Trapped water collected under flooring
- Bond failure
- Mold & Mildew
- Odors





# Moisture + Flooring







What Do You  
Do?  
Plan Ahead.



# Moisture + Flooring

## Learn Concrete History

- Confirm placement or lack of vapor retarder:
  - All flooring products require vapor retarder for warranty.
- Inquire about original concrete specification/submittals.
- Inquire about previous floor covering:
  - How many layers and years they were installed?
  - If any issues with floor failures.
  - If issues with maintenance that could not be resolved.





# Moisture + Flooring

## Analyze Building Drainage/Irrigation/Landscaping

- Gutter System:
  - Existing
  - Functional/Working
  - Divert water away from building
- Landscaping:
  - Graded properly
  - Hillsides or semi below grade areas
  - Areas of washed out soil/mulch
- Skirt of Building:
  - Soil/mulch build up to, or past, weep holes
  - Mildew

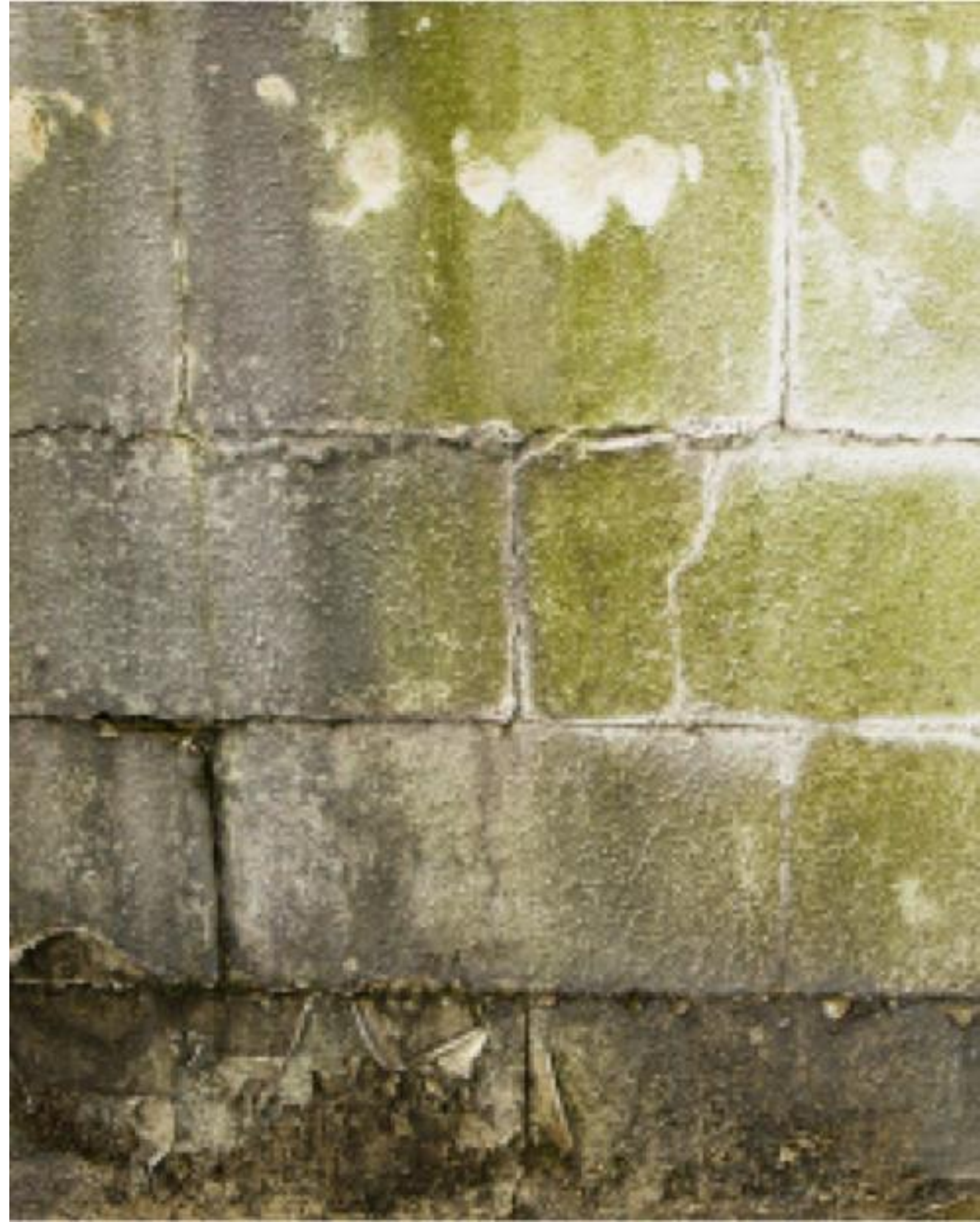




# Moisture + Flooring

## Test/Analyze Building Interior

- Existing Flooring:
  - See if any signs of moisture (peaking seams/bubbles/hollowness/cracked or broken tile/adhesive)
  - Compare new flooring properties to old (VCT or 12' carpet vs. heat welded vinyl, carpet tile, SVT or wood)
- Other Finishes:
  - Chipped/peeling paint
  - Sagging ceiling tiles
  - Rusted door frames
  - Moisture marks on wood base or behind cove base
- Test Concrete:
  - Third party preferably
  - Prior to quoting if able
  - As early in the project if not prior
  - Positively prior to HVAC shutdown





# Moisture + Flooring



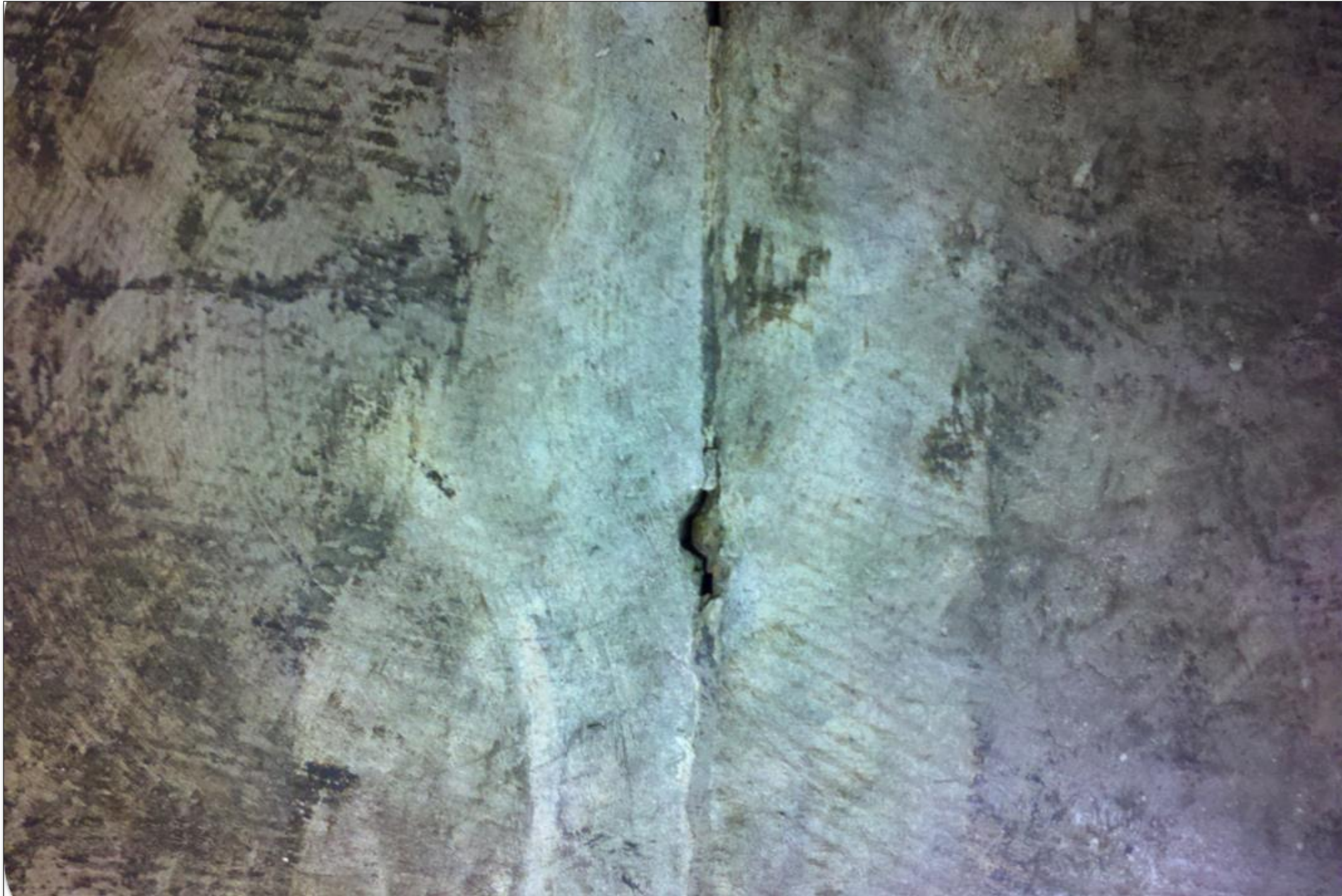


# Moisture + Flooring





# Moisture + Flooring







What Do You  
Do?





# Moisture + Flooring

44

## Plan Ahead + Communicate

- Fill with concrete with proper water/cement ratio.
- Install per concrete institute specifications:
  - Proper vapor retarder, repaired vapor retarder
  - Bonding agent from new to existing concrete
- Allow required drying times.
- Request special pricing if drying time not allowed:
  - Use of fast setting cement (Mapei Planitop FD or Topem Premix)
  - Use of 2 part 100% solid mitigation
- Offer drying properties as discussed in new slabs.
- Communicate with flooring contractor:
  - Quantity
  - Time frame
  - Pricing for fast setting cement or 2 part 100 % solid



# Outline Specification from IFTI

- Prior to the installation of any Flooring or Cementitious Underlayment, Moisture Testing shall be performed in accordance with ASTM F2170 “Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes”
- Testing shall be done by an Independent ICRI Certified Concrete Slab Moisture Testing Technician. Complete test results shall be sent to Tenant’s Project Manager within 48 hours of receipt
- Bond testing shall be accomplished to determine the compatibility of the adhesive to the concrete slab
- The following guidelines must be met:
  - For RH (Relative Humidity) of 80% or less and PH of 9 or less - standard adhesives can be used per the Flooring Manufacturers requirements
  - For RH readings between 80% and 90% and PH of 11 or less - High Moisture adhesives are allowed per the Flooring Manufacturers requirements
  - For RH readings greater than 90% or a PH greater than 11 - a Moisture Mitigation system is required per ASTM F3010 “Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings”
  - Per Outline Specifications 180/3A.12 a 15 mill Stego Wrap Vapor Barrier is required directly under the concrete slab. Failure to install the Specified Vapor Barrier will require the installation of a Moisture Mitigation system per ASTM F3010 regardless of the moisture levels in the slab



## Powerbond

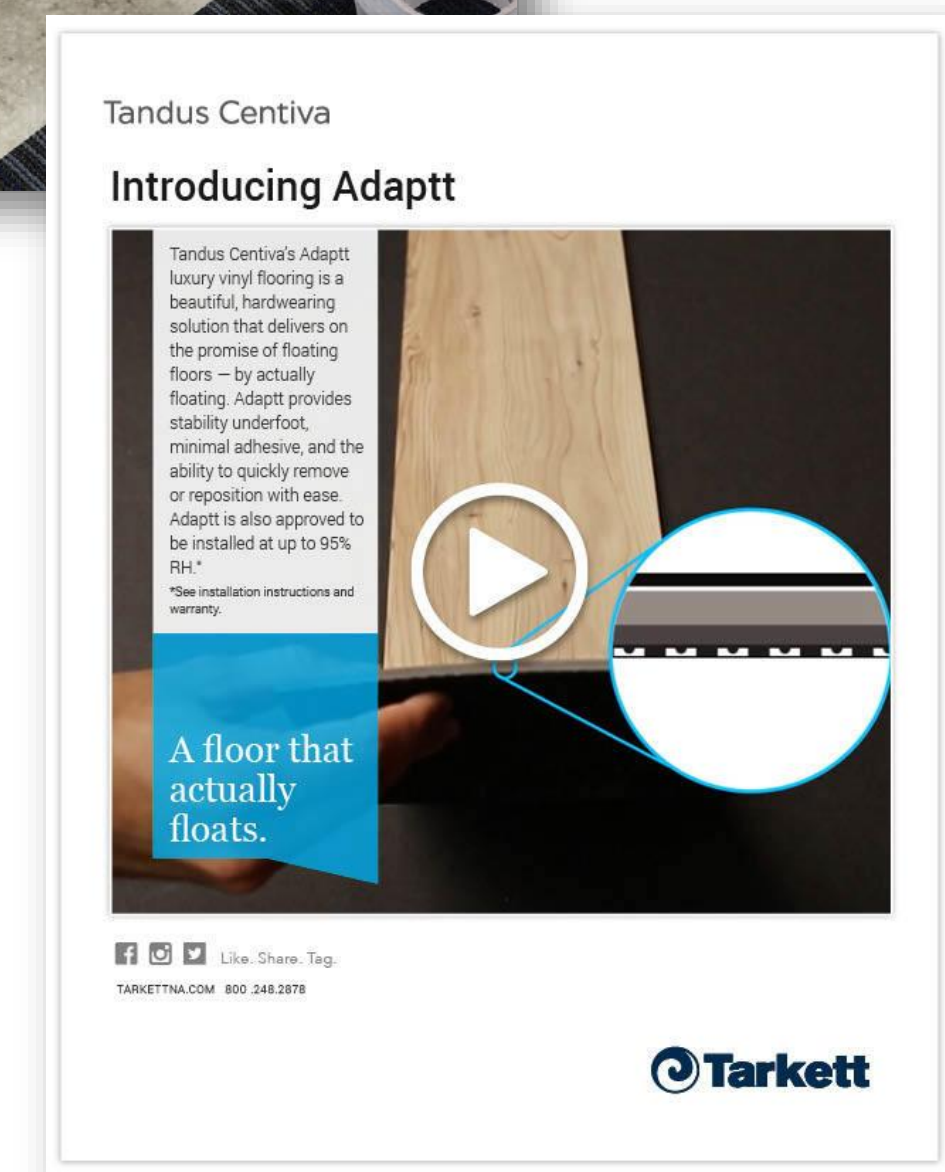
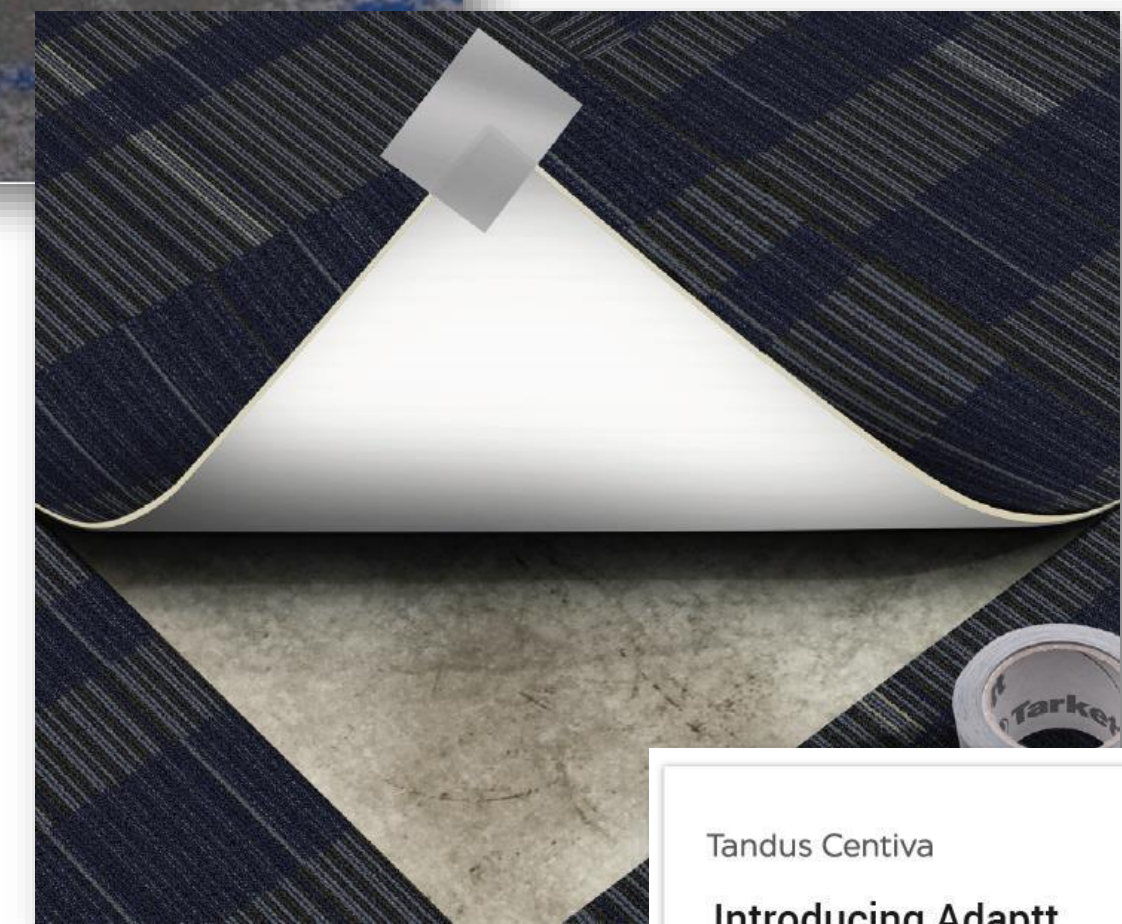
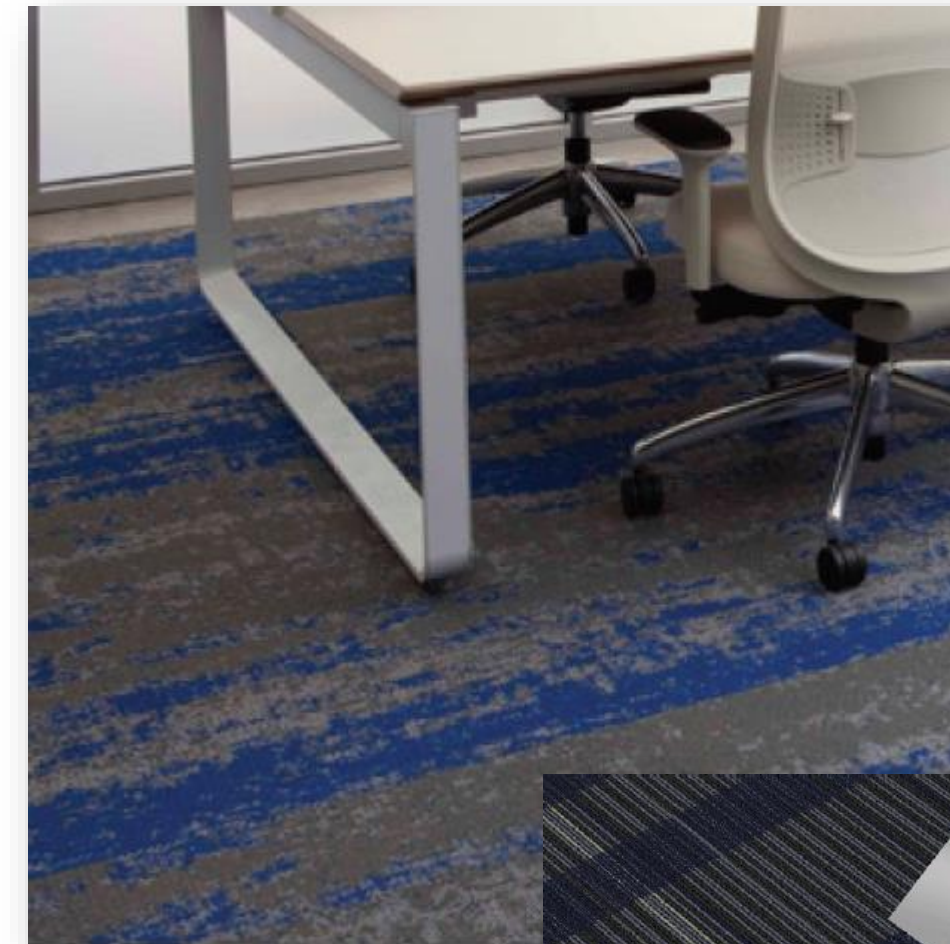
- Install without moisture mitigation, as long as no free water
- Hybrid resilient/soft-surface
- 6-foot rolled goods
- Looks and feels like carpet; maintains like sheet vinyl
- 50-year track record

## Tandus Carpet Tile

- Ethos backing and Omniccoat Technology, with Tarkett Tape
- Install without moisture mitigation, as long as no free water

## Adaptt LVT

- Floating floor, with SureSet Technology
- Requires no adhesive
- Can be installed in areas with 95% RH or lower
- If 95%+ use SureStart® underlayment





# OTHER MOISTURE MANAGEMENT PRODUCTS

- Moisture Mitigation Systems
  - Ardex MC Rapid
  - Schonox EPA
  - Ardex VR98
- Adhesives
- Anti-mold treatment





For additional information and assistance, contact your local Fuse Alliance Member.

Visit [www.fusealliance.com](http://www.fusealliance.com) and click **Find A Contractor** for the Fuse Alliance Member closest to your project.

**Thank You!**  
Sponsored by Fuse Alliance

