

Permeation & Crack Isolation...

**What Every Architect, Specifier,
and Contractor Needs to Know**

by
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SESSION DESCRIPTION

Is your approach to waterproofing up to date? There are many new products for waterproofing and crack isolation, and you need to address permeation and isolation before making any final product decisions. This presentation reviews the evolution of waterproofing and crack isolation as well as current best practices. Permeation and crack isolation are two critical performance criteria that often escape scrutiny when evaluating best practices with regard to waterproofing and crack isolation. This presentation focuses on these key performance metrics. Attendees will leave armed with the information to objectively evaluate products and systems for future projects.

LEARNING OBJECTIVES

At the end of this session, participants will be able to:

1. Review the history of crack isolation and permeation and the important role they play in successful tile installations.
2. Review current ANSI and ASTM standards with regard to crack isolation and waterproofing.
3. Explore the interconnected relationship between waterproofing, crack isolation, and permeation with regard to a successful waterproofing installation.
4. Outline the critical path to ensure that your projects successfully address these critical areas of performance.

Presentation Benchmarks

“The Nature of Attributes”

....attributes are the means by which a product's performance characteristics can be identified.

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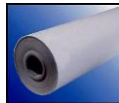
The three essential considerations of an attribute:

- Requirements
- Criteria
- Tests

A Short History of Crack Isolation

Early attempts included:

- Duct tape
- Carpet tacks
- Scribing felt and mastic
- “Gunny sacks” and thin-set



Why Do Tile & Stone Crack?



A Short History of Crack Isolation-Specs



- For years, most specifications would only call out for "crack isolation" with no means to gauge performance based on industry testing.
- Waterproofing would usually also mention..."crack isolation", "crack suppression", or "joint bridging", but no industry metrics for performance existed.

Key Areas of Failure

- Traditional clamping ring drains
- Linear drains
- Movement joints
- Plane transitions
- Deflection, shrinkage, curing cracks

*"Hotel owner claims
\$4 million dollars in
damages from faulty
shower pans"*

Washington D.C., July 20th 2012

Key Areas of Failure-Drains, clamping



- Constant movement in the drain/plumbing assembly contributes to stress at drain/WP interface.
- This subtle but constant movement, when combined with inferior installation and products with questionable performance, can result in failure.

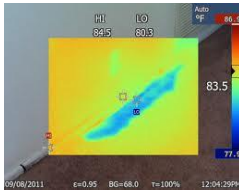
Key Areas of Failure-Drains, linear

- Drain body composition is a factor
- Movement between dis-similar substrates is a stress point
- Methods of waterproofing can contribute to failure
- Certain drain styles are not compatible with waterproofing "best practices"



Key Areas of Failure-plane transitions

- The "floor-to-wall" transition is the most common area of failure
- Movement at this "change in plane" may exceed 1/16" inch



Key Areas of Failure-movement joints



- Saw cut joint...
- Cold joint...
- Expansion...

Some products can be used for the first two conditions...there are no crack iso products that can be used over an expansion joint.



Key Areas of Failure-movement joints



- There are no products that can be used to install tile or stone over an expansion joint
- Consult the TCNA manual details relevant to EJ171

Key Areas of Failure-movement joints



Of course do not forget to put your movement joints into your finished installation.

8' to 12' for exterior
20' to 25' for interior

Key Areas of Failure-slab cracks



- All concrete will crack, for a variety of reasons...this movement will have an impact on the WP membrane performance
- No membrane can guard against vertical movement of slab cracks

Presentation Benchmarks

"The Nature of Attributes"

....attributes are the means by which a product's performance characteristics can be identified.

The three essential considerations of an attribute:

- Requirements-crack isolation
- Criteria-can withstand movement up to 1/8"
- Tests-ANSI A118.12 "high performance"

The True Definition



ANSI Jig Test

System Crack Resistance Tester

The apparatus is manually operated to move the concrete blocks apart at a designated rate until a specified "crack width" is reached. The assembly is inspected for cracks in the tile and is discontinued if any are found. If no cracks are found in the tile, the test is continued. An assembly exhibiting no cracks in the tile after the opening width reaches 1/16" receives a "Standard Performance" rating; an assembly exhibiting no cracks in the tile after the opening width reaches 1/8" receives a "High Performance" rating.

ANSI A118.12 Standard Performance vs. High Performance

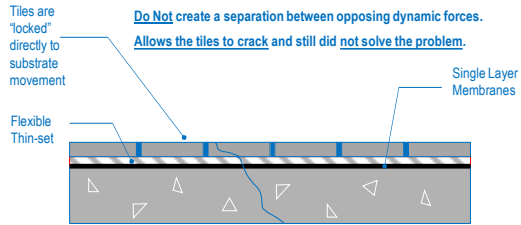
5.4.9 Continue testing at one hour intervals by opening the gap an additional 0.016 in. (theoretical) until one of the following occurs: (A) the specimen gap is 0.062 in. (for standard performance) or 0.125 in. (for high performance) or (B) tile cracks or de-bonds. Report the maximum specimen gap opening before tile failure occurs for each of the three test specimens.

Requirement: Standard performance: Tile failure occurs after 1/16 in. specimen gap opening, but before 1/8 in. gap opening. High Performance: Tile failure does not occur by 1/8 in. specimen gap opening.

END OF ANSI A118.12

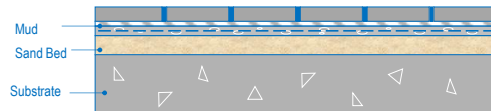
ANSI A118.12 Standard Performance

Fluid Applied=Direct Bond=standard performance



Thick Bed Method

Indirect Bond – “Old World” Method



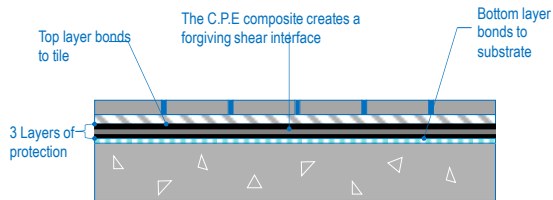
Thick Bed Method

“The Sand Layer was the First Indirect Bond”

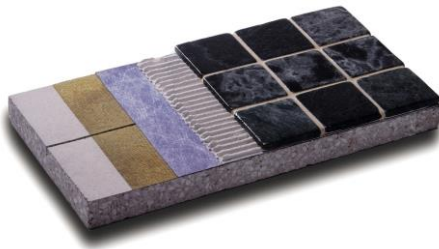


ANSI A118.12 High Performance

Composite Sheets=Indirect Bond=High Performance

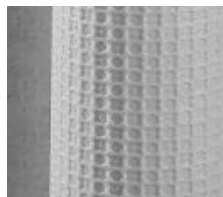


Does Your Crack Iso/Waterproofing Meet ANSI A118.12 for High Performance?



Is Uncoupling "Crack Isolation"?

What is Uncoupling?...is it another name for crack iso?



Is Uncoupling “Crack Isolation”?

I have been told...

- ...it is “kind of like” crack isolation
- ...it is not crack isolation...but protects tile from cracking
- ...that it is crack isolation

[...some blog titles that reinforce the confusion](#)

Uncoupling Membranes-Protect Tile from Cracking

Uncoupling or Crack Isolation-What’s the Difference?

What Actually Does an Uncoupling Membrane Do?

Is Uncoupling “Crack Isolation”?

Uncoupling: a Webster’s Definition.... to separate or disconnect (something) from something else



Is Uncoupling “Crack Isolation”?

Isolation: to separate from others



Is Uncoupling "Crack Isolation"?

Is it an accepted method per TCNA?



Is Uncoupling "Crack Isolation"?

Are there any ANSI Standards?



Presentation Benchmarks

"The Nature of Attributes"

....attributes are the means by which a product's performance characteristics can be identified.

The three essential considerations of an attribute:

- Requirements-provide "uncoupling" performance
 - Criteria-none available from industry
 - Tests-none available

Is Uncoupling "Crack Isolation"?

Request ANSI A118.12 test results for any "uncoupling" membranes.



Permeation

Per-me-ation

- First used in 1623
- The act of "passing through or...into every part of..."



Permeation - City Center



Moisture Vapor Transmission

	Classification / permeation*	Highest perm in classification	Oz of water / hr / sq. ft	Amount of water / week / 100 sq. ft	Amount of water / week / 1000 sq. ft
1	0.1 perm or less	0.1 perm =	0.00022 8571	3.84 oz	38.4 oz
2	$0.1 \leq 1.0$ perm	1.0 perm =	0.00228 5714	38.4 oz	384 oz (3 gallons)
3	$1.0 \leq 10.0$	10 perm =	0.02285 7143	384 oz (3 gallons)	3840 oz (30 gallons)

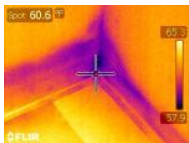
ASTM CPE rating: 0.15
E96=0.5 PVC rating: 0.40

Permeation



- Perm rating of 0.5 or lower is needed
- Perm rating of 0.15 = 34 oz. per 1K Sq. Ft.
- Perm rating of 2+ = 2.5 gallons per 1K Sq. Ft.

Permeation



Infrared images of toxic mold behind stud walls

Hotels, High-rises Try Proactive Mold Prevention

By Indoor Environment Communications and Shelly LeVick, Attorney,
Segal McCambridge Singer & Mahoney, Austin, Texas

Permeation - If Ignored



Presentation Benchmarks

"The Nature of Attributes"

....attributes are the means by which a product's performance characteristics can be identified.

The three essential considerations of an attribute:

- Requirements-membrane must prevent vapor migration
 - Criteria - perm rating must be 0.5 or lower
 - Test - ASTM E96

Permeation - Hawaii



Permeation

- Permeation...too much steam in the wrong places is the cause of many mold remediation cases.
- Acceptable perm rating
- Unacceptable perm rating...



SUMMARY

- Successful crack isolation is many times interwoven with the waterproofing specifications.
- You have to "drill down" to ANSI A118.12 "high performance" to ensure the crack isolation/WP product used will withstand the typical substrate movements inherent in every installation.
- Permeation is an overlooked component of successful waterproofing. Including ASTM E96 standards in waterproofing products used on your projects addresses that concern.

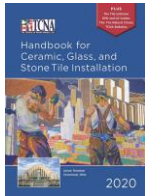
SUMMARY

- Using current, updated ANSI and ASTM standards for crack isolation and waterproofing and incorporating the CSI "nature of attributes" approach to evaluating a product's performance potential eliminates the chance of sales and marketing spin from unduly influencing your final product selection.

Why leave it to just anyone?

"Because tile is a permanent finish, the lowest bid should not be the driving factor, but rather who is the most qualified to perform the scope of the work specified."

- TCNA Handbook



The Tile Council of North America urges design professionals to include language in specifications to secure qualified contractors and installers. The following nonprofit programs are well-established and recognized by the Handbook Committee:

- Advanced Certifications for Tile Installers (ACT)
- Ceramic Tile Education Foundation (CTEF) Certified Tile Installer Program
- International Masonry Institute (IMI) Contractor College
- Journeyman Tile Layer Apprenticeship Programs
- Natural Stone Institute (NSI) Accreditation for Natural Stone Tile Installation
- National Tile Contractors Association (NTCA) Five Star Contractor Program
- Tile Contractors Association of America (TCAA) Trowel of Excellence Program



MasterSpec®

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer is [a **Five-Star member of the National Tile Contractors Association**] [or] [a **Trowel of Excellence member of the Tile Contractors' Association of America**].
2. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.
3. Installer employs only [Ceramic Tile Education Foundation Certified Installers] [or] [installers recognized by the U.S. Department of Labor as Journeyman Tile Layers] for Project.
4. Installer employs at least one installer for Project that has completed the Advanced Certification for Tile Installers (ACT) certification for installation of [mud floors] [mud walls] [membranes] [shower receptors] [gauged porcelain tile/gauged porcelain tile panels and slabs] [and] [large format tile].



SpecLink

10000	QUALITY ASSURANCE
10000	Maintain one copy of and <u>ANALYZE/STATE</u> and <u>TCNA</u> on site.
10000	Manufacturer Qualification: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
10000	Installer Qualifications:
10000	Company specializing in performing the installation, with minimum of five years of documented experience.
10000	Accredited Five-Star member of the National Tile Contractors Association (NTCA) or Trowel of Excellence member of the Tile Contractors Association of America (TCAA).
10000	Installer Certification:
10000	Ceramic Tile Education Foundation (CTEF) Certified Tile Installer (CTI).
10000	Apprenticeship Program: Installer has achieved Journeyworker status through an apprenticeship from the International Union of Bricklayers and Allied Craftworkers (IBUAC) or a U.S. Department of Labor (DOL) recognized program.
10000	Advanced Certifications for Tile Installers (ACT): Certification in the installation of membranes, mortar bed (mud) floors, mortar (mud) walls, shower receptors, large format tile, gauged porcelain tile/panels/slabs and grouts.
10000	International Masonry Training and Education Foundation (IMTEF) Supervisor Certification Program (SCP).





LARGE FORMAT TILE

MEMBRANES

MUD WORK

SHOWERS

GAUGED PORCELAIN TILE

GROUTS



Advanced Certifications for Tile Installers
tilecertifications.com



Ceramic Tile Education Foundation
ceramictilefoundation.org
info@ceramictilefoundation.org



National Tile Contractors Association / Five Star
Contractor Group
tile-assn.com
NTCAqualifiedlabor@tile-assn.com



Tile Contractors' Association of America
tcaainc.org
info@tcaainc.org



Tile Council of North America, Inc.
TCNAtile.com/find-qualified
info@tcnatile.com

ANY QUESTIONS?



This concludes our Program.
Please feel free to contact me for additional information.

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THANK YOU!

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