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Crack Isolation Article

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Tile is one of the most durable types of floor covering available. It easily outlasts carpet, vinyl and most hardwood floors. Some installations have lasted for centuries. A thousand years ago, tile was installed over a bed of sand. In the mid 1900's, a reinforced mortar bed (which is a mixture of portland cement and sand about 1.25" thick and reinforced with 2" x 2" wire) was used. The bed was installed over concrete with a cleavage membrane separating the mortar bed from the concrete. Mortar beds or sand layers separated tile from the substrate below and allowed for differences in movement in the substrate and the tile.

Modern materials and techniques dramatically reduced installation time, but the potential for failures was also increased. While it may not be apparent, tile does move. Environmental conditions like temperature, sunlight and humidity can cause it to move. These forces can become extremely strong and allowances for lateral movement are essential to a successful tile installation. The Tile Council of North America (TCNA) publishes recommendations for movement joints in tile fields in their "Handbook for Ceramic Tile Installation".

Forces created by movement in the tile field are further aggravated by differences in movement in the substrate below. Concrete tends to crack as it shrinks during the curing process. Industry experts state "The question is not if concrete will crack. It is when and where it will crack". Concrete can crack up to 1/16" in 10 feet as it cures. And, plywood floors can provide similar challenges when they expand and contract with variations in temperature and humidity.

Tile must be installed over a flat, structurally sound substrate. Deficiencies must be addressed prior to installing tile. The ceramic and stone tile industries publish their individual requirements for maximum allowable deflection. In essence, the substrate must be strong enough to support the total weight of the installation and its service needs.

While mortar or sand beds provided the requisite separation, there are inherent problems. For example, they are relatively heavy, they add height and are time consuming to install. As construction schedules were compressed, faster techniques were needed. In answer to this need, the Tile Council of America developed the thin-bed method of installation in the 1960's. The thin-bed method is a cementitious adhesive that allows tile to be bonded directly to a substrate.

Thin-bed (or thin-set) methods made tiling faster and easier and allowed for significant growth in the use of tile in residential and commercial construction. However, thin-bed methods did not separate the sub floor from tile, and direct bonding allows for the transfer of forces from subfloor to the tile. So, when a concrete floor cracks, that force is telegraphed directly to tile causing it to crack. Even hairline cracks can cause tiles to crack.

Noble company was one of the first with an answer to this problem. In 1984, they introduced NobleSeal[®] TS, a composite sheet membrane that provided waterproofing and crack isolation for thin-bed tile installations.

NobleSeal TS is made from chlorinated polyethylene (CPE) with a non-woven polyester fabric laminated to both sides. The fabric provides a bondable surface so that the membrane can be bonded to a substrate and tile can be bonded to the other side. The CPE membrane in the middle provides elasticity and relieves the stress caused by differences in movement in the tile field and in the substrate. CPE is impervious and an extremely effective barrier to water and vapor. It's not affected by variations in temperature and is resistant to a broad range of chemicals. CPE is also so durable Noble Company can guarantee that it will last the life of the original tile installation.

Installing NobleSeal under tile relieves the stress caused by differences in movement in the tile field and the substrate which protects tile from cracking. However, tile installations must include allowances for movement in the tile field. The TCNA Handbook spells out their recommendations for movement joints in Detail EJ171. Grout joints are replaced with soft (flexible) joints to facilitate movement. Exposure to moisture or sunlight increases potential for movement and soft joints are recommended every 8 to 12 feet in both directions in exposed areas.

Installation of NobleSeal protects tile from cracking due to telegraphing of forces from cracks. It also allows tile to bridge control joints in concrete substrates. Without membrane, tile should be cut to honor the control joints. Installing CIS allows tile patterns to be preserved and offers tile setters or decorators greater creativity and flexibility in designs.

The TCNA Handbook shows two methods of installation for crack isolation membranes:

- Partial coverage involves installing membrane only over the cracks or joints. This method may be suitable as long as the concrete does not crack in other areas.
- Full coverage requires crack isolation membrane under all the tile. It provides more assurance that future cracks in the concrete will not affect tile performance.

NobleSeal is not the only crack isolation membrane. Terms like crack suppression, anti-fracture and uncoupling membranes are used to describe products that are purported to protect tile from cracking. Manufacturers state claims regarding performance, and there are test data that can be considered when comparing products. A description of test data follows:

- ASTM C627 (called the Robinson Floor test) is actually a tile service rating. It provides a rating system of 5 levels from residential to extra heavy. While not really a measure of substrate movement, it does provide information about the affect of compressibility of a component in the system. It would not be advantageous to add a compressible membrane in a tile installation.

ANSI A118.12 is the standard for crack isolation membranes. The standard measures a variety of performance areas such as shear bond, resistance to micro organisms (important to avoid mold growth) and, perhaps the most important element, performance. "System Crack Resistance" is a measure of the membranes ability to prevent tile from cracking when the substrate moves. There are 2 levels of performance:

- Standard performance requires the membrane to protect tile when the substrate separates more than 1/16".
- High performance requires the membrane to prevent cracking when the substrate is opened more than a 1/8". All NobleSeal sheets have been tested to ANSI A118.12 and are rated High Performance. And all NobleSeal sheets are rated Extra Heavy in Robinson Floor tests. This provides the assurance that you are getting the best possible protection for you custom tile installation.

NobleSeal is easy to install, especially when it is bonded with a NobleBond adhesive. The process follows:

- Apply the adhesive
 - Embed the sheet with a a roller.
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The floor is protected and tile can then be installed with a latex modified thin-set mortar. NobleSeal is the choice of demanding design and construction professionals around the world (from Las Vegas to New York to Dubai). It has a record of success protecting tile for 25 years with millions of square feet installed. Whether your job is residential or commercial, large or small, use NobleSeal to avoid costly failures.

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