Creating Proper Movement (Expansion) Joints for Ceramic, Brick and Stone Tile Installations

Expansion (movement) joints are mandatory to allow the ceramic tile, brick tile, and stone tile assembly (tile, setting materials and grout) to accommodate moisture and thermal expansion.

The tile industry switched the term from expansion joints to movement joints with the publication of the ANSI A108 American National Standard Specifications for the Installation of Ceramic Tile in 1999 and in the 2001 TCA Handbook for Ceramic Tile Installation.

Over the years, the recommendations for expansion joint width have continued to change. Here are the recommendations for installations before 2005:

> Minimum ½" joint with maximum spacing at 16' in all directions;
> Minimum ⅜" joint with maximum spacing at 12' in all directions;
> Minimum ¼" joint with maximum spacing of 8' in all directions;
> Minimum ⅛" joint with maximum spacing of 4' in all directions;
> Minimum widths shall be increased 1/16" for each 15°F of actual temperature range greater than 100°F between summer high and winter low.
> Decks exposed in the sky in northern USA usually require ¾" wide joints on 12' centers.

In the 2005/2006 *Handbook for Ceramic Tile Installation*, the guidelines were modified to a minimum ½" joint with maximum spacing at 12' apart in all directions; and a minimum ⅜" joint with maximum spacing at 8'apart in all directions.

These rules include all installations on exteriors of buildings, all installations exposed to sunlight or temperature changes, and all installations exposed to moisture.

The *TCNA Handbook* recommends doubling the rule distance apart for expansion joints for interior applications and caution exceeding these rules.

Expansion joints are required where tile and stonework abut restraining surfaces, such as perimeter walls, dissimilar floors, curbs, columns, pipes, ceilings, handrails, doorframes, and where changes in backing material occur. Expansion joints throughout tile, brick and stone installations over structural expansion joints must never be narrower than the structural expansion joint.

Movement joints are required over all control, construction, cold and seismic joints in the structure and should continue through the tile and stonework including all horizontal and vertical assemblies. For additional information, consult the Tile Council of North America (TCNA) about Assembly Method EJ171.

Here's a successful expansion joint on a wall surface.

The failure of the installing tile, masonry, stone contractor or builder or general contractor to coordinate and install, or have installed by other contractors, the correct expansion joints to these requirements and the specifications, contributes to the job failures that occur on commercial, institutional and residential projects.

Shown is a working expansion joint.

I am observing installations in large custom homes without expansion joints and resultant loss of flooring assembly bond. The lack of expansion joints is exacerbated by the lack of scarifying the concrete slab prior to installation.

Note: The TCNA *Handbook for Ceramic, Glass and Stone Tile Installation* exclude the detailing of expansion joint screeds for exterior veneer. The tile industry typically uses a wire reinforced mortar bed, while the lath and plastering industry uses a scratch and brown coat.

When the lath and plastering industry is installing a scratch and brown coat, a #15 screed is most often used. The #15 screed only serves to control shrinkage of the mortar. The #40 screed is used for both shrinkage and expansion of the mortar.

The Technical Services Informa-

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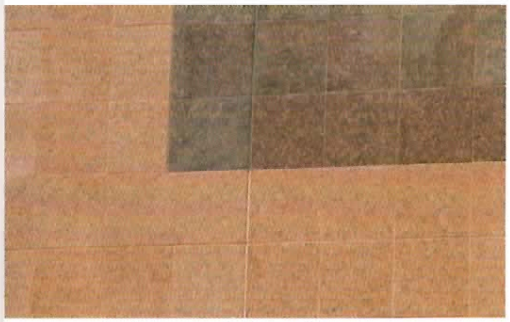
tion Bureau now recommends the M Slide over the #40 screed to reduce moisture intrusion at the screed locations. The best screed is still a double casing bead over double stud location.

In general, requirements ANSI 1985, 1992, 1999, openings for expansion joints in tile work shall be provided as specified and where indicated on the project drawings.



Another example of a working expansion joint.

Extend openings for expansion joints completely through tile, setting material, mortar bed and reinforcing down to, but not through, waterproofing or cleavage membrane.

Keep expansion joint cavities open and clean of dirt, grout, mortar and setting materials. Tile edges to which sealant will bond shall be clean and dry. Primer on tile edges is mandatory when recommended by sealant manufacturer's recommendations. Install sealant after tile work and grout are dry. Follow sealant manufacturer's recommendations. Dimensions in ANSI 1985, ANSI 1992 and ANSI 1999 are repeated as located above.

Saw-tooth joints affect the performance of sealant and caulking materials and are not recommended. Where specified, contractor should obtain a waiver or release of liability prior to continuing with installation.

In following the EJ171 Movement Joint Guidelines for Ceramic, Glass and Stone:

- Ensure that the location of tile work joints align with existing joints in the substrate, joints in the tile work should be constructed during installation of mortar beds and/or tile, rather than saw-cutting joints after installation.
- Set compressible backup strip when mortar is placed or utilize removable wood strip to provide for backup after mortar has cured.

Sealants in traffic areas require a Shore A hardness of 35 or greater.

Silicone sealants may be used on both exterior and interior vertical tile surfaces. Single-component, mildew resistant silicone sealants are formulated with fungicide for sealing interior joints in ceramic tile showers and around tubs, sinks and plumbing fixtures.

Don't use acrylic, latex, and siliconized caulks in wet areas as these caulks are not mold resistant, and may support mold growth on the caulk. Use sealants complying with ASTM C920, which designates sealants according Type, Grade Class and Uses.

On all projects (commercial and residential) the contractor must responsibly follow the location for expansion joints as designed by the architect, or landscape architect. Where expansion/movement joints are not designed or included, the

Here is a failing installation due to no expansion joint.

contractor has a responsibility to ask for direction. **If the contractor is told to proceed without expansion joints, the contractor should obtain a waiver or release of liability.** In the case of where no architect is involved in the work to be performed, discussion of expansion joints should occur. Manufactured/preformed joint profiles are available and may be used. Follow manufacturer's installation recommendations. Rules as listed above still apply. Contractors should be familiar with assembly methods **F125-Partial and F125 Full** for movement joints associated to concrete slab cracks pre-existing to the tile installation.

Waterproof membranes meeting ANSI A118.10 and Crack Isolation Membranes meeting ANSI A118.12 are great tools to prevent moisture migration or crack migration through tile assemblies, as long as the contractor is aware of the membranes' limitations. Follow membrane manufacturer's installation instructions. However, the usage of the membrane does not eliminate the need for expansion/movement joints in the tile assembly.

Contractors are responsible for the workmanship of their employees and subcontractors, and need to make sure their employees are trained and aware of these expansion/movement joint requirements. Remember, failures are expensive and repair may cost twice what your contract was worth to perform the correct repair.

For more information on movement (expansion joints), review the TCNA Handbook for Ceramic, Glass and Stone Tile Installation; the American National Standards for the Installation of Ceramic Tile ANSI A108, A118, and A136; and the American National Standard Specifications for Ceramic Tile ANSI A137.1.

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About the Author:
Gregory I. Mowat FCSI CDT CTC CFC of Forensic Tile Consultants. He has been active in the building industry for over 40 years and has worked for contractors, tile distributors, the Ceramic Tile and Marble Institute of San Diego and forensics for the past 22 years. He can be reached at tile4n6@aol.com or www.forensictileconsultants.com.