



Movement Joint in Tile Assemblies

There has been considerable discussion concerning the need for movement joints in tile assemblies. The question is not whether they are needed; that is a simple yes. The questions are “Where do they go?”, and “What is used to fill the joint in the tile assembly that will control or compensate for movement in the entire assembly?” There are several different types of construction movement joints defined by the Tile Council of North America (TCNA) that are needed in tile assemblies:

- Construction / Cold Joints are formed between two successive placements of concrete. Quite often, the reinforcement in the concrete will continue through the two successive placements.
- Contraction / Control Joints formed in the concrete or sawn into cured concrete. This creates a weakened plane in the concrete that regulates the location of cracking from natural movement during the curing cycle. The concrete will crack the same as the random cracks we commonly observe in concrete slabs, except with the inclusion of control joints, this random cracking is controlled to a specific location. There is a potential for continued movement that will cause these cracks to open and close with the same as the unrestricted natural cracks that occur randomly.

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- Expansion Joints are created in the concrete to compensate for excessive expansion, due primarily to temperature changes in the concrete. As the concrete cures, it generally shrinks, and as the temperature rises, the concrete and tile assembly expands. When the expansion exceeds the shrinkage, the concrete needs a joint to compensate; if not, it can bend and dome slightly, resulting in cracks in the assembly.
- Isolation Joints are typically found where two concrete surfaces meet. This is most common when a horizontal surface meets a vertical surface. Since these surfaces can move in three dimensions, it is important to isolate them from each other.

American National Standard Specification for the Installation of Ceramic Tile (ANSI), with the approval of TCNA members, has defined the size and frequency of movement joints for a successful tile or stone installation. The placement and size of the joint is dependent on the environmental conditions at the location of the concrete. If the concrete subfloor is interior in a controlled environment there should be a movement joint place every 2- 25 feet in both directions. If that interior space is exposed to direct sunlight and will therefore have more significant temperature fluctuations, the joints should be more frequent: every 8 - 12 feet. If the tile is to be placed over concrete in an exterior application, the concrete and tile assembly should have movement joints placed every 8-12 feet. In applications where the tile assembly will be exposed to temperature changes up to 100°F, the width of the movement joint should be 3/8" to 1/2", depending on frequency of the movement joints. The width of the movement joint should be increased by 1/16" for every 15°F increase in temperature change above 100°F. Generally, it is acceptable for the movement joint width to equal the width of the grout joint in interior applications, but never less than 1/8". The movement joint width in the tile assembly should never be narrower than that placed in the concrete subfloor.

The movement joint in the tile assembly should be placed directly over the movement joint in the concrete substrate (exceptions to this will be discussed later). The identified movement joint in the tile assembly should not be grouted with the cement based grout; it is to be kept open during the grouting process. Once the grout in the balance of the assembly has fully cured (generally 48 hours), the identified movement joint should be cleaned out of residual debris: i.e. dried grout, dried mortar, dirt, etc. A suitable backer rod shall be compressed into the open joint to within one half the width of the joint of the surface of the tile; if the movement joint is 1/2" wide, it should be filled to within 1/4" of the surface of the tile with the backing rod. Suitable backing rod materials are defined in the ANSI specification as: closed cell polyethylene foam, closed cell butyl rubber foam, and open or closed cell polyurethane foam.





ANSI and TCNA recommend a caulk with Shore A hardness greater than 35 for traffic areas, such as CUSTOM'S Commercial 100% Silicone Caulk.

Once the movement joints are properly prepared they are now ready to be filled with the right flexible caulk or sealant. Using the wrong caulk will ruin the tile installation; the right caulk is one that will move with the tile assembly and hold up to the abuse of daily traffic. If the wrong caulk is used in the movement joint, the stress that can develop from movement of the substrate can damage the tile assembly. The damage can be as minor as cracks in the cement grout, to major cracks through the tile or loose tile. It is tempting to use a low-cost siliconized acrylic. These are generally available in a variety of colors, and while they can be used to fill the space where horizontal surfaces meet vertical surfaces in some installations, they do not meet the ASTM C-920 requirements nor provide the performance required for a movement joint in most specified tile installations. Siliconized acrylics do not have the flexibility to move with the assembly in commercial applications. ANSI recommends the use of a Silicone, Polysulfide, or Polyurethane Caulk that meets the requirements of ASTM C-920 for filling the movement joints.

Silicone caulk has many advantages over polysulfide and polyurethane caulks:

- Available in a wide variety of colors.
- Better stain resistance to common materials.
- Better UV stability for exterior applications.
- Excellent bonding to glass and glazed surfaces of tile.
- Shorter tack-free time speeds full installation.
- Can withstand a greater environment temperature range.

Custom Building Products Commercial 100% Silicone Caulk meets the requirements of ASTM C-920, Type S, Grade NS, Class 25, Use T, M, & G. Since it has a Shore A Hardness greater than 35, it can be used in traffic areas.

In many cases, designers do not want to interrupt the tile pattern with movement joints of a different color. Custom Building Products' Commercial 100% Silicone Caulk has been formulated in many of the most popular designer colors so that now the color of the movement joint can match that of the grout in the balance of the tile assembly. Designers also do not like to cut the movement joint through the solid tiles, interrupting their desired pattern. For successful installation, it has been traditionally accepted that the movement joint in the tile assembly had to be placed directly over the movement joint in the concrete. While this is still true for Construction and Expansion Joints, a formed Contraction or Control Joint can be relocated with the use of an isolation membrane like Custom Building Products' Crack Buster® Pro, in conjunction with Custom Building Products' Commercial 100% Silicone Caulk filling the movement joint. The Crack Buster Pro should be placed over the joint at twice the diagonal width of the tile being installed, and the movement joint in the tile assembly should be placed as close as possible over the Contraction or Control Joint.

For successful ceramic or stone tile installations it is imperative to incorporate movement joints in both the concrete substrate and the tile assembly.

In some cases, the Contraction or Control Joints will run diagonal to the grout joints in the tile assembly. Again, the Designers do not want to cut movement joints diagonally through the tile assemblies. One solution to this is to place a saw tooth joint pattern along the Contraction or Control Joint in the substrate. Because of the additional stresses placed on the flexible sealant, this practice has been discouraged. However, with the use of a crack isolation membrane like Custom Building Products' Crack Buster Pro and the right sealant, like Custom Building Products' Commercial 100% Silicone Caulk, a design-appealing saw tooth movement joint can be successfully installed.

For successful ceramic or stone tile installations, it is imperative to incorporate movement joints in both the concrete substrate and the tile assembly. Ignoring the need for proper movement joints in the tile assembly will result in callbacks and expensive repairs, as well as the subsequent installation of movement joints. It is important that ANSI and TCNA guidelines are followed for the proper placement of these movement joints. It is equally important to use the right materials meeting the requirements of the industry standards. To meet the appeal of today's designers, it is important to use a movement joint sealant/caulk that matches the color of the cement grout used throughout the tile assembly. Custom Building Products' Commercial 100% Silicone Caulk has been formulated and color matched to meet these demands. It meets the requirements of ANSI and ASTM C-920 for traffic area use, and is available in a variety of popular colors to meet any designer's expectations.



ABOUT THE AUTHOR

Steve Taylor is Director of Architecture and Technical Marketing for Custom Building Products and has more than 30 years of experience developing products for the construction industry. Steve is a member of the Tile Council of North America (TCNA), helping to determine proper tile installation methods and standards, including the simplification of tile installation processes which enables tile professionals to save time and money.