



**CERAMIC TILE INSTITUTE OF AMERICA, INC.**  
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## **CTIOA FIELD REPORT 75-3-1 (R-99)**

### **SUBJECT: BONDING CONCRETE TILE**

Concrete is one of the most versatile and durable products in the building industry, whether poured in place or pre cast. An excellent example of this versatility is pre cast concrete tiles that are available in a large variety of shapes, colors, textures and sizes. It is important to realized that the properties of these tiles are different from those of ceramic tiles and as such, may react differently to environmental conditions and installation techniques than their ceramic counterpart.

The main difference is how concrete tile reacts to moisture. Concrete curing is a chemical process called "hydration" which utilizes water to obtain a high percentage of its potential strength within 28 days. The content of the cement matrix (aggregate, relative volume of cement to water, plasticizers, etc ... ) as well as temperature and humidity during the curing period plays an important role in determining the length of time needed to reach this desired high strength level. Under controlled factory conditions (curing chambers), this curing period can be reduced to less than a week. Since concrete utilizes water rapidly during curing, the dimensional stability is affected to a much greater extent during this period.

To a lesser degree, cured concrete can also expand and contract when the moisture content increases and decreases. The re-introduction of moisture to just one side of a cured tile during the installation, may also potentially affect it's dimensional stability. This could result in a possible bonding separation of the tile from either the substrate, mortar and/or grout. Even though this movement is the exception rather than the rule, it is prudent to recognized the dynamics of such a phenomenon, whether minor or major, and take steps to minimize any potential for losing bond.

1. **MANUFACTURED DATE:** Check the manufactured date or level of curing Most manufacturers accelerate curing time using elevated temperatures, fast setting cements or additives and do not ship tiles until they have reached sufficient curing levels.
2. **SUBSTRATE PREPARATION:** Concrete slabs are to be well cured, dimensionally stable and free of cracks, waxy or oily films, curing compounds, paint, carpet or linoleum glues, joint compound, sanding dust or other dust or dirt from other trades which may inhibit bond of the setting mortars. After the slab has been completely cleaned, the use of a concrete primer may also enhance the bond strength. When there is doubt as to the condition of slab surface, pour a small amount of water on the surface. If the slab is clean, the water will be quickly absorbed, if it beads up, there is a potential bonding problem. If there is still any doubt, install several tiles and let them set for several days. When you removed these tiles, you will then know exactly how the rest of the tiles will bond to the slab.
3. **OTHER PROCEDURES:** Of course, all other requirements for substrate preparation, placement of expansion joints, crack suppression membranes, proper mixing techniques and ratios of mortars and grouts, etc. that you would normally do for ceramic tile, hold true for cement based or concrete tiles.
4. **COVERAGE:** Bonding mortar coverage is important in any installation and in the case of

coverage under any given tile and support of edges and corners may be assured by backbuttering or by following the recommendation in the TCA Handbook (page 8) for Bonding Large Size Tiles for Coverage and Support: "Select a notched trowel sized to facilitate the proper coverage. Key the mortar into the substrate with the flat side of the trowel. Comb with the notched side of the trowel in ONE DIRECTION. Firmly push tiles into the mortar and move them perpendicular ACROSS the ridges forward and back approximately 1/8 to 1/4 inch to flatten the ridges and fill the valleys. This method can produce maximum coverage with the corners and edges fully supported, without backbuttering or beat-in. Periodically remove and check a tile to assure proper coverage is being attained."

5. **DAMP CURE:** To avoid any affect on the dimensional stability of concrete tiles resulting in bond separation problems after installation and grouting, damp cure by wetting the surface of all tiles and keep them covered for at least 72 hours. Particular attention must be paid to this recommendation when installing tiles in hot, dry climates.
6. **MANUFACTURER'S RECOMMENDATIONS:** Finally, never proceed with installation until you have read all the literature that should be included with your purchase. If the information is not included, request it from your contact at point of purchase.