



CERAMIC TILE INSTITUTE OF AMERICA, INC.  
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## CTI FIELD REPORT 66-2-4 (R-89)

### SUBJECT: Bonding To Concrete Surfaces

#### A. Introduction

1. This Field Report will cover horizontal and vertical concrete surfaces. Basically these surfaces are the same as on any clean, roughened, well cured concrete surface a good bond for ceramic tile can be obtained.
2. If there is a doubt about the stability of the concrete, the tile should not be adhered directly to it as any cracks will carry through to the face of the tile. Tile can be installed by isolation from the concrete and mechanical anchoring if there is a doubt about the stability.

#### B. Necessary Steps

1. Concrete surfaces shall be roughened. This can be done on horizontal surfaces by application of a steel trowel and fine broom finish. Vertical surfaces or horizontal surfaces that have been rotary trowelled shall be given a medium to heavy sandblast or be bush hammered to remove surface oil and slickened surface caused by forms or trowelling.
2. When tile is to be adhered directly to concrete surfaces, with the thin set portland cement mortars, the mortar shall be spread onto the surface and in addition to this, the tile shall be backbuttered. The tile shall be placed before either surface glazes over, then beaten into place and properly finished.
3. When a setting bed is going to be bonded to vertical concrete surfaces the concrete shall receive a dash coat, mixed in proportions of one part of Antihydro to five parts of water and in turn add this into dry mixed sand and cement to bring to proper consistency. Roughened surfaces shall be cleaned and well saturated with water prior to the application of the dash coat. Maintain moisture by covering or repeated wetting, for a minimum of three days, until cured to maximum hardness and bond.
4. When adhering a setting bed to a horizontal surface the roughened surface shall be cleaned and well saturated with water. A wet slurry of one part of Portland cement to one and one-half parts of sharp fine graded sand shall be broomed over the clean saturated surface. The setting bed mortar shall be placed before the wet slurry glazes over.
5. In order to prevent a loss of bond, expansion joints are necessary except to small areas.
  - A. On exteriors, expansion joints shall be used wherever the tile installation butts to columns or other surfaces of the building. Expansion joints shall also be placed 12 to 16 feet apart in each direction (not to exceed 16 feet) in the field of the tile. It is good practice to put an expansion joint around the entire periphery of floors regardless of the size of the floor.
  - B. Expansion joints shall be the same on interior installations, except that in the field they can be positioned 24 to 36 feet apart in each direction.

#### C. Example

1. Millions of square feet of tile are successfully installed over these surfaces but occasionally we do get one that causes problems and the study of it can be helpful regarding some of the problems that were encountered.

- A. It is possible that installing tile over a concrete structure, where the moisture has not had the opportunity to cure out, will help start leaching and efflorescence with the resulting stains and deposits on the face of the tile.
- B. It will also be noted that cracks in the structure and working expansion joints will be concentrated spots for moisture to come through, carrying deposits to the face of the tile.
- C. The Ceramic Tile Institute advises not to cover working expansion joints in the structure with the tile installation. The working of the structural joint will loosen and buckle the tile. If the tile is installed before the moisture and shrinkage has taken place in the concrete, more movement will occur at these joints which will hasten and worsen the loose and buckled tile.
- D. When proper expansion joints have not been carried through the tile installation, where working joints occur in the structure, continuous patching is often required. If the moisture is locked in behind the tile, the condition will be worsened as the concrete cures and shrinks.
- E. It has been common practice to use scrap aluminum metal to make chairs to position the reinforcing bar into the center of tilt-up slabs. When the slab is lifted up into place the tips of the chairs are exposed on the surface of the concrete. The chair becomes an electrolyte in contact with the reinforcing bars and moisture. When the chair is decomposed by the electrolytic action it forms crystal growth which in turn can crack, break and push off the tile. This crystal growth is capable of generating tremendous pounds per square inch pressure, so much in fact that it will push a hole through a piece of glazed wall tile.

#### D. Conclusion

1. If in doubt about the stability of the concrete, do not bond directly to it. Isolate the installation from the concrete and mechanically anchor it.
2. Concrete surfaces shall be roughened, clean and well cured.
3. Expansion joints shall be used in large areas and around the periphery of floors to avoid loss of bond.