

### FIELD REPORT # 0706

## RE: Check Concrete Slabs First

There are two major reasons individually that cause most common failures with bonding tile to concrete slabs.

- One- Surface contamination, surface coatings and/or carbonation (old slabs), are all potential bond breakers.  
Two- Movement in the concrete substrate not allowed for in the tile installation. This report covers only suggestions to pre-determine if a slab is bondable. (See CTMA Field Reports # 0707, '**Concrete Slabs That Move**' and # 0708, '**Membranes, Crack Isolation**' that address dealing with movement in the slab and tile assembly.)

### I- CHECK THE CONCRETE SLABS FOR CONTAMINATION::

Make sure the surface is clean and free of any foreign materials. If there is any doubt, there are three recommended methods to verify whether a slab is ready to accept the bonding of tile.

- A- The most common method is to place water on the slab. If it is quickly absorbed into the slab it is considered clean and bondable. If it beads up, that indicates there is some contamination on the surface which will probably inhibit the tile's bond.  
B- Install a test tile on the slab and remove it the next day to test whether it actually bonded to the slab.  
C- Test with **PHENOL** in solution\*. If the **Phenol** application turns either *Red or Pink*, the slab is considered acceptable to bond tile. If over 12 ph, it will turn bright red. A ph of 11 to 12 will turn pink.

\*The solution is a mixture of **Phenol** granules & rubbing alcohol. Concrete normally has a high ph.

- 1- If there is no color reaction (less than a ph of 11), the slab could have a potential bonding problem. To determine whether the problem is only on the surface or throughout the slab,

abrade

the surface (with a sharp instrument) and then apply the **Phenol** solution again. If the abraded area turns *Red or Pink*, the problem is obviously only with the thin top surface. If there is no coloration, then suggest that the owner seek a *concrete specialist's* opinion before proceeding with installing the tile.

- 2- If the problem is only with the thin top surface of the concrete, there are a number of ways to clean a slab's surface; however, it must be abraded. The best way to abrade or remove the thin top surface is to 'shot-blast' or grind the surface. If that is not possible, then vigorous hand wire brush the surface. After the surface is abraded, leave the floor free from any dust!

- D- Important to note is that acids are not listed as one of the options for cleaning slabs. However, if you must use an acid you better do it right the first time. There are four basic types of acids used in the industry.

- 1- **Acetic Acid:** Vinegar is a 5% acetic acid that has potential to damage cement.  
2- **Muriatic Acid:** Never use it! Negatives far outweigh any potential good!  
3- **Phosphoric Acid:** The one of two acids of choice for cleaning unglazed surfaces.  
4- **Sulfamic Acid:** The other acid of choice for cleaning unglazed surfaces.

Extremely important: All acids must be flushed off thoroughly with clean water and neutralized.

### II- CHECK THE CONCRETE SLAB FOR ANY SIGNS OF MOVEMENT:

Concrete is not a flexible material, thus any 'movement' under an on-grade slab will cause the concrete to

## Check Concrete Slabs First – II

crack, unless the slab is properly designed. The term ‘movement’ refers to a variety of causes such as: earthquakes, soil expansion and contraction, expansion and contraction caused by heat and moisture. Being ‘properly designed’ requires making allowances for these ongoing ‘movements’ through the use of **Movement Joints** in the tile assembly. It is very important to select the correct type of Movement Joint and where it is placed in the tile assembly. Membranes are also an important consideration.

NOTE: For additional information on membranes, see CTMA’s Field Report # 0708, ‘**Membranes, Crack Isolation,**’ available free upon request.

### III- **ADDITIONAL CONSIDERATIONS:**

- A- Verify how true the slab is to the required plane (level or sloped).
  - 1- According to ANSI\* and the TNCA Handbook+, “*Maximum permissible variation in the plane or slope, 1/4" in 10 feet (6 mm in 3 m) from the required plane; nor more than 1/16-inch in 12 inches (2 mm in 305 mm) when measured from the high points in the surface.*”
  - 2- If the concrete slab that is about to receive tile does not meet all of the above requirements, **DO NOT INSTALL TILE** without notifying the G/C or owner in writing of your concerns. If ordered to proceed anyway, obtain a written release prior to installation. If you proceed without a written release, you have in effect **bought the slab** as acceptable, and all future problems are yours.
    - \* ANSI = *American National Standard Specifications for the Installation of Ceramic tile.*
    - + TNCA = *Handbook for Ceramic Tile Installation*
- B- When satisfied that you can bond tile to the concrete slab substrate, it is extremely important to lay out the complete tile installation prior to the installation of any tiles. Never assume rooms are square! Normally start all tile installations less than one tile from the wall, so you can cut tiles to fit uneven walls. When the tile application continues from room to room, a layout in advance can save many cuts and ‘dutchmen.’

### IV- **CAUTION - Substrates Have Limitations:**

The performance of a properly installed tile installation is dependent upon the durability and dimensional stability of the substrate to which it is bonded. The user is cautioned that certain substrate materials used in wet areas are subject to deterioration from moisture penetration. (Refer ANSI A108, AN-2.5.3.2.1)