



Reinforcing – Tips You Can ‘Bed’ On

One of the first milestones for a new tile installer is their first mortar bed installation. What starts out looking like “just a pile of sand, cement, a little bit of water and some other stuff” magically transforms into the substrate which gets covered with tile. The Tile Council of North America’s *TCA Handbook for Ceramic Tile Installation* contains guidelines for various ceramic tile installation methods which use mortar beds. For non-bonded mortar beds, the reinforcing is indicated in the drawings by the word(s) “reinforcing” or “metal lath”. Reinforcing is not indicated for bonded mortar beds. Non-bonded beds are generally separated from the substrate by a cleavage membrane, which allows movement in the mortar bed and, consequently, creates the need for reinforcement. Reinforcement increases the tensile strength of the mortar bed and helps reduce potential failures in the tile.

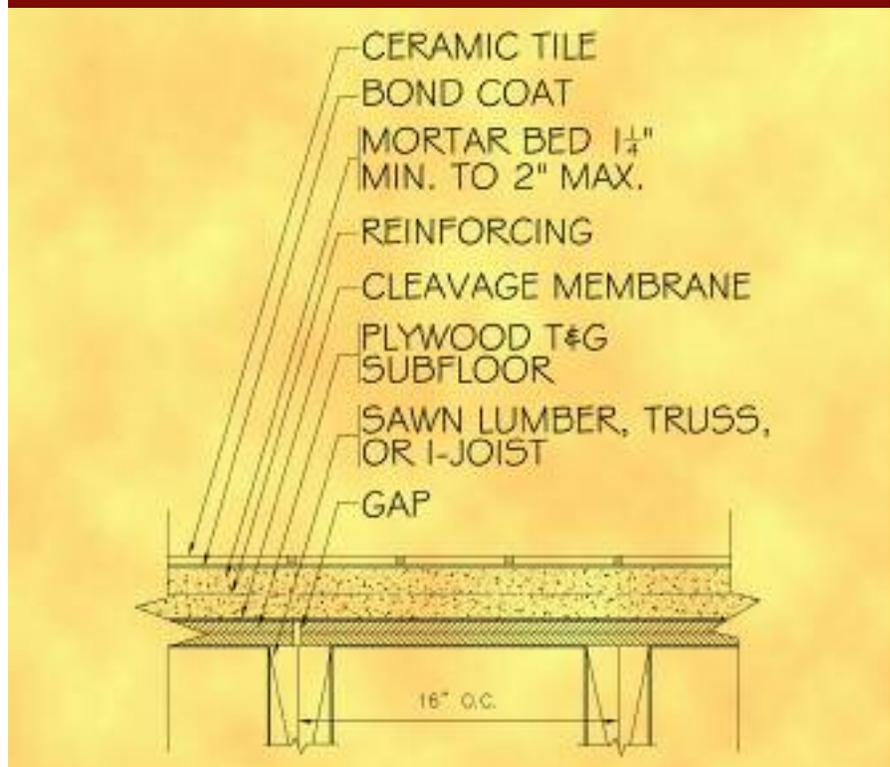
Types of Reinforcing:

The types of metal reinforcing referred to in various details of the *TCA Handbook* and the American National Standards Institute’s (*ANSI Specifications for the Installation of Ceramic Tile*) are:

- 1.) **Reinforcing wire fabric** – ASTM A82 (Standard Specification for Steel Wire, Plain, for Concrete Reinforcement) or ASTM A185 (Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete).
- 2.) **Metal lath** – ASTM C847 (Standard Specification for Metal Lath) - covering sheet lath, expanded metal lath, diamond mesh, flat and self-furring, and rib metal lath, etc.

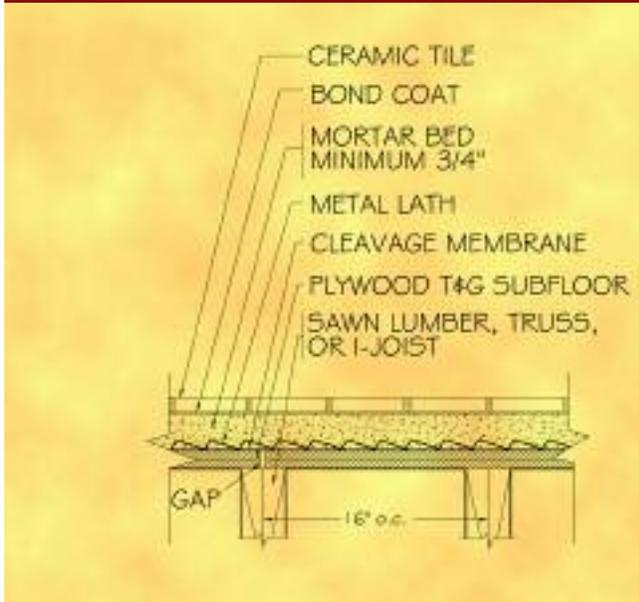
Two types of metal reinforcing are illustrated in Handbook details F141 and F145. In F141, “reinforcing” is indicated, while “metal lath” is indicated in F145. “2.5 lbs/yd² metal lath” is explicitly called out under “Materials” in F145, whereas the “Materials” specification in F141 doesn’t state which type of reinforcing

Figure 1. TCA Handbook detail F141.



Right: Whether or not metal lath or reinforcing is to be used in this mortar bed application is not explained in the detail but rather in the ANSI installation method A108.1A and the types of acceptable wire meshes are listed in ANSI A108.02 – 3.7.

Figure 2. TCA Handbook detail F145.



Above: Guideline F145 indicates the type of metal lath in the "Requirements" section in the TCA Handbook.

is to be used. Instead, the proper materials for the mortar bed, reinforcing, and cleavage membrane are referenced together under "Materials", directing the installer to use ANSI method A108.1A. This is the ANSI standard for "Installation of Ceramic Tile in the Wet-set Method, with Portland Cement Mortar". A108.1A explains that for application of metal lath and scratch-coat to *walls and ceilings*, the installer is to use metal lath "complying with ASTM C847...Lath shall be flat, expanded type and weigh not less than 2.5 pounds per square yard". When addressing the application of mortar for *floors, decks, and countertops* over a cleavage membrane, etc., A108.1A refers to "wire reinforcing" as opposed to metal lath.

The Difference between Wire Reinforcing and Metal Lath?

Reinforcing wire meshes or fabrics are a series of wires welded together in square or rectangular grids commonly called welded wire reinforcement (WWR). Those which are referenced in ANSI A108.02 – 3.7 (previously A-2.1.7) have these general properties:

- 1.) Welded as opposed to woven – meaning the wire intersections are welded together such that the resulting heat and pressure form a homogenous fused joint between the crossing wires;
- 2.) Plain versus deformed – there are *many* types of weaves, some of which involve using a deformed or crimped wire.

However, both of the ASTM specifications listed above for the WWR to be used as mortar bed reinforcing indicate the use of smooth/straight or "plain" wire.

3.) WWRs are specified by the wire gage and mesh size. The spacing of the wires is indicated in both the longitudinal (horizontal) direction and transverse (vertical) direction. Note that these dimensions have to do with the manufacturing process associated with the WWR and **not** with the position of the reinforcement in the mortar bed.

For example, the longitudinal direction is specified *first*, so for ANSI A108.02 – 3.7.3: 1 1/2" x 2" (38 X 50 mm) mesh, 16/13 wire:

- the mesh has a 1 1/2" spacing and 16 gage wire in the longitudinal direction, and
- has a 2" spacing and 13 gage wire in the transverse direction.

Expanded metal lath is also used to reinforce mortar beds. It starts out as a metal sheet with parallel slits cut into it. When pulled apart (expanded), the diamond-shaped openings are created. The "cups" formed by the openings in a vertical application should be facing upward, enabling the lath to hold the mortar. When properly oriented with the diamond-mesh "cups-up", the mesh is noticeably less shiny than when the cups are facing downward. The shape of the openings and the directionality of the expanded metal lath, which allow it to hold mortar in vertical applications, are properties which are not desirable for a reinforcing wire in the *middle* of a mortar bed. It is typically used at the bottom of a thinner mortar bed (3/4" minimum) and fastened to the wooden substrate where the mortar doesn't need to be keyed-in to bond to another mortar layer below the reinforcing.

In self-furred metal laths, there are dimples in the lath, which eliminate the need for furring nails. With the base of the dimple against the substrate, this lath can be fastened at the dimples themselves. There is more that could be explored with respect to reinforcing and a wide range of products available for use. However, this should provide a brief glimpse into some of the basic terminology and shed some light on one of the commonly asked questions about the Handbook. **TILE**

About the Author



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Sharon Jones, Director of Research and Installation Standards, is a ceramic engineer with the Tile Council of North America (TCNA). TCNA is a publisher of the American National Standards Institute's (ANSI) Specifications for the Installation of Ceramic Tile and the TCNA Handbook for Ceramic Tile Installation, the industry's guidelines for ceramic tile installation.