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**ABSTRACT:**

Setting beds are no longer limited to mortar beds and thin beds. Now medium beds are part of the ANSI standards. Selecting the right installation products depends on the tile, the substrate, and the expected performance.

**FILING:**

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**KEYWORDS:**

Tile setting, thick bed, medium bed, thin bed, mortar, adhesive, epoxy, furan

**REFERENCES:**

ANSI A108 Series Installation Specifications, a total of 18 separate standards  
ANSI A118.1 - Dry-Set Portland Cement Mortar  
ANSI A118.3 - Chemical Resistant, Water Cleanable tile-Setting and - Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive  
ANSI A118.4 - Latex-Portland Cement Mortar  
ANSI A118.5 - Chemical Resistant Furan Mortars and Grouts for Tile Installation  
ANSI A118.8 - Modified Epoxy Emulsion Mortar/Grout  
ANSI A136.1 - Organic Adhesives for Installation of Ceramic Tile  
TCNA Handbook - TCA Handbook for Ceramic Tile Installation

## Tile Setting Methods & Products

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### Setting Methods

Tile setting methods are divided into three basic types: thick bed, medium bed, and thin bed.

Thick bed methods rely on a portland cement mortar bed applied up to 2 inches thick. The tile can be set into workable mortar or bonded to a cured mortar bed. Using thick bed installation allows less than perfect substrates to be leveled so the tile can be installed in plane.

Medium bed installation methods were recently included in the ANSI A108 and A118 standards to accommodate large format tiles prevalent in current designs. Medium beds are installed 3/16 to 3/4 inches thick using a dry-set mortar or a latex modified mortar. The bed thickness helps ensure full contact with the tile to prevent damage from traffic. See Conspectus Tech Tips C2030 - Large Format Tile Installations.

Thin bed setting methods rely on a single layer tile bonding material applied 3/32 to 3/16 inch thick including adhesive, dry-set mortar, latex modified mortar, epoxy mortar, furan mortar or other specialty setting material.

Standard setting methods for floors, walls, ceilings, soffits, bathtubs, showers, countertops, tubs fountains, refrigerator rooms, and steam rooms, are defined in the TCNA Handbook.

The Handbook is updated annually and is available on CD-ROM with all the ANSI standards referenced by the Handbook for a nominal charge.

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### Mortar Beds

Mortar beds are composed of portland cement mortar and sand.

Lime is normally added to the mix when the mortar is installed on walls. Latex additives (also called polymer additives) can be included in the mortar mix for improved performance. Latex additives improve adhesion, bond strength, and resistance to impact. The additives also reduce water absorption, an important property especially for exterior applications in locations subject to freeze-thaw cycles.

An important note about mortar beds: Mortar beds must be allowed to cure to achieve the strength to support traffic. Cure time can be as short as one day, but longer cure times up to 10 days are desirable.

### Organic Adhesives

ANSI A136.1 Type I organic adhesives can be used for interior dry or intermittently wet floor, wall, ceiling, and countertop installations. Type II adhesives are limited to wall and ceiling installations. Type II adhesives are not suitable for foot traffic because the required bond strength is less than half the strength required for Type I adhesives.

According to the TCNA Handbook, organic adhesive setting methods are considered suitable for residential and light construction for dry and limited water exposure applications. The Handbook W245 setting method with a glass mat gypsum board substrate

permits adhesives for wet areas. The Handbook indicates suitable substrates for adhesives used in wet applications are portland cement plaster or masonry. Some adhesives are solvent based. When projects are designed to meet LEED sustainability requirements for indoor air quality, be sure to verify the adhesive's VOC content.

## Dry-Set Portland Cement Mortar

Dry-set mortar (commonly called thin-set mortar) complies with ANSI A118.1. The mix includes portland cement, sand, and additives to enhance water retention. Dry-set mortars function as a bond coat to adhere the tile to the substrate. Dry-set mortars can be used for all typical floor and wall tile substrates for both interior and exterior applications in dry and wet locations. Most dry-set mortars are acceptable for use over waterproofing and crack isolation membranes.

## Latex-Portland Cement Mortar

Latex-portland cement mortars are similar to dry-set mortars, except the mortar mix includes a latex additive. These mortars comply with ANSI A118.4. The latex additive improves the mortar performance as it does for mortar beds noted above. All porcelain tile should be installed with latex-portland cement mortar because the improved performance is required to compensate for the impervious tile. These latex modified mortars are available in two forms. Mortars may be supplied as a bagged dry mix with a liquid latex mixture.

The latex mixture replaces part or all of the gauging water added to the dry mix. The other form is a bagged dry mix that includes a dry latex additive. This mortar requires water, only, to be added before use.

Some latex-portland cement mortars are available in a quick setting formulation. This allows installer to begin grouting the tile in as little as 2 hours after setting the tile. Quick setting mortars can be especially useful for renovation projects when the spaces must be returned to use quickly, when installing large format tile, and when setting impervious tile on an impervious substrate. Other latex-portland cement mortars are available for use with exterior glue plywood (EGP). These applications are interior dry and limited water exposure locations, despite the type of plywood.

## Epoxies

Epoxies are available in three types: mortars, emulsion mortars and adhesives. All epoxies provide improved bond strength and impact resistance compared to other setting materials. For optimum chemical and temperature resistance, use two-part epoxy mortars meeting ANSI A118.3. Epoxy emulsion mortars are a blend epoxy, portland cement and sand meeting ANSI A118.8. Use emulsion mortars for an economical epoxy installation. Use two-part epoxy adhesives meeting ANSI A118.3 for improved performance compared to organic adhesives.

The TCNA Handbook includes very few setting methods relying on epoxies. The most prevalent use of epoxies is for grout.

## Furan Mortar

Furan mortar meeting ANSI A118.5 is used where chemical resistance, usually acids, and high temperature resistance are critical. These mortars are often used in industrial applications with acid resistant brick and tile installed as flooring and process vessel linings.

## Conclusions

For commercial construction, consider using latex modified mortars to improve overall performance. Always use latex modified mortars for porcelain tile. Use latex modified mortars for exterior locations subject to freeze-thaw cycles. Avoid using organic adhesives unless the tile is installed in a dry application. Consult the tile setting manufacturer for setting materials that are suitable for use over flexible waterproofing and crack isolation membranes.

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