THE BRICK INDUSTRY ASSOCIATION

Brick Brief

June 2025

INTERIOR THIN BRICK FLOORING INSTALLATION GUIDE

INTRODUCTION

A thin brick flooring system consists primarily of thin brick masonry units made from clay or shale laid in a continuous mortar setting bed with mortar joints between units. The recommendations in this *Brick Brief* are based on requirements from the Tile Council of North America (TCNA) and ASTM C1935, *Standard Practice for Installation Methods for Adhered Veneer Systems Using Thin Brick Units Made From Clay or Shale*. However, be aware that thin brick and ceramic tile are not fully interchangeable, as they are manufactured to different standards and requirements.

This *Brick Brief* discusses design considerations, materials, installation, and maintenance requirements for thin brick flooring. The recommendations in this *Brick Brief* are intended for interior areas in residential and light commercial buildings that have limited pedestrian traffic, limited exposure to water, and no concentrated loads from carts or dollies with steel or hard plastic wheels. *These recommendations are not intended for exterior applications or those with vehicular traffic.*

PLANNING

Assessment

The first step is to assess the current condition of the existing floor structure that will be under the thin brick flooring. If thin brick flooring is to be installed in new construction, coordinate with the builder so that the floor structure can provide adequate support and meet deflection limits in accordance with the building code requirements. Consider the following questions in this phase:

- **What type of space will the floor be installed in?** Typical locations include kitchens, foyers, mudrooms, laundry rooms and powder rooms.
- **What kind of floor structure is present, and how much load can it support?** Modern homes will typically have either a wood-framed floor (plywood over either solid or engineered wood joists) or a concrete floor. Concrete floor structures can generally support more load than a wood-framed floor. A design professional should be consulted if the thin brick flooring assembly (including setting bed mortar and cementitious backer units, if used) will exceed 1 in. in thickness. Assemblies exceeding this thickness may be heavier than the load the floor structure was designed to support.
- **How much vertical space is available for thin brick flooring?** In the case of an existing room, baseboards can typically be raised, but transitions to other rooms or flooring can have a height limit, even when modifying thresholds and adding transition strips.

Design Decisions

Installation Method. This document includes four recommended installation methods, two for wood-framed floor structures and two for concrete floor structures. Choose whichever is most appropriate for the location where thin brick flooring will be installed:

- **Wood-Framed Floor Structure.** A minimum combined subfloor thickness of $^{19}/_{32}$ in. is required.
  - **Option A** – Maximum joist spacing of 16 in. Components include:
    - Cementitious backer units (CBUs) and accessories
    - Leveling mortar for under the CBUs
    - Setting bed mortar
    - Thin brick units
    - Joint mortar/grout
  - **Option B** – Maximum joist spacing of 19.2 in. Components include:
    - Uncoupling membrane and accessories
    - Setting bed mortar
    - Thin brick units
    - Joint mortar/grout
- **Concrete Floor Structure**
  - **Option C** – Slabs on grade. This option is intended for concrete slabs in direct contact with the ground. Components include:
    - Crack isolation membrane (uncoupling membrane could be used instead)
    - Setting bed mortar
    - Thin brick units
    - Joint mortar/grout
  - **Option D** – Elevated slabs. This option is intended for concrete slabs that are not in contact with the ground, such as those serving as the second floor or higher in a building or those installed over a basement or crawl space. Components include:
    - Uncoupling membrane
    - Setting bed mortar
    - Thin brick units
    - Joint mortar/grout

Bond Pattern. Thin brick flooring can be laid out in a variety of bond patterns. Running bond, herringbone and basketweave bond patterns are commonly used in paving. Allow for ⅜ in. wide mortar joints between units. A "tight fit" or "dry stack" configuration where the brick are placed in contact with one another without mortar joints is not recommended due to accumulation of debris between the units and an increased potential for edge chipping. The unit-to-unit joints are also intended to accommodate variations in the units.

Movement Joints. Incorporating movement joints at the perimeter of the thin brick flooring is recommended to allow for expansion of the brick or movement of the substrate. Space movement joints no more than 25 ft apart, unless the flooring is exposed to direct sunlight, heat and/or moisture, where the joint spacing should be reduced to a maximum of 12 ft.

Membranes. Inclusion of a membrane is recommended, but not required, in most of the installation methods presented here. Where recommended by an installation method, the membranes are intended to provide protection against cracks by creating a separation between the thin brick flooring and the structural floor system. Waterproofing membranes can also be installed below the flooring to provide additional protection against moisture.

Radiant Heating. This is an optional feature for integral heating. There are two types of radiant heating to consider: electric and hydronic. In these systems, continuous wire or tubing is laid over the floor area and encapsulated in a cementitious underlayment directly beneath the setting bed. Hydronic tube heating elements require a thicker encapsulating layer of underlayment than electric heating elements, so electric radiant heat is preferred when weight or thickness of the flooring assembly is a concern. An electric system is also preferred for elevated wood-framed floors with joists spaced over 16 in. apart due to the potential for excessive deflection that could prevent the hydronic system from working properly. If a hydronic system is used in such flooring, it is recommended that a design professional be consulted to assess whether stiffening of the floor framing may be needed.

Material Selection – Thin Brick Units

There are two types of thin brick units for flooring:

- Pavers traditionally used in horizontal applications
- Thin veneer brick intended for use in walls

Although manufactured from the same materials, pavers and thin veneer brick are held to separate requirements, as noted below.

Pavers. Pavers comply with ASTM C902, *Standard Specification for Pedestrian and Light Traffic Paving Brick*. Use of pavers is preferred due to their long performance history and testing requirements specific to horizontal applications.

- Width and length: Typically 3⅝ in. × 7⅝ in.
- Thickness: 1¼ in. – thinnest available units from typical manufacturing process
- Thickness: ½ in. – cut from full-depth units

Thin Veneer Brick. Thin veneer brick comply with ASTM C1088. These can be fabricated as thin units or cut from full bed depth brick.

- Width: Typically ranges from 2¼ to 7⅝ in.
- Length: Typically ranges from 7⅝ to 11⅝ in.
- Thickness: Typically ranges from ½ to 1 in.

Note that while thin veneer brick have been used as flooring, ASTM C1088 does not explicitly state that they are intended to be used in flooring applications. This is because thin veneer brick meeting ASTM C1088 are not required to meet property requirements typically associated with horizontal applications. Such property requirements provide information on a brick's ability to withstand a breaking load when unevenly supported; its ability to resist abrasion from foot or wheeled traffic; and its ability to provide a slip/skid-resistant, chemical-resistant surface. Some manufacturers conduct additional testing to provide values for these properties.

Color. There are two primary types of coloring for brick:

- Through-body color, meaning that the visible color is consistent over the full thickness of the brick. The majority of pavers and many thin veneer brick are manufactured with through-body color.
- Coatings, typically consisting of slurries applied to the brick prior to firing. These are sometimes used to create the finish color of thin veneer brick. While such coatings applied to thin veneer brick are intended to withstand weathering in a wall application, they are generally not tested for properties typically related to flooring applications such as slip resistance or resistance to abrasion caused by foot traffic. Exposure to foot traffic may abrade away the coating, altering the appearance, unless a protective coating is applied post-installation. A glazed finish offers a smooth texture more resistant to abrasion and staining that serves as an alternate to using a protective coating. Consider slip resistance when using a glazed finish in a flooring application.

Texture. Available surface textures range from smooth to rough. Consider avoiding rough textures with narrow, closely spaced crevices, such as combed or scored, as they can accumulate dirt and debris that is difficult to remove.

When selecting brick for a flooring application, consider that brick units with a history of successful performance in a flooring application typically are uncoated, are

moderately textured and conform to ASTM C902 requirements.

Material Selection – Other Components

Mortar. Mortar is used as a setting bed beneath the thin brick and to fill the joints between the units. Setting bed mortar adheres the thin brick units to the subfloor system. Pointing mortar, which is sometimes referred to as grout (common for tile work), is placed between units. These can be different mortar materials, but it is recommended that both materials be from a single manufacturer and product line for compatibility.

- **Setting Bed Mortar.** There are multiple types of mortars that can be used to set thin brick, including:
  - Polymer modified setting mortars, commonly referred to as "thin-set" mortars:
    - ANSI A118.4
    - ANSI A118.15
  - Traditional masonry mortar, which is typically used where the setting bed thickness exceeds the maximum for a thin-set mortar:
    - ASTM C270, Type S
- **Pointing Mortar/Grout.** Multiple materials can be used to fill the joints between brick units, including:
  - Traditional masonry mortar meeting ASTM C270, Type N
  - Sanded cementitious grout meeting ANSI A118.6

Avoid the use of polymer modified pointing mortar or grout, as it can stain the brick surface and will be very difficult or impossible to remove.

Backer Board/Cementitious Backer Units (CBUs). Also known as "cement board," these are applied over wood subfloors to provide additional stiffness and to reduce deflection that can crack the finished thin brick floor.

- CBUs should conform to ASTM C1325 Type A or ANSI A118.9
- Be aware that fiber cement backer boards are different from CBUs; they are not interchangeable

Membranes. Whenever a membrane is used, it must be compatible with the setting bed mortar. It is preferred to use products from the same manufacturer and product line for this reason. In some cases, a single membrane may serve multiple functions.

- Waterproofing membranes can be used to provide increased resistance to moisture. The membrane should have low permeability and conform to ANSI A118.10.
- Crack isolation membranes prevent minor in-plane cracking in the substrate from extending into the thin brick flooring. They should conform to ANSI A118.12.
- Uncoupling membranes create an air space between the thin brick and the substrate, allowing the two layers to move independently, which helps to reduce the risk of cracking in the thin brick flooring. Currently, they do not have their own material standard, but it is recommended to use products that conform to ANSI A118.12 requirements and achieve 50 psi or greater shear bond strength with the setting bed mortar within seven days.

Joint Sealant. Sometimes referred to as "caulking," joint sealants are installed over backer rods in movement joints.

- Polyurethane joint sealant is preferred, but silicone or polysulfide sealants can be used. Be aware that some silicone sealants can stain light-colored brick.
- Must be sufficiently compressible.
- Must meet the requirements of ASTM C920, *Specification for Elastomeric Joint Sealants*, Grade P and Uses T and M.
  - Grade P means the sealant is intended for horizontal applications.
  - Use T means the sealant can withstand pedestrian traffic.
  - Use M means the sealant is intended to bond to masonry and mortar.
- Backer rods should be closed cell or bicellular polyethylene foam intended for use with sealants. Polyethylene bond break tape can be used in lieu of a backer rod.

INSTALLATION

Surface Preparation

Layout. The direction of the bond pattern can be oriented either square or diagonal in relation to the room.

- Test the layout by dry-setting units before installing any mortar setting bed. Adjust the layout based on focus points, such as door openings or features like fireplace hearths, to minimize cut units in these highly visible locations.
- Avoid cutting units less than one-half of their width or one-quarter of their length.
- More information about unit layout is available in ANSI A108.2 and other resources intended for ceramic tile installation.

Tolerances/Level. The variation in the subfloor or the surface after CBUs are installed should be no more than ¼ in. in 10 ft and no more than 1⁄16 in. in 1 ft when measured from the high points in the surface. Variations in the surface that exceed these limits could result in a tripping hazard.

Movement Joints. The width of movement joints should be approximately ⅜ in. to match mortar joints.

- Follow the joint sealant manufacturer's recommendations regarding sealant bead dimensions.

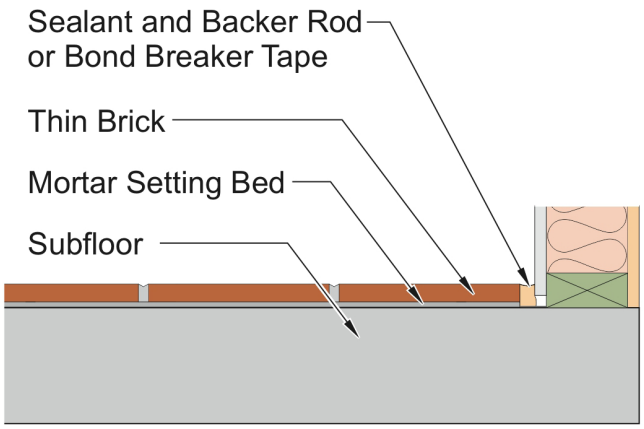

Figure 1: Thin Brick Flooring Expansion Joints

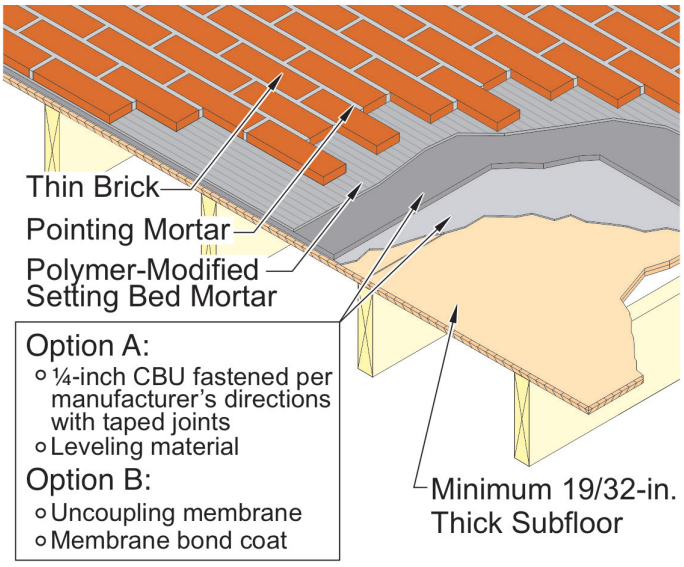

Figure 2: Thin Brick on Wood Floor Framing

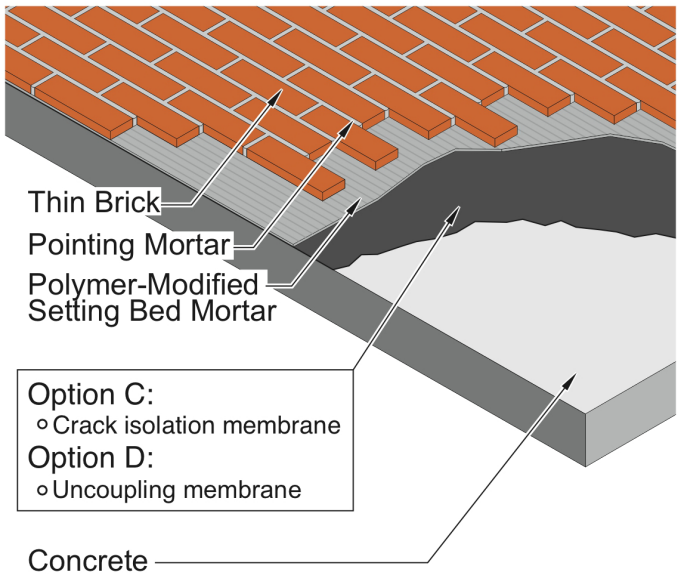

Figure 3: Thin Brick on Concrete

- Install a backer rod in joints exceeding ⅜ in. in depth prior to applying the elastomeric sealant. In cases where the joint is not deep enough for both a backer rod and the joint sealant, apply bond break tape to the bottom of the joint instead of a backer rod (Figure 1).
- Movement joints along the room's perimeter can be concealed under the baseboard trim or a supplemental shoe molding. At doorways or transitions to other floor finishes, the joint can be concealed below thresholds or transition strips.

Wood-Framed Floors. See Figure 2.

- **Option A** – wood joists spaced up to 16 in., installation of CBU. Applying a continuous layer of CBU over the subfloor provides a stiffer surface on which to install thin brick flooring.
  - Install a continuous mortar bed to the subfloor for leveling and support of the CBU. Use of a leveling compound is also permitted.
  - Apply minimum ¼ in. thick CBU over the mortar bed/leveling compound, fasten to the existing subfloor and attach with corrosion-resistant cement board screws. Provide minimum ¾ in. penetration into the joist/framing member.
  - Stagger CBU ends and edge joints to avoid aligning with joints in the subfloor and joints between adjacent CBU panels.
  - Leave a minimum ⅜ in. wide gap at the perimeter of the installation for a movement joint.
  - Cover joints between CBUs with 4 in. wide alkali-resistant glass fiber mesh tape embedded in mortar.
- **Option B** – wood joists spaced up to 19.2 in., installation of uncoupling membrane:
  - Install uncoupling membrane between the subfloor and the mortar setting bed in accordance with uncoupling membrane manufacturer's instructions.
  - If desired, see the uncoupling membrane manufacturer's recommendations for more information about detailing the membrane to also serve as waterproofing.

Concrete Floor Slabs. New concrete slabs to receive thin brick flooring (Figure 3) must be cured for at least 28 days and be sufficiently dry to receive membranes or setting bed mortar. New or existing slabs that are not sufficiently dry can result in poor membrane performance. Contact the membrane manufacturer for more information.

The slabs must have a troweled or fine broom finish, not smooth. An existing surface that does not meet these requirements can be scarified. Curing compounds and other contaminants that could impede bond between the slab and mortar setting bed or membrane must be removed.

- **Option C** – On-ground concrete, installation of crack isolation membrane:
  - Install crack isolation membrane over full surface of concrete in accordance with the membrane manufacturer's instructions.
- **Option D** – Above-ground concrete, installation of uncoupling membrane:
  - Install uncoupling membrane between the subfloor and the mortar setting bed in accordance with the uncoupling membrane manufacturer's instructions.
  - If desired, see the uncoupling membrane manufacturer's recommendations for more information about detailing the membrane to also serve as waterproofing.

Placing Thin Brick Units

- **Clean Surface.** The bonding surface of the unit should be clean and free of all foreign substances that can inhibit bond.
- **Moisten Surface.** Follow the thin brick manufacturer's recommendations and moisten the bonding surface prior to installation when needed to achieve adequate bond.
- **Apply Setting Bed Mortar.** Use setting bed mortar to adhere thin brick to substrate. Spread mortar directly on prepared substrate with a notched trowel per mortar manufacturer recommendations to achieve a thin bond coat meeting the limiting thickness specified by the manufacturer. Limit to an area over which the thin brick can be laid before the mortar begins to set, as indicated by the mortar manufacturer's instructions.
- **Set and Align Thin Brick.** Set the thin brick units in the desired bond pattern, spaced to provide joints that are approximately ⅜ in. wide. Due to the natural variability of brick, not all units will be exactly the same size, so the joint width will vary slightly. Spacers or chalk lines can be used to establish alignment, but visual estimation of the joint sizes during installation is preferred, as it creates a more authentic finished product.
- **Press and Work Thin Brick into Setting Bed.** Apply pressure to fully engage the unit with the setting bed mortar and to achieve full coverage on the unit back. Do not allow the unit to come into direct contact with the substrate while applying pressure. While the setting bed mortar remains workable, press and "work" the unit into the setting bed mortar. This is accomplished by shifting the unit back and forth laterally (or alternately rotating clockwise and counterclockwise slightly) while applying pressure, to help collapse the ridges of the setting bed mortar, ensuring proper bond. As work progresses, ensure that the top surface of each unit is aligned relative to the surrounding units by sweeping the surface with a 48 in. straight edge or level. Avoid lips or offsets. Make adjustments to the units as necessary prior to setting bed mortar becoming unworkable. Avoid disturbing units in mortar that has already begun to set.

Filling and Tooling Mortar Joints

There are two methods for installing the mortar between the thin brick units: the bricklayer method and the tile setter method. In most cases the bricklayer method is preferred because it keeps mortar, which can be very difficult to remove later, from contacting the exposed brick surface. However, there are cases where the tile setter method may be desired, such as with a mortar wash appearance or when glazed thin brick is used. Whichever method is used, the joints must be completely filled with mortar, often called "grout" in tile work.

Bricklayer Method. In this method, the mortar for the joints is placed between units using either a piping (grout) bag, or a jointing tool and a hawk. The mortar should have the consistency of peanut butter so it can be squeezed out of the bag. If using a jointing tool and a hawk, the mortar should be stiffer. The piping bag option is covered here:

- Fill the bag and stir mortar to remove air pockets.
- Close the open end by rolling the bag on itself such that pressure forces the mortar out of the tip in a smooth stream. The mortar should not drip from the bag when elevated.
- Take care not to overfill the joints or place mortar on the top surface of the thin brick, as attempting to remove it later will be very difficult.
- Avoid smearing mortar on the brick surfaces. Use a damp sponge to remove any mortar that gets on exposed surfaces before it dries.

Tile Setter Method. In this method, the pointing mortar/grout is applied to the top surface of the thin brick and then floated or squeegeed into the joints.

- The primary disadvantage of this method is that the pointing mortar/grout becomes embedded in the pores of the brick and is very difficult, if not impossible, to remove later.
- While some installers have applied a release agent to the top brick surfaces to avoid this, doing so runs the risk of accidentally applying it to the sides of the thin brick, where it is detrimental to the bond between the mortar in the joint and the brick.

Tooling Mortar Joints. Mortar is tooled when it is "thumbprint hard." This describes the condition of the mortar where it is soft enough that pressing a thumb into the mortar leaves an indentation, but dry enough that no mortar is transferred to the thumb.

- Tool mortar using a joint striker or sled runner jointing tool with the specified profile.
- A concave profile is preferred as the tooling consolidates the mortar to achieve a dense joint with minimal voids and a good bond to the thin brick. Use a jointer with a diameter larger than the joint width. Other joint profiles are not recommended, as they result in insufficient joint depth, no consolidation, poor bond, and/or debris accumulation.
- After tooling the joint, brush excess mortar and debris from the surface using a nonmetallic, medium-soft bristle fiber brush or medium nap carpet square. Remove larger dried mortar clumps with wooden paddles or nonmetallic tools.

POST-INSTALLATION

Cleaning and Protective Coatings

Cleaning. It is recommended that the brickwork be cleaned first by physical means such as sweeping and vacuuming, which should be adequate if proper bricklaying techniques have been applied. If the floor surface requires additional cleaning after sweeping and/or vacuuming, then a chemical cleaner can be considered.

- Sweep and/or vacuum flooring to remove dirt and debris.
- Select a cleaner that is appropriate for interior applications and is specifically formulated for cleaning clay masonry. Use the least aggressive cleaning methods that produce an acceptable result. Test cleaning materials and methods on an inconspicuous area for evaluation prior to large-scale cleaning.
- Avoid use of unbuffered muriatic (hydrochloric) or hydrofluoric acid. Many proprietary cleaners contain acids. However, their formulations typically include buffers that make them safer, easier to use properly and more environmentally responsible.
- Consider using a wet/dry vacuum to manage the volume of water during the cleaning process.
- Allow flooring to dry completely. This could take several weeks if the brick and its substrate were saturated with water during the cleaning process. No protective coatings should be applied to the brickwork until it is completely dry. This could seal in moisture, causing damage to the appearance and physical properties of the assembly.

For more information on cleaning, refer to *Technical Note* 20.

Protective Coatings. Protective coatings, sometimes referred to as “sealers,” are an optional component in a thin brick flooring installation.

Brickwork is a natural breathable ceramic that requires little maintenance. Addition of a coating that requires periodic reapplication can create more upkeep than untreated brick surfaces. However, it may be beneficial, particularly in kitchen areas, to limit absorption from spills or in areas using surface-applied brick finishes to protect against abrasion caused by heavy foot traffic. Before applying a protective coating to brickwork, it is important to consider a few precautions. Coatings that change the water vapor permeability of the brickwork can cause discoloration if water becomes trapped beneath the coating and is not able to evaporate.

Penetrants and film-formers are two types of protective coatings.

- Use a penetrating silane, siloxane or pre-blended silane/siloxane based water repellent when a protective coating is applied, due to its breathability.
- Use of a film-forming coating is discouraged, unless required by the manufacturer to protect the finish of the thin brick units. If used, select a vapor-permeable coating intended for use on unglazed tile floors. Be aware that the coating can reduce the slip resistance of the floor and require more frequent reapplication than a penetrating water repellent, which can further reduce the coating permeability.
- For more detailed information on these and other colorless coatings for brick, including the consideration of slip resistance, refer to *Technical Note* 6A. Refer to *Technical Note* 6 for more information about water vapor permeance (breathability).
- Be aware that coating and sealing materials advertised as “non-staining” or “non-discoloring” may still change the appearance of the brick slightly, typically darkening it. Test in an inconspicuous area before large-scale application.

Maintenance

Periodic Cleaning. Remove dust and debris from the surface of the brickwork by sweeping or vacuuming regularly. For quarterly to annual cleaning, if desired, diluted surface cleaners specially formulated for brick surfaces can be used.

In cases where a water repellent was applied, periodic maintenance of the coating may be required. Penetrants such as water repellents may last from 10 to 20 years when applied properly, depending on the concentration of the penetrating materials and the amount of pedestrian traffic on its surface. Follow coating manufacturer requirements. Removal of the existing coating may be required before reapplying the coating.