



TECHNICAL NOTES on Brick Construction

1850 Centennial Park Drive, Suite 301, Reston VA 20191 | www.gobrick.com | 703-620-0010

Technical Notes 28C - Thin Brick Veneer - Introduction [Jan. 1986] (Reissued Jan. 2001)

Abstract: This *Technical Notes* is an introduction to thin brick veneer, and covers the brick units, several application procedures and its advantages and disadvantages. It is not the purpose of this *Technical Notes* to cover *all* aspects of the use of thin brick veneer, nor to make specific recommendations for installation. Future issues on the topic of thin brick veneer will address, in detail, design, detailing and construction requirements.

Key Words: adhered veneer, brick, panels, prefabrication, thick set, thin brick, thin set.

INTRODUCTION

This *Technical Notes* addresses thin fired clay units, often referred to as thin brick, as interior or exterior wall coverings. Thin brick veneer is a relatively new product which is seeing increasing popularity in commercial, residential and do-it-yourself markets. The kinds of thin brick units discussed are formed from shale and/or clay, and are kiln-fired. These thin brick units are much like facing brick (ASTM C 216), except they are approximately 1/2 to 1 in. (12 to 25 mm) thick. The face sizes are normally the same as conventional brick and therefore, when in place, give the appearance of a conventional brick masonry wall. ASTM C 1088 Thin Veneer Brick Units made from Clay or Shale covers two grades for exposure conditions to weather which are defined as Exterior and Interior. The three types of thin veneer brick are based on appearance and are defined as TBS, TBX and TBA. Minimum compressive strengths are not required in C 1088 as there is no way to test thin brick in compression.

There were early uses of thin brick. In the early 1950's, the Structural Clay Products Research Foundation (now the Brick Institute of America) began the development of "SCR Re-Nu-Veneer", a 3/4 in. (19 mm) thick fired clay unit which had Norman size nominal face dimensions (2 - 2/3 in. by 12 in. [68 mm by 305 mm]). The decision to begin development of this product was due to marketing research which recognized remodeling and reveneering areas as substantial markets for a thin clay veneer wall covering. In addition to developing the thin units, the Foundation developed special clips to attach the units to an existing wall, mortar for grouting the joints and a power-driven grouting gun. Locations were chosen to test the product, manufacturers were licensed to produce the units and applicators were licensed to install the "Re-Nu-Veneer". After approximately 4 years of effort, work was discontinued on the project.

Today, thin brick are being installed using a variety of procedures. In Japan and in the United States, thin brick have been placed into forms and cast integrally with concrete, thus providing a very attractive architectural precast concrete panel. Another procedure involves bonding thin brick to a 16 in. by 48 in. (406 mm by 1220 mm) substrate, resulting in small, lightweight, easily installed modular panels. Ceramic tile installation techniques are often used to install the brick units, either at the jobsite or on prefabricated panels, and homeowners are renovating with do-it-yourself thin brick products.

This *Technical Notes* addresses thin brick units, several methods for installing thin brick, as well as some of the advantages and disadvantages of thin brick veneer.

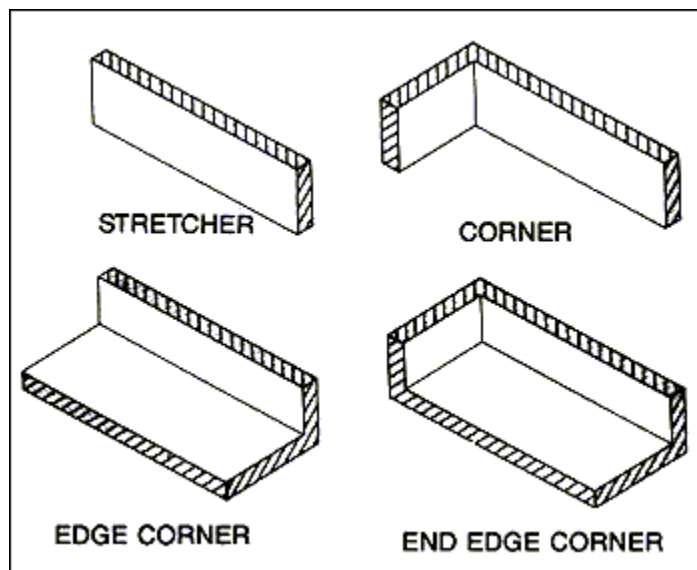
THIN BRICK UNITS

Thin brick are available in various sizes, colors and textures. The most commonly found face size is standard modular with nominal dimensions of 2-2/3 in. by 8 in. (68 mm by 203 mm). The actual face dimensions vary slightly among manufacturers, but are typically 3/8 in. to 1/2 in. (10 mm to 13 mm) less than the nominal dimensions. The economy size unit is 50% longer and higher, but this difference goes virtually unnoticed since the aspect ratio (length to height) is the same for both the standard and the economy modular units. The economy modular face size, 4 in. by 12 in. (102 mm by 305 mm), is popular for use in large buildings because productivity is increased, and the unit's size decreases the number of visible mortar joints, thus giving large walls a more pleasing appearance by reducing the visual scale of the wall. Other sizes, such as Norwegian, 3-in. (76 mm), non-

modular, oversize, etc., may be available. Table 1 contains face sizes of several modular brick units; however, thin brick may not be available in each size. It is advisable to check with individual manufacturers or distributors regarding sizes available in a particular area. Figure 1 illustrates the various types of thin brick units.

TABLE 1
Nominal Modular Face Sizes For Brick

| Unit Designation | Face Dimension | | Number of Courses in 16 in. |
|-----------------------------|----------------|------------|-----------------------------|
| | Height in. | Length in. | |
| Standard | 2 2/3 | 8 | 6 |
| Engineer | 3 1/5 | 8 | 5 |
| Economy 8 or Jumbo Closure | 4 | 8 | 4 |
| Double | 5 1/3 | 8 | 3 |
| Roman | 2 | 12 | 8 |
| Norman | 2 2/3 | 12 | 6 |
| Norwegian | 3 1/5 | 12 | 5 |
| Economy 12 or Jumbo Utility | 4 | 12 | 4 |
| Triple | 5 1/3 | 12 | 3 |



Thin Brick Units

FIG. 1

As with all other fired clay or shale products, color depends on the chemical composition of the raw material, the intensity of firing and controls used in the firing. The color ranges for thin brick units are as unlimited as those for other fired clay brick. The texture of thin brick units depends on the method of manufacture and the surface treatment used prior to firing. Also, some manufacturers provide glazed thin brick units.

The physical properties, such as modulus of rupture and compressive strength of the thin units, depend on the raw materials and methods of molding or forming the units. Fire resistance properties of thin brick construction have not been evaluated. But, because the units are made from fire clay or shale, it is likely that the overall performance of a wall system would be improved as compared to non-masonry sidings. Thermal resistivity of thin brick is probably not significantly different than that of solid face brick; however, because of the unit's thickness, the overall resistance would be very little. Likewise, because of the thickness, the units would contribute little mass for thermal storage.

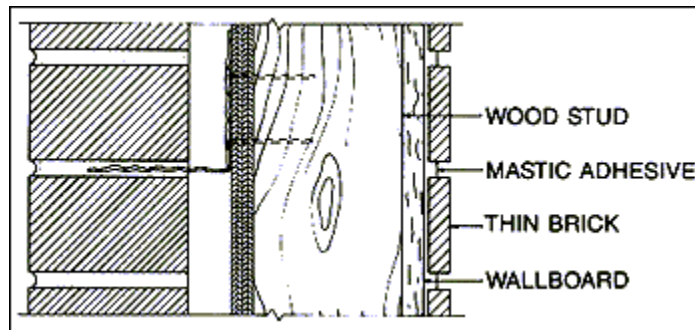
Primarily, thin brick functions as an architectural wall covering that has the maintenance-free benefits of conventional brick masonry. Secondly, thin brick will provide some protection to the material over which it is applied. In comparison to *conventional brick masonry*, thin brick will have less fire resistance, sound resistance, structural strength, thermal mass or insulation properties.

METHODS OF THIN BRICK INSTALLATION

Adhered Veneer

Adhered veneer relies on a bonding agent between the thin brick units and the backup substrate. Adhered veneer construction may be classified as either thin bed set or thick bed set.

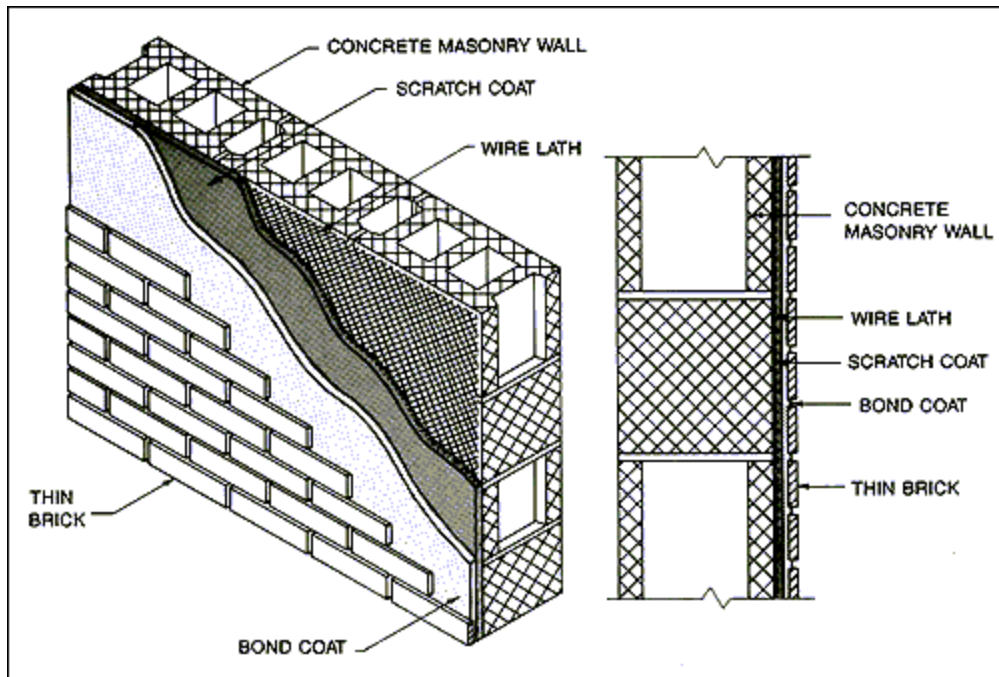
Thin Set. The thin bed set procedure typically utilizes an epoxy or organic adhesive, and is normally used on interior surfaces only. For areas subject to dampness, only clear and dry masonry surfaces or concrete surfaces should be used for backup. For dry locations, the backing material (substrate) may be wood, wallboard, masonry, etc. A cross-section depicting a wood frame wall upon which thin brick veneer (thin set procedure) is installed is shown in Fig. 2.



Thin Set Interior Finish Over Wallboard

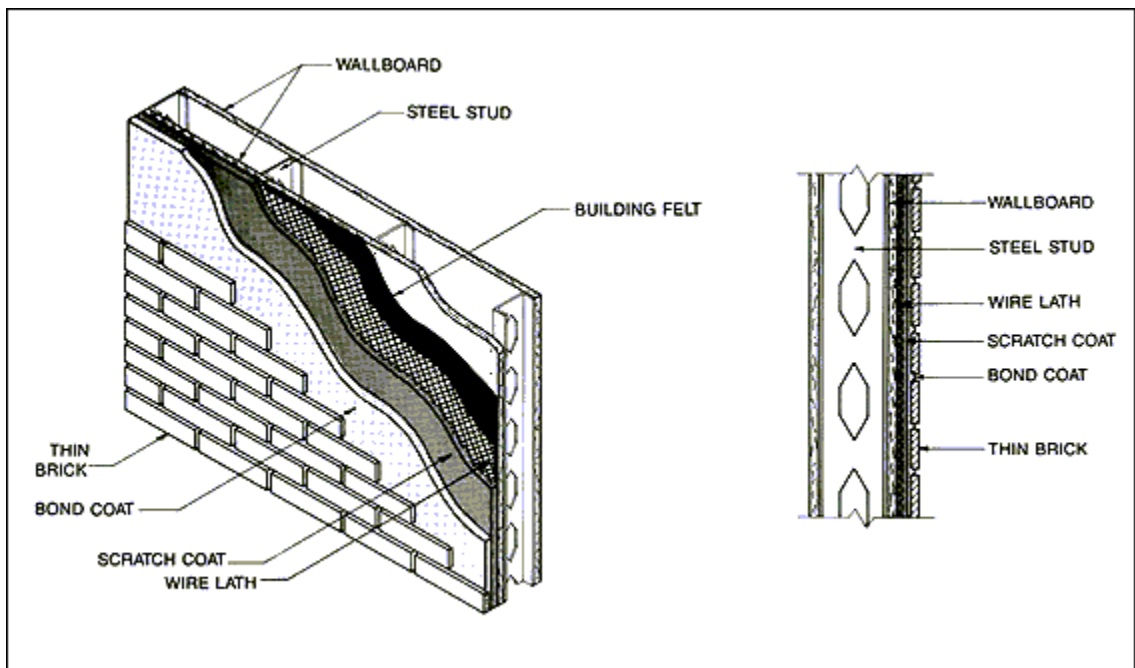
FIG. 2

Thick Set. The thick bed set procedure is used on interior and exterior surfaces. The backing material may be masonry, concrete, steel or wood stud framing. The thick bed setting procedure over concrete masonry is illustrated in Fig. 3. The wire lath shown in Fig. 3 may be eliminated if the masonry wall is heavily scarified (sand-blasted). (Williams, Griffith, Jr., "New Bricklike Tile Veneer", *Building Standards*, July-August, 1982). For applications over steel studs, procedures are similar to those used for concrete or masonry backup; however, wallboard and building felt must be installed over the studs before the lath and mortar bed are placed. Thick bed setting of thin brick over steel studs is shown in Fig. 4.



Thick Set Method Over Masonry

FIG. 3



Thick Set Method Over Steel Stud Framing

FIG. 4

Prefabrication

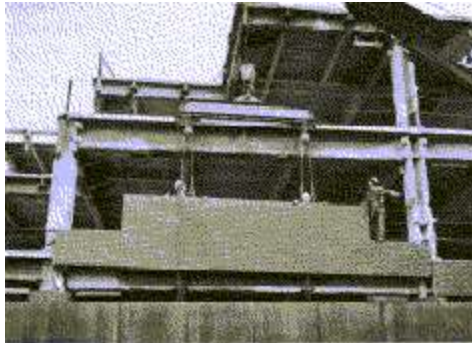
Prefabrication, utilizing thin brick veneer units, has been accomplished using the "casting" method. This process involves the combination of thin brick, grout and/or concrete cast into a prefabricated panel (similar to architectural pre-cast concrete). This process requires the use of forms, a method of placing the units, and a system for grouting. The usual practice is to place the units face down into a form (or waffle mold), and place a very fluid grout over the back surface of the units. The grout flows into the space between the units, thus forming

the appearance of mortar joints (see Fig. 5). Concrete and reinforcement are placed over the grout to provide structural support. The installation of a completed panel is shown in Fig. 6.



Grouting Over Back Surface of Thin Brick Panel

FIG. 5



Erection of Panel

FIG. 6

The use of steel studs and the thick bed setting procedure is another method of prefabrication with thin brick (see Figs. 4, 7 and 8). The use of thin brick for prefabrication of this type results in panels which are lighter than many of the conventional prefabricated panel systems.



Positioning Prefabricated Panel

FIG. 7



Electric Winch Used To Lower Panels Over Edge of Slab

FIG. 8

There are several advantages of prefabrication over laid-in-place masonry. By using panelized construction, the need for on-site scaffolding is eliminated, which can be a significant cost savings in masonry construction. If an off-site plant is used, the work and storage areas for materials at the jobsite are reduced, resulting in a less congested jobsite. If proper scheduling of delivery is maintained, the panels can be erected as they are delivered, eliminating any need for panel storage at the site. One of the distinct advantages of the factory set-up is that it permits year-round work and multi-shift workdays. The use of prefabricated masonry may eliminate the need for, or actually provide, the means of winterizing the structure.

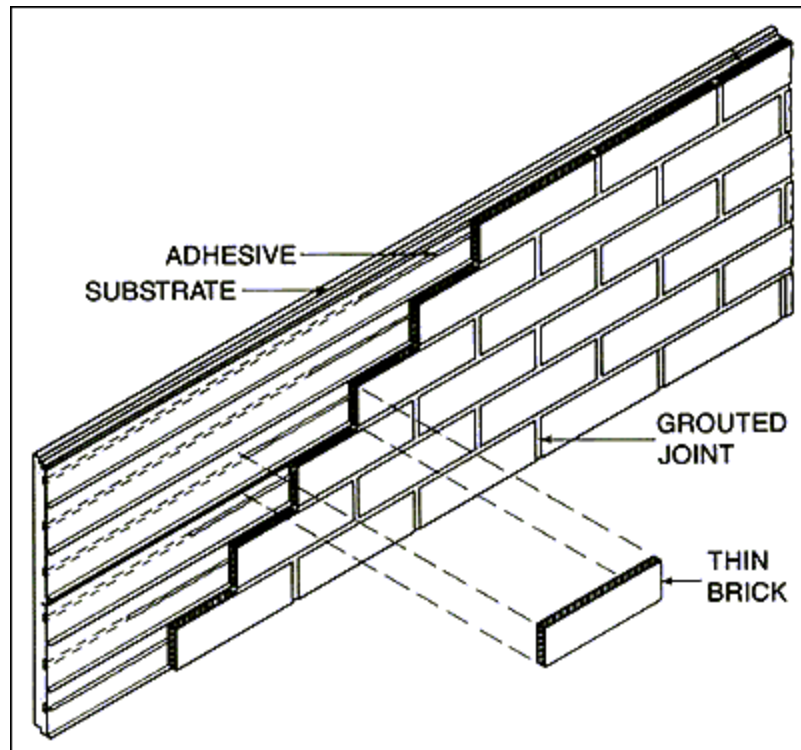
The use of panelization makes possible the fabrication of complex wall shapes. These shapes can be accomplished with ease. Complicated shapes with returns, soffits, arches, etc., are accomplished by using jigs, forms and templates. Repetitive usage of these shapes can lower costs appreciably.

Prefabrication allows for the use of stringent quality control. Mortar batching systems can be tightly controlled, and curing conditions, temperature and humidity can also be controlled. Panelization on some projects may save construction time. It is possible for the masonry panels to be built before ground-breaking for the project, thus keeping far enough ahead of the in-place construction work to permit panel erection when needed.

As with any construction method, prefabrication has inherent advantages as well as disadvantages. The use of prefabricated brick masonry is limited to use with certain types of construction. The designer should be aware of the limitations of prefabricated masonry. The size of brick masonry panels is limited primarily by transportation and erection requirements. Architectural plan layout may, in some cases, preclude the use of prefabricated brick masonry. Another disadvantage of prefabricated brick masonry, as in other panel systems, is the absence of adjustment capabilities during the construction process. In-place masonry construction permits the craftsman to build masonry to fit the other elements of the structure by adjusting joint thicknesses over a large area so that they are not noticeable. This is not possible with prefabricated elements. The use of prefabricated elements sometimes requires that other trades build to accuracies beyond the standard construction tolerances of those trades.

Modular Panels

A relatively new method of thin brick application is becoming popular in the United States and Canada. Modular panels are produced by several different companies and each system differs slightly. Basically, thin brick units are adhered to modular panels in the factory, or at the jobsite. The modular panels have dimensions of approximately 16 in. by 48 in. (406 mm by 1220 mm), as shown in Fig. 9. The backing materials to which the brick units are adhered may consist of polystyrene, polyurethane, cementitious board, asphalt-impregnated fiber board, plywood, aluminum, or a combination of these materials, depending on the manufacturer.

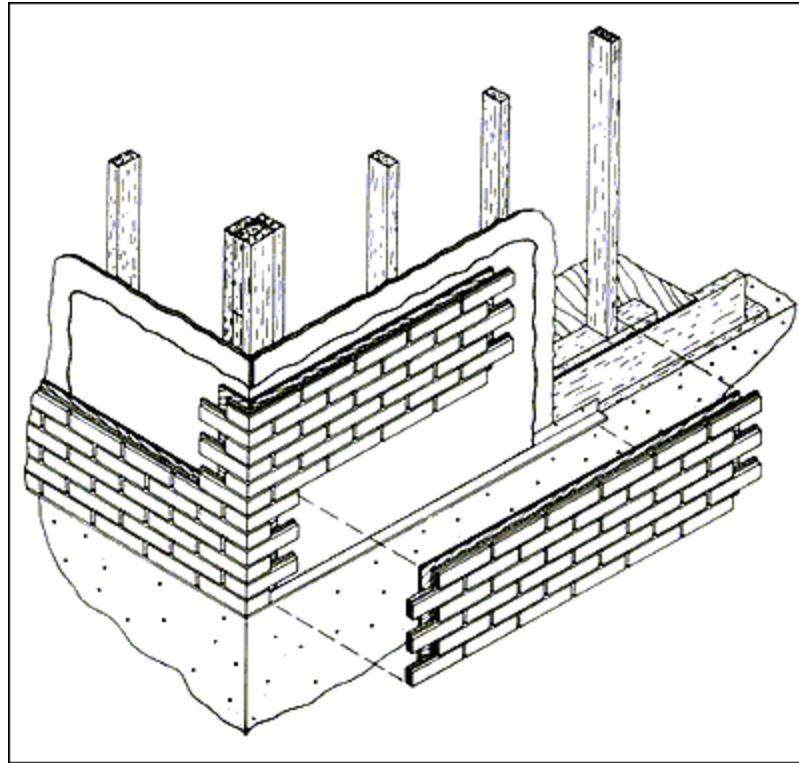


Thin Brick Panel

FIG. 9

The panels weigh approximately 35 lb (16 Kg), which is light enough for one person to handle easily. Installation techniques vary only slightly among the different manufacturers. At the time of this writing (1985) most, but not all, systems require that the head and bed joints between the thin brick units be grouted after the panels are secured to the supporting wall.

The application of the modular panels is illustrated in Fig. 10. Since the construction materials and application methods vary among manufacturers, the user must select the panel with installation techniques and materials which best fit the job requirements. Measures must be taken to prevent water penetration and subsequent corrosion, especially for multi-story buildings which are subjected to severe weather conditions.



Modular Panels Over Frame Construction

FIG. 10

BUILDING CODE ACCEPTANCE

The model building codes (Building Officials and Code Administrators, International, 4051 West Flossmoor Road, Country Club Hills, Illinois; Southern Building Code Congress International, Inc., 900 Montclair Road, Birmingham, Alabama; International Conference of Building Officials, 5360 South Workman Mill Road, Whittier, California) do not specifically address the usage of thin brick veneer in all of the methods of installation mentioned in this *Technical Notes*. Thick set and thin set adhered veneer have been used for many years with thin brick units, ceramic tile and architectural terra cotta; therefore, these methods are addressed in the model codes. The other methods, such as prefabrication or modular panels, may have to be approved on a case-by-case basis, through research compliance reports from the various model code agencies, or through code changes.

ADVANTAGES AND DISADVANTAGES OF THIN BRICK VENEER

Some of the advantages of thin brick veneer are:

1. Interior thin brick veneer finishes can be applied by homeowners or other moderately skilled craftsmen.
2. Thin brick veneer is more durable and longer lasting than aluminum, wood or vinyl sidings.
3. Prefabrication with thin brick veneer is easily and economically done.
4. Better sound and fire resistance properties may be obtained using thin brick veneer than with some non-masonry sidings.
5. Thin brick units are more durable than imitation brick units made from gypsum, cement or plastics.
6. Walls built with thin brick units are lighter in weight than conventional masonry veneer.
7. Cleanup costs often incurred in conventional brick veneer construction may be reduced.

8. Year-round installation is possible.

9. May be used where structural support for conventional brick veneer is not available.

Some of the disadvantages of thin brick veneer are:

1. The durability and overall quality of thin brick veneer systems may not be equivalent to conventional brick veneer.

2. Thin brick veneer does not provide the structural properties of conventional brick veneer.

3. Sound and fire resistance properties are less than those of conventional brick masonry veneer.

4. Thin brick veneer does not provide the thermal mass of conventional brick veneer.

SUMMARY

This *Technical Notes* has discussed a relatively new product in the masonry industry - thin brick veneer. Walls faced with thin brick veneer may look like conventional brick masonry walls, yet weigh considerably less. Thin brick veneer is popular with homeowners for redecorating or renovating because the homeowners can obtain an attractive finish and may do the work themselves.

Thin units are also used in commercial construction, applied one unit at a time, or applied in large prefabricated panels. Small, lightweight, interlocking modular panels are available and are installed as a siding. Thin brick veneer can provide the same architectural effects as conventional brick masonry, but does not have the same structural, thermal or fire resistance qualities.

The information contained in this *Technical Notes* is based on the available data and the experience of the technical staff of the Brick Industry Association. Final decisions on the use of information, details and materials as discussed in this *Technical Notes* are not within the purview of the Brick Industry Association and must rest with the project designer, owner, or both.