



PRODUCT PROFILE



Revised 7/2015

Glen-Gery Clay Thin Brick (1/2", 3/4" and 1" thick)

General

Glen-Gery provides clay thin brick in a multitude of shades and textures to accommodate the visual and application requirements of most projects. Sizes range from 8 to 16 inch and from extruded to handmade providing the widest range of thin brick available for any application.

The thickness of the thin brick available is based on the method of manufacture and the desired texture/uniformity.

Extruded thin brick available in 1/2" thickness are typically extruded as thin brick with unique surface textures and colors meeting Type TBS tolerances.

Glen-Gery's greatest variety of thin brick are available in molded and extruded 3/4" thickness. This thickness allows units to be cut from full units often specifically manufactured with larger coring and thinner webs to facilitate cutting while reducing the quantity of raw material required for manufacture. Material cut from the thin brick can be ground and reused to manufacture thin or full size units. In addition, Glen-Gery's unique large scale custom cutting operation allows thin brick to be cut from a specific lot of full brick to ensure color matching of both full and thin brick.

Handmade thin brick are available in 1" thickness to accommodate the inherent variation expected from handmade units.

Today's thin brick are installed in a wide variety of different wall systems including thickset, thinset, metal panel systems (such as Glen-Gery Thin Tech® Panels) as well as precast and tilt-up concrete wall systems. The appearance of thin brick, as well as the method of manufacture, affects the potential use of the thin brick in the various wall systems available. The thickness of the individual thin brick typically has minimal, if any, effect on any of the applications.

While each of the three categories of thin brick previously listed can be installed in most of thin brick wall systems, the precast and tilt-up concrete wall systems require thin brick with very rigid tolerances and surface textures limited to smooth or velour (wirecut) textures. In addition the cleaning techniques utilized by concrete panel manufacturers may also limit colors typical of full size units. See additional information at the end of this Profile regarding thin brick for use with precast and tilt-up concrete wall systems.

Additional information is available from your Glen-Gery representative for each thin brick wall system.

Unit Specifications

Glen-Gery thin brick are typically manufactured to conform to the requirements of American Society for Testing

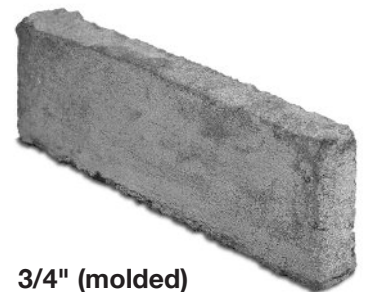
and Materials (ASTM) Standard Specification C 1088, Grade Exterior. Depending upon the particular product selected, Type TBA, TBS, or TBX may be available. These products also conform to the requirements of ASTM C 1088, Grade Interior. When specifying this product, the specifications should cite:

- 1) The product name and state "as manufactured by Glen-Gery Corporation."
- 2) Conformance to the requirements ASTM C 1088, Grade Exterior.
- 3) The actual unit dimensions listed as thickness x height x length.

Example: Harding Blend thin brick as manufactured by Glen-Gery Corporation to conform to the requirements of ASTM C 1088, Grade Exterior, Type TBS. The units shall have dimensions of 3/4" X 2-1/4" X 7-5/8".



1/2" (extruded)



3/4" (molded)



3/4" (extruded)



1" (handmade)

Design Criteria

Size:

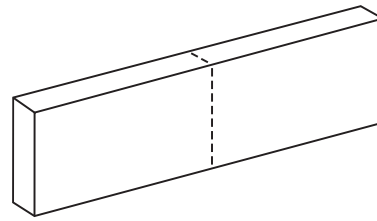
Table 1 provides the many sizes in which Glen-Gery manufactures thin brick.

Dimensional Tolerances:

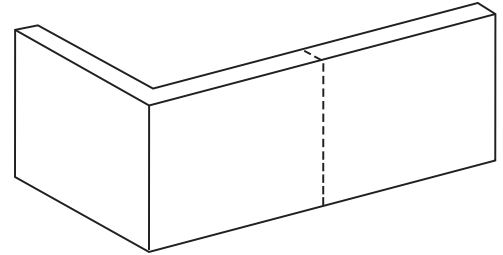
Glen-Gery thin brick are manufactured to provide specific dimensional tolerances. The dimensional tolerances of the product are intended to be within the requirements of ASTM C 1088, Type TBS for general use. Some products (including but not limited to those manufactured at the Hanley Plant) are manufactured to meet Type TBX. Products with colors matching Handmade bricks are manufactured to meet Type TBA. The product ordered will generally contain a number of units which are over or under the specified dimensions.

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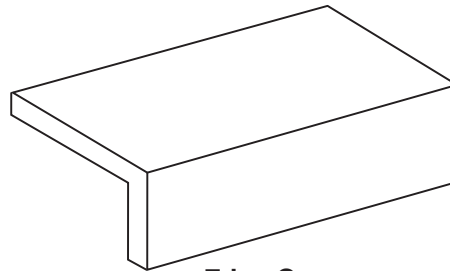
FIGURE A



Flats and 1/2 Flats



Corners and 1/2 Corners



Edge Cap

TABLE 1
Thin Brick Size, Coverage and Weight

Thin Brick Size	Specified Dimension						Thin Brick per square foot	Average Weight per unit (kg)	
	Thickness (inches) (mm)		Height (inches) (mm)		Length (inches) (mm)				
Queen	3/4	20	2-3/4	70	7-5/8	194	5.63	1.6	0.7
Lightweight Modular	3/4	20	2-1/4	57	7-5/8	194	6.75	1.0	0.5
Lightweight Engineer Modular	3/4	20	2-3/4	70	7-5/8	194	5.63	1.0	0.5
1/2-Modular (extruded)	1/2	13	2-1/4	57	7-5/8	194	6.75	0.7	0.3
3/4-Modular (extruded/molded)	3/4	20	2-1/4	57	7-5/8	194	6.75	1.1	0.5
Modular (handmade)	1	25	2-1/4	57	7-5/8	194	6.75	1.1	0.5
1/2-Engineer Modular	1/2	13	2-3/4	70	7-5/8	194	5.63	0.8	0.4
3/4- Engineer Modular	3/4	20	2-3/4	70	7-5/8	194	5.63	1.6	0.7
Econo	3/4	20	3-5/8	92	7-5/8	194	4.50	1.5	0.7
Standard	3/4	20	2-1/4	57	8	203	6.55	1.1	0.5
Engineer Standard	3/4	20	2-3/4	70	8	203	5.39	1.7	0.8
Handmade Oversized	1	25	2-3/4	70	8-1/2	216	5.00	1.7	0.8
King Narrow-Bed	3/4	20	2-3/4	70	9-5/8	244	4.55	1.5	0.7
Engineer King	3/4	20	2-3/16	71	9-5/8	244	4.55	1.5	0.7
King	3/4	20	3-5/8	92	9-5/8	244	4.55	1.5	0.7
Roman	3/4	20	1-5/8	41	11-5/8	295	6.00	1.0	0.5
Norman	3/4	20	2-1/4	57	11-5/8	295	4.50	1.5	0.7
Utility	3/4	20	3-5/8	57	11-5/8	295	3.00	2.4	1.1
Kingston	3/4	20	2-3/4	70	11-5/8	295	3.75	1.9	0.9
Viking			1-5/8	41	15-58	397	4.50	XX	XX
Saxon	3/4	20	2-1/4	57	15-5/8	397	3.38	2.0	0.9
Titan	3/4	20	3-5/8	92	15-5/8	397	2.25	3.0	1.4

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The dimensional variations are related to the raw materials, forming, drying and firing processes, and the desired finish and color. Thus, for some products, all the units may be slightly over or slightly under the specified dimensions.

Inquiries should be made regarding the dimensional variations which might be expected if project detailing requires precise coursing.

Specialty products or gauged products may be desirable when thin brick are incorporated into precast or tilt-up concrete wall systems. Many of Glen-Gery's extruded products include dimensional tolerances tighter than those required by ASTM and can be utilized for precast

concrete wall systems. Glen-Gery also offers edge-grinding of units to create tighter tolerances if required.

Configurations:

These units are manufactured to conform to the requirements of ASTM C 1088.

Weight:

The weight of the brick units vary with the raw material, size, manufacturing processes. While actual weight of specific thin brick should be confirmed, average weight of each size thin brick manufactured by Glen-Gery is included in Table 1.

Finishes:

Glen-Gery thin brick are available in a variety of textures. The textures include smooth, velour, bar, rug, matt, paper cut, scored, rockface, slurry and sand finishes. The availability of a particular finish is usually dependent on the specific product.

Glazed thin brick meeting ASTM C126 surface requirements are also available.

Color:

Glen-Gery thin brick are available in a multitude of color blends. The colors

TABLE 2
Thin Brick and Mortar Quantities¹
Nominal 3/8 Inch Mortar Joints

Thin Brick Size	Vertical Coursing in courses per inch	Thin Brick units per square foot	*Mortar Quantities	
			Cubic Foot per 100 square foot	Cubic Foot per 1000 units
Queen	5 Courses per 16"	5.63	0.99	1.76
Lightweight Modular	3 Courses per 8"	6.75	1.13	1.68
Lightweight Engineer Modular	5 Courses per 16"	5.63	0.99	1.76
1/2-Modular (extruded)	3 Courses per 8"	6.75	0.75	1.12
3/4-Modular (extruded/molded)	3 Courses per 8"	6.75	1.13	1.68
Modular (handmade)	4 Courses per 8"	6.75	1.51	2.23
1/2-Engineer Modular	5 Courses per 16"	5.63	0.66	1.17
3/4- Engineer Modular	3 Courses per 8"	5.63	0.99	1.76
Econo	1 Course per 4"	4.50	0.85	1.89
Standard	3 Courses per 8"	6.55	0.85	1.30
Engineer Standard	5 Courses per 16"	5.39	0.98	1.82
Handmade Oversized	5 Courses per 16"	5.00	1.23	2.46
King Narrow-Bed	5 Courses per 16"	4.55	0.95	2.09
Engineer King	5 Courses per 16"	4.55	0.71	1.57
King	5 Courses per 16"	4.55	0.95	2.09
Roman	4 Courses per 8"	6.00	1.33	2.22
Norman	3 Courses per 8"	4.50	1.05	2.33
Utility	1 Course per 4"	3.00	0.76	2.54
Kingston	5 Courses per 16"	3.75	0.90	2.41
Viking	4 Courses per 8"	4.50	XX	XX
Saxon	3 Courses per 8"	3.38	1.01	2.98
Titan	1 Course per 4"	2.25	0.72	3.19

¹ These values are actual quantities and must be increased for waste and any possible construction requirements which may necessitate additional quantities.

* Mortar estimate includes mortar needed for concave, vee or grapevine joints only; for Thin Tech® or Thinset Applications. Thickset applications will require additional material for scratch coat/mortar bed.

available include various shades of red, brown, gray, buff, and white. Some colors are the natural colors of the fired raw materials, while others are produced by fusing a surface treatment onto the surface of the brick during firing or adding minerals to the bodies of the brick. If through body colors are desired, inquiries should be made regarding the availability of the desired colors. The color selection may also be limited by the product selected and the desired finish. Consult with your Glen-Gery representative for products acceptable in specific applications.

Shapes:

Common thin brick shapes are shown in Figure A.

Shapes dimensioned for coursing with other brick sizes, and custom shapes having configurations to fit specific project requirements are also available. These nonstandard shapes require detailed dimension drawings which must be submitted to and approved by Glen-Gery.

All shapes should be identified early in the project design because certain shape configurations may require special forming, drying, or firing processes. These processes may require more time or different scheduling than standard thin brick.

Physical Properties of Units

Compressive Strength:

Because thin brick are individually attached to substrates, compressive strength is not a relevant quality of thin bricks. ASTM C 1088 does not require reporting of compressive strength because testing tall, thin sections of brick for compressive strength are not indicative of performance.

Water Absorption:

Glen-Gery's extruded products: The average maximum hot-water absorption by submersion in boiling water for five hours is less than 17% and will typically be less than 9%. The average

saturation coefficient is generally less than 0.78. In instances where the saturation coefficient exceeds 0.78, the cold water absorption for Glen-Gery brick is less than 8% and the units meet the requirements of ASTM C1088, Grade Exterior.

Glen-Gery's molded and Handmade products: The average maximum hot-water absorption by submersion in boiling water for five hours is less than 17% and will typically be less than 15%. The average saturation coefficient is generally less than 0.65.

Initial Rate of Absorption (IRA):

Glen-Gery's extruded products: The initial

rate of absorption (suction) normally does not exceed 30 grams per 30 square inches per minute under laboratory conditions.

Glen-Gery's molded and Handmade products: The initial rate of absorption (suction) normally may exceed 30 grams per 30 square inches per minute under laboratory conditions.

Properties of Walls

Compressive Strength:

Compressive strength of a thin brick wall system is not typically affected by the thin brick units provided.

TABLE 3
Units Per Linear Foot in Various Positions
Nominal 3/8 Inch Mortar Joints

Thin Brick Size	FLATS		SHAPES	
	Stretcher	Soldier	Corner (Vertically)	Header (Horizontally)
Queen	1.50	3.75	3.75	1.57
Lightweight Modular	1.50	4.50	4.50	1.57
Lightweight Engineer Modular	1.50	3.75	3.75	1.57
Modular	1.50	4.50	4.50	1.57
Engineer Modular	1.50	3.75	3.75	1.57
Econo	1.50	3.00	3.00	1.57
Standard	1.43	4.50	4.50	1.50
Engineer Standard	1.43	3.75	3.75	1.50
Handmade Oversized	1.33	3.75	3.75	1.41
King Narrow-Bed	1.20	3.75	3.75	1.25
Engineer King	1.20	4.26	3.75	1.25
King	1.20	3.75	3.75	1.25
Roman	1.00	6.00	1.50	1.03
Norman	1.00	4.50	4.50	1.03
Utility	1.00	3.00	3.00	1.03
Kingston	1.00	3.75	3.75	1.03
Viking	XX	XX	XX	XX
Saxon	0.75	4.50	*	0.77
Titan	0.75	3.00	*	0.77

*12-inch units could be used at corner to allow proper 1/2-bond coursing.

Thermal Performances:

The thermal resistance of Glen-Gery thin brick is approximately 0.11 (hr • sq. ft. • deg f)/(Btu • in.). Therefore thin brick thermal performance is as follows:

Thin Brick Thickness (inch)	Thermal Resistance (hr • sq. ft. • deg f)/(Btu • in.)
1/2	0.05
3/4	0.08
1	0.11

The thermal resistance is used to predict the thermal performance of wall elements under steady-state conditions. The mass and specific heat of this product provide additional benefit when subjected to the dynamic conditions of the natural environment. As described in the American Society of Heating Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1, the effects of mass, specific heat, and the color of the brick should be considered. Reference: BIA Technical Notes on Brick Construction 4 Revised, "Heat Transmission Coefficients of Brick Masonry Walls", 4B Revised, "Energy Code Compliance of Brick Masonry Walls" and 43D, "Brick Passive Solar Heating Systems, Part IV – Material Properties."

Sound Transmission:

The sound transmission of thin brick has not been measured and is typically dependent upon the overall wall system.

Fire Resistance:

Fire resistance ratings for thin brick are dependent upon the entire wall system utilized. Prescriptive one-hour and two-hour fire-resistance-rated exterior walls constructed with adhered thin veneer brick units on steel or wood studs are included in the International Code Council (ICC) International Building Code (IBC). These designs can be used by architects/engineers/designers of building construction projects in those jurisdictions that adopt and enforce the IBC where the nonbearing exterior walls of a building are required to have a one-hour or two-hour fire-resistance rating.

Coefficient of Thermal Expansion:

Glen-Gery thin brick have a coefficient of thermal expansion of approximately 0.000004 in. (in. • °F) as listed in The

Building Code Requirements for Masonry Structures (TMS 402/ACI 530/ASCE 5) .

Coefficient of Moisture Expansion:

Glen-Gery thin brick veneer have a coefficient of moisture expansion which is less than 0.0005 in./in. Most of the moisture expansion of Glen-Gery thin brick occurs immediately after the bricks are fired, before the brick arrive at the job site.

Construction

Storage and Protection:

Store brick in their packaging off ground to avoid contamination by water, mud, dust or materials likely to cause staining or other defects. Do not use packages of thin brick as supports or work surfaces. Cover packages with a weather resistant membrane held securely in place or otherwise protect packages from the elements.

Wetting:

As deemed necessary (see IRA), wet units prior to contact with mortar. Wetting procedures vary by thin brick application and environment. Contact your Glen-Gery representative for specific information.

Weather Extremes:

When using Portland cement mortars, follow the procedures required by The International Building Code (IBC). The IBC references cold and hot weather construction provisions for masonry that are based on those found in Specification for Masonry Structures (TMS 602/ACI 530.1/ASCE 6) and required by Building Code Requirements for Masonry Structures (TMS 402/ACI 530/ASCE 5). While specific cold and hot weather provisions are not included within the International Residential Code (IRC) the IRC states that mortar for use in masonry construction shall comply with ASTM C 270, which requires mortar for other than masonry veneer to be prepared in accordance with the Masonry Industry Council's "Hot and Cold Weather Masonry Construction Manual." Further information is also available in the BIA Technical Notes on Brick Construction 1, "Cold and Hot Weather Construction."

When using proprietary attachment systems, adhesives or preblended cements, consult the manufacturer's written instructions for cold and hot weather requirements.

Installation:

When using Portland cement mortars in thickset applications butter the backs of the units and set units in full mortar joints. Use a Portland cement lime mortar conforming to ASTM C 270. A prepackaged mortar mix conforming to these specifications is Glen-Gery Color Mortar Blend. Reference: Glen-Gery Product Profile "Glen-Gery Color Mortar Blend." Joints must be completely filled to ensure performance.

When using proprietary attachment systems or preblended adhesives or cements, consult the manufacturer's written instructions for installation.

Tooling:

When thumbprint hard, tool all joints to produce a concave, grapevine, or vee joint finish.

Protection of Work:

At the end of each day and before each shut down period, cover work with a strong weather resistant membrane which is held in place securely. Scaffold boards closest to the wall should be tilted up at days end to prevent splatter during rain. Care should also be taken to protect brickwork located near the ground from mud and dirt.

Cleaning:

When the attachment system uses Portland cement mortars, remove excess mortar with a stiff bristle brush at the end of each shift. Clean with wooden paddles and stiff fiber brushes using clean water. If a cleaning agent is necessary, presoak the wall with clean water prior to applying the cleaning agent and thoroughly rinse the wall with clean water after cleaning. Prior to determining a final cleaning solution, test the procedure and cleaning agent on a small sample area to observe the effectiveness of the overall cleaning solution and, most importantly, to detect any possible deleterious effects

or changes in appearance of the brick. Additional information is available in the Glen-Gery Technical Profile "Cleaning New Brickwork." Check with your Glen-Gery Distributor or District Sales Manager prior to making a final selection of a cleaning procedure and solution. When using Type N mortars, clean down should never occur prior to 7 days after work is completed to assure appropriate curing of the mortar. Reference: BIA Technical Notes on Brick Construction 20, "Cleaning Brickwork."

When using proprietary attachment systems, adhesives or preblended cements, consult the manufacturer's written instructions for cleaning.

Estimating:

The quantities of brick and mortar required for a project vary with the size of the brick unit, the wall construction, the number of field cuts necessary, and the workmanship. Table 2 provides the quantities of brick and mortar quantities per 1,000 brick units. The figures are based on the units being placed in the wall as stretchers in stack or running bond. The values provided are estimates of the quantities in the finished wall and do not account for waste. These values represent the actual number of units per linear foot for the various brick sizes placed on the four most frequently used positions in the wall. The values are based on a

nominal three-eighth inch mortar joint. Reference: BIA Technical Notes on Brick Construction 10, "Dimensioning and Estimating Brick Masonry."

PRECAST AND TILT-UP CONCRETE WALL PANEL APPLICATIONS

Concrete panel manufacturers, including precast and tilt-up wall systems, offer a unique and well performing walls for a variety of applications that typically involve relatively repetitive wall panels. Such systems allow the use of thin brick in wall systems that previously did not include thin brick. With the advent of various thin brick liners that hold the brick in place, as well as advancements in concrete technology, thin brick can be placed face down in the concrete liner. The liner holds the thin brick in place as concrete is poured and the brick form the finished surface. In such systems the thin brick must be uniform enough to reduce potential leakage between the liner and the edge of the brick.

In addition, the finished faces of the thin brick are typically required to be waxed in order to prevent concrete, which passes between the liner and the edge of the clay unit, from sticking to the finished surface of the brick. The wax and concrete is removed after the panel is removed from the liner utilizing a hot water pressure washer.

While Glen-Gery produces a wide

variety of colors, textures and sizes available in thin brick, precast and tilt-up concrete panels typically require very uniform products that are often tighter than grade TBX, with textures limited to smooth or wirecut to reduce concrete leakage between the thin brick and the liner. Cleaning procedures typically limit surface coatings to very light sand or spray coatings that are not removed by the high pressure cleaning techniques.

Glen-Gery is capable of providing a wide variety of thin brick meet such requirements, including many thru-body and surface coated brick, as well as smooth and wirecut textures capable of withstanding concrete panel cleaning techniques.

In addition, Glen-Gery offers edge-grinding of thin brick to ensure such uniformity and waxing of finished faces often required by concrete panel manufacturers; as well as standard thin brick shapes and many custom shapes for unique thin brick possibilities.

Be sure to contact your local Glen-Gery representative to determine available thin brick for such applications.

For further information contact:
Glen-Gery Technical Services
433 South Pottsville Pike
Shoemakersville, PA 19555
(610) 562-3076



610.374.4011
info@glengery.com
www.glengery.com

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