SUBJECT: Summary of Clay Brick Standards

ASTM Standards for clay brick contain the requirements for the physical properties, dimension tolerances, and allowable defects, such as chips and cracks. These requirements cover a broad range of requirements that regulate the durability and appearance of clay brick in each of these categories. This summary lists some of those properties for interested parties that do not need the complete standard. For those who need them, the standards can be purchased from ASTM International at www.ASTM.org. The standards covered in this digest are:

- ASTM C216 Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)
- ASTM C652 Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale)
- ASTM C1088 Standard Specification for Thin Veneer Brick Units Made From Clay or Shale

We have grouped these three together, because their properties and tolerances are very similar.

Grades:

Each of these specifications contains two grades: SW and MW. SW stands for "severe weathering." MW stands for "Moderate Weathering." Each standard recommends that only grade SW be used outdoors in areas with a weathering index of 50 or greater, as defined by a map in those standards. The only areas in the United States with a weathering index less than 50 are:

- The southern half of Florida
- Texas near Big Bend and south of Corpus Christi
- Southwestern Arizona, and southwestern California
- Hawaii is not mentioned, but also has a weathering index less than 50

For exact locations, see the map in any of those standards. Grade SW can be used in all climate zones, but should not be used as pavers or embedded in outdoor concrete flatwork, because freeze-thaw damage is likely to occur. Clay pavers are designed for those applications.

Physical requirements:

Each grade has physical requirements for compressive strength, absorption, saturation coefficients and other properties that affect the durability and freeze-thaw resistance of the brick. Those properties are as follows, except C1088 does not have compressive strength requirements, because the test is not practical for thin brick:

Grade	Compressive Strength Minimum	Maximum Boiling Water Absorption	Saturation Coefficient
SW	3000 psi	17%	0.78
MW	2500 psi	22%	0.88

Two alternates are allowed for brick with unusual physical properties to qualify for grade SW. Manufacturers are responsible for testing and certifying their product to meet these requirements. Purchasers can request copies of the test results for products from the manufacturer.

Tolerances on Dimensions:

Each standard has two or three types. Each type has allowable tolerances for variation from its specified dimensions as follows:

Specified Dimension (Length, height or width)	**Maximum Variation from Specified Dimension**	
	Type C216 FBX	Type C216 FBS
	Type C652 HBX	Types C652 HBS, HBB
	Type C1088 TBX	Type C1088 TBS
3” and under	±1/16” (1.6 mm)	±3/32” (2.4 mm)
Over 3” to 4”	±3/32” (2.4 mm)	±1/8” (3.2 mm)
Over 4” to 6”	±1/8” (3.2 mm)	±3/16” (4.8 mm)
Over 6” to 8”	±5/32” (4.0 mm)	±1/4” (6.4 mm)
Over 8” to 12”	±7/32” (5.6 mm)	±5/16” (7.9 mm)
Over 12” to 16”	±9/32” (7.1 mm)	±3/8” (9.5 mm)

ASTM C216 has additional tolerance restrictions for variation from **average** dimensions in a delivery of brick as follows:

Average Dimension (Length, height or width)	**C216 Maximum Variation from Average Dimension**		
	Type FBX	Type FBS Smooth	Type FBS Rough
3” and under	±1/16” (1.6 mm)	±1/16” (1.6 mm)	±3/32” (2.4 mm)
Over 3” to 4”	±1/16” (1.6 mm)	±3/32” (2.4 mm)	±1/8” (3.2 mm)
Over 4” to 6”	±3/32” (2.4 mm)	±3/32” (2.4 mm)	±3/16” (4.8 mm)
Over 6” to 8”	±3/32” (2.4 mm)	±1/8” (3.2 mm)	±1/4” (6.4 mm)
Over 8” to 12”	±1/8” (3.2 mm)	±3/16” (4.8 mm)	±5/16” (7.9 mm)
Over 12” to 16”	±3/16” (4.8 mm)	±1/4” (6.4 mm)	±3/8” (9.5 mm)

Tolerances on Warpage:

All of these standards have tolerances for permissible variation from plane or warpage:

Specified Dimension (Length, height or width)	**Maximum Variation from Specified Dimension**	
	Type C216 FBX	Type C216 FBS
	Type C652 HBX	Types C652 HBS, HBB
	Type C1088 TBX	Type C1088 TBS
8” and under	1/16” (1.6 mm)	3/32” (2.4 mm)
Over 8” to 12”	3/32” (2.4 mm)	1/8” (3.2 mm)
Over 12” to 16”	1/8” (3.2 mm)	5/32” (4.0 mm)

Tolerances on Chippage:

Chippage tolerances can be confusing because they allow two groups:

- The first set of columns in the table below allows for larger chips in a small percentage of the brick delivered to the site.
- The second set of columns allows a smaller number of chips in the majority of the brick.

Maximum Permissible Extent of Chippage From the Edges and Corners of Exposed Face						
Type	Lesser % Allowed More Chippage			Greater % Allowed Less Chippage		
	⬇	From Edge	From Corner	⬇	From Edge	From Corner
FBX, HBX, TBX	< 5%	1/8” – 1/4" (3.2–6.4 mm)	1/4" – 3/8” (6.4–9.5 mm)	95 – 100%	0” – 1/8" (0–3.2 mm)	0" – 1/4” (0–6.4 mm)
FBS Plain, HBS & TBS Formed	<10%	1/4” – 5/16" (6.4–7.9 mm)	1/4" – 3/8” (6.4–9.5 mm)	90 – 100%	0” – 1/4" (0–6.4 mm)	0" – 3/8” (0–9.5 mm)
FBS Textured, HBS & TBS Altered	<15%	5/16” – 7/16" (7.9–11.1 mm)	1/4" – 3/8” (6.4–9.5 mm)	85 – 100%	0” – 5/16" (0–7.9 mm)	0" – 1/2” (0–12.7 mm)
FBA, HBA, HBB, TBA	Match the sample specified by the purchaser, but not more restrictive than textured or altered.					

The number of brick in a delivery that are broken or otherwise fail to meet the requirements for chippage and tolerances shall not exceed 5%.