3
CLAY AND CERAMIC PRODUCTS

Clay as a raw material is most valued for its ceramic characteristics. When subjected to high firing temperatures, the silicates in clay melt, fusing the particles to a density that approaches vitrification. The resulting strength and weather resistance make brick, structural clay tile, and terra cotta among the most durable of building materials.

3.1 BRICK

There are many different shapes, sizes, and types of brick. ASTM standards cover building brick, facing brick, hollow brick, paving brick, firebox brick, glazed brick, chemical resistant brick, and others based on appearance of the unit. The three most widely used are building brick, face brick, and hollow brick (*see Fig. 3-1*).

Building brick (sometimes called common brick) is used primarily as a structural material or as a backing for other finishes, where strength and durability are of more importance than appearance. Under ASTM C62, *Standard Specification for Building Brick,* grading is based on physical requirements and directly related to durability and resistance to weathering (*see Fig. 3-2*).

Grade SW (severe weathering) is used where a high degree of resistance to frost action is required and where conditions of exposure indicate the possibility of freezing when the unit is permeated with water. Grade SW is recommended for below-grade installations in moderate and severe weathering areas, and for horizontal or other non-vertical surfaces in all weathering conditions. Grade MW (moderate weathering) may be used only in negligible weathering regions for vertical installations and for above-grade non-vertical installations. Grade NW (no weathering) is permitted only for interior work where there will be no weather exposure.

Moisture enters the face of a brick by capillary action. When present in sufficient quantity and for an extended time, water will penetrate through the brick and approximate the laboratory condition defined as “permeated” (which results from 24-hour submersion in cold water). Permeation may easily

Unit	Weathering Grade	Minimum Compressive Strength, Gross Area (psi)		Maximum Water Absorption by 5-Hour Boiling (%)		C/B Maximum Saturation Coefficient	
		Average of 5 Tests	Individual Unit	Average of 5 Tests	Individual Unit	Average of 5 Tests	Individual Unit
Face brick (ASTM C216)	SW MW	3000 2500	2500 2200	17 22	20 25	0.78 0.88	0.80 0.90
Building brick (ASTM C62)	SW MW NW	3000 2500 1500	2500 2200 1250	17 22 no limit	20 25 no limit	0.78 0.88 no limit	0.80 0.90 no limit
Hollow brick (ASTM C652)	SW MW	3000 2500	2500 2200	17 22	20 25	0.78 0.88	0.80 0.90
Glazed brick (ASTM C1405)	Exterior Interior	6000 3000	5000 2500	— —	7 (cold water) —	0.78 —	0.80 —
Glazed brick (ASTM C126)	— —	3000 2000	2500 1500	— —	— —	— —	— —

Grade Recommendations for Brick Exposures in Exterior Walls

Exposure	Weathering Index	
	Less Than 50	50 and Greater
In vertical surfaces:		
In contact with earth	MW	SW
Not in contact with earth	MW	SW
In other than vertical surfaces:		
In contact with earth	SW	SW
Not in contact with earth	MW	SW

Grade SW Brick intended for use where high and uniform resistance to damage caused by cyclic freezing is desired, and where the brick may be frozen when permeated with water.

Grade MW Brick which may be used where moderate resistance to cyclic freezing damage is permissible or where the brick may be damp but not permeated with water when freezing occurs.

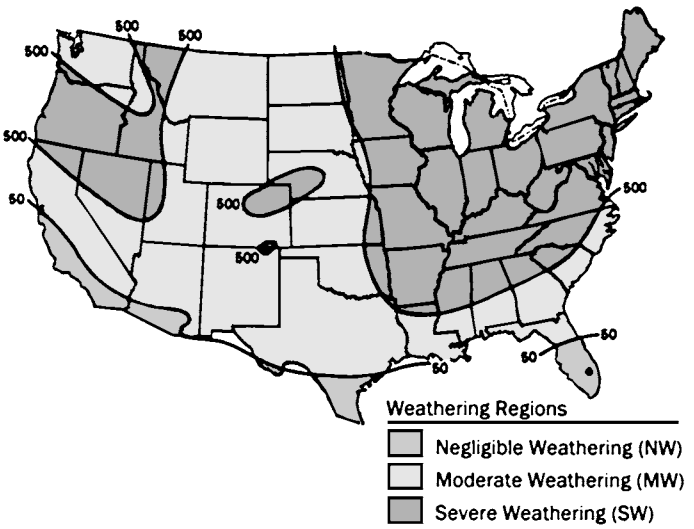

Figure 3-1 ASTM physical requirements for brick. (*Copyright ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428. Reprinted with permission.*)