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	3000	2500	17	20	0.78	0.80
	MW	2500	2200	22	25	0.88	0.90
Building brick (ASTM C62)	SW	3000	2500	17	20	0.78	0.80
	MW	2500	2200	22	25	0.88	0.90
	NW	1500	1250	no limit	no limit	no limit	no limit
Hollow brick (ASTM C652)	SW	3000	2500	17	20	0.78	0.80
	MW	2500	2200	22	25	0.88	0.90
Glazed brick (ASTM C1405)	Exterior	6000	5000	–	7 (cold water)	0.78	0.80
	Interior	3000	2500	–	–	–	–
Glazed brick (ASTM C126)	—	3000	2500	–	–	–	–
	–	2000	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.

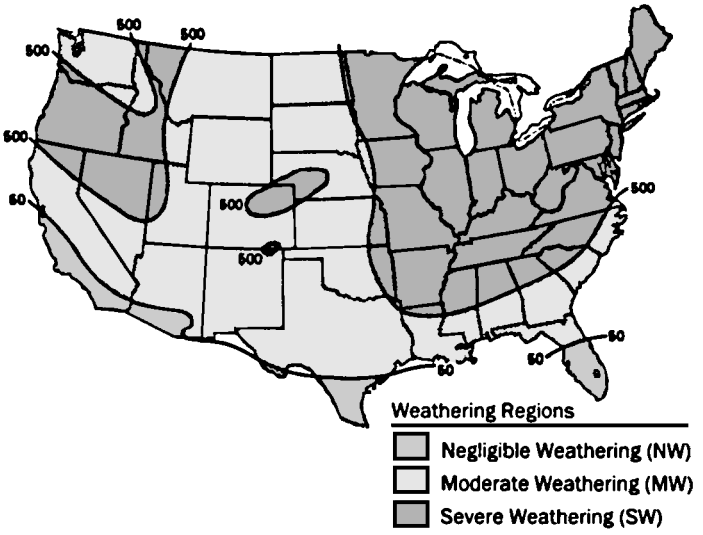

Figure 3-28 Minimum physical requirements for brick. (*Copyright ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428. Reprinted with permission.*)

3.4.1 Compressive Strength

The compressive strengths of brick and tile are usually based on gross area. Extruded bricks generally have higher compressive strength and lower absorption than those produced by the soft-mud or dry-press processes. For a given clay and method of manufacture, higher compressive strength and lower absorption are also associated with higher burning temperatures. The minimum compressive strength values listed in *Fig. 3-28* are substantially exceeded by most manufacturers. Actual compressive strengths of clay masonry units are usually higher than those of ordinary structural concrete. For standard-run brick, strengths typically range from 1500 to 22,500 psi, with the majority of units produced being in excess of 4500 psi (*see Fig. 3-29*).

3.4.2 Transverse Strength

The transverse strength of a brick acting as a beam supported at both ends is called the *modulus of rupture*. Tests at the National Institute of Standards and Technology (NIST) indicate minimum values for well-burned brick to be in excess of 500 psi, with a maximum average of 2890 psi. There is no general

Brick Classification by Compressive Strength

Designation	Minimum Compressive Strength (psi)	
	Average of 5 Units	Individual Unit
2,500	2,500	2,200
4,500	4,500	4,000
6,000	6,000	5,300
8,000	8,000	7,000
10,000	10,000	8,800
12,000	12,000	10,600
14,000	14,000	12,300

(*From Schneider and Dickey*, Reinforced Masonry Design).

(*from Brick Industry Association [BIA]*, Principles of Brick Masonry, *1973*)

Actual Compressive Strength of Brick Produced in the United States

Range (psi)	Percentage of Production Within Range (%)
21,001 to 22,500	0.46
19,501 to 21,000	0.69
18,001 to 19,500	0.46
16,501 to 18,000	2.04
15,001 to 16,500	1.49
13,501 to 15,000	3.71
12,001 to 13,500	4.76
10,501 to 12,000	7.78
9,001 to 10,500	8.61
7,501 to 9,000	11.92
6,001 to 7,500	15.47
4,501 to 6,000	16.81
3,001 to 4,500	17.97
1,501 to 3,000	7.46
0 to 1,500	0.36
Total Percent	99.99

Figure 3-29 Compressive strength of brick.