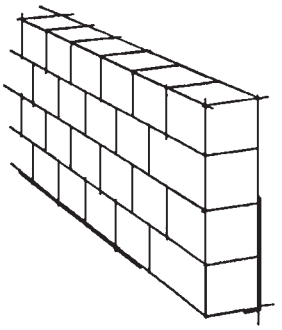
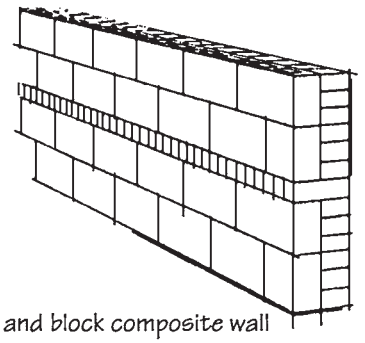
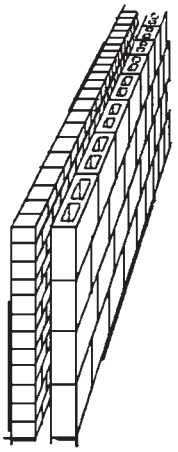
BUILDING SYSTEMS AND APPLICATIONS



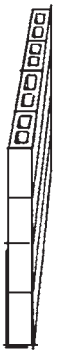
solidly grouted 8" block
E_T 7.625 in.



8" brick and block composite wall
E_T 5.8 to 6.3 in.

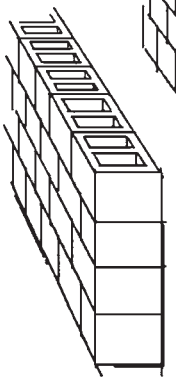


10" brick/block cavity wall
E_T 5.8 to 6.5 in.

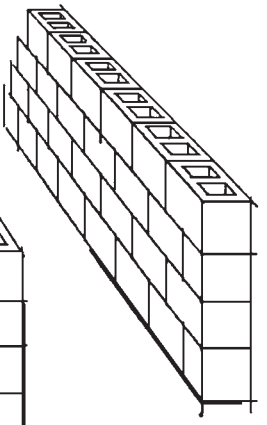


4" block wall
60-80% solid
E_T 2.2 to 2.9 in.

6" block wall
55-75% solid
E_T 3.1 to 4.2 in.



12" block wall
50-60% solid
E_T 5.7 to 7.0 in.



8" block wall
50-60% solid
E_T 3.8 to 4.6 in.

Width (in.)	Gross Volume (cu.in.)	Minimum Thickness (in.)		Three-Core Units		Two-Core Units	
		Shell	Web	Percent Solid Volume	Equivalent Solid Thickness (in.)	Percent Solid Volume	Equivalent Solid Thickness (in.)
3-5/8	432	0.75	0.75	63	2.28	64	2.32
		1.00	1.00	73	2.66	73	2.66
5-5/8	670	1.00	1.00	59	3.32	57	3.21
		1.12	1.00	63	3.54	61	3.43
		1.25	1.00	66	3.71	64	3.60
		1.37	1.12	70	3.94	68	3.82
7-5/8	908	1.25	1.00	56	4.27	53	4.04
		1.37	1.12	60	4.57	57	4.35
		1.50	1.12	62	4.73	59	4.50
9-5/8	1145	1.25	1.12	53	5.10	48	4.62
		1.37	1.12	55	5.29	51	4.91
		1.50	1.25	58	5.58	54	5.20
11-5/8	1395	1.25	1.12	49	5.70	44	5.12
		1.37	1.12	51	5.93	46	5.35
		1.50	1.25	54	6.28	49	5.70
		1.75	1.25	57	6.63	52	6.04

Figure 8-16 Volume characteristics and equivalent thickness (E_T) of some typical CMUs.

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BUILDING SYSTEMS AND APPLICATIONS

The fire resistance of wall or floor assemblies made up of different materials or types of masonry units can be calculated using the formula

$$R_A = (R_1^{0.59} + R_2^{0.59} + \ldots + R_n^{0.59} + A_1 + A_2 + \ldots + A_n + pl)^{1.7}$$

Where

R_A	=	fire endurance rating of assembly (hours)
$R_1, R_2, \ldots, R_n$	=	fire endurance rating of assembly components or wythes 1, 2, ...n, respectively (hours)
$A_1, A_2, \ldots, A_n$	=	0.30 coefficient for each continuous air space of at least 1/2 inch between wythes 1, 2, …, n, respectively
pl	=	coefficient for thickness of plaster (from table below)

Thickness of Sanded Gypsum Plaster (inch)	Coefficient for Plaster One Side	Coefficient for Plaster Two Sides
1/2	0.30	0.60
5/8	0.37	0.75
3/4	0.45	0.90

Figure 8-17 Calculated fire resistance. (*Formula and table from* International Building Code 2003.)

8.4.3 UL Ratings

Underwriters' Laboratories (UL) design numbers apply only to a specific proprietary product or assembly manufactured by a specific manufacturer or manufacturers. The fire resistance ratings of clay and concrete masonry, on the other hand, are generic. They apply to all products made from the same types of raw materials. Consequently, UL identifies masonry products by their classification, rather than by design numbers. For example, Class B-4 concrete masonry units have a 4-hour rating, Class C-3 concrete masonry units have a 3-hour rating, and Class D-2 units have a 2-hour rating. The *UL Fire Resistance Directory* then lists CMU manufacturers who are eligible to issue a UL certificate for one or more of these classifications. The Directory also gives UL numbers for several tested masonry wall assemblies. All of these assemblies were tested so that a specific manufacturer could show that a particular product (mortar mix or insulation insert, for example) could be added to or substituted in a "standard" masonry assembly and still achieve the same fire rating.

Most of the masonry wall assemblies "listed" in the UL Directory are too proprietary to apply to masonry construction in general. The UL numbers for these other assemblies are not appropriate if any of the component materials vary from the specific brand or type of products identified, including such items as veneer anchors or lime. For masonry, the more appropriate way to note construction documents is to reference the building code and table from which the rating requirement is taken, and require that unit manufacturers provide test reports or certifications attesting to the fire endurance rating of their products.

8.4.4 Steel Fireproofing

Steel frame construction is vulnerable to fire damage and must be protected from heat and flame. Structural clay tile, brick, and concrete block can all be

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