

CONCRETE MASONRY WALL WEIGHTS

TEK 14-13B
Structural (2008)

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INTRODUCTION

Concrete masonry walls provide a range of benefits, including structural integrity, fire and sound resistance, energy efficiency, insect resistance, durability and architectural interest. Many of these attributes are measured quantitatively, and often vary directly with the weight of the concrete masonry wall.

Wall weights are used directly to calculate:

- Sound transmission class (STC) ratings, with heavier walls providing higher STC ratings and hence better sound insulation. See TEK 13-1B, *Sound Transmission Class Ratings for Concrete Masonry Walls* (ref. 1), for further information.
- Seismic base shear force, with heavier walls resulting in higher base shear values. See TEK 14-12B, *Seismic Design Forces on Concrete Masonry Buildings* (ref. 2), for further information.
- Heat capacity, an indication of thermal storage capacity, with heavier walls providing higher heat capacities and potentially better energy performance. See TEK 6-16A,

Heat Capacity (HC) Values for Concrete Masonry Walls (ref. 3), for further information).

- Gravity loads (wall dead loads) on structural members such as lintels and foundations.
- Dead loads to resist uplift and overturning for high wind resistance.

Additional wall properties are also impacted by wall weight, although estimates of these properties are based on concrete density or aggregate type, rather than directly on wall weight. TEK 2-6, *Density-Related Properties of Concrete Masonry Assemblies* (ref. 4), also discusses the various physical and design properties influenced by the density of concrete masonry units. Examples of these properties include:

- Fire resistance ratings, with lower density walls providing more fire resistance in general. See TEK 7-1B, *Fire Resistance Rating of Concrete Masonry Assemblies* (ref. 5), for further information).
- Thermal resistance, with lower density walls providing higher R-values and potentially better energy performance. See TEK 6-1A, *R-Values of Multi-Wythe Concrete Masonry Walls*, and TEK 6-2A, *R-Values for Single Wythe Concrete Masonry Walls* (refs. 6, 7), for further information.

Tables 1 through 8 list concrete masonry wall weights for 4 to 16 inch (102 to 406 mm) thick single wythe walls. Wall weights for grouted 4-in. (102-mm) concrete masonry walls

Table 1—4-in. (102-mm) Single Wythe Wall Weights

Units	Vertical grout spacing, in. (mm)	Mortar bedding	Wall weight, lb/ft ² (kg/m ²) for concrete densities, lb/ft ³ (kg/m ³) of:					
			85 (1,362)	95 (1,522)	105 (1,682)	115 (1,842)	125 (2,003)	135 (2,163)
Hollow	No grout	Face shell	13 (64)	15 (73)	16 (78)	18 (88)	19 (93)	20 (98)
Hollow	No grout	Full	14 (68)	15 (73)	16 (78)	18 (88)	19 (93)	21 (103)
Solid	No grout	Full	27 (132)	30 (147)	33 (161)	35 (171)	38 (186)	41 (200)

Table 2—4-in. (102-mm) Single Wythe Wall Weights—Half-High Units^A

Units	Vertical grout spacing, in. (mm)	Mortar bedding	Wall weight, lb/ft ² (kg/m ²) for concrete densities, lb/ft ³ (kg/m ³) of:					
			85 (1,362)	95 (1,522)	105 (1,682)	115 (1,842)	125 (2,003)	135 (2,163)
Hollow	No grout	Face shell	14 (68)	15 (73)	16 (78)	18 (88)	19 (93)	20 (98)
Hollow	No grout	Full	14 (68)	15 (73)	17 (83)	18 (88)	19 (93)	21 (103)
Solid	No grout	Full	28 (137)	31 (151)	34 (166)	36 (176)	39 (191)	42 (205)

^A units have nominal face dimensions of 16 in. (406 mm) long by 4 in. (102 mm) high

are not provided. Because of the small core size and resulting difficulty in consolidating grout, these units are rarely grouted.

Weights listed in the tables are based on the following assumptions.

- Minimum face shell & web thickness requirements of *Standard Specification for Loadbearing Concrete Masonry Units*, ASTM C 90-06 (ref. 8). These values apply to most currently available concrete masonry units. The 2006 edition of ASTM C 90 included slightly reduced minimum face shell thickness requirements for concrete masonry units 10 in. (254 mm) and greater in width. These smaller face shells result in slightly lower calculated wall weights for 10, 12-, 14- and 16-in. (254-, 305-, 356-, and 406-mm) units. Note that even though ASTM C 90-06 is not referenced in the *International Building Code* (ref. 9) until the 2009 edition, and in *Building Code Requirements for Masonry Structures* (ref. 10) until the 2008 edition, designers should be aware that many concrete masonry producers started complying with the reduced face shell requirements at a much earlier date. When using dead loads for beneficial effects such as overturning resistance, it is advised that the lower wall weights based on ASTM C 90-06 be used.
- Except as noted in Table 2, units have nominal face dimensions of 16 in. (406 mm) long by 8 in. (203 mm) high, as shown in Figure 1.
- All mortar joints are $\frac{3}{8}$ in. (9.5 mm) thick. The mortar joint

depth is equal to the thickness of the face shell or web on which it is placed (i.e., there is no excess mortar).

- Each unit has square ends and two square cores, as shown in Figure 1.
- Mortar density is 125 pcf (2,003 kg/m³).
- Grout density is 140 pcf (2,243 kg/m³).
- There is no excess grout in the wall.

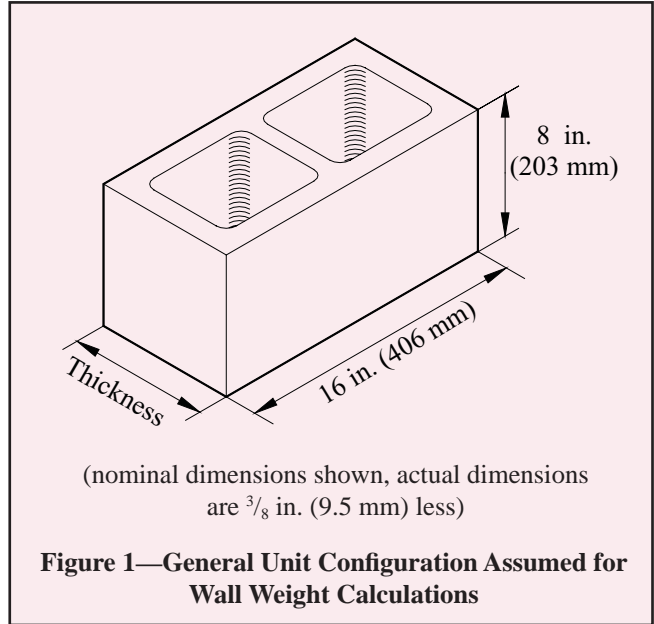


Table 3—6-in. (152-mm) Single Wythe Wall Weights

Units	Vertical grout spacing, in. (mm)	Mortar bedding	Wall weight, lb/ft ² (kg/m ²) for concrete densities, lb/ft ³ (kg/m ³) of:					
			85 (1,362)	95 (1,522)	105 (1,682)	115 (1,842)	125 (2,003)	135 (2,163)
Hollow	No grout	Face shell	20 (98)	22 (108)	24 (117)	26 (127)	28 (137)	30 (147)
Hollow	No grout	Full	20 (98)	22 (108)	24 (117)	26 (127)	28 (137)	31 (151)
Solid	No grout	Full	42 (205)	46 (225)	50 (244)	55 (269)	59 (288)	63 (308)
Hollow	8 (203)	Full	53 (259)	56 (274)	58 (283)	60 (293)	62 (303)	64 (313)
Hollow	16 (406)	Face shell	37 (181)	39 (191)	41 (200)	43 (210)	45 (220)	47 (230)
Hollow	24 (610)	Face shell	31 (151)	33 (161)	35 (171)	37 (181)	39 (191)	41 (200)
Hollow	32 (812)	Face shell	28 (137)	30 (147)	32 (156)	34 (166)	37 (181)	39 (191)
Hollow	40 (1,016)	Face shell	26 (127)	29 (142)	31 (151)	33 (161)	35 (171)	37 (181)
Hollow	48 (1,219)	Face shell	25 (122)	27 (132)	30 (147)	32 (156)	34 (166)	36 (176)
Hollow	56 (1,422)	Face shell	25 (122)	27 (132)	29 (142)	31 (151)	33 (161)	35 (171)
Hollow	64 (1,626)	Face shell	24 (117)	26 (127)	28 (137)	30 (147)	32 (156)	34 (166)
Hollow	72 (1,829)	Face shell	23 (112)	26 (127)	28 (137)	30 (147)	32 (156)	34 (166)
Hollow	80 (2,032)	Face shell	23 (112)	25 (122)	27 (132)	29 (142)	31 (151)	34 (166)
Hollow	88 (2,235)	Face shell	23 (112)	25 (122)	27 (132)	29 (142)	31 (151)	33 (161)
Hollow	96 (2,438)	Face shell	23 (112)	25 (122)	27 (132)	29 (142)	31 (151)	33 (161)
Hollow	104 (2,642)	Face shell	22 (108)	24 (117)	27 (132)	29 (142)	31 (151)	33 (161)
Hollow	112 (2,845)	Face shell	22 (108)	24 (117)	26 (127)	28 (137)	30 (147)	33 (161)
Hollow	120 (3,048)	Face shell	22 (108)	24 (117)	26 (127)	28 (137)	30 (147)	32 (156)

Table 4—8-in. (203-mm) Single Wythe Wall Weights

Units	Vertical grout spacing, in. (mm)	Mortar bedding	Wall weight, lb/ft ² (kg/m ²) for concrete densities, lb/ft ³ (kg/m ³) of:					
			85 (1,362)	95 (1,522)	105 (1,682)	115 (1,842)	125 (2,003)	135 (2,163)
Hollow	No grout	Face shell	25 (122)	28 (137)	31 (151)	33 (161)	36 (176)	39 (191)
Hollow	No grout	Full	26 (127)	28 (137)	31 (151)	34 (166)	37 (181)	39 (191)
Solid	No grout	Full	56 (274)	62 (303)	68 (332)	74 (362)	80 (391)	86 (420)
Hollow	8 (203)	Full	73 (357)	76 (371)	78 (381)	81 (396)	84 (411)	86 (420)
Hollow	16 (406)	Face shell	49 (239)	52 (254)	55 (269)	57 (279)	60 (293)	63 (308)
Hollow	24 (610)	Face shell	41 (200)	44 (215)	47 (230)	49 (239)	52 (254)	55 (269)
Hollow	32 (812)	Face shell	37 (181)	40 (195)	43 (210)	45 (220)	48 (235)	51 (249)
Hollow	40 (1,016)	Face shell	35 (171)	38 (186)	40 (195)	43 (210)	46 (225)	48 (235)
Hollow	48 (1,219)	Face shell	33 (161)	36 (176)	39 (191)	41 (200)	44 (215)	47 (230)
Hollow	56 (1,422)	Face shell	32 (156)	35 (171)	38 (186)	40 (195)	43 (210)	46 (225)
Hollow	64 (1,626)	Face shell	31 (151)	34 (166)	37 (181)	39 (191)	42 (205)	45 (220)
Hollow	72 (1,829)	Face shell	31 (151)	33 (161)	36 (176)	39 (191)	41 (200)	44 (215)
Hollow	80 (2,032)	Face shell	30 (147)	33 (161)	35 (171)	38 (186)	41 (200)	44 (215)
Hollow	88 (2,235)	Face shell	30 (147)	32 (156)	35 (171)	38 (186)	40 (195)	43 (210)
Hollow	96 (2,438)	Face shell	29 (142)	32 (156)	35 (171)	37 (181)	40 (195)	43 (210)
Hollow	104 (2,642)	Face shell	29 (142)	32 (156)	34 (166)	37 (181)	40 (195)	42 (205)
Hollow	112 (2,845)	Face shell	29 (142)	31 (151)	34 (166)	37 (181)	39 (191)	42 (205)
Hollow	120 (3,048)	Face shell	28 (137)	31 (151)	34 (166)	37 (181)	39 (191)	42 (205)

Table 5—10-in. (254-mm) Single Wythe Wall Weights

Units	Vertical grout spacing, in. (mm)	Mortar bedding	Wall weight, lb/ft ² (kg/m ²) for concrete densities, lb/ft ³ (kg/m ³) of:					
			85 (1,362)	95 (1,522)	105 (1,682)	115 (1,842)	125 (2,003)	135 (2,163)
Hollow	No grout	Face shell	29 (142)	32 (156)	35 (171)	38 (186)	41 (200)	45 (220)
Hollow	No grout	Full	30 (147)	33 (161)	36 (176)	39 (191)	42 (205)	45 (220)
Solid	No grout	Full	71 (347)	78 (381)	86 (420)	93 (454)	101 (494)	108 (528)
Hollow	8 (203)	Full	93 (454)	96 (469)	100 (489)	103 (503)	106 (518)	109 (533)
Hollow	16 (406)	Face shell	61 (298)	64 (313)	68 (332)	71 (347)	74 (362)	77 (376)
Hollow	24 (610)	Face shell	50 (244)	54 (264)	57 (279)	60 (293)	63 (308)	66 (323)
Hollow	32 (812)	Face shell	45 (220)	48 (235)	51 (249)	54 (264)	58 (283)	61 (298)
Hollow	40 (1,016)	Face shell	42 (205)	45 (220)	48 (235)	51 (249)	54 (264)	58 (283)
Hollow	48 (1,219)	Face shell	40 (195)	43 (210)	46 (225)	49 (239)	52 (254)	55 (269)
Hollow	56 (1,422)	Face shell	38 (186)	41 (200)	44 (215)	48 (235)	51 (249)	54 (264)
Hollow	64 (1,626)	Face shell	37 (181)	40 (195)	43 (210)	46 (225)	50 (244)	53 (259)
Hollow	72 (1,829)	Face shell	36 (176)	39 (191)	42 (205)	46 (225)	49 (239)	52 (254)
Hollow	80 (2,032)	Face shell	35 (171)	39 (191)	42 (205)	45 (220)	48 (235)	51 (249)
Hollow	88 (2,235)	Face shell	35 (171)	38 (186)	41 (200)	44 (215)	47 (230)	50 (244)
Hollow	96 (2,438)	Face shell	34 (166)	37 (181)	41 (200)	44 (215)	47 (230)	50 (244)
Hollow	104 (2,642)	Face shell	34 (166)	37 (181)	40 (195)	43 (210)	46 (225)	50 (244)
Hollow	112 (2,845)	Face shell	34 (166)	37 (181)	40 (195)	43 (210)	46 (225)	49 (239)
Hollow	120 (3,048)	Face shell	33 (161)	36 (176)	40 (195)	43 (210)	46 (225)	49 (239)

Table 6—12-in. (305-mm) Single Wythe Wall Weights

Units	Vertical grout spacing, in. (mm)	Mortar bedding	Wall weight, lb/ft ² (kg/m ²) for concrete densities, lb/ft ³ (kg/m ³) of:					
			85 (1,362)	95 (1,522)	105 (1,682)	115 (1,842)	125 (2,003)	135 (2,163)
Hollow	No grout	Face shell	32 (156)	35 (171)	39 (191)	42 (205)	46 (225)	49 (239)
Hollow	No grout	Full	33 (161)	36 (176)	40 (195)	43 (210)	47 (230)	50 (244)
Solid	No grout	Full	86 (420)	95 (464)	104 (508)	113 (552)	122 (596)	131 (640)
Hollow	8 (203)	Full	114 (557)	118 (577)	121 (591)	125 (611)	128 (626)	132 (645)
Hollow	16 (406)	Face shell	73 (357)	77 (376)	80 (391)	84 (411)	87 (425)	90 (440)
Hollow	24 (610)	Face shell	59 (288)	63 (308)	66 (323)	70 (342)	73 (357)	77 (376)
Hollow	32 (812)	Face shell	52 (254)	56 (274)	59 (288)	63 (308)	66 (323)	70 (342)
Hollow	40 (1,016)	Face shell	48 (235)	52 (254)	55 (269)	59 (288)	62 (303)	66 (323)
Hollow	48 (1,219)	Face shell	46 (225)	49 (239)	53 (259)	56 (274)	59 (288)	63 (308)
Hollow	56 (1,422)	Face shell	44 (215)	47 (230)	51 (249)	54 (264)	57 (279)	61 (298)
Hollow	64 (1,626)	Face shell	42 (205)	46 (225)	49 (239)	53 (259)	56 (274)	59 (288)
Hollow	72 (1,829)	Face shell	41 (200)	44 (215)	48 (235)	51 (249)	55 (269)	58 (283)
Hollow	80 (2,032)	Face shell	40 (195)	44 (215)	47 (230)	50 (244)	54 (264)	57 (279)
Hollow	88 (2,235)	Face shell	39 (191)	43 (210)	46 (225)	50 (244)	53 (259)	57 (279)
Hollow	96 (2,438)	Face shell	39 (191)	42 (205)	46 (225)	49 (239)	53 (259)	56 (274)
Hollow	104 (2,642)	Face shell	38 (186)	42 (205)	45 (220)	49 (239)	52 (254)	55 (269)
Hollow	112 (2,845)	Face shell	38 (186)	41 (200)	45 (220)	48 (235)	52 (254)	55 (269)
Hollow	120 (3,048)	Face shell	37 (181)	41 (200)	44 (215)	48 (235)	51 (249)	55 (269)

Table 7—14-in. (356-mm) Single Wythe Wall Weights

Units	Vertical grout spacing, in. (mm)	Mortar bedding	Wall weight, lb/ft ² (kg/m ²) for concrete densities, lb/ft ³ (kg/m ³) of:					
			85 (1,362)	95 (1,522)	105 (1,682)	115 (1,842)	125 (2,003)	135 (2,163)
Hollow	No grout	Face shell	35 (171)	38 (186)	42 (205)	46 (225)	50 (244)	54 (264)
Hollow	No grout	Full	36 (176)	40 (195)	43 (210)	47 (230)	51 (249)	55 (269)
Solid	No grout	Full	100 (489)	111 (542)	121 (591)	132 (645)	142 (694)	153 (748)
Hollow	8 (203)	Full	135 (660)	139 (679)	143 (699)	147 (718)	150 (733)	154 (753)
Hollow	16 (406)	Face shell	85 (415)	89 (435)	93 (454)	96 (469)	100 (489)	104 (508)
Hollow	24 (610)	Face shell	68 (332)	72 (352)	76 (371)	80 (391)	83 (406)	87 (425)
Hollow	32 (812)	Face shell	60 (293)	64 (313)	67 (327)	71 (347)	75 (367)	79 (386)
Hollow	40 (1,016)	Face shell	55 (269)	59 (288)	62 (303)	66 (323)	70 (342)	74 (362)
Hollow	48 (1,219)	Face shell	51 (249)	55 (269)	59 (288)	63 (308)	67 (327)	70 (342)
Hollow	56 (1,422)	Face shell	49 (239)	53 (259)	57 (279)	60 (293)	64 (313)	68 (332)
Hollow	64 (1,626)	Face shell	47 (230)	51 (249)	55 (269)	59 (288)	62 (303)	66 (323)
Hollow	72 (1,829)	Face shell	46 (225)	50 (244)	53 (259)	57 (279)	61 (298)	65 (318)
Hollow	80 (2,032)	Face shell	45 (220)	49 (239)	52 (254)	56 (274)	60 (293)	64 (313)
Hollow	88 (2,235)	Face shell	44 (215)	48 (235)	51 (249)	55 (269)	59 (288)	63 (308)
Hollow	96 (2,438)	Face shell	43 (210)	47 (230)	51 (249)	54 (264)	58 (283)	62 (303)
Hollow	104 (2,642)	Face shell	42 (205)	46 (225)	50 (244)	54 (264)	58 (283)	61 (298)
Hollow	112 (2,845)	Face shell	42 (205)	46 (225)	49 (239)	53 (259)	57 (279)	61 (298)
Hollow	120 (3,048)	Face shell	41 (200)	45 (220)	49 (239)	53 (259)	57 (279)	60 (293)

Table 8—16-in. (406-mm) Single Wythe Wall Weights

Units	Vertical grout spacing, in. (mm)	Mortar bedding	Wall weight, lb/ft ² (kg/m ²) for concrete densities, lb/ft ³ (kg/m ³) of:					
			85 (1,362)	95 (1,522)	105 (1,682)	115 (1,842)	125 (2,003)	135 (2,163)
Hollow	No grout	Face shell	37 (181)	42 (205)	46 (225)	50 (244)	54 (264)	58 (283)
Hollow	No grout	Full	39 (191)	43 (210)	47 (230)	51 (249)	55 (269)	60 (293)
Solid	No grout	Full	115 (562)	127 (621)	139 (679)	151 (738)	163 (797)	175 (855)
Hollow	8 (203)	Full	156 (762)	160 (782)	164 (801)	168 (821)	173 (845)	177 (865)
Hollow	16 (406)	Face shell	97 (474)	101 (494)	105 (513)	109 (533)	114 (557)	118 (577)
Hollow	24 (610)	Face shell	77 (376)	81 (396)	85 (415)	90 (440)	94 (459)	98 (479)
Hollow	32 (812)	Face shell	67 (327)	71 (347)	76 (371)	80 (391)	84 (411)	88 (430)
Hollow	40 (1,016)	Face shell	61 (298)	65 (318)	70 (342)	74 (362)	78 (381)	82 (401)
Hollow	48 (1,219)	Face shell	57 (279)	61 (298)	66 (323)	70 (342)	74 (362)	78 (381)
Hollow	56 (1,422)	Face shell	54 (264)	59 (288)	63 (308)	67 (327)	71 (347)	75 (367)
Hollow	64 (1,626)	Face shell	52 (254)	56 (274)	61 (298)	65 (318)	69 (337)	73 (357)
Hollow	72 (1,829)	Face shell	51 (249)	55 (269)	59 (288)	63 (308)	67 (327)	71 (347)
Hollow	80 (2,032)	Face shell	49 (239)	54 (264)	58 (283)	62 (303)	66 (323)	70 (342)
Hollow	88 (2,235)	Face shell	48 (235)	52 (254)	57 (279)	61 (298)	65 (318)	69 (337)
Hollow	96 (2,438)	Face shell	47 (230)	52 (254)	56 (274)	60 (293)	64 (313)	68 (332)
Hollow	104 (2,642)	Face shell	47 (230)	51 (249)	55 (269)	59 (288)	63 (308)	67 (327)
Hollow	112 (2,845)	Face shell	46 (225)	50 (244)	54 (264)	58 (283)	63 (308)	67 (327)
Hollow	120 (3,048)	Face shell	45 (220)	50 (244)	54 (264)	58 (283)	62 (303)	66 (323)

REFERENCES

1. *Sound Transmission Class Ratings for Concrete Masonry Walls*, TEK 13-1B. National Concrete Masonry Association, 2007.
2. *Seismic Design Forces on Concrete Masonry Buildings*, TEK 14-12B. National Concrete Masonry Association, 2005.
3. *Heat Capacity (HC) Values for Concrete Masonry Walls*, TEK 6-16A. National Concrete Masonry Association, 2008.
4. *Density-Related Properties of Concrete Masonry Assemblies*, TEK 2-6. National Concrete Masonry Association, 2008.
5. *Fire Resistance Rating of Concrete Masonry Assemblies*, TEK 7-1B. National Concrete Masonry Association, 2008.
6. *R-Values of Multi-Wythe Concrete Masonry Walls*, TEK 6-1A. National Concrete Masonry Association, 1999.
7. *R-Values for Single Wythe Concrete Masonry Walls*, TEK 6-2A. National Concrete Masonry Association, 2005.
8. *Standard Specification for Loadbearing Concrete Masonry Units*, ASTM C 90-06. ASTM International, 2006.
9. *International Building Code*. International Code Council, 2003, 2006 and 2009.
10. *Building Code Requirements for Masonry Structures*, ACI 530/ASCE 5/TMS 402. Reported by the Masonry Standards Joint Committee, 2002, 2005 and 2008.

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