

CONCRETE MASONRY WALL WEIGHTS

TEK 14-13A

Structural (2002)

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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 13-1A, ref. 1, for further information),
- seismic base shear force, with heavier walls resulting in higher base shear values (see TEK 14-12A, ref. 2, for further information),
- heat capacity, an indication of thermal storage capacity, with heavier walls providing higher heat capacities (see TEK 6-16, ref. 3, for further information), and
- gravity loads (wall dead loads) on structural members such as lintels and foundations.

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. Examples of these properties include:

- fire resistance ratings, with lighter weight walls providing more fire resistance in general (see TEK 7-1A, ref. 4, for further information), and
- thermal resistance, with lighter weight walls providing higher R-values (see TEK 6-1A, ref. 5, for further information).

Tables 1 through 6 list concrete masonry wall weights for 4 to 12 inch (102 to 305 mm) thick single wythe walls. 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 (ref. 6),
- except as noted in Table 2, units have nominal face dimensions of 16 in. (406 mm) long by 8 in. (203 mm) high,
- 125 pcf (2,003 kg/m³) mortar
- 140 pcf (2,243 kg/m³) grout, and
- no excess mortar or grout in the wall.

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

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	30 (147)	34 (166)	37 (181)	40 (195)	44 (215)	47 (230)
Hollow	No grout	Full	31 (151)	34 (166)	38 (186)	41 (200)	44 (215)	48 (235)
Solid	No grout	Full	71 (347)	78 (381)	86 (420)	93 (454)	101 (494)	108 (528)
Hollow	8 (203)	Full	93 (454)	96 (469)	99 (484)	102 (498)	106 (518)	109 (533)
Hollow	16 (406)	Face shell	62 (303)	65 (318)	68 (332)	71 (347)	75 (367)	78 (381)
Hollow	24 (610)	Face shell	51 (249)	54 (264)	58 (283)	61 (298)	64 (313)	68 (332)
Hollow	32 (812)	Face shell	46 (225)	49 (239)	53 (259)	56 (274)	59 (288)	62 (303)
Hollow	40 (1,016)	Face shell	43 (210)	46 (225)	49 (239)	53 (259)	56 (274)	59 (288)
Hollow	48 (1,219)	Face shell	41 (200)	44 (215)	47 (230)	51 (249)	54 (264)	57 (279)
Hollow	56 (1,422)	Face shell	39 (191)	43 (210)	46 (225)	49 (239)	52 (254)	56 (274)
Hollow	64 (1,626)	Face shell	38 (186)	41 (200)	45 (220)	48 (235)	51 (249)	55 (269)
Hollow	72 (1,829)	Face shell	37 (181)	41 (200)	44 (215)	47 (230)	50 (244)	54 (264)
Hollow	80 (2,032)	Face shell	37 (181)	40 (195)	43 (210)	46 (225)	50 (244)	53 (259)
Hollow	88 (2,235)	Face shell	36 (176)	39 (191)	43 (210)	46 (225)	49 (239)	52 (254)
Hollow	96 (2,438)	Face shell	36 (176)	39 (191)	42 (205)	45 (220)	49 (239)	52 (254)
Hollow	104 (2,642)	Face shell	35 (171)	38 (186)	42 (205)	45 (220)	48 (235)	52 (254)
Hollow	112 (2,845)	Face shell	35 (171)	38 (186)	41 (200)	45 (220)	48 (235)	51 (249)
Hollow	120 (3,048)	Face shell	35 (171)	38 (186)	41 (200)	44 (215)	48 (235)	51 (249)

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	35 (171)	38 (186)	42 (205)	46 (225)	50 (244)	54 (264)
Hollow	No grout	Full	36 (176)	39 (191)	43 (210)	47 (230)	51 (249)	54 (264)
Solid	No grout	Full	86 (420)	95 (464)	104 (508)	113 (552)	122 (596)	131 (640)
Hollow	8 (203)	Full	113 (552)	116 (567)	120 (586)	124 (606)	128 (626)	132 (645)
Hollow	16 (406)	Face shell	74 (362)	78 (381)	81 (396)	85 (415)	89 (435)	93 (454)
Hollow	24 (610)	Face shell	61 (298)	65 (318)	68 (332)	72 (352)	76 (371)	80 (391)
Hollow	32 (812)	Face shell	54 (264)	58 (283)	62 (303)	66 (323)	69 (337)	73 (357)
Hollow	40 (1,016)	Face shell	50 (244)	54 (264)	58 (283)	62 (303)	65 (318)	69 (337)
Hollow	48 (1,219)	Face shell	48 (235)	52 (254)	55 (269)	59 (288)	63 (308)	67 (327)
Hollow	56 (1,422)	Face shell	46 (225)	50 (244)	53 (259)	57 (279)	61 (298)	65 (318)
Hollow	64 (1,626)	Face shell	45 (220)	48 (235)	52 (254)	56 (274)	60 (293)	63 (308)
Hollow	72 (1,829)	Face shell	43 (210)	47 (230)	51 (249)	55 (269)	59 (288)	62 (303)
Hollow	80 (2,032)	Face shell	43 (210)	46 (225)	50 (244)	54 (264)	58 (283)	61 (298)
Hollow	88 (2,235)	Face shell	42 (205)	46 (225)	49 (239)	53 (259)	57 (279)	61 (298)
Hollow	96 (2,438)	Face shell	41 (200)	45 (220)	49 (239)	53 (259)	56 (274)	60 (293)
Hollow	104 (2,642)	Face shell	41 (200)	45 (220)	48 (235)	52 (254)	56 (274)	60 (293)
Hollow	112 (2,845)	Face shell	40 (195)	44 (215)	48 (235)	52 (254)	55 (269)	59 (288)
Hollow	120 (3,048)	Face shell	40 (195)	44 (215)	47 (230)	51 (249)	55 (269)	59 (288)

REFERENCES

1. *Sound Transmission Class Ratings for Concrete Masonry Walls*, TEK 13-1A. National Concrete Masonry Association, 2000.
2. *Seismic Design Forces on Concrete Masonry Buildings*, TEK 14-12A. National Concrete Masonry Association, 1997.
3. *Heat Capacity (HC) Values for Concrete Masonry Walls*, TEK 6-16. National Concrete Masonry Association, 1989.
4. *Fire Resistance Rating of Concrete Masonry Assemblies*, TEK 7-1A. National Concrete Masonry Association, 2001.
5. *R-Values of Multi-Wythe Concrete Masonry Walls*, TEK 6-1A. National Concrete Masonry Association, 1999.
6. *Standard Specification for Loadbearing Concrete Masonry Units*, ASTM C 90-01. American Society for Testing and Materials, 2001.