Designing to Brickwork Dimensions



Technical GuideLast Updated: April 2023



The Brick Development Association

The Brick Development Association is the national authority on clay bricks and pavers.

The membership accounts for almost 99% of the bricks produced in the UK; the BDA members are commitment to manufacturing products of outstanding quality and developing one of the nation's most productive and sustainable supply chains.

The BDA Guides and Technical Guides are continually updated to take account of the latest materials, systems and products developed in the clay brick and paver sector.

We are grateful to our various team of experts, contributors, staff as well as our membership whose support, we are eternally grateful for.

Keith Aldis

Chief Executive Officer
Brick Development Association

Scope of Document

This is an initial guidance document for the general public and members of the construction profession.

Designing to brickwork dimensions can involve a number of issues, so this document is not intended to be a comprehensive guide, but rather a summary of the key issues and a signpost to further information, if required.

The BDA are committed to providing impartial and authoriative information.

We make every effort to ensure the accuracy and quality of information and guidance when it is published. However we can take no responsibility for the subsequent use of this information, nor for any errors or omissions it may contain.

UK Brick Manufacturers

(●35) Raeburn (42) Throckley • (44) Union (43) Todhills • (50) Alne • 3) Claughton (•1) Accrington (•24) Howley Park (08) Carlton 36) Ravenhead (•15) Denton (•27) Kirton (30) Wrexham 34) Parkhouse 2) Chesterton (•17) Dorket Head (31) Measham (29) Lodge Lane Charnwood 9) Eclipse (•47) Whittlesey (2) Aldridge & Atlas... (6) Blockleys (25) Brierley Hill-(45) Waresley (22) Hartleybury) Bulmer (•33) Northcot (48) Marks Teve (•23) Bellingdon 9) Cattybrook (38) Smeed Dean (20) Ewhurst ● (39) South Holmwood (46) Warnham (21) 5 (32) Michelmershe (10) Chailey (•40) (28) Laybrook (41) Swanage

Bulmer

www.bulmerbrickandtile.co.uk

Sudbury (7)

Forterra

www.forterra.co.uk

Accrington (1), Claughton Manor (13), Cradley (14), Desford (16), Howley Park (24), Kirton (27), Measham (31), Whittlesey (47), Wilnecote (49)

H.G.Matthews

www.hgmatthews.com

Bellingdon (23)

Ibstock

www.ibstockbrick.co.uk

Aldridge & Atlas (2,3), Ashdown (4), Cattybrook (9), Chailey (10), Chesterton (12), Dorket Head (17), Ellistown (18), Eclipse (19), Laybrook (28), Lodge Lane (29), Parkhouse (34), Ravenhead (36), South Holmwood (39), Swanage (41), Throckley (42), Union (44)

Ketley

www.ketley-brick.co.uk

Brierley Hill (25)

Matclad

www.matclad.co.uk

Wrecham (30)

Michelmersh

www.mbhplc.co.uk

Michelmersh (32), Blockleys (6), Charnwood (11), Carlton (8), Freshfield (21)

Northcot

www.northcotbrick.co.uk

Blockley (33)

Raeburn

www.raeburnbrick.co.uk

Blantyne (35)

Sussex Handmade Brick

www.sussexhandmadebrick.co.uk

Sussex Handmade Brick (40)

W.H Collier

www.whcollier.co.uk

Marks Tey (48)

Wienerberger

www.wienerberger.co.uk

Denton (15), Ewhurst (20), Hartlebury (22), Kingsbury (26), Sandown (37), Smeed Dean (38), Todhills (43), Waresley (45), Warnham (46)

York Handmade

www.yorkhandmade.co.uk

Alne (50)

Cover image and back cover image; York House. dMFK Architects.

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Introduction

Niall McLaughlin Architects

The successful design and construction of brickwork will require the designer to consider the material when setting out, in both plan and elevation.

Setting out to multiples of brick dimensions alleviates the implementation of cut bricks and awkward bond patterns. This will improve the aesthetics of the finished building.

Brickwork dimension tables are an aid to designers in the preparation of design and construction drawings.

This document aims to assist designers when setting out brickwork for buildings and determining the coordinating size in various applications.

The brickwork dimension tables within this document are based on a standard size UK clay brick, combined with a nominal 10mm mortar joint. Should you wish to deviate from these dimensions the same principles will apply.





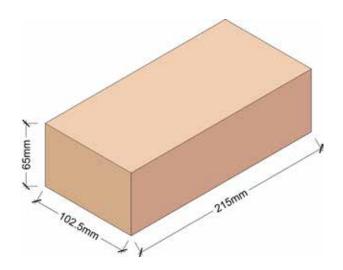


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Brick Co-ordinating Size

Versatility

The versatility of the raw clay material and manufacturing process means that it is possible to fabricate bricks to a wide range of dimensions. The brick dimensions stated by the manufacturer are known as the work size. The most widely used work size for UK clay bricks is seen in the image opposite:



Actual Size - Tolerance and Range

When specifying with brick it is important to consider the tolerance and range values declared by the manufacturer in accordance with EN771-1.

The tolerance is the difference between the stated work size and the average actual size. The tolerance will be stated as T2 (generally the smallest deviation from the stated work size), T1 or Tm (deviation in mm from the stated work size declared by the manufacturer; it may be wider or closer than the other categories).

Declared Size [mm]	T2 Lower & upper limits [mm]	T2 Tolerances [mm]	T1 Lower & upper limits [mm]	T1 Tolerances [mm]	Tm
215	211-219	±4	209-221	±6	A a de alone d bu
102.5	99-105	±3	98-106	±4	As declared by the manufacturer
65	63-67	±2	62-68	±3	

The range value covers the dimension difference within a sample, between the largest brick and the smallest. The range will be stated as R2 (generally the smallest range), R1 or Rm (range in mm declared by the manufacturer; it may be wider or closer than the other categories).

Declared Size [mm]	R2 [mm]	R1 [mm]	Rm [mm]
215	4	9	A a de alone d la
102.5	3	6	As declared by the manufacturer
65	2	5	

Both T2, T1, R2 and R1 are derived from formula set out in EN 771-1.

The primary concern is to ensure that the tolerance of the specified brick is compatible with the desired aesthetic effect i.e. If the design requires extremely crisp, regular brickwork, then a smaller range and tolerance should be considered. Adjacent components and design details must also be coordinated with the specified tolerances.

Brick Co-ordinating Size

Co-ordinating Size

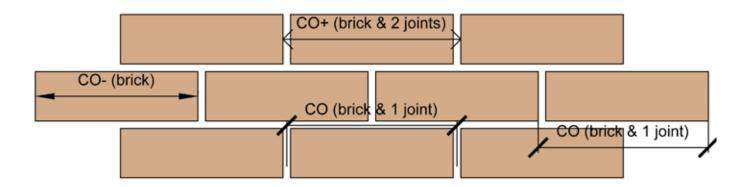
To accurately dimension brickwork an allowance also needs to be made for the mortar joints. Allowing for a standard brick work size and nominal 10mm mortar joints results in the following co-ordinating size:

225 x 112.5 x 75mm

This process should be applied to all size combinations of brick and mortar. All brickwork dimensions can be determined by one of three conditions:

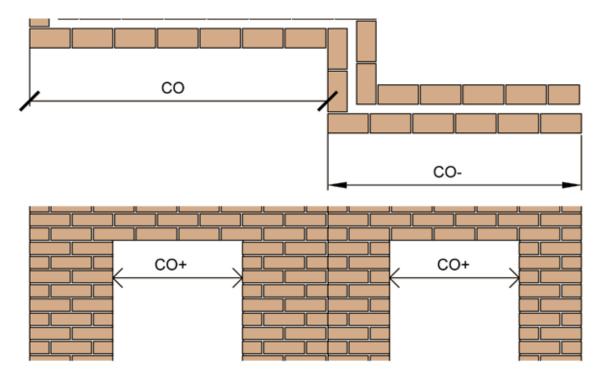
CO+ Brick + 2 joints e.g. openings in brickwork

CO Brick + 1 joint e.g. panels with opposite return ends co- Brick dimension only e.g. piers or panels between openings



Application of Co-ordinating Size

Examples of how the three conditions are applied can be seen on the following elevation and plan:



Note: refer also to the BDA guidance for the incorporation of movement joints 'Designing for movement in brickwork' August 2016.

Brick Dimensions Tables

_			
n formalism of	CO-	со	CO+
[number of bricks]	[mm]	[mm]	[mm]
0.5	102.5	112.5	122.5
1	215	225	235
1.5	327.5	337.5	347.5
2	440	450	460
2.5	552.5	562.5	572.5
3	665	675	685
3.5	777.5	787.5	797.5
4	890	900	910
4.5	1002.5	1012.5	1022.5
5	1115	1125	1135
5.5	1227.5	1237.5	1247.5
6	1340	1350	1360
6.5	1452.5	1462.5	1472.5
7	1565	1575	1585
7.5	1677.5	1687.5	1697.5
8	1790	1800	1810
8.5	1902.5	1912.5	1922.5
9	2015	2025	2035
9.5	2127.5	2137.5	2147.5
10	2240	2250	2260
10.5	2352.5	2362.5	2372.5
11	2465	2475	2485
11.5	2577.5	2587.5	2597.5
12	2690	2700	2710
12.5	2802.5	2812.5	2822.5
13	2915	2925	2935
13.5	3027.5	3037.5	3047.5
14	3140	3150	3160
14.5	3252.5	3262.5	3272.5
15	3365	3375	3385
15.5	3477.5	3487.5	3497.5
16	3590	3600	3610
16.5	3702.5	3712.5	
17	3815	3825	3835
17.5	3927.5	3937.5	3947.5
18	4040	4050	4060
18.5	4152.5	4162.5	4172.5
19	4265	4275	4285
19.5	4377.5	4387.5	4397.5
20	4490	4500	4510

n Inumber of	CO-	со	CO+
	[mm]	[mm]	[mm]
bricks]	4602.5	4612.5	4622.5
20.5	4602.5	4612.5	4622.5
21	4715	4725	4735
21.5	4827.5	4837.5	4847.5
22	4940	4950	4960
22.5	5052.5	5062.5	5072.5
23	5165	5175	5185
23.5	5277.5	5287.5	5297.5
24	5390	5400	5410
24.5	5502.5	5512.5	5522.5
25	5615	5625	5635
25.5	5727.5	5737.5	5747.5
26	5840	5850	5860
26.5	5952.5	5962.5	5972.5
27	6065	6075	6085
27.5	6177.5	6187.5	6197.5
28	6290	6300	6310
28.5	6402.5	6412.5	6422.5
29	6515	6525	6535
29.5	6627.5	6637.5	6647.5
30	6740	6750	6760
30.5	6852.5	6862.5	6872.5
31	6965	6975	6985
31.5	7077.5	7087.5	7097.5
32	7190	7200	7210
32.5	7302.5	7312.5	7322.5
33	7415	7425	7435
33.5	7527.5	7537.5	7547.5
34	7640	7650	7660
34.5	7752.5	7762.5	7772.5
35	7865	7875	7885
35.5	7977.5	7987.5	7997.5
36	8090	8100	8110
36.5	8202.5	8212.5	8222.5
37	8315	8325	8335
37.5	8427.5	8437.5	8447.5
38	8540	8550	8560
38.5	8652.5	8662.5	8672.5
39	8765	8775	8785
39.5	8877.5	8887.5	8897.5
40	8990	9000	9010

Brick Dimensions Tables

_			
n Inhar of	CO-	со	CO+
[number of bricks]	[mm]	[mm]	[mm]
40.5	9102.5	9112.5	9122.5
41	9215	9225	9235
41.5	9327.5	9337.5	9347.5
42	9440	9450	9460
42.5	9552.5	9562.5	9572.5
43	9665	9675	9685
43.5	9777.5	9787.5	9797.5
44	9890	9900	9910
44.5	10002.5	10012.5	10022.5
45	10115	10125	10135
45.5	10227.5	10237.5	10247.5
46	10340	10350	10360
46.5	10452.5	10462.5	10472.5
47	10565	10575	10585
47.5	10677.5	10687.5	10697.5
48	10790	10800	10810
48.5	10902.5	10912.5	10922.5
49	11015	11025	11035
49.5	11127.5	11137.5	11147.5
50	11240	11250	11260
50.5	11352.5	11362.5	11372.5
51	11465	11475	11485
51.5	11577.5	11587.5	11597.5
52	11690	11700	11710
52.5	11802.5	11812.5	11822.5
53	11915	11925	11935
53.5	12027.5	12037.5	12047.5
54	12140	12150	12160
54.5	12252.5	12262.5	12272.5
55	12365	12375	12385
55.5	12477.5	12487.5	12497.5
56	12590	12600	12610
56.5	12702.5	12712.5	12722.5
57	12815	12825	12835
57.5	12927.5	12937.5	12947.5
58	13040	13050	13060
58.5	13152.5	13162.5	13172.5
59	13265	13275	13285
59.5	13377.5	13387.5	13397.5
60	13490	13500	13510

n	CO-	со	CO+
[number of	[mm]	[mm]	[mm]
bricks]	42502.5	42542.5	42522.5
60.5	13602.5	13612.5	13622.5
61	13715	13725	13735
61.5	13827.5	13837.5	13847.5
62	13940	13950	13960
62.5	14052.5	14062.5	14072.5
63	14165	14175	14185
63.5	14277.5	14287.5	14297.5
64	14390	14400	14410
64.5	14502.5	14512.5	14522.5
65	14615	14625	14635
65.5	14727.5	14737.5	14747.5
66	14840	14850	14860
66.5	14952.5	14962.5	14972.5
67	15065	15075	15085
67.5	15177.5	15187.5	15197.5
68	15290	15300	15310
68.5	15402.5	15412.5	15422.5
69	15515	15525	15535
69.5	15627.5	15637.5	15647.5
70	15740	15750	15760
70.5	15852.5	15862.5	15872.5
71	15965	15975	15985
71.5	16077.5	16087.5	16097.5
72	16190	16200	16210
72.5	16302.5	16312.5	16322.5
73	16415	16425	16435
73.5	16527.5	16537.5	16547.5
74	16640	16650	16660
74.5	16752.5	16762.5	16772.5
75	16865	16875	16885
75.5	16977.5	16987.5	16997.5
76	17090	17100	17110
76.5	17202.5	17212.5	17222.5
77	17315	17325	17335
77.5	17427.5	17437.5	17447.5
78	17540	17550	17560
78.5	17652.5	17662.5	17672.5
79	17765	17775	17785
79.5	17877.5	17887.5	17897.5
80	17990	18000	18010

Brick Dimensions Tables

n	CO-	со	CO+
[number of	[mm]	[mm]	[mm]
bricks]			
1	65	75	85
2	140	150	160
3	215	225	235
4	290	300	310
5	365	375	385
6	440	450	460
7	515	525	535
9	590 665	600	610
10	740	675 750	685 760
11	815	825	835
12	890	900	910
13	965	975	985
14	1040	1050	1060
15	1115	1125	1135
16	1190	1200	1210
17	1265	1275	1285
18	1340	1350	1360
19	1415	1425	1435
20	1490	1500	1510
21	1565	1575	1585
22	1640	1650	1660
23	1715	1725	1735
24	1790	1800	1810
25	1865	1875	1885
26	1940	1950	1960
27	2015	2025	2035
28	2090	2100	2110
29	2165	2175	2185
30	2240	2250	2260
31	2315	2325	2335
32	2390	2400	2410
33	2465	2475	2485
34	2540	2550	2560
35	2615	2625	2635
36	2690	2700	2710
37	2765	2775	2785
38	2840	2850	2860
39 40	2915 2990	2925	2935 3010
		3000	
41	3065 3140	3075 3150	3085 3160
43	3140	3225	3235
44	3213	3300	3310
45	3365	3375	3385
46	3440	3450	3460
47	3515	3525	3535
48	3590	3600	3610
49	3665	3675	3685
50	3740	3750	3760
51	3815	3825	3835
52	3890	3900	3910
53	3965	3975	3985
54	4040	4050	4060
55	4115	4125	4135
56	4190	4200	4210
57	4265	4275	4285
58	4340	4350	4360
59	4415	4425	4435
60	4490	4500	4510

n	co-	со	CO+
[number of	[mm]	[mm]	[mm]
bricks]	()	firming	[iiiiii]
61	4565	4575	4585
62	4640	4650	4660
63	4715	4725	4735
64	4790	4800	4810
65	4865	4875	4885
66	4940	4950	4960
67	5015	5025	5035
68	5090	5100	5110
69	5165	5175	5185
70	5240	5250	5260
71	5315	5325	5335
72	5390	5400	5410
73	5465	5475	5485
74	5540	5550	5560
75	5615	5625	5635
76	5690	5700	5710
77	5765	5775	5785
78	5840	5850	5860
79	5915	5925	5935
80	5990	6000	6010
81	6065	6075	6085
82	6140	6150	6160
83	6215	6225	6235
84	6290	6300	6310
85	6365	6375	6385
86	6440	6450	6460
87	6515	6525	6535
88	6590	6600	6610
89	6665	6675	6685
90	6740	6750	6760
91	6815	6825	6835
92	6890	6900	6910
93	6965	6975	6985
94	7040	7050	7060
95	7115	7125	7135
96	7190	7200	7210
97	7265	7275	7285
98	7340	7350	7360
99	7415	7425	7435
100	7490	7500	7510
101	7565	7575	7585
102	7640	7650	7660
103	7715	7725	7735
104	7790	7800	7810
105	7865	7875	7885
106	7940	7950	7960
107	8015	8025	8035
108	8090	8100	8110
109	8165	8175	8185
110	8240	8250	8260
111	8315	8325	8335
112	8390	8400	8410
113	8465	8475	8485
114	8540	8550	8560
115	8615	8625	8635
116	8690	8700	8710
117	8765	8775	8785
118	8840	8850	8860
119	8915	8925	8935
120	8990	9000	9010

References and Further Reading

EN 771-1, Specification for masonry units Part 1: Clay masonry units

BS 4729, Clay and calcium silicate bricks of special shapes and sizes - Recommendations

BS 8000-3, Workmanship on building sites - Part 3: Code of practice for masonry

BS EN 998-2, Specification for mortar for masonry - Part 2: Masonry mortar

BS EN 1990, Eurocode - Basis of structural design

BS EN 1996-1-1, Eurocode 6 - Design of masonry structures - Part 1-1: General rules for reinforced and unreinforced masonry structures

BS EN 1996-1-2, Eurocode 6 - Design of masonry structures. General rules. Structural fire design

BS EN 1996-2, Eurocode 6 - Design of masonry structures - Part 2: Design considerations, selection of materials and execution of masonry

BS EN 1996-3, Eurocode 6 – Design of masonry structures. Simplified calculation methods for unreinforced masonry structures

PD 6697, Recommendations for the design of masonry structures to BS EN 1996-1-1 and BS EN 1996-2

BS 8103-2, Structural design of low-rise buildings – Part 2: Code of practice for masonry walls for housing

Brick Development Products & Services

Brick Awards

The Brick Awards celebrate the best examples of clay brick in our built environment. Each year the awards attract over 350 entries from leading architects, housebuilders, developers and contractors; accross 17 hotly contested categories. It is FREE and simple to enter on our web site: www.brick.org.uk

Technical Publications

The BDA provides a range of technical publications and guides; which are freely available to Architects, Developers, Builders and General public on our web site: www.brick.org.uk

The Fourth Eddition of 'Guide to Successful Brickwork' is available at all good book shops.

Brick Works Events

The BDA regularly runs courses and seminars for all those professionals involved with the design and construction of brick buildings. Please contact George Spreckley our Events & PR Manager on email: georgespreckley@brick.org.uk

Brick Bulletin

This widely acclaimed e-magazine features the latest developments in brick design and is recognised world wide as the foremost journal of contemporary brickwork. It is available free through the 'Brick Bulletin' tab our website: www.brick.org.uk.

Brickmakers Quality Charter

Clay brick makes a significant contribution to the UK's safe, healthy and sustainable built environment. The Brickmakers Quality Charter scheme promotes the responsible sourcing of clay brick, through credentialling and the flexibility businesses seek from an established and audited supply chain.

Training and Education

The BDA offers lectures and other educational services for Architects, Engineers, Developers as well as support for students and public interested in creating successful brickwork. We also provide technical input to events for practicing architects, engineers and organisations involved in continuing professional development.

Research and Testing

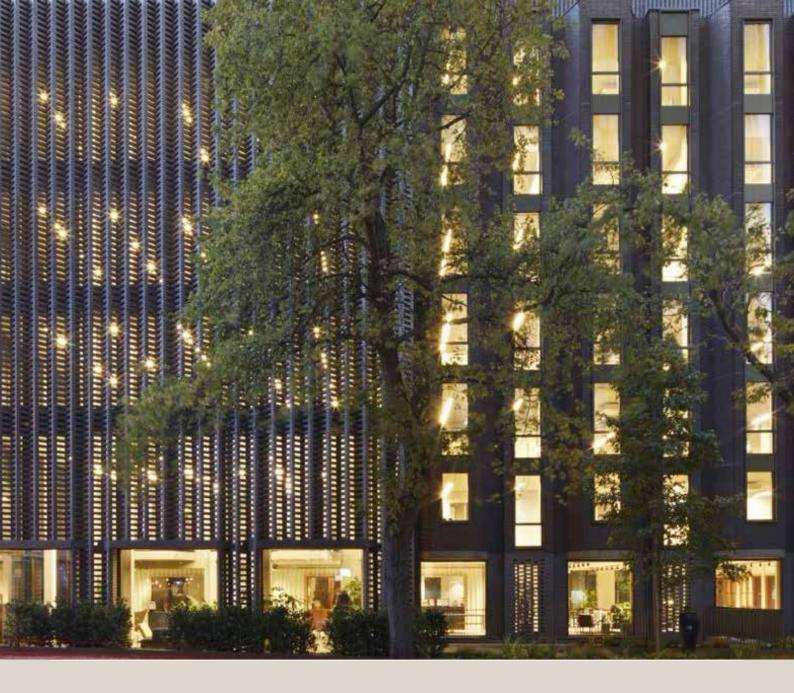
The BDA identifies specific areas where independent research and testing programmes are required to further the confident use of clay brick and to ensure quality.

Statistical and Marketing Information

The Brick Development Association is an independent body committed to providing authoriative information about the use of clay brick in construction.

We collate statistical information on brick production, UK deliveries, and related supply for imported products together with volume information including testing, research and development.

We provide free technical support on the use of clay brick, and encourage best practice in the use of brick in the built enviornment.



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