BEKAERT

better together

Brickforce® Engineers guide and load tables

Brickforce INSIDE

Innovative solutions for the construction industry

Table of Contents

Your hidden strength

Brickforce® has been in continuous use since 1918. Wall panels were designed to cope with lateral wind load and, by spanning between stanchion bases, eliminated the need for wall footings.

Furthermore, in 1972 when an additional factory extension was built, Brickforce® was used in the walls for wind loading and to extend the centres of movement joints. Several of these panels were 45 metres in length but there were no signs of cracking from thermal effects.

With the development of BS Codes of Practice and the Masonry Eurocode, the range of Brickforce® introduced in 1995 allows the designer more flexibility and the bricklayer an easier product to handle and position.

This is achieved by using a range of different flattened wire sizes with an integral cross wire. As the cross wires are in the same plane as the main wires, Brickforce® is only between 2.75 mm and 3 mm thick overall, achieving maximum cover for bond and ease of handling and placing. Furthermore, to ensure the correct product is used, every strip of Brickforce® is marked by ink jetting, with the product name and size code, plus a production traceability code, for QA purposes.

This guide has been produced to help Engineers appreciate the advantages of using structural bed joint reinforcement together with the necessary information for designs to be undertaken. If further assistance is required, our technical team will be pleased to help with either telephone enquiries or design requests.

Technical assistance available

✔ Free design service for: panels, lintels, beams
✔ Telephone enquiry service
✔ Office/site liaison with engineering staff
✔ Details and take-offs

We also offer a CPD seminar presentation on the design and use of bed joint reinforcement. This is available at lunchtimes or evenings and would suit Engineers, Architects, Clerks of Works and Colleges.

🗏 BEKAERT

The Brickforce® range

This range of sizes has been developed to help the Design Engineer produce an efficient, cost effective, reinforced masonry design utilising a product format which was originally used in 1918.

Structural Brickforce® is manufactured in 5 diameters, starting with 3.00 mm to match the Code of Practice minimum. With this range of sizes it is possible to get closer to the optimum solution, thus reducing material costs.

This flexibility gives the Design Engineer the ability to save on other materials. For example, wind posts can be designed out, top rails removed in laterally loaded panels and minimum wall widths maintained. Masonry lintels and beams can also be achieved with the use of Brickforce®.

To assist site installation, the main wires are flattened to between 2.75 and 3.00 mm with the cross wires in the same plane. This ensures lapping and crossing at intersections can be achieved within the code requirements for material thickness of 6 mm maximum build up of steel in a 10 mm bed-joint.

Important notes

1. Brickforce® is now produced with a characteristic tensile strength of 500 N/mm².

2. The equivalent diameter of the wire is given to enable the cross sectional area to be calculated and is a minimum. The flattening process lengthens the wire and therefore reduces the cross sectional area. To compensate for this reduction, Bekaert uses a larger diameter wire initially, to ensure that after flattening the minimum equivalent diameter is as stated. An Engineer can design with confidence, knowing our Factory Quality Control Management System (QMS) has received BS EN IS09001:2000 recognition.

Diameter reference	Minimum equivalent diameter (mm)	Minimum cross sectional area (mm2)	Approx depth across flats (mm)
BF30	3.00	7.07	2.75
BF35	3.58	10.06	2.75
BF40	4.00	12.56	2.75
BF45	4.50	15.91	2.75
BF50	5.00	19.64	3.00

Available in various widths

Raw material

Testing

Welding process

Manufacturing

Despatch

BEKAERT

3

The Brickforce® range

Brick/block wall width	100 mm	140 mm	150 mm	190 mm	215 mm
Brickforce® width	60 mm	100 mm	100 mm	150 mm	175 mm

The table above shows the most common widths of Brickforce®. These are carried in stock in both stainless steel and galvanised steel finishes and for all diameters. Other sizes are available and are made to order.

Product reference

As Brickforce® is available in stainless steel and galvanised steel wire for each diameter and for various widths, each type of Brickforce® has its own unique reference.

For example:
- The diameter reference BF35 is preceded by the finish type (S = stainless steel, G = galvanised steel) and followed by the product width.

- Therefore, SBF35W60 is stainless steel Brickforce® with main wires of 3.58 equivalent diameter and a width of 60 mm. (For 100 mm wide brick/block).

✔ Stainless steel, grade 304S15 (R3 - 1.4301) for external walls.
✔ Galvanised finish to BS443 (265 g/m2) (R13 BS EN 10244 with a coating to BS EN 10020)
✔ Length of strip = 2,700 mm.
✔ Lap length = 225 mm.
✔ Corners, T-sections, radius and other shapes are available.

The Royal Opera House, Covent Garden, London©

Twickenham Stadium, Twickenham, London©

Benefits

✔ The Design Engineer can select a suitable wire diameter for the most economic design.

✔ Reduction of windposts.

✔ Top rails may be omitted.

✔ Centres of movement joints increased.

✔ Span greater distances between supports.

✔ Avoid increasing the thickness of a wall.

BEKAERT

Design notes

All structural bed joint reinforcement is covered by BS5628 Part 2, and or EN845-3, the Code of Practice for the structural use of reinforced and pre-stressed masonry. The main points of this code in relation to bed joint reinforcement are listed ....

1. For laterally loaded panels a minimum cross sectional area of reinforcement at 14 mm2 is required, placed at vertical intervals not exceeding 450 mm. Furthermore, the partial safety factor for the compressive strength of masonry should be taken from clause 27 of BS5628 Part 1.

2. An increase in the limiting dimension is permissible to 60 x the effective thickness and a corresponding increase in panel area is available depending on the support conditions.

3. Various design methods are acceptable, the more popular for lateral load resistance is A5 method three: Design using modified orthogonal ratio. A typical panel design using this method is shown on pages 19 and 20.

4. Durability and material finish are covered in Table 14 of BS5628 Part 2. Galvanised material, unless coated to a minimum weight of 940 g/m2 is only for use in internal walls as the required 940 g/m2 galvanising on small diameter wires is impossible to achieve consistently. For external walls, including the inner leaf of a cavity wall, only austenitic stainless steel is used in line with EN 845-3.

5. To allow bond to develop between reinforcement and mortar a maximum depth of steel of 6 mm is given, thus allowing 2 mm cover top and bottom.

Brickforce®

Important notes

The maximum depth of reinforcement becomes critical at laps, corners, intersections and wall tie positions - hence Bekaert's preference for flattened wires. This flattened profile, together with the integral cross wires, enables larger diameters of wire to be used without an increase in the overall steel thickness, therefore, reinforcement continuity can be maintained. By using welded corner units and T-sections etc., within the maximum steel depth of 6 mm the bricklayer has no problems with layer build up, and the bed joint thickness remains as designed.
Also, by using a larger diameter at 450 mm centres instead of a smaller one at 225 mm centres, minimum quantities of reinforcement are used, construction is faster and wall ties can be easily positioned in the intermediate bed joints.

6. The minimum cover stipulated in BS5628 Part 2 is 15 mm, but it is usual when designing to use 20 mm. This will allow for either raked joints or give the bricklayer 5 mm tolerance when laying the reinforcement.

7. The tables for 215 mm wide block assume the use of collar jointed wall construction in accordance with BS5628 Part 1. The reinforcement used in Bekaert Bricktie, is made from the same range of wire diameters as Brickforce®, but has 20 mm x 3 mm cross pieces, enabling the wall to be designed as a single leaf.

Bricktie

Ⓑ BEKAERT

Load tables for reinforcement of laterally loaded masonry panels

To demonstrate the flexibility of our Brickforce® range, a set of tables has been developed showing the ultimate lateral load capacities for various panel sizes using different diameters of Brickforce® wires.

These tables should also prove invaluable during initial overall design as a guide to the selection of panel lengths, superstructure layout, quantities etc., before final design is required. Assistance with these tables, or panels with openings is available by contacting our technical team.

Notes on design tables

1. The load tables give the ultimate load capacity (in kN/M2) of various unreinforced and reinforced wall panels under uniform lateral loading.

2. Partial safety factors adopted: $\gamma_m = 3.0$, $\gamma_{mm} = 2.3$, $\gamma_{ms} = 1.15$.

3. These tables have been prepared in accordance with BS5628 Part 2 using the A5 method 3. Characteristic tensile strength of steel = 500 N/mm2.

4. Precompression due to self weight of the wall panel has been taken into consideration.
Block Density = 6.5 kN/m3.
Brick Wall Density = 20 kN/m3. Mortar Designation = (iii).

5. Block strength and brick "water absorption" are specified in tables.

6. Bricks to have minimum compressive strength of 15 kN/m2.

7. For Brickforce® coding details e.g. BF30, BF35, see page 3.

8. Brickforce® reference selected must be prefixed by either 'S' for stainless steel (external walls) or 'G' for galvanised steel (internal walls). E.g. SBF4OW60 is stainless Brickforce® 4 mm diameter with a width of 60 mm.

Use of tables

1. **Check limiting dimensions of panel.** This table also demonstrates how a block width can be maintained by reinforcing with Brickforce® rather than increasing the block thickness (e.g. 6,000 unreinforced = 140 block: 6,000 reinforced = 100 block with Brickforce®).

2. **Check limiting area of panel.** This table shows increases in area available by using Brickforce®, as indicated in the Code of Practice BS5628 Part 2. If designing a single leaf wall, the burgundy figures in the panel capacity tables show panel sizes complying with the code requirements. The blue figures are for use when considering the leaf to be part of a cavity wall and the limiting area should be checked from the table.

3. **Cavity walls.** Look up relevant wall types and thickness as below and add together to give ultimate panel capacity:
a) Unreinforced 102, brick outer leaf page 8, and reinforced inner leaf pages 9 to 16.
b) Both leaves reinforced pages 9 to 16.

4. **Single Leaf walls.** Use tables on pages 9 to 16.

5. Where the enhancement of lateral load capacity of a panel is greater than 50% it is advisable to check serviceability and deflection.

6. For any wall type not included in these tables please contact our Technical Department.

7. **Product Coding.** The product code is a build up of:
a) The finish.
b) Type of product BF = Brickforce®.
c) Wire diameter.
d) Overall width of product e.g.
SBF45W150 Stainless Brickforce® 4.5 mm diameter, 150 mm wide.
GBF40W100 Galvanised Brickforce® 4.00 mm diameter, 100 mm wide.

Product Code

Limiting dimensions and areas

	Unreinforced 50 x eff. thickness	Reinforced 60 x eff. thickness
Single leaf wall		
102 brick	5,100 mm	6,120 mm
100 block	5,000 mm	6,000 mm
140 block	7,000 mm	8,400 mm
215 block	10,750 mm	12,900 mm
Cavity wall		
102/100	6,733 mm	8,080 mm
102/140	8,066 mm	9,680 mm
102/215	10,566 mm	12,680 mm
100/100	6,667 mm	8,000 mm
100/140	8,000 mm	9,600 mm
100/215	10,750 mm	12,900 mm
140/140	9,333 mm	11,200 mm

	Effective thickness (mm)	unreinforced m²	reinforced m²	unreinforced m²	reinforced m²	unreinforced m²	reinforced m²	unreinforced m²	reinforced m²
Single leaf wall									
102 brick	102	15.61	18.73	14.05	16.65	23.41	28.09	21.07	24.97
100 block	100	15.00	18.00	13.50	16.00	22.50	27.00	20.25	24.00
140 block	140	29.40	35.28	26.46	31.36	44.10	52.92	39.69	47.04
215 block	215	69.34	83.20	62.40	73.96	104.01	124.81	93.61	110.94
Cavity wall		Note: The figures below assume a cavity width of less than 100 mm.							
102/100	134.67	27.20	32.64	24.48	29.02	40.81	48.97	36.73	43.53
102/140	161.33	39.04	46.85	35.14	41.64	58.56	70.27	52.71	62.47
102/215	211.33	66.99	80.39	60.29	71.46	100.49	120.58	90.44	107.18
100/100	133.33	26.67	32.00	24.00	28.44	40.00	48.00	36.00	42.66
100/140	160.00	38.40	46.08	34.56	40.96	57.60	69.12	51.84	61.44
100/215	210.00	66.15	79.38	59.53	70.56	99.22	119.07	89.30	105.84
140/140	186.67	52.27	62.72	47.04	55.75	78.40	94.08	70.56	83.63

◙ BEKAERT

102 Brick work - unreinforced
Water absorption = 7-12%

Panel size		Mortar designation (iii)							
L (m)	H (m)	A	C	E	F	G	H	K	L
5.0	3.0	0.39	0.65	0.69	0.84	0.99	1.19	0.52	0.66
5.0	3.5	0.36	0.61	0.60	0.73	0.88	1.04	0.43	0.55
5.0	4.0	0.33	0.58	0.53	0.66	0.80	0.94	0.37	0.47
5.0	4.5	0.32	0.56	0.49	0.62	0.75	0.86	0.33	0.42
5.0	5.0	0.31	0.54	0.45	0.58	0.71	0.80	0.30	0.38
5.0	5.5	0.30	0.53	0.42	0.55	0.68	0.76	0.27	0.34
5.0	6.0	0.29	0.52	0.40	0.52	0.66	0.73	0.25	0.31
5.5	3.0	0.34	0.55	0.64	0.76	0.89	1.07	0.49	0.63
5.5	3.5	0.31	0.52	0.55	0.66	0.79	0.94	0.41	0.52
5.5	4.0	0.29	0.49	0.48	0.59	0.71	0.84	0.35	0.44
5.5	4.5	0.28	0.47	0.44	0.55	0.66	0.77	0.31	0.39
5.5	5.0	0.26	0.46	0.40	0.51	0.62	0.71	0.28	0.35
5.5	5.5	0.25	0.45	0.37	0.48	0.59	0.66	0.25	0.32
5.5	6.0	0.25	0.44	0.36	0.46	0.57	0.64	0.23	0.29
6.0	3.0	0.30	0.48	0.59	0.69	0.80	0.98	0.46	0.60
6.0	3.5	0.28	0.46	0.50	0.61	0.71	0.86	0.38	0.49
6.0	4.0	0.26	0.43	0.44	0.54	0.64	0.77	0.33	0.42
6.0	4.5	0.24	0.41	0.40	0.49	0.58	0.70	0.29	0.36
6.0	5.0	0.23	0.40	0.37	0.46	0.55	0.65	0.26	0.32
6.0	5.5	0.22	0.39	0.34	0.43	0.52	0.60	0.23	0.29
6.0	6.0	0.22	0.38	0.32	0.41	0.50	0.56	0.21	0.27
6.5	3.0	0.27	0.44	0.55	0.64	0.75	0.92	0.44	0.57
6.5	3.5	0.25	0.40	0.47	0.56	0.65	0.79	0.36	0.47
6.5	4.0	0.23	0.38	0.41	0.50	0.59	0.71	0.31	0.40
6.5	4.5	0.22	0.36	0.37	0.45	0.53	0.64	0.27	0.34
6.5	5.0	0.20	0.35	0.34	0.41	0.50	0.59	0.24	0.31
6.5	5.5	0.20	0.34	0.31	0.39	0.47	0.55	0.22	0.28
6.5	6.0	0.19	0.33	0.29	0.37	0.45	0.51	0.20	0.25
7.0	3.0	0.25	0.40	0.52	0.60	0.70	0.86	0.42	0.55
7.0	3.5	0.22	0.36	0.44	0.52	0.60	0.73	0.35	0.45
7.0	4.0	0.21	0.34	0.39	0.46	0.54	0.65	0.30	0.38
7.0	4.5	0.20	0.33	0.35	0.42	0.49	0.59	0.26	0.33
7.0	5.0	0.18	0.31	0.31	0.38	0.45	0.54	0.23	0.29
7.0	5.5	0.18	0.30	0.29	0.35	0.43	0.50	0.21	0.26
7.0	6.0	0.17	0.29	0.27	0.34	0.41	0.47	0.19	0.24
7.5	3.0	0.23	0.36	0.50	0.57	0.66	0.82	0.41	0.53
7.5	3.5	0.20	0.33	0.42	0.49	0.56	0.69	0.33	0.43
7.5	4.0	0.19	0.31	0.36	0.43	0.50	0.61	0.28	0.36
7.5	4.5	0.18	0.29	0.32	0.39	0.46	0.55	0.25	0.31
7.5	5.0	0.17	0.28	0.29	0.35	0.42	0.51	0.22	0.28
7.5	5.5	0.16	0.27	0.27	0.33	0.39	0.47	0.20	0.25
7.5	6.0	0.15	0.26	0.25	0.31	0.37	0.43	0.18	0.23
8.0	3.0	0.21	0.33	0.47	0.54	0.63	0.78	0.39	0.52
8.0	3.5	0.19	0.30	0.40	0.46	0.53	0.66	0.32	0.42
8.0	4.0	0.17	0.28	0.34	0.40	0.46	0.57	0.27	0.35
8.0	4.5	0.16	0.27	0.31	0.36	0.42	0.52	0.24	0.30
8.0	5.0	0.15	0.25	0.28	0.33	0.39	0.47	0.21	0.27
8.0	5.5	0.15	0.24	0.25	0.31	0.36	0.44	0.19	0.24
8.0	6.0	0.14	0.23	0.23	0.28	0.34	0.40	0.17	0.22

102 Brick work - unreinforced
Water absorption >12%

Panel size		Mortar designation (iii)							
L (m)	H (m)	A	C	E	F	G	H	K	L
5.0	3.0	0.32	0.52	0.56	0.68	0.80	0.96	0.42	0.53
5.0	3.5	0.29	0.49	0.48	0.59	0.71	0.84	0.35	0.44
5.0	4.0	0.27	0.47	0.43	0.54	0.65	0.76	0.30	0.38
5.0	4.5	0.26	0.46	0.40	0.50	0.61	0.71	0.27	0.34
5.0	5.0	0.25	0.44	0.37	0.47	0.58	0.65	0.25	0.31
5.0	5.5	0.24	0.43	0.35	0.45	0.56	0.63	0.22	0.28
5.0	6.0	0.24	0.42	0.33	0.43	0.54	0.60	0.21	0.26
5.5	3.0	0.28	0.45	0.51	0.61	0.72	0.87	0.39	0.50
5.5	3.5	0.26	0.43	0.44	0.54	0.64	0.76	0.33	0.42
5.5	4.0	0.24	0.40	0.39	0.48	0.58	0.68	0.28	0.36
5.5	4.5	0.23	0.39	0.36	0.45	0.54	0.63	0.25	0.32
5.5	5.0	0.22	0.38	0.33	0.42	0.51	0.59	0.23	0.29
5.5	5.5	0.21	0.37	0.31	0.39	0.48	0.54	0.21	0.26
5.5	6.0	0.20	0.36	0.29	0.38	0.47	0.52	0.19	0.24
6.0	3.0	0.24	0.39	0.47	0.56	0.65	0.79	0.37	0.48
6.0	3.5	0.23	0.37	0.41	0.49	0.58	0.70	0.31	0.39
6.0	4.0	0.21	0.35	0.36	0.44	0.52	0.63	0.27	0.34
6.0	4.5	0.20	0.33	0.32	0.40	0.48	0.57	0.23	0.30
6.0	5.0	0.19	0.33	0.30	0.38	0.45	0.53	0.21	0.27
6.0	5.5	0.18	0.32	0.28	0.35	0.43	0.49	0.19	0.24
6.0	6.0	0.18	0.31	0.26	0.33	0.41	0.46	0.18	0.22
6.5	3.0	0.22	0.35	0.44	0.52	0.60	0.74	0.35	0.46
6.5	3.5	0.20	0.33	0.38	0.45	0.53	0.64	0.29	0.38
6.5	4.0	0.19	0.31	0.34	0.40	0.48	0.58	0.25	0.32
6.5	4.5	0.18	0.30	0.30	0.37	0.44	0.52	0.22	0.28
6.5	5.0	0.17	0.28	0.28	0.34	0.41	0.48	0.20	0.25
6.5	5.5	0.16	0.28	0.26	0.32	0.39	0.45	0.18	0.23
6.5	6.0	0.16	0.27	0.24	0.30	0.37	0.42	0.17	0.21
7.0	3.0	0.20	0.32	0.42	0.49	0.57	0.70	0.34	0.44
7.0	3.5	0.18	0.29	0.36	0.42	0.48	0.59	0.28	0.36
7.0	4.0	0.17	0.28	0.31	0.38	0.44	0.53	0.24	0.31
7.0	4.5	0.16	0.27	0.28	0.34	0.40	0.49	0.21	0.27
7.0	5.0	0.15	0.25	0.26	0.31	0.37	0.45	0.19	0.24
7.0	5.5	0.14	0.25	0.24	0.29	0.35	0.41	0.17	0.21
7.0	6.0	0.14	0.24	0.22	0.28	0.33	0.39	0.16	0.20
7.5	3.0	0.18	0.29	0.40	0.46	0.54	0.66	0.33	0.43
7.5	3.5	0.17	0.27	0.34	0.39	0.46	0.56	0.27	0.35
7.5	4.0	0.15	0.25	0.30	0.35	0.41	0.50	0.23	0.30
7.5	4.5	0.15	0.24	0.27	0.32	0.37	0.45	0.20	0.26
7.5	5.0	0.14	0.23	0.24	0.29	0.34	0.42	0.18	0.23
7.5	5.5	0.13	0.22	0.22	0.27	0.32	0.38	0.16	0.20
7.5	6.0	0.13	0.21	0.21	0.25	0.30	0.36	0.15	0.19
8.0	3.0	0.17	0.27	0.38	0.44	0.51	0.63	0.32	0.41
8.0	3.5	0.15	0.25	0.32	0.37	0.43	0.53	0.26	0.34
8.0	4.0	0.14	0.23	0.28	0.33	0.38	0.46	0.22	0.29
8.0	4.5	0.13	0.22	0.25	0.30	0.35	0.42	0.19	0.25
8.0	5.0	0.13	0.21	0.23	0.27	0.32	0.39	0.17	0.22
8.0	5.5	0.12	0.20	0.21	0.25	0.30	0.36	0.15	0.20
8.0	6.0	0.11	0.19	0.19	0.23	0.28	0.33	0.14	0.18

102 Brick — Water absorption = 7-12% — Brickforce reinforcement at 450 centres					Design case — Panel size		100 Block — Compressive strength = 3.5 N/mm² — Brickforce reinforcement at 450 centres					140 Block — Compressive strength = 3.5 N/mm² — Brickforce reinforcement at 450 centres					215 collar jointed wall (see notes) — Compressive strength = 3.5 N/mm² — Bricktie reinforcement at 450 centres				
BF 30 W 60	BF 35 W 60	BF 40 W 60	BF 45 W 60	BF 50 W 60	L (m)	H (m)	BF 30 W 60	BF 35 W 60	BF 40 W 60	BF 45 W 60	BF 50 W 60	BF 30 W 100	BF 35 W 100	BF 40 W 100	BF 45 W 100	BF 50 W 100	CF 30 W 175	CF 35 W 175	CF 40 W 175	CF 45 W 175	CF 50 W 175
0.33	0.43	0.50	0.60	0.70	5.0	3.0	0.28	0.36	0.43	0.51	0.60	0.44	0.57	0.67	0.81	0.95	0.75	0.97	1.14	1.37	1.63
0.31	0.39	0.46	0.56	0.66	5.0	3.5	0.26	0.34	0.40	0.49	0.57	0.40	0.53	0.63	0.76	0.90	0.69	0.90	1.07	1.29	1.54
0.29	0.37	0.44	0.53	0.63	5.0	4.0	0.24	0.32	0.39	0.47	0.55	0.38	0.51	0.60	0.73	0.87	0.64	0.85	1.02	1.24	1.48
0.27	0.35	0.42	0.51	0.61	5.0	4.5	0.23	0.31	0.37	0.45	0.54	0.36	0.49	0.58	0.71	0.85	0.62	0.82	0.98	1.20	1.44
0.26	0.34	0.41	0.50	0.59	5.0	5.0	0.23	0.30	0.36	0.44	0.53	0.35	0.47	0.56	0.69	0.82	0.59	0.79	0.95	1.16	1.40
0.25	0.33	0.40	0.49	0.58	5.0	5.5	0.22	0.30	0.36	0.44	0.52	0.34	0.46	0.55	0.68	0.81	0.57	0.77	0.93	1.14	1.38
0.24	0.32	0.39	0.48	0.57	5.0	6.0	0.21	0.29	0.35	0.43	0.51	0.33	0.45	0.54	0.67	0.80	0.56	0.75	0.92	1.12	1.36
0.29	0.37	0.43	0.51	0.60	5.5	3.0	0.24	0.31	0.37	0.44	0.51	0.38	0.49	0.58	0.69	0.81	0.65	0.83	0.98	1.18	1.39
0.27	0.34	0.40	0.48	0.57	5.5	3.5	0.22	0.29	0.35	0.42	0.49	0.35	0.46	0.54	0.66	0.77	0.60	0.78	0.92	1.11	1.32
0.25	0.32	0.38	0.46	0.54	5.5	4.0	0.21	0.28	0.33	0.40	0.47	0.33	0.43	0.51	0.62	0.74	0.56	0.73	0.87	1.05	1.26
0.23	0.31	0.36	0.44	0.52	5.5	4.5	0.20	0.27	0.32	0.38	0.45	0.31	0.42	0.50	0.60	0.72	0.53	0.70	0.84	1.02	1.22
0.22	0.29	0.35	0.43	0.50	5.5	5.0	0.19	0.26	0.31	0.38	0.45	0.30	0.40	0.48	0.59	0.70	0.51	0.68	0.81	0.99	1.19
0.21	0.28	0.34	0.41	0.49	5.5	5.5	0.19	0.25	0.30	0.37	0.44	0.29	0.39	0.47	0.57	0.68	0.49	0.65	0.79	0.96	1.16
0.21	0.28	0.33	0.41	0.48	5.5	6.0	0.18	0.25	0.30	0.36	0.43	0.28	0.38	0.46	0.56	0.67	0.48	0.64	0.77	0.95	1.14
0.26	0.33	0.38	0.45	0.52	6.0	3.0	0.21	0.27	0.32	0.38	0.44	0.33	0.43	0.50	0.60	0.70	0.58	0.73	0.85	1.02	1.20
0.24	0.30	0.36	0.42	0.49	6.0	3.5	0.20	0.26	0.30	0.36	0.42	0.31	0.40	0.47	0.57	0.67	0.53	0.69	0.81	0.97	1.15
0.22	0.28	0.33	0.40	0.47	6.0	4.0	0.18	0.24	0.29	0.34	0.41	0.29	0.38	0.45	0.54	0.64	0.49	0.64	0.76	0.92	1.09
0.21	0.27	0.31	0.38	0.45	6.0	4.5	0.17	0.23	0.27	0.33	0.39	0.27	0.36	0.43	0.52	0.61	0.46	0.61	0.73	0.88	1.05
0.20	0.26	0.30	0.37	0.44	6.0	5.0	0.17	0.22	0.27	0.32	0.38	0.26	0.35	0.42	0.51	0.60	0.44	0.59	0.70	0.85	1.02
0.19	0.25	0.29	0.36	0.42	6.0	5.5	0.16	0.22	0.26	0.32	0.37	0.25	0.34	0.40	0.49	0.59	0.43	0.57	0.68	0.83	1.00
0.18	0.24	0.29	0.35	0.41	6.0	6.0	0.16	0.21	0.25	0.31	0.37	0.24	0.33	0.39	0.48	0.58	0.41	0.55	0.66	0.81	0.98
0.24	0.30	0.34	0.40	0.47	6.5	3.0	0.19	0.24	0.29	0.34	0.39	0.30	0.39	0.45	0.54	0.62	0.52	0.66	0.77	0.92	1.08
0.21	0.27	0.32	0.37	0.44	6.5	3.5	0.17	0.23	0.27	0.32	0.37	0.28	0.35	0.42	0.50	0.58	0.47	0.61	0.71	0.85	1.01
0.20	0.25	0.30	0.35	0.41	6.5	4.0	0.16	0.21	0.25	0.30	0.35	0.26	0.34	0.40	0.48	0.56	0.44	0.57	0.68	0.81	0.96
0.19	0.24	0.28	0.34	0.40	6.5	4.5	0.15	0.20	0.24	0.29	0.34	0.24	0.32	0.38	0.46	0.54	0.41	0.54	0.64	0.77	0.92
0.17	0.23	0.27	0.32	0.38	6.5	5.0	0.15	0.20	0.23	0.28	0.33	0.23	0.31	0.36	0.44	0.52	0.39	0.51	0.62	0.74	0.89
0.17	0.22	0.26	0.31	0.37	6.5	5.5	0.14	0.19	0.23	0.27	0.32	0.22	0.30	0.35	0.43	0.51	0.38	0.50	0.60	0.73	0.87
0.16	0.21	0.25	0.31	0.36	6.5	6.0	0.14	0.19	0.22	0.27	0.32	0.22	0.29	0.34	0.42	0.50	0.37	0.49	0.58	0.71	0.85
0.21	0.27	0.31	0.37	0.43	7.0	3.0	0.17	0.22	0.26	0.30	0.35	0.27	0.35	0.41	0.49	0.56	0.47	0.60	0.70	0.83	0.97
0.19	0.24	0.28	0.33	0.39	7.0	3.5	0.16	0.20	0.23	0.28	0.32	0.25	0.32	0.37	0.44	0.52	0.43	0.54	0.63	0.75	0.89
0.18	0.23	0.27	0.32	0.37	7.0	4.0	0.15	0.19	0.22	0.27	0.31	0.23	0.30	0.35	0.42	0.50	0.40	0.51	0.60	0.72	0.85
0.17	0.22	0.25	0.30	0.35	7.0	4.5	0.14	0.18	0.21	0.26	0.30	0.22	0.29	0.34	0.41	0.48	0.37	0.48	0.57	0.69	0.82
0.16	0.20	0.24	0.29	0.34	7.0	5.0	0.13	0.17	0.21	0.25	0.29	0.21	0.27	0.32	0.39	0.46	0.35	0.46	0.55	0.66	0.79
0.15	0.19	0.23	0.28	0.33	7.0	5.5	0.13	0.17	0.20	0.24	0.28	0.20	0.26	0.31	0.38	0.45	0.34	0.44	0.53	0.64	0.76
0.14	0.19	0.22	0.27	0.32	7.0	6.0	0.12	0.16	0.19	0.24	0.28	0.19	0.26	0.30	0.37	0.44	0.33	0.43	0.52	0.63	0.75
0.19	0.25	0.28	0.34	0.39	7.5	3.0	0.16	0.20	0.23	0.28	0.32	0.25	0.32	0.37	0.44	0.51	0.43	0.54	0.64	0.75	0.88
0.18	0.22	0.26	0.30	0.35	7.5	3.5	0.14	0.18	0.21	0.25	0.29	0.23	0.29	0.34	0.40	0.47	0.39	0.49	0.58	0.69	0.81
0.16	0.21	0.24	0.28	0.33	7.5	4.0	0.13	0.17	0.20	0.24	0.28	0.21	0.27	0.32	0.38	0.44	0.36	0.46	0.54	0.65	0.76
0.15	0.20	0.23	0.27	0.32	7.5	4.5	0.13	0.16	0.19	0.23	0.27	0.20	0.26	0.30	0.36	0.43	0.34	0.44	0.52	0.62	0.73
0.14	0.18	0.22	0.26	0.30	7.5	5.0	0.12	0.16	0.18	0.22	0.26	0.19	0.25	0.29	0.35	0.41	0.32	0.42	0.49	0.59	0.71
0.14	0.17	0.21	0.25	0.29	7.5	5.5	0.11	0.15	0.18	0.21	0.25	0.18	0.23	0.28	0.34	0.40	0.30	0.40	0.47	0.57	0.68
0.13	0.17	0.20	0.24	0.29	7.5	6.0	0.11	0.15	0.17	0.21	0.25	0.17	0.23	0.27	0.33	0.39	0.29	0.38	0.46	0.56	0.67
0.18	0.23	0.26	0.31	0.36	8.0	3.0	0.14	0.19	0.21	0.25	0.29	0.23	0.29	0.34	0.40	0.46	0.40	0.50	0.59	0.69	0.80
0.16	0.21	0.24	0.28	0.32	8.0	3.5	0.13	0.17	0.20	0.23	0.27	0.21	0.27	0.31	0.37	0.43	0.36	0.45	0.53	0.63	0.74
0.15	0.19	0.22	0.26	0.30	8.0	4.0	0.12	0.15	0.18	0.21	0.25	0.19	0.24	0.29	0.34	0.40	0.33	0.42	0.49	0.58	0.68
0.14	0.18	0.21	0.25	0.29	8.0	4.5	0.11	0.15	0.17	0.21	0.24	0.18	0.23	0.27	0.33	0.38	0.31	0.40	0.47	0.56	0.66
0.13	0.17	0.20	0.24	0.28	8.0	5.0	0.11	0.14	0.17	0.20	0.23	0.17	0.22	0.26	0.32	0.37	0.29	0.38	0.45	0.54	0.64
0.12	0.16	0.19	0.23	0.27	8.0	5.5	0.10	0.14	0.16	0.19	0.23	0.16	0.21	0.25	0.30	0.36	0.28	0.36	0.43	0.52	0.61
0.12	0.15	0.18	0.22	0.26	8.0	6.0	0.10	0.13	0.15	0.19	0.22	0.16	0.20	0.24	0.29	0.35	0.26	0.35	0.41	0.50	0.59

102 Brick — Water absorption = 7-12% — Brickforce reinforcement at 450 centres

Design case — Panel size

100 Block — Compressive strength = 3.5 N/mm² — Brickforce reinforcement at 450 centres

140 Block — Compressive strength = 3.5 N/mm² — Brickforce reinforcement at 450 centres

215 collar jointed wall (see notes) — Compressive strength = 3.5 N/mm² — Bricktie reinforcement at 450 centres

102 BF30 W60	102 BF35 W60	102 BF40 W60	102 BF45 W60	102 BF50 W60	L (m)	H (m)	100 BF30 W60	100 BF35 W60	100 BF40 W60	100 BF45 W60	100 BF50 W60	140 BF30 W100	140 BF35 W100	140 BF40 W100	140 BF45 W100	140 BF50 W100	CF30 W175	CF35 W175	CF40 W175	CF45 W175	CF50 W175
0.54	0.72	0.86	1.03	1.24	5.00	3.00	0.48	0.64	0.76	0.91	1.09	0.74	0.98	1.19	1.44	1.70	1.25	1.66	1.99	2.43	2.89
0.51	0.68	0.82	0.98	1.18	5.00	3.50	0.45	0.61	0.73	0.88	1.05	0.70	0.94	1.13	1.38	1.64	1.18	1.59	1.89	2.33	2.78
0.48	0.65	0.79	0.95	1.14	5.00	4.00	0.44	0.59	0.71	0.86	1.02	0.67	0.90	1.09	1.34	1.60	1.12	1.53	1.83	2.26	2.71
0.46	0.63	0.76	0.93	1.12	5.00	4.50	0.42	0.57	0.69	0.85	1.01	0.65	0.88	1.07	1.32	1.58	1.09	1.48	1.79	2.21	2.68
0.45	0.61	0.74	0.91	1.09	5.00	5.00	0.41	0.56	0.68	0.83	0.99	0.63	0.86	1.05	1.30	1.56	1.05	1.44	1.75	2.17	2.63
0.44	0.60	0.73	0.90	1.08	5.00	5.50	0.40	0.55	0.67	0.82	0.98	0.62	0.85	1.03	1.28	1.54	1.03	1.41	1.73	2.14	2.60
0.43	0.58	0.71	0.89	1.07	5.00	6.00	0.39	0.55	0.66	0.81	0.97	0.61	0.84	1.02	1.26	1.52	1.01	1.39	1.70	2.11	2.56
0.47	0.61	0.73	0.88	1.06	5.50	3.00	0.41	0.54	0.64	0.77	0.92	0.63	0.84	1.01	1.22	1.44	1.07	1.42	1.69	2.07	2.44
0.44	0.58	0.70	0.84	1.01	5.50	3.50	0.39	0.52	0.62	0.75	0.89	0.60	0.80	0.97	1.17	1.39	1.01	1.36	1.62	1.99	2.36
0.42	0.55	0.67	0.81	0.97	5.50	4.00	0.37	0.50	0.60	0.72	0.86	0.57	0.77	0.93	1.13	1.34	0.96	1.30	1.55	1.91	2.28
0.40	0.54	0.65	0.79	0.94	5.50	4.50	0.36	0.48	0.58	0.71	0.84	0.55	0.75	0.90	1.11	1.32	0.93	1.26	1.51	1.87	2.24
0.39	0.52	0.63	0.77	0.92	5.50	5.00	0.35	0.47	0.57	0.70	0.83	0.54	0.73	0.88	1.09	1.30	0.90	1.22	1.48	1.83	2.21
0.37	0.51	0.61	0.75	0.91	5.50	5.50	0.34	0.46	0.56	0.69	0.82	0.52	0.71	0.87	1.07	1.29	0.87	1.19	1.45	1.79	2.18
0.37	0.50	0.60	0.75	0.90	5.50	6.00	0.33	0.46	0.55	0.68	0.82	0.51	0.70	0.86	1.06	1.27	0.86	1.17	1.43	1.77	2.15
0.41	0.53	0.63	0.76	0.91	6.00	3.00	0.35	0.47	0.55	0.66	0.79	0.55	0.72	0.87	1.04	1.23	0.92	1.22	1.46	1.78	2.09
0.39	0.51	0.61	0.73	0.87	6.00	3.50	0.34	0.45	0.53	0.64	0.76	0.52	0.69	0.84	1.01	1.19	0.88	1.17	1.40	1.71	2.03
0.36	0.48	0.58	0.70	0.84	6.00	4.00	0.32	0.43	0.51	0.62	0.74	0.50	0.66	0.80	0.98	1.16	0.84	1.13	1.34	1.65	1.97
0.35	0.46	0.56	0.68	0.80	6.00	4.50	0.31	0.41	0.50	0.60	0.72	0.48	0.64	0.77	0.94	1.12	0.80	1.08	1.29	1.59	1.91
0.33	0.45	0.54	0.66	0.79	6.00	5.00	0.30	0.41	0.49	0.59	0.71	0.47	0.63	0.76	0.93	1.11	0.78	1.05	1.27	1.57	1.88
0.32	0.44	0.53	0.65	0.78	6.00	5.50	0.29	0.40	0.48	0.59	0.70	0.45	0.61	0.74	0.92	1.10	0.75	1.03	1.24	1.54	1.86
0.32	0.43	0.52	0.64	0.76	6.00	6.00	0.29	0.39	0.47	0.58	0.69	0.44	0.60	0.73	0.90	1.09	0.74	1.00	1.22	1.51	1.83
0.37	0.48	0.57	0.68	0.81	6.50	3.00	0.32	0.42	0.49	0.59	0.69	0.49	0.64	0.78	0.92	1.09	0.83	1.10	1.30	1.58	1.85
0.34	0.44	0.53	0.64	0.76	6.50	3.50	0.29	0.39	0.47	0.56	0.66	0.46	0.60	0.73	0.88	1.04	0.77	1.03	1.22	1.49	1.76
0.32	0.42	0.51	0.61	0.73	6.50	4.00	0.28	0.38	0.45	0.54	0.64	0.44	0.58	0.70	0.85	1.01	0.74	0.99	1.17	1.44	1.71
0.31	0.41	0.49	0.59	0.71	6.50	4.50	0.27	0.36	0.43	0.52	0.62	0.42	0.56	0.68	0.82	0.98	0.71	0.95	1.13	1.40	1.66
0.29	0.39	0.47	0.58	0.68	6.50	5.00	0.26	0.35	0.42	0.51	0.61	0.41	0.54	0.65	0.80	0.95	0.68	0.92	1.10	1.36	1.62
0.27	0.38	0.46	0.57	0.67	6.50	5.50	0.26	0.34	0.42	0.51	0.60	0.40	0.53	0.64	0.79	0.94	0.66	0.90	1.08	1.33	1.61
0.28	0.37	0.45	0.55	0.66	6.50	6.00	0.25	0.34	0.41	0.50	0.60	0.39	0.52	0.63	0.78	0.94	0.64	0.88	1.06	1.31	1.59
0.34	0.43	0.51	0.61	0.72	7.00	3.00	0.28	0.37	0.44	0.52	0.61	0.44	0.58	0.69	0.83	0.97	0.76	0.99	1.17	1.41	1.65
0.30	0.39	0.47	0.56	0.67	7.00	3.50	0.26	0.35	0.41	0.49	0.58	0.40	0.53	0.64	0.77	0.91	0.68	0.91	1.07	1.31	1.55
0.29	0.38	0.45	0.54	0.65	7.00	4.00	0.25	0.33	0.40	0.47	0.56	0.39	0.51	0.62	0.75	0.88	0.66	0.87	1.04	1.27	1.50
0.27	0.36	0.43	0.53	0.62	7.00	4.50	0.24	0.32	0.38	0.46	0.55	0.37	0.50	0.60	0.73	0.86	0.63	0.84	1.00	1.23	1.46
0.26	0.35	0.42	0.51	0.60	7.00	5.00	0.23	0.31	0.37	0.45	0.53	0.36	0.48	0.58	0.71	0.84	0.60	0.81	0.97	1.19	1.43
0.25	0.34	0.41	0.50	0.59	7.00	5.50	0.23	0.30	0.36	0.44	0.52	0.35	0.47	0.56	0.69	0.82	0.58	0.79	0.95	1.17	1.40
0.25	0.33	0.40	0.49	0.58	7.00	6.00	0.22	0.30	0.36	0.44	0.52	0.34	0.46	0.55	0.68	0.81	0.57	0.77	0.93	1.15	1.38
0.31	0.39	0.46	0.55	0.65	7.50	3.00	0.26	0.34	0.39	0.47	0.55	0.40	0.52	0.63	0.74	0.87	0.69	0.89	1.05	1.27	1.48
0.28	0.36	0.43	0.51	0.61	7.50	3.50	0.24	0.31	0.37	0.44	0.52	0.37	0.48	0.58	0.69	0.82	0.63	0.82	0.97	1.19	1.39
0.26	0.34	0.40	0.48	0.57	7.50	4.00	0.22	0.30	0.35	0.42	0.50	0.34	0.46	0.55	0.66	0.78	0.59	0.78	0.92	1.13	1.33
0.25	0.32	0.39	0.47	0.56	7.50	4.50	0.21	0.29	0.34	0.41	0.49	0.33	0.44	0.53	0.65	0.76	0.56	0.75	0.89	1.10	1.30
0.24	0.31	0.38	0.45	0.54	7.50	5.00	0.21	0.28	0.33	0.40	0.47	0.32	0.43	0.51	0.63	0.74	0.54	0.73	0.86	1.07	1.27
0.23	0.30	0.36	0.44	0.52	7.50	5.50	0.20	0.27	0.32	0.39	0.46	0.31	0.42	0.50	0.61	0.72	0.52	0.70	0.84	1.03	1.24
0.22	0.29	0.36	0.43	0.51	7.50	6.00	0.20	0.26	0.32	0.38	0.46	0.30	0.41	0.49	0.60	0.72	0.50	0.69	0.82	1.01	1.22
0.28	0.36	0.42	0.50	0.59	8.00	3.00	0.24	0.31	0.36	0.42	0.49	0.37	0.48	0.57	0.67	0.78	0.63	0.81	0.96	1.15	1.34
0.26	0.33	0.39	0.46	0.55	8.00	3.50	0.22	0.28	0.33	0.40	0.47	0.34	0.44	0.53	0.63	0.74	0.58	0.75	0.89	1.08	1.26
0.23	0.30	0.36	0.43	0.51	8.00	4.00	0.20	0.26	0.31	0.37	0.44	0.31	0.41	0.49	0.59	0.70	0.53	0.70	0.83	1.01	1.19
0.22	0.29	0.35	0.42	0.50	8.00	4.50	0.19	0.25	0.31	0.37	0.43	0.30	0.40	0.48	0.58	0.68	0.51	0.67	0.80	0.99	1.16
0.21	0.28	0.34	0.41	0.48	8.00	5.00	0.19	0.25	0.30	0.36	0.43	0.29	0.39	0.46	0.56	0.66	0.49	0.65	0.78	0.96	1.13
0.21	0.27	0.33	0.40	0.47	8.00	5.50	0.18	0.24	0.29	0.35	0.41	0.28	0.37	0.45	0.55	0.65	0.47	0.63	0.75	0.93	1.11
0.20	0.26	0.32	0.39	0.46	8.00	6.00	0.17	0.23	0.28	0.34	0.40	0.27	0.36	0.44	0.53	0.63	0.45	0.61	0.73	0.90	1.08

102 Brick — Water absorption = 7–12% — Brickforce reinforcement at 450 centres
Design case — Panel size
100 Block — Compressive strength = 3.5 N/mm² — Brickforce reinforcement at 450 centres
140 Block — Compressive strength = 3.5 N/mm² — Brickforce reinforcement at 450 centres
215 collar jointed wall (see notes) — Compressive strength = 3.5 N/mm² — Bricktie reinforcement at 450 centres

BF 30 W60	BF 35 W60	BF 40 W60	BF 45 W60	BF 50 W60	L (m)	H (m)	BF 30 W60	BF 35 W60	BF 40 W60	BF 45 W60	BF 50 W60	BF 30 W100	BF 35 W100	BF 40 W100	BF 45 W100	BF 50 W100	CF 30 W175	CF 35 W175	CF 40 W175	CF 45 W175	CF 50 W175
0.63	0.74	0.82	0.94	1.06	5.0	3.0	0.46	0.56	0.63	0.72	0.82	0.74	0.90	1.02	1.17	1.32	1.31	1.56	1.76	2.03	2.31
0.54	0.64	0.72	0.83	0.95	5.0	3.5	0.40	0.49	0.56	0.65	0.75	0.64	0.79	0.91	1.05	1.20	1.12	1.37	1.57	1.82	2.09
0.48	0.57	0.65	0.76	0.87	5.0	4.0	0.36	0.45	0.52	0.61	0.70	0.58	0.72	0.83	0.97	1.12	1.00	1.24	1.43	1.67	1.94
0.43	0.52	0.61	0.71	0.82	5.0	4.5	0.33	0.42	0.49	0.58	0.67	0.53	0.67	0.78	0.92	1.06	0.92	1.15	1.34	1.57	1.84
0.39	0.48	0.57	0.66	0.77	5.0	5.0	0.31	0.40	0.46	0.55	0.64	0.49	0.62	0.73	0.87	1.01	0.84	1.07	1.26	1.49	1.74
0.37	0.46	0.54	0.63	0.74	5.0	5.5	0.29	0.38	0.44	0.53	0.62	0.46	0.60	0.70	0.84	0.98	0.80	1.02	1.20	1.43	1.68
0.35	0.44	0.51	0.61	0.71	5.0	6.0	0.28	0.36	0.43	0.51	0.60	0.44	0.57	0.68	0.81	0.95	0.76	0.98	1.15	1.38	1.63
0.58	0.68	0.74	0.84	0.95	5.5	3.0	0.41	0.50	0.56	0.63	0.72	0.67	0.80	0.91	1.03	1.16	1.20	1.40	1.58	1.80	2.04
0.50	0.58	0.65	0.75	0.85	5.5	3.5	0.36	0.44	0.50	0.58	0.66	0.58	0.71	0.81	0.93	1.06	1.03	1.24	1.40	1.62	1.85
0.43	0.51	0.58	0.67	0.76	5.5	4.0	0.32	0.40	0.45	0.53	0.61	0.52	0.64	0.73	0.85	0.97	0.90	1.11	1.27	1.47	1.70
0.39	0.47	0.54	0.63	0.71	5.5	4.5	0.29	0.37	0.43	0.50	0.57	0.47	0.59	0.68	0.80	0.92	0.82	1.02	1.18	1.38	1.60
0.36	0.43	0.50	0.59	0.68	5.5	5.0	0.27	0.35	0.40	0.48	0.55	0.44	0.55	0.64	0.76	0.88	0.76	0.95	1.11	1.30	1.52
0.33	0.40	0.47	0.55	0.64	5.5	5.5	0.26	0.33	0.38	0.45	0.53	0.41	0.52	0.61	0.72	0.84	0.70	0.89	1.05	1.24	1.45
0.31	0.39	0.45	0.53	0.62	5.5	6.0	0.25	0.32	0.37	0.44	0.51	0.39	0.50	0.59	0.70	0.82	0.67	0.86	1.00	1.20	1.40
0.54	0.62	0.68	0.76	0.85	6.0	3.0	0.37	0.45	0.50	0.56	0.63	0.62	0.72	0.82	0.92	1.03	1.10	1.27	1.42	1.62	1.81
0.46	0.54	0.60	0.68	0.76	6.0	3.5	0.33	0.40	0.45	0.51	0.58	0.54	0.64	0.73	0.84	0.94	0.95	1.13	1.27	1.46	1.65
0.40	0.47	0.53	0.61	0.69	6.0	4.0	0.29	0.36	0.41	0.47	0.54	0.47	0.58	0.66	0.76	0.87	0.83	1.01	1.15	1.33	1.52
0.36	0.42	0.48	0.56	0.63	6.0	4.5	0.26	0.33	0.37	0.44	0.50	0.42	0.53	0.60	0.70	0.81	0.74	0.91	1.05	1.22	1.40
0.33	0.39	0.45	0.52	0.60	6.0	5.0	0.25	0.31	0.36	0.42	0.48	0.39	0.49	0.57	0.67	0.77	0.69	0.85	0.99	1.15	1.34
0.30	0.37	0.42	0.49	0.57	6.0	5.5	0.23	0.29	0.34	0.40	0.46	0.37	0.46	0.54	0.64	0.74	0.64	0.80	0.93	1.10	1.28
0.28	0.34	0.40	0.47	0.54	6.0	6.0	0.22	0.28	0.32	0.38	0.44	0.34	0.44	0.51	0.61	0.71	0.60	0.76	0.88	1.04	1.22
0.51	0.58	0.64	0.71	0.79	6.5	3.0	0.35	0.42	0.46	0.52	0.58	0.58	0.68	0.76	0.85	0.95	1.03	1.19	1.32	1.50	1.67
0.43	0.50	0.55	0.62	0.69	6.5	3.5	0.30	0.36	0.41	0.46	0.52	0.50	0.59	0.66	0.75	0.84	0.88	1.03	1.15	1.32	1.49
0.38	0.44	0.49	0.56	0.63	6.5	4.0	0.27	0.33	0.37	0.43	0.48	0.44	0.53	0.60	0.69	0.78	0.77	0.92	1.04	1.21	1.37
0.33	0.39	0.44	0.51	0.58	6.5	4.5	0.24	0.30	0.34	0.40	0.45	0.39	0.48	0.55	0.64	0.73	0.69	0.84	0.95	1.11	1.27
0.30	0.36	0.41	0.47	0.54	6.5	5.0	0.22	0.28	0.32	0.37	0.42	0.36	0.44	0.51	0.59	0.68	0.63	0.77	0.88	1.03	1.19
0.28	0.34	0.38	0.45	0.51	6.5	5.5	0.21	0.26	0.30	0.35	0.41	0.33	0.42	0.48	0.57	0.66	0.58	0.72	0.84	0.98	1.14
0.26	0.31	0.36	0.42	0.49	6.5	6.0	0.20	0.25	0.29	0.34	0.39	0.31	0.40	0.46	0.54	0.63	0.55	0.69	0.80	0.94	1.09
0.49	0.55	0.60	0.66	0.74	7.0	3.0	0.33	0.39	0.43	0.48	0.54	0.55	0.64	0.72	0.79	0.88	0.97	1.12	1.24	1.40	1.55
0.40	0.47	0.51	0.56	0.63	7.0	3.5	0.28	0.33	0.37	0.42	0.47	0.46	0.54	0.61	0.68	0.76	0.82	0.95	1.06	1.20	1.34
0.35	0.41	0.45	0.51	0.58	7.0	4.0	0.25	0.30	0.34	0.39	0.44	0.41	0.49	0.55	0.63	0.71	0.72	0.85	0.96	1.10	1.24
0.31	0.37	0.41	0.47	0.53	7.0	4.5	0.22	0.27	0.31	0.36	0.41	0.36	0.44	0.50	0.58	0.66	0.64	0.77	0.88	1.01	1.15
0.28	0.33	0.37	0.43	0.49	7.0	5.0	0.20	0.25	0.29	0.33	0.38	0.33	0.41	0.46	0.54	0.62	0.58	0.71	0.81	0.94	1.08
0.26	0.31	0.35	0.40	0.46	7.0	5.5	0.19	0.24	0.27	0.32	0.36	0.31	0.38	0.44	0.51	0.59	0.54	0.66	0.76	0.88	1.02
0.24	0.29	0.33	0.38	0.44	7.0	6.0	0.18	0.23	0.26	0.31	0.35	0.29	0.36	0.42	0.49	0.57	0.50	0.62	0.72	0.84	0.98
0.46	0.52	0.57	0.63	0.70	7.5	3.0	0.31	0.37	0.40	0.45	0.50	0.52	0.60	0.67	0.74	0.82	0.92	1.06	1.17	1.31	1.44
0.39	0.44	0.48	0.53	0.60	7.5	3.5	0.26	0.31	0.35	0.39	0.43	0.44	0.51	0.57	0.64	0.71	0.78	0.90	0.99	1.13	1.25
0.33	0.38	0.42	0.47	0.53	7.5	4.0	0.23	0.28	0.31	0.35	0.39	0.38	0.45	0.51	0.57	0.64	0.68	0.79	0.88	1.01	1.13
0.29	0.34	0.38	0.43	0.49	7.5	4.5	0.21	0.25	0.29	0.33	0.37	0.34	0.41	0.46	0.53	0.60	0.60	0.72	0.81	0.93	1.06
0.26	0.31	0.35	0.40	0.45	7.5	5.0	0.19	0.23	0.27	0.31	0.35	0.31	0.38	0.43	0.49	0.56	0.54	0.66	0.75	0.87	0.99
0.24	0.29	0.32	0.37	0.42	7.5	5.5	0.17	0.22	0.25	0.29	0.33	0.28	0.35	0.40	0.46	0.53	0.50	0.61	0.69	0.81	0.92
0.22	0.27	0.30	0.35	0.40	7.5	6.0	0.16	0.21	0.24	0.28	0.32	0.26	0.33	0.38	0.44	0.51	0.46	0.57	0.66	0.77	0.89
0.45	0.50	0.54	0.59	0.66	8.0	3.0	0.30	0.35	0.38	0.42	0.47	0.50	0.57	0.64	0.69	0.76	0.88	1.01	1.11	1.23	1.35
0.37	0.42	0.46	0.50	0.56	8.0	3.5	0.25	0.29	0.33	0.36	0.41	0.41	0.48	0.54	0.60	0.66	0.74	0.85	0.94	1.06	1.18
0.32	0.36	0.39	0.44	0.49	8.0	4.0	0.21	0.26	0.29	0.32	0.36	0.36	0.42	0.47	0.53	0.59	0.64	0.74	0.82	0.93	1.04
0.28	0.32	0.36	0.40	0.45	8.0	4.5	0.19	0.23	0.26	0.30	0.34	0.32	0.38	0.43	0.49	0.55	0.57	0.67	0.75	0.86	0.97
0.25	0.29	0.33	0.37	0.42	8.0	5.0	0.18	0.22	0.25	0.28	0.32	0.29	0.35	0.40	0.46	0.52	0.51	0.61	0.69	0.80	0.91
0.23	0.27	0.30	0.35	0.39	8.0	5.5	0.16	0.20	0.23	0.26	0.30	0.27	0.32	0.37	0.43	0.49	0.47	0.57	0.65	0.75	0.85
0.21	0.25	0.28	0.32	0.37	8.0	6.0	0.15	0.19	0.21	0.25	0.29	0.24	0.30	0.35	0.40	0.46	0.43	0.53	0.60	0.70	0.80

Design case

Panel size		102 Brick — Water absorption = 7-12% — Brickforce reinforcement at 450 centres					100 Block — Compressive strength = 3.5 N/mm² — Brickforce reinforcement at 450 centres					140 Block — Compressive strength = 3.5 N/mm² — Brickforce reinforcement at 450 centres					215 collar jointed wall (see notes) — Compressive strength = 3.5 N/mm² — Bricktie reinforcement at 450 centres				
L (m)	H (m)	BF 30 W60	BF 35 W60	BF 40 W60	BF 45 W60	BF 50 W60	BF 30 W60	BF 35 W60	BF 40 W60	BF 45 W60	BF 50 W60	BF 30 W100	BF 35 W100	BF 40 W100	BF 45 W100	BF 50 W100	CF 30 W175	CF 35 W175	CF 40 W175	CF 45 W175	CF 50 W175
5.0	3.0	0.74	0.90	1.02	1.18	1.35	0.57	0.71	0.81	0.93	1.07	0.92	1.13	1.30	1.50	1.72	1.59	1.94	2.23	2.60	2.98
5.0	3.5	0.65	0.80	0.91	1.06	1.22	0.50	0.64	0.73	0.86	0.99	0.81	1.01	1.17	1.37	1.59	1.39	1.72	2.01	2.36	2.74
5.0	4.0	0.58	0.72	0.83	0.97	1.13	0.45	0.59	0.68	0.81	0.94	0.73	0.92	1.08	1.28	1.49	1.26	1.57	1.85	2.20	2.58
5.0	4.5	0.54	0.67	0.78	0.92	1.07	0.43	0.55	0.65	0.77	0.90	0.68	0.87	1.02	1.22	1.43	1.17	1.48	1.75	2.09	2.46
5.0	5.0	0.50	0.63	0.73	0.87	1.02	0.40	0.52	0.61	0.74	0.87	0.63	0.82	0.97	1.16	1.37	1.09	1.39	1.65	1.98	2.35
5.0	5.5	0.47	0.60	0.70	0.84	0.98	0.39	0.50	0.60	0.72	0.84	0.60	0.79	0.94	1.13	1.33	1.04	1.35	1.59	1.92	2.28
5.0	6.0	0.45	0.57	0.68	0.82	0.95	0.37	0.49	0.58	0.70	0.82	0.58	0.76	0.90	1.10	1.29	0.99	1.30	1.54	1.86	2.21
5.5	3.0	0.68	0.81	0.91	1.04	1.19	0.51	0.62	0.71	0.81	0.93	0.82	1.00	1.15	1.31	1.49	1.43	1.73	1.97	2.28	2.60
5.5	3.5	0.59	0.72	0.81	0.94	1.08	0.45	0.56	0.65	0.75	0.86	0.72	0.90	1.04	1.21	1.38	1.26	1.54	1.78	2.09	2.40
5.5	4.0	0.52	0.64	0.73	0.86	0.99	0.40	0.51	0.59	0.70	0.81	0.65	0.81	0.95	1.11	1.29	1.12	1.38	1.62	1.92	2.23
5.5	4.5	0.48	0.59	0.68	0.80	0.93	0.37	0.48	0.56	0.66	0.77	0.60	0.76	0.89	1.06	1.23	1.03	1.29	1.53	1.81	2.12
5.5	5.0	0.44	0.56	0.64	0.76	0.89	0.35	0.46	0.53	0.64	0.74	0.56	0.72	0.84	1.01	1.18	0.97	1.22	1.45	1.72	2.03
5.5	5.5	0.42	0.52	0.61	0.72	0.85	0.33	0.43	0.51	0.61	0.72	0.52	0.68	0.80	0.96	1.14	0.91	1.16	1.37	1.64	1.95
5.5	6.0	0.40	0.50	0.59	0.70	0.82	0.32	0.42	0.50	0.60	0.70	0.50	0.66	0.78	0.94	1.11	0.87	1.12	1.33	1.60	1.90
6.0	3.0	0.62	0.74	0.83	0.93	1.06	0.46	0.56	0.63	0.71	0.81	0.74	0.89	1.02	1.16	1.31	1.30	1.56	1.76	2.02	2.29
6.0	3.5	0.54	0.65	0.74	0.85	0.97	0.41	0.50	0.57	0.66	0.76	0.66	0.80	0.93	1.07	1.22	1.15	1.39	1.59	1.86	2.12
6.0	4.0	0.48	0.58	0.67	0.77	0.89	0.36	0.46	0.53	0.62	0.71	0.59	0.73	0.85	0.99	1.14	1.02	1.25	1.46	1.71	1.98
6.0	4.5	0.43	0.53	0.61	0.71	0.82	0.33	0.42	0.49	0.58	0.67	0.53	0.67	0.78	0.92	1.07	0.92	1.14	1.34	1.59	1.85
6.0	5.0	0.40	0.50	0.57	0.67	0.78	0.31	0.40	0.47	0.56	0.65	0.50	0.63	0.74	0.88	1.03	0.86	1.08	1.28	1.52	1.78
6.0	5.5	0.38	0.47	0.54	0.64	0.75	0.30	0.38	0.45	0.54	0.62	0.47	0.60	0.71	0.85	0.99	0.81	1.03	1.21	1.45	1.71
6.0	6.0	0.35	0.44	0.51	0.61	0.72	0.28	0.37	0.43	0.52	0.60	0.44	0.57	0.68	0.81	0.96	0.77	0.98	1.16	1.39	1.64
6.5	3.0	0.58	0.69	0.77	0.86	0.97	0.43	0.51	0.57	0.65	0.74	0.69	0.83	0.94	1.06	1.19	1.22	1.45	1.62	1.85	2.09
6.5	3.5	0.50	0.60	0.67	0.76	0.87	0.37	0.45	0.51	0.59	0.67	0.60	0.73	0.83	0.95	1.08	1.05	1.27	1.44	1.66	1.89
6.5	4.0	0.44	0.54	0.61	0.70	0.80	0.33	0.42	0.48	0.55	0.63	0.54	0.66	0.76	0.89	1.01	0.94	1.15	1.32	1.54	1.77
6.5	4.5	0.40	0.49	0.56	0.64	0.74	0.30	0.38	0.44	0.52	0.60	0.49	0.61	0.71	0.83	0.95	0.85	1.04	1.22	1.43	1.66
6.5	5.0	0.36	0.45	0.52	0.60	0.69	0.28	0.36	0.42	0.49	0.57	0.45	0.56	0.66	0.78	0.91	0.78	0.97	1.13	1.35	1.57
6.5	5.5	0.34	0.42	0.49	0.57	0.67	0.27	0.34	0.40	0.47	0.55	0.42	0.54	0.63	0.75	0.88	0.73	0.92	1.08	1.29	1.51
6.5	6.0	0.32	0.40	0.46	0.55	0.64	0.25	0.33	0.38	0.46	0.53	0.40	0.51	0.61	0.72	0.85	0.70	0.88	1.04	1.24	1.46
7.0	3.0	0.55	0.65	0.72	0.80	0.90	0.40	0.47	0.53	0.60	0.68	0.65	0.77	0.87	0.98	1.10	1.14	1.35	1.51	1.71	1.92
7.0	3.5	0.46	0.55	0.62	0.70	0.79	0.34	0.41	0.46	0.53	0.60	0.55	0.66	0.76	0.86	0.97	0.97	1.17	1.31	1.50	1.70
7.0	4.0	0.41	0.50	0.56	0.64	0.73	0.31	0.38	0.43	0.50	0.56	0.50	0.60	0.69	0.80	0.91	0.87	1.05	1.20	1.40	1.59
7.0	4.5	0.37	0.45	0.51	0.59	0.67	0.28	0.35	0.40	0.47	0.53	0.45	0.56	0.64	0.75	0.86	0.78	0.96	1.11	1.30	1.49
7.0	5.0	0.34	0.41	0.47	0.54	0.63	0.26	0.32	0.38	0.44	0.51	0.41	0.51	0.60	0.70	0.81	0.72	0.89	1.03	1.22	1.41
7.0	5.5	0.31	0.38	0.44	0.51	0.60	0.24	0.31	0.36	0.42	0.49	0.39	0.48	0.57	0.67	0.78	0.67	0.83	0.97	1.15	1.35
7.0	6.0	0.29	0.37	0.42	0.49	0.57	0.23	0.29	0.34	0.41	0.47	0.36	0.46	0.54	0.65	0.75	0.63	0.80	0.93	1.11	1.30
7.5	3.0	0.52	0.61	0.67	0.75	0.84	0.37	0.44	0.49	0.55	0.62	0.61	0.72	0.81	0.91	1.01	1.07	1.26	1.41	1.59	1.78
7.5	3.5	0.44	0.52	0.58	0.65	0.73	0.32	0.38	0.43	0.49	0.55	0.52	0.62	0.70	0.80	0.90	0.91	1.09	1.22	1.40	1.57
7.5	4.0	0.38	0.46	0.52	0.59	0.66	0.28	0.35	0.39	0.45	0.51	0.46	0.56	0.63	0.73	0.82	0.81	0.97	1.10	1.27	1.44
7.5	4.5	0.35	0.42	0.47	0.54	0.62	0.26	0.32	0.37	0.42	0.48	0.42	0.51	0.59	0.68	0.78	0.73	0.89	1.02	1.19	1.36
7.5	5.0	0.32	0.38	0.44	0.50	0.58	0.24	0.30	0.34	0.40	0.46	0.38	0.47	0.55	0.64	0.74	0.67	0.82	0.95	1.12	1.28
7.5	5.5	0.29	0.35	0.41	0.47	0.54	0.22	0.28	0.32	0.38	0.44	0.35	0.44	0.51	0.61	0.70	0.61	0.76	0.88	1.05	1.21
7.5	6.0	0.27	0.33	0.39	0.45	0.52	0.21	0.27	0.31	0.36	0.42	0.33	0.42	0.49	0.58	0.68	0.58	0.72	0.84	1.00	1.17
8.0	3.0	0.50	0.58	0.63	0.71	0.78	0.35	0.41	0.46	0.51	0.58	0.58	0.68	0.75	0.84	0.94	1.02	1.19	1.32	1.48	1.65
8.0	3.5	0.42	0.49	0.55	0.61	0.69	0.30	0.36	0.40	0.45	0.51	0.49	0.58	0.66	0.74	0.83	0.86	1.03	1.14	1.30	1.46
8.0	4.0	0.36	0.43	0.48	0.54	0.61	0.26	0.32	0.36	0.41	0.46	0.43	0.51	0.58	0.66	0.75	0.75	0.90	1.01	1.16	1.31
8.0	4.5	0.32	0.39	0.44	0.50	0.57	0.24	0.29	0.33	0.39	0.44	0.39	0.47	0.54	0.62	0.71	0.68	0.83	0.94	1.09	1.24
8.0	5.0	0.30	0.36	0.41	0.47	0.53	0.22	0.27	0.31	0.36	0.42	0.36	0.44	0.51	0.59	0.67	0.62	0.76	0.87	1.03	1.17
8.0	5.5	0.27	0.33	0.38	0.43	0.50	0.20	0.26	0.30	0.35	0.40	0.33	0.41	0.47	0.56	0.64	0.57	0.71	0.82	0.96	1.11
8.0	6.0	0.25	0.31	0.35	0.41	0.47	0.19	0.24	0.28	0.33	0.38	0.31	0.38	0.45	0.53	0.61	0.53	0.66	0.77	0.91	1.06

102 Brick — Water absorption = 7-12% — Brickforce reinforcement at 450 centres

100 Block — Compressive strength = 3.5 N/mm² — Brickforce reinforcement at 450 centres

140 Block — Compressive strength = 3.5 N/mm² — Brickforce reinforcement at 450 centres

Design case — Panel size

215 collar jointed wall (see notes) — Compressive strength = 3.5 N/mm² — Bricktie reinforcement at 450 centres

Panel L (m)	Panel H (m)	102 Brick BF30 W60	BF35 W60	BF40 W60	BF45 W60	BF50 W60	100 Block BF30 W60	BF35 W60	BF40 W60	BF45 W60	BF50 W60	140 Block BF30 W100	BF35 W100	BF40 W100	BF45 W100	BF50 W100	215 CF30 W175	CF35 W175	CF40 W175	CF45 W175	CF50 W175
5.0	3.0	0.87	1.08	1.24	1.45	1.65	0.69	0.86	1.00	1.17	1.36	1.10	1.38	1.59	1.87	2.16	1.90	2.37	2.73	3.20	3.72
5.0	3.5	0.76	0.96	1.12	1.31	1.52	0.62	0.79	0.92	1.08	1.27	0.99	1.25	1.46	1.72	2.01	1.68	2.14	2.49	2.95	3.45
5.0	4.0	0.70	0.88	1.04	1.22	1.43	0.57	0.74	0.87	1.03	1.20	0.91	1.16	1.37	1.63	1.91	1.54	1.98	2.33	2.79	3.27
5.0	4.5	0.65	0.83	0.98	1.16	1.37	0.54	0.71	0.83	0.99	1.17	0.85	1.10	1.31	1.57	1.84	1.44	1.87	2.22	2.67	3.16
5.0	5.0	0.61	0.78	0.93	1.11	1.31	0.51	0.67	0.80	0.96	1.13	0.80	1.05	1.25	1.51	1.79	1.35	1.77	2.12	2.56	3.06
5.0	5.5	0.58	0.75	0.90	1.08	1.28	0.49	0.65	0.78	0.94	1.11	0.77	1.02	1.22	1.48	1.75	1.31	1.72	2.06	2.50	2.99
5.0	6.0	0.56	0.73	0.87	1.05	1.24	0.48	0.63	0.76	0.92	1.08	0.74	0.99	1.18	1.44	1.71	1.26	1.67	2.00	2.44	2.92
5.5	3.0	0.78	0.96	1.10	1.28	1.44	0.61	0.76	0.86	1.01	1.17	0.97	1.22	1.39	1.62	1.86	1.69	2.10	2.40	2.78	3.23
5.5	3.5	0.69	0.86	0.99	1.16	1.33	0.55	0.69	0.80	0.94	1.09	0.88	1.10	1.28	1.50	1.74	1.51	1.90	2.19	2.58	3.00
5.5	4.0	0.62	0.78	0.91	1.06	1.24	0.50	0.64	0.75	0.88	1.03	0.79	1.01	1.18	1.40	1.63	1.35	1.73	2.02	2.40	2.81
5.5	4.5	0.57	0.73	0.86	1.01	1.18	0.47	0.61	0.71	0.85	0.99	0.74	0.95	1.12	1.34	1.57	1.26	1.63	1.92	2.30	2.70
5.5	5.0	0.54	0.69	0.81	0.96	1.13	0.44	0.58	0.69	0.82	0.96	0.70	0.91	1.08	1.30	1.53	1.19	1.55	1.84	2.21	2.61
5.5	5.5	0.51	0.65	0.77	0.92	1.09	0.42	0.56	0.66	0.80	0.94	0.66	0.87	1.04	1.25	1.48	1.13	1.47	1.76	2.13	2.53
5.5	6.0	0.49	0.63	0.75	0.90	1.06	0.41	0.54	0.65	0.78	0.92	0.64	0.84	1.01	1.23	1.45	1.09	1.44	1.71	2.08	2.48
6.0	3.0	0.71	0.87	0.98	1.13	1.27	0.54	0.67	0.76	0.89	1.02	0.86	1.08	1.22	1.42	1.63	1.53	1.87	2.12	2.44	2.83
6.0	3.5	0.63	0.78	0.89	1.04	1.18	0.49	0.61	0.71	0.83	0.96	0.78	0.98	1.13	1.32	1.53	1.36	1.70	1.95	2.27	2.64
6.0	4.0	0.56	0.70	0.82	0.95	1.10	0.45	0.57	0.66	0.78	0.90	0.71	0.90	1.05	1.24	1.44	1.23	1.55	1.80	2.13	2.48
6.0	4.5	0.51	0.64	0.76	0.88	1.02	0.41	0.53	0.62	0.73	0.85	0.65	0.83	0.98	1.16	1.35	1.12	1.43	1.67	2.00	2.33
6.0	5.0	0.48	0.61	0.72	0.85	0.99	0.39	0.51	0.60	0.71	0.83	0.62	0.80	0.94	1.13	1.32	1.06	1.37	1.61	1.93	2.26
6.0	5.5	0.46	0.58	0.69	0.81	0.95	0.37	0.49	0.58	0.69	0.81	0.59	0.76	0.91	1.09	1.28	1.00	1.30	1.54	1.86	2.20
6.0	6.0	0.43	0.55	0.65	0.77	0.92	0.36	0.47	0.56	0.67	0.79	0.56	0.73	0.88	1.06	1.25	0.95	1.25	1.48	1.80	2.14
6.5	3.0	0.67	0.80	0.90	1.04	1.16	0.50	0.61	0.69	0.80	0.92	0.80	0.99	1.12	1.29	1.48	1.42	1.72	1.94	2.23	2.57
6.5	3.5	0.58	0.71	0.80	0.93	1.05	0.44	0.55	0.63	0.73	0.84	0.71	0.89	1.01	1.17	1.35	1.24	1.53	1.75	2.02	2.34
6.5	4.0	0.52	0.64	0.74	0.86	0.98	0.40	0.51	0.59	0.69	0.80	0.65	0.81	0.94	1.10	1.27	1.12	1.40	1.62	1.90	2.20
6.5	4.5	0.47	0.59	0.68	0.80	0.92	0.37	0.48	0.55	0.65	0.76	0.60	0.75	0.88	1.04	1.20	1.02	1.30	1.51	1.79	2.08
6.5	5.0	0.43	0.54	0.64	0.75	0.87	0.35	0.45	0.52	0.62	0.73	0.55	0.71	0.83	0.99	1.15	0.94	1.21	1.42	1.70	1.98
6.5	5.5	0.41	0.52	0.61	0.72	0.84	0.33	0.43	0.51	0.60	0.71	0.53	0.68	0.80	0.96	1.12	0.90	1.16	1.37	1.64	1.93
6.5	6.0	0.39	0.49	0.58	0.69	0.82	0.32	0.42	0.49	0.59	0.69	0.50	0.65	0.77	0.93	1.09	0.85	1.12	1.32	1.59	1.88
7.0	3.0	0.63	0.75	0.84	0.95	1.07	0.47	0.56	0.63	0.73	0.84	0.75	0.91	1.03	1.18	1.35	1.33	1.59	1.79	2.05	2.35
7.0	3.5	0.53	0.65	0.72	0.84	0.94	0.40	0.49	0.56	0.65	0.75	0.64	0.80	0.90	1.05	1.20	1.13	1.39	1.58	1.81	2.09
7.0	4.0	0.48	0.59	0.67	0.78	0.88	0.37	0.46	0.53	0.62	0.71	0.59	0.74	0.85	0.99	1.14	1.02	1.28	1.47	1.70	1.97
7.0	4.5	0.44	0.54	0.62	0.73	0.83	0.34	0.43	0.50	0.58	0.68	0.54	0.68	0.79	0.93	1.08	0.94	1.18	1.37	1.61	1.87
7.0	5.0	0.40	0.50	0.58	0.68	0.78	0.32	0.40	0.47	0.55	0.65	0.50	0.64	0.75	0.88	1.03	0.86	1.10	1.28	1.52	1.77
7.0	5.5	0.37	0.47	0.55	0.64	0.75	0.30	0.38	0.45	0.53	0.62	0.47	0.61	0.71	0.85	0.99	0.81	1.04	1.22	1.46	1.70
7.0	6.0	0.36	0.45	0.53	0.62	0.73	0.29	0.37	0.44	0.52	0.61	0.45	0.58	0.69	0.83	0.97	0.77	1.00	1.18	1.41	1.66
7.5	3.0	0.60	0.71	0.78	0.88	0.99	0.43	0.52	0.59	0.67	0.77	0.71	0.85	0.95	1.09	1.23	1.25	1.48	1.65	1.89	2.16
7.5	3.5	0.51	0.61	0.68	0.78	0.87	0.37	0.46	0.52	0.60	0.69	0.60	0.74	0.84	0.97	1.11	1.06	1.29	1.46	1.67	1.93
7.5	4.0	0.45	0.54	0.61	0.71	0.80	0.34	0.42	0.48	0.56	0.64	0.54	0.67	0.77	0.89	1.02	0.94	1.17	1.34	1.54	1.78
7.5	4.5	0.41	0.50	0.57	0.66	0.76	0.31	0.39	0.45	0.53	0.61	0.50	0.63	0.72	0.84	0.97	0.86	1.08	1.25	1.46	1.69
7.5	5.0	0.37	0.46	0.53	0.62	0.71	0.29	0.37	0.43	0.50	0.58	0.46	0.58	0.68	0.80	0.93	0.80	1.01	1.17	1.38	1.60
7.5	5.5	0.34	0.43	0.50	0.58	0.68	0.27	0.35	0.40	0.48	0.56	0.43	0.55	0.64	0.76	0.88	0.74	0.95	1.10	1.31	1.53
7.5	6.0	0.32	0.40	0.48	0.56	0.65	0.26	0.33	0.39	0.46	0.54	0.41	0.53	0.62	0.74	0.86	0.70	0.91	1.06	1.27	1.48
8.0	3.0	0.57	0.67	0.73	0.82	0.92	0.41	0.48	0.54	0.62	0.70	0.67	0.79	0.88	1.01	1.14	1.18	1.38	1.54	1.75	1.99
8.0	3.5	0.48	0.57	0.64	0.73	0.81	0.35	0.43	0.48	0.56	0.63	0.57	0.69	0.78	0.90	1.02	1.01	1.21	1.36	1.55	1.78
8.0	4.0	0.42	0.50	0.56	0.65	0.73	0.31	0.38	0.43	0.50	0.58	0.50	0.62	0.70	0.81	0.93	0.87	1.07	1.22	1.40	1.61
8.0	4.5	0.38	0.46	0.52	0.61	0.69	0.29	0.36	0.41	0.48	0.55	0.46	0.58	0.66	0.77	0.88	0.80	1.00	1.15	1.33	1.53
8.0	5.0	0.35	0.43	0.49	0.57	0.65	0.27	0.34	0.39	0.46	0.53	0.43	0.54	0.62	0.73	0.84	0.74	0.93	1.08	1.26	1.46
8.0	5.5	0.32	0.40	0.46	0.54	0.62	0.25	0.32	0.37	0.43	0.51	0.40	0.51	0.59	0.69	0.80	0.69	0.87	1.01	1.20	1.39
8.0	6.0	0.30	0.37	0.44	0.51	0.59	0.24	0.30	0.35	0.42	0.48	0.37	0.48	0.56	0.66	0.77	0.64	0.83	0.96	1.14	1.33

102 Brick — Water absorption = 7-12% — Brickforce reinforcement at 450 centres

Design case — Panel size

100 Block — Compressive strength = 3.5 N/mm² — Brickforce reinforcement at 450 centres

140 Block — Compressive strength = 3.5 N/mm² — Brickforce reinforcement at 450 centres

215 collar jointed wall (see notes) — Compressive strength = 3.5 N/mm² — Bricktie reinforcement at 450 centres

L (m)	H (m)	102 BF30 W60	102 BF35 W60	102 BF40 W60	102 BF45 W60	102 BF50 W60	100 BF30 W60	100 BF35 W60	100 BF40 W60	100 BF45 W60	100 BF50 W60	140 BF30 W100	140 BF35 W100	140 BF40 W100	140 BF45 W100	140 BF50 W100	215 CF30 W175	215 CF35 W175	215 CF40 W175	215 CF45 W175	215 CF50 W175
5.0	3.0	1.06	1.27	1.44	1.66	1.87	0.80	0.98	1.12	1.30	1.50	1.28	1.58	1.80	2.10	2.40	2.24	2.74	3.12	3.61	4.17
5.0	3.5	0.91	1.11	1.28	1.48	1.70	0.71	0.89	1.02	1.20	1.38	1.13	1.41	1.64	1.92	2.21	1.96	2.43	2.80	3.30	3.83
5.0	4.0	0.81	1.01	1.17	1.36	1.58	0.64	0.82	0.95	1.13	1.30	1.02	1.29	1.51	1.79	2.08	1.77	2.22	2.58	3.08	3.59
5.0	4.5	0.74	0.94	1.09	1.28	1.49	0.60	0.77	0.90	1.08	1.24	0.95	1.21	1.42	1.70	1.99	1.64	2.08	2.43	2.91	3.43
5.0	5.0	0.69	0.88	1.01	1.21	1.41	0.56	0.73	0.86	1.03	1.19	0.89	1.14	1.34	1.62	1.91	1.52	1.95	2.29	2.75	3.27
5.0	5.5	0.66	0.84	0.98	1.17	1.37	0.53	0.70	0.83	1.00	1.16	0.85	1.10	1.30	1.57	1.85	1.45	1.87	2.22	2.66	3.16
5.0	6.0	0.62	0.80	0.94	1.14	1.32	0.51	0.68	0.80	0.96	1.13	0.81	1.06	1.25	1.51	1.79	1.39	1.80	2.14	2.57	3.06
5.5	3.0	0.97	1.15	1.29	1.47	1.64	0.71	0.87	0.98	1.14	1.30	1.15	1.41	1.58	1.83	2.09	2.03	2.45	2.76	3.16	3.63
5.5	3.5	0.83	1.01	1.14	1.32	1.50	0.63	0.78	0.90	1.05	1.20	1.02	1.26	1.44	1.68	1.93	1.77	2.18	2.49	2.90	3.35
5.5	4.0	0.72	0.90	1.04	1.20	1.38	0.57	0.72	0.83	0.97	1.12	0.91	1.14	1.32	1.56	1.79	1.58	1.96	2.27	2.68	3.11
5.5	4.5	0.66	0.83	0.96	1.12	1.30	0.53	0.67	0.78	0.93	1.07	0.84	1.06	1.24	1.47	1.71	1.45	1.83	2.12	2.53	2.96
5.5	5.0	0.62	0.78	0.90	1.06	1.23	0.49	0.63	0.74	0.89	1.03	0.79	1.00	1.17	1.41	1.64	1.35	1.72	2.01	2.40	2.83
5.5	5.5	0.58	0.73	0.85	1.01	1.17	0.46	0.60	0.71	0.85	0.99	0.74	0.95	1.12	1.34	1.58	1.26	1.61	1.91	2.28	2.71
5.5	6.0	0.55	0.70	0.82	0.98	1.14	0.44	0.58	0.69	0.83	0.97	0.71	0.92	1.08	1.30	1.54	1.21	1.56	1.85	2.22	2.63
6.0	3.0	0.89	1.05	1.16	1.32	1.46	0.64	0.77	0.87	1.00	1.14	1.03	1.27	1.40	1.62	1.84	1.85	2.21	2.46	2.79	3.20
6.0	3.5	0.77	0.92	1.03	1.19	1.34	0.57	0.70	0.80	0.93	1.06	0.92	1.13	1.28	1.49	1.70	1.62	1.97	2.23	2.57	2.96
6.0	4.0	0.67	0.82	0.94	1.08	1.24	0.51	0.64	0.74	0.86	0.99	0.83	1.03	1.18	1.38	1.59	1.44	1.78	2.04	2.39	2.76
6.0	4.5	0.60	0.74	0.86	0.99	1.14	0.47	0.59	0.69	0.81	0.93	0.75	0.94	1.09	1.29	1.49	1.30	1.62	1.87	2.22	2.58
6.0	5.0	0.56	0.70	0.81	0.94	1.09	0.44	0.56	0.66	0.78	0.89	0.70	0.89	1.04	1.23	1.43	1.22	1.53	1.78	2.12	2.48
6.0	5.5	0.52	0.66	0.76	0.90	1.04	0.41	0.53	0.63	0.75	0.86	0.66	0.84	0.99	1.18	1.38	1.14	1.44	1.69	2.02	2.38
6.0	6.0	0.49	0.62	0.72	0.86	0.99	0.39	0.51	0.60	0.72	0.83	0.62	0.80	0.94	1.13	1.34	1.07	1.36	1.61	1.93	2.29
6.5	3.0	0.84	0.98	1.08	1.22	1.35	0.60	0.71	0.80	0.92	1.04	0.97	1.17	1.30	1.48	1.68	1.74	2.04	2.28	2.57	2.93
6.5	3.5	0.72	0.85	0.94	1.08	1.20	0.52	0.63	0.71	0.82	0.94	0.84	1.03	1.15	1.33	1.52	1.49	1.79	2.02	2.30	2.64
6.5	4.0	0.63	0.76	0.85	0.98	1.11	0.47	0.58	0.66	0.77	0.88	0.76	0.93	1.06	1.24	1.42	1.32	1.62	1.85	2.14	2.47
6.5	4.5	0.56	0.68	0.78	0.90	1.03	0.43	0.53	0.62	0.72	0.83	0.69	0.85	0.99	1.16	1.33	1.20	1.48	1.70	2.00	2.31
6.5	5.0	0.51	0.63	0.73	0.84	0.97	0.40	0.50	0.58	0.68	0.79	0.63	0.79	0.92	1.09	1.26	1.10	1.37	1.58	1.88	2.19
6.5	5.5	0.48	0.59	0.69	0.80	0.93	0.37	0.48	0.56	0.66	0.76	0.59	0.75	0.88	1.05	1.22	1.03	1.30	1.51	1.80	2.11
6.5	6.0	0.45	0.56	0.65	0.77	0.89	0.35	0.45	0.53	0.64	0.74	0.56	0.72	0.84	1.01	1.18	0.97	1.23	1.44	1.72	2.03
7.0	3.0	0.79	0.92	1.01	1.14	1.25	0.56	0.66	0.74	0.84	0.95	0.91	1.09	1.21	1.37	1.54	1.64	1.90	2.12	2.39	2.70
7.0	3.5	0.67	0.78	0.86	0.99	1.09	0.48	0.57	0.64	0.74	0.84	0.77	0.94	1.04	1.19	1.36	1.38	1.64	1.83	2.07	2.37
7.0	4.0	0.59	0.70	0.78	0.90	1.01	0.43	0.53	0.60	0.69	0.79	0.70	0.85	0.96	1.11	1.27	1.23	1.49	1.69	1.93	2.22
7.0	4.5	0.52	0.63	0.72	0.83	0.94	0.39	0.49	0.56	0.65	0.75	0.63	0.78	0.90	1.04	1.20	1.11	1.36	1.56	1.81	2.09
7.0	5.0	0.47	0.58	0.67	0.77	0.88	0.36	0.45	0.52	0.61	0.70	0.58	0.72	0.84	0.98	1.13	1.01	1.25	1.44	1.70	1.97
7.0	5.5	0.44	0.54	0.62	0.72	0.83	0.34	0.43	0.50	0.59	0.68	0.54	0.68	0.79	0.94	1.08	0.94	1.18	1.36	1.61	1.88
7.0	6.0	0.41	0.51	0.59	0.69	0.80	0.32	0.41	0.48	0.57	0.66	0.51	0.65	0.76	0.90	1.05	0.89	1.12	1.30	1.55	1.81
7.5	3.0	0.75	0.88	0.94	1.07	1.17	0.52	0.62	0.69	0.78	0.88	0.87	1.02	1.13	1.27	1.43	1.55	1.78	1.99	2.22	2.51
7.5	3.5	0.64	0.74	0.81	0.92	1.01	0.45	0.53	0.60	0.69	0.78	0.73	0.88	0.97	1.11	1.26	1.30	1.54	1.72	1.93	2.20
7.5	4.0	0.56	0.65	0.72	0.83	0.92	0.40	0.48	0.54	0.63	0.71	0.64	0.78	0.88	1.01	1.15	1.14	1.37	1.55	1.75	2.01
7.5	4.5	0.49	0.59	0.66	0.76	0.86	0.36	0.45	0.51	0.59	0.67	0.59	0.72	0.82	0.95	1.09	1.03	1.25	1.43	1.65	1.89
7.5	5.0	0.44	0.54	0.61	0.71	0.81	0.33	0.42	0.48	0.56	0.64	0.54	0.67	0.77	0.89	1.03	0.94	1.16	1.33	1.55	1.79
7.5	5.5	0.40	0.50	0.57	0.66	0.76	0.31	0.39	0.45	0.53	0.61	0.49	0.62	0.72	0.85	0.98	0.87	1.08	1.24	1.46	1.69
7.5	6.0	0.38	0.47	0.54	0.63	0.72	0.29	0.37	0.43	0.51	0.59	0.47	0.59	0.69	0.81	0.94	0.82	1.02	1.18	1.40	1.63
8.0	3.0	0.71	0.84	0.89	1.01	1.10	0.49	0.58	0.64	0.73	0.81	0.83	0.96	1.06	1.19	1.32	1.48	1.67	1.87	2.08	2.33
8.0	3.5	0.60	0.70	0.76	0.87	0.95	0.42	0.50	0.56	0.64	0.72	0.69	0.83	0.91	1.04	1.17	1.24	1.44	1.61	1.81	2.05
8.0	4.0	0.53	0.61	0.66	0.76	0.84	0.37	0.44	0.49	0.57	0.65	0.60	0.72	0.80	0.92	1.05	1.07	1.27	1.42	1.60	1.83
8.0	4.5	0.47	0.55	0.61	0.71	0.79	0.33	0.41	0.46	0.54	0.61	0.55	0.67	0.75	0.87	0.99	0.96	1.16	1.32	1.51	1.73
8.0	5.0	0.42	0.51	0.57	0.66	0.74	0.31	0.38	0.44	0.51	0.58	0.50	0.62	0.70	0.82	0.94	0.88	1.07	1.23	1.42	1.63
8.0	5.5	0.38	0.47	0.53	0.61	0.70	0.29	0.36	0.41	0.48	0.55	0.46	0.57	0.66	0.78	0.89	0.81	1.00	1.15	1.35	1.55
8.0	6.0	0.35	0.44	0.50	0.57	0.66	0.27	0.34	0.39	0.46	0.53	0.43	0.54	0.62	0.74	0.85	0.76	0.94	1.08	1.27	1.48

102 Brick — Water absorption = 7-12%
Brickforce reinforcement at 450 centres

Design case — Panel size

100 Block — Compressive strength = 3.5 N/mm²
Brickforce reinforcement at 450 centres

140 Block — Compressive strength = 3.5 N/mm²
Brickforce reinforcement at 450 centres

215 collar jointed wall (see notes) — Compressive strength = 3.5 N/mm²
Bricktie reinforcement at 450 centres

BF 30 W 60	BF 35 W 60	BF 40 W 60	BF 45 W 60	BF 50 W 60	L (m)	H (m)	BF 30 W 60	BF 35 W 60	BF 40 W 60	BF 45 W 60	BF 50 W 60	BF 30 W 100	BF 35 W 100	BF 40 W 100	BF 45 W 100	BF 50 W 100	CF 30 W 175	CF 35 W 175	CF 40 W 175	CF 45 W 175	CF 50 W 175
0.48	0.55	0.59	0.65	0.71	5.0	3.0	0.33	0.38	0.41	0.45	0.50	0.55	0.63	0.69	0.75	0.82	0.97	1.11	1.21	1.33	1.47
0.40	0.46	0.50	0.55	0.60	5.0	3.5	0.27	0.32	0.35	0.39	0.43	0.46	0.53	0.58	0.64	0.71	0.81	0.94	1.03	1.14	1.26
0.35	0.40	0.44	0.48	0.53	5.0	4.0	0.24	0.28	0.31	0.35	0.38	0.39	0.46	0.51	0.57	0.63	0.70	0.82	0.90	1.00	1.12
0.30	0.35	0.39	0.43	0.48	5.0	4.5	0.21	0.25	0.28	0.31	0.35	0.35	0.41	0.46	0.51	0.57	0.62	0.73	0.81	0.91	1.01
0.27	0.32	0.35	0.39	0.44	5.0	5.0	0.19	0.23	0.25	0.29	0.32	0.31	0.37	0.41	0.47	0.52	0.55	0.65	0.73	0.83	0.93
0.25	0.29	0.32	0.37	0.41	5.0	5.5	0.17	0.21	0.24	0.27	0.30	0.29	0.34	0.38	0.44	0.49	0.51	0.60	0.68	0.77	0.87
0.23	0.27	0.30	0.34	0.38	5.0	6.0	0.16	0.20	0.22	0.25	0.28	0.26	0.32	0.36	0.41	0.46	0.47	0.56	0.63	0.72	0.82
0.45	0.51	0.55	0.61	0.66	5.5	3.0	0.30	0.35	0.38	0.41	0.45	0.51	0.58	0.64	0.69	0.75	0.91	1.03	1.12	1.23	1.35
0.38	0.43	0.46	0.51	0.56	5.5	3.5	0.25	0.29	0.32	0.36	0.39	0.42	0.49	0.53	0.59	0.65	0.76	0.87	0.95	1.05	1.16
0.32	0.37	0.40	0.44	0.49	5.5	4.0	0.22	0.25	0.28	0.31	0.34	0.36	0.42	0.46	0.51	0.57	0.65	0.75	0.82	0.91	1.01
0.28	0.32	0.36	0.40	0.44	5.5	4.5	0.19	0.23	0.25	0.28	0.31	0.32	0.37	0.41	0.46	0.51	0.57	0.67	0.74	0.82	0.91
0.25	0.29	0.32	0.36	0.40	5.5	5.0	0.17	0.21	0.23	0.26	0.29	0.29	0.34	0.38	0.42	0.47	0.51	0.60	0.67	0.75	0.84
0.23	0.27	0.29	0.33	0.37	5.5	5.5	0.16	0.19	0.21	0.24	0.27	0.26	0.31	0.34	0.39	0.44	0.46	0.55	0.61	0.69	0.77
0.21	0.25	0.27	0.31	0.34	5.5	6.0	0.15	0.18	0.20	0.22	0.25	0.24	0.29	0.32	0.37	0.41	0.43	0.51	0.57	0.65	0.73
0.43	0.48	0.52	0.57	0.61	6.0	3.0	0.29	0.33	0.35	0.38	0.42	0.48	0.54	0.59	0.64	0.69	0.86	0.96	1.05	1.14	1.24
0.36	0.40	0.43	0.48	0.52	6.0	3.5	0.24	0.27	0.30	0.33	0.36	0.40	0.45	0.50	0.55	0.59	0.71	0.81	0.88	0.97	1.07
0.30	0.35	0.38	0.41	0.45	6.0	4.0	0.20	0.24	0.26	0.29	0.31	0.34	0.39	0.43	0.48	0.52	0.61	0.70	0.77	0.85	0.93
0.27	0.30	0.33	0.37	0.40	6.0	4.5	0.18	0.21	0.23	0.26	0.28	0.30	0.35	0.38	0.42	0.47	0.53	0.62	0.68	0.75	0.83
0.24	0.27	0.30	0.33	0.37	6.0	5.0	0.16	0.19	0.21	0.24	0.26	0.27	0.31	0.34	0.39	0.43	0.47	0.55	0.61	0.69	0.76
0.21	0.25	0.27	0.30	0.34	6.0	5.5	0.15	0.17	0.19	0.22	0.24	0.24	0.28	0.32	0.36	0.40	0.43	0.51	0.56	0.63	0.71
0.20	0.23	0.25	0.28	0.31	6.0	6.0	0.13	0.16	0.18	0.20	0.22	0.22	0.26	0.29	0.33	0.37	0.39	0.46	0.52	0.59	0.66
0.41	0.46	0.49	0.53	0.58	6.5	3.0	0.27	0.31	0.33	0.36	0.39	0.46	0.51	0.56	0.60	0.65	0.82	0.91	0.99	1.07	1.17
0.34	0.38	0.41	0.45	0.49	6.5	3.5	0.22	0.26	0.28	0.30	0.33	0.38	0.43	0.47	0.51	0.55	0.67	0.76	0.83	0.91	0.99
0.29	0.33	0.35	0.39	0.42	6.5	4.0	0.19	0.22	0.24	0.27	0.29	0.32	0.37	0.40	0.44	0.48	0.57	0.66	0.72	0.79	0.87
0.25	0.28	0.31	0.34	0.37	6.5	4.5	0.17	0.19	0.21	0.24	0.26	0.28	0.32	0.35	0.39	0.43	0.50	0.58	0.63	0.70	0.77
0.22	0.25	0.28	0.31	0.34	6.5	5.0	0.15	0.17	0.19	0.22	0.24	0.25	0.29	0.32	0.35	0.39	0.44	0.52	0.57	0.63	0.70
0.20	0.23	0.25	0.28	0.31	6.5	5.5	0.14	0.16	0.18	0.20	0.22	0.23	0.26	0.29	0.33	0.36	0.40	0.47	0.52	0.58	0.65
0.18	0.21	0.23	0.26	0.29	6.5	6.0	0.12	0.15	0.16	0.18	0.21	0.21	0.24	0.27	0.30	0.34	0.37	0.43	0.48	0.54	0.60
0.40	0.44	0.47	0.51	0.55	7.0	3.0	0.26	0.29	0.31	0.34	0.36	0.44	0.49	0.53	0.57	0.61	0.78	0.87	0.94	1.01	1.10
0.33	0.36	0.39	0.42	0.46	7.0	3.5	0.21	0.24	0.26	0.28	0.31	0.36	0.40	0.44	0.48	0.51	0.64	0.72	0.78	0.85	0.93
0.27	0.31	0.33	0.37	0.40	7.0	4.0	0.18	0.21	0.23	0.25	0.27	0.30	0.35	0.38	0.41	0.45	0.54	0.62	0.68	0.74	0.81
0.24	0.27	0.29	0.32	0.35	7.0	4.5	0.16	0.18	0.20	0.22	0.24	0.27	0.30	0.33	0.37	0.40	0.47	0.54	0.60	0.66	0.72
0.21	0.24	0.26	0.29	0.32	7.0	5.0	0.14	0.16	0.18	0.20	0.22	0.24	0.27	0.30	0.33	0.37	0.42	0.49	0.53	0.59	0.65
0.20	0.22	0.25	0.27	0.30	7.0	5.5	0.13	0.15	0.17	0.18	0.20	0.21	0.25	0.27	0.30	0.34	0.38	0.44	0.49	0.54	0.60
0.17	0.20	0.22	0.24	0.27	7.0	6.0	0.12	0.14	0.15	0.17	0.19	0.19	0.23	0.25	0.28	0.31	0.35	0.40	0.45	0.50	0.56
0.38	0.42	0.45	0.48	0.52	7.5	3.0	0.25	0.28	0.30	0.32	0.34	0.42	0.46	0.50	0.54	0.58	0.75	0.83	0.89	0.96	1.05
0.31	0.35	0.37	0.40	0.44	7.5	3.5	0.20	0.23	0.25	0.27	0.29	0.34	0.38	0.42	0.45	0.49	0.62	0.69	0.74	0.81	0.88
0.26	0.30	0.32	0.35	0.38	7.5	4.0	0.17	0.20	0.21	0.23	0.25	0.29	0.33	0.36	0.39	0.42	0.52	0.59	0.64	0.70	0.76
0.23	0.26	0.28	0.31	0.33	7.5	4.5	0.15	0.17	0.19	0.21	0.23	0.25	0.29	0.31	0.35	0.38	0.45	0.52	0.56	0.62	0.68
0.20	0.23	0.25	0.27	0.30	7.5	5.0	0.13	0.15	0.17	0.19	0.20	0.22	0.26	0.28	0.31	0.34	0.40	0.46	0.50	0.56	0.61
0.18	0.21	0.23	0.25	0.27	7.5	5.5	0.12	0.14	0.15	0.17	0.19	0.20	0.23	0.25	0.28	0.31	0.36	0.42	0.46	0.51	0.56
0.16	0.19	0.21	0.23	0.25	7.5	6.0	0.11	0.13	0.14	0.16	0.17	0.18	0.21	0.23	0.26	0.29	0.33	0.38	0.42	0.47	0.52
0.37	0.41	0.43	0.46	0.50	8.0	3.0	0.24	0.26	0.28	0.31	0.33	0.41	0.45	0.48	0.52	0.55	0.73	0.80	0.85	0.92	1.00
0.30	0.33	0.36	0.38	0.41	8.0	3.5	0.19	0.22	0.24	0.26	0.28	0.33	0.37	0.40	0.43	0.46	0.59	0.66	0.71	0.77	0.84
0.26	0.28	0.30	0.33	0.36	8.0	4.0	0.16	0.19	0.20	0.22	0.24	0.28	0.31	0.34	0.37	0.40	0.50	0.56	0.61	0.67	0.72
0.22	0.25	0.27	0.29	0.31	8.0	4.5	0.14	0.16	0.18	0.20	0.21	0.24	0.27	0.30	0.33	0.36	0.43	0.49	0.54	0.59	0.64
0.19	0.22	0.24	0.26	0.28	8.0	5.0	0.13	0.15	0.16	0.18	0.20	0.21	0.24	0.27	0.29	0.32	0.38	0.44	0.48	0.53	0.58
0.17	0.20	0.21	0.24	0.26	8.0	5.5	0.12	0.13	0.14	0.16	0.18	0.19	0.22	0.24	0.27	0.29	0.34	0.39	0.43	0.48	0.53
0.16	0.18	0.20	0.22	0.24	8.0	6.0	0.10	0.12	0.13	0.15	0.16	0.17	0.20	0.22	0.24	0.27	0.31	0.36	0.40	0.44	0.48

Design case

| Panel size		102 Brick — Water absorption = 7-12% — Brickforce reinforcement at 450 centres					100 Block — Compressive strength = 3.5 N/mm² — Brickforce reinforcement at 450 centres					140 Block — Compressive strength = 3.5 N/mm² — Brickforce reinforcement at 450 centres					215 collar jointed wall (see notes) — Compressive strength = 3.5 N/mm² — Bricktie reinforcement at 450 centres				
L (m)	H (m)	BF 30 W 60	BF 35 W 60	BF 40 W 60	BF 45 W 60	BF 50 W 60	BF 30 W 60	BF 35 W 60	BF 40 W 60	BF 45 W 60	BF 50 W 60	BF 30 W 100	BF 35 W 100	BF 40 W 100	BF 45 W 100	BF 50 W 100	CF 30 W 175	CF 35 W 175	CF 40 W 175	CF 45 W 175	CF 50 W 175
5.0	3.0	0.63	0.70	0.75	0.82	0.87	0.41	0.47	0.51	0.56	0.60	0.69	0.79	0.84	0.93	1.01	1.23	1.40	1.51	1.64	1.82
5.0	3.5	0.52	0.58	0.63	0.69	0.74	0.34	0.39	0.43	0.47	0.51	0.57	0.66	0.71	0.79	0.86	1.02	1.17	1.27	1.39	1.54
5.0	4.0	0.44	0.50	0.54	0.60	0.65	0.29	0.34	0.37	0.42	0.45	0.49	0.57	0.62	0.69	0.75	0.88	1.01	1.11	1.22	1.35
5.0	4.5	0.39	0.44	0.48	0.53	0.58	0.26	0.30	0.33	0.37	0.41	0.43	0.50	0.55	0.61	0.68	0.77	0.89	0.99	1.09	1.21
5.0	5.0	0.34	0.39	0.43	0.48	0.53	0.23	0.27	0.30	0.34	0.37	0.39	0.45	0.50	0.56	0.62	0.69	0.80	0.89	0.99	1.10
5.0	5.5	0.31	0.36	0.40	0.44	0.49	0.21	0.25	0.28	0.31	0.35	0.35	0.41	0.46	0.51	0.58	0.62	0.73	0.81	0.92	1.02
5.0	6.0	0.28	0.33	0.36	0.41	0.45	0.19	0.23	0.26	0.29	0.33	0.32	0.38	0.42	0.48	0.54	0.57	0.67	0.75	0.85	0.95
5.5	3.0	0.60	0.65	0.70	0.77	0.81	0.39	0.43	0.47	0.52	0.56	0.65	0.74	0.78	0.86	0.93	1.16	1.31	1.40	1.52	1.68
5.5	3.5	0.49	0.54	0.58	0.64	0.69	0.32	0.36	0.39	0.44	0.47	0.54	0.61	0.66	0.73	0.79	0.96	1.09	1.18	1.29	1.42
5.5	4.0	0.42	0.46	0.50	0.55	0.60	0.27	0.31	0.34	0.38	0.41	0.46	0.53	0.57	0.63	0.69	0.82	0.93	1.02	1.12	1.23
5.5	4.5	0.36	0.41	0.45	0.49	0.53	0.24	0.28	0.30	0.34	0.37	0.40	0.46	0.51	0.56	0.62	0.71	0.82	0.91	1.00	1.10
5.5	5.0	0.32	0.36	0.40	0.44	0.48	0.21	0.25	0.27	0.31	0.34	0.36	0.41	0.46	0.51	0.56	0.64	0.74	0.82	0.91	1.00
5.5	5.5	0.29	0.33	0.36	0.40	0.44	0.19	0.23	0.25	0.28	0.31	0.32	0.38	0.42	0.46	0.52	0.58	0.67	0.74	0.83	0.92
5.5	6.0	0.26	0.30	0.33	0.37	0.41	0.18	0.21	0.23	0.26	0.29	0.30	0.35	0.38	0.43	0.48	0.53	0.62	0.69	0.77	0.86
6.0	3.0	0.57	0.62	0.67	0.72	0.76	0.37	0.41	0.44	0.48	0.51	0.62	0.69	0.73	0.80	0.86	1.11	1.23	1.32	1.42	1.57
6.0	3.5	0.47	0.51	0.55	0.60	0.64	0.30	0.34	0.37	0.41	0.44	0.51	0.57	0.61	0.68	0.73	0.90	1.02	1.11	1.20	1.32
6.0	4.0	0.39	0.44	0.47	0.52	0.56	0.26	0.29	0.32	0.35	0.38	0.43	0.49	0.53	0.58	0.64	0.77	0.87	0.96	1.04	1.15
6.0	4.5	0.34	0.38	0.41	0.46	0.49	0.22	0.26	0.28	0.31	0.34	0.37	0.43	0.47	0.52	0.56	0.67	0.77	0.84	0.92	1.01
6.0	5.0	0.30	0.34	0.37	0.41	0.45	0.20	0.23	0.25	0.28	0.31	0.33	0.38	0.42	0.47	0.52	0.60	0.69	0.76	0.84	0.92
6.0	5.5	0.27	0.31	0.34	0.37	0.41	0.18	0.21	0.23	0.26	0.28	0.30	0.35	0.38	0.43	0.47	0.54	0.62	0.69	0.76	0.84
6.0	6.0	0.25	0.28	0.31	0.34	0.38	0.16	0.19	0.21	0.24	0.26	0.27	0.32	0.35	0.39	0.44	0.49	0.57	0.63	0.70	0.78
6.5	3.0	0.55	0.59	0.63	0.68	0.72	0.35	0.38	0.41	0.45	0.48	0.59	0.66	0.69	0.76	0.81	1.06	1.17	1.25	1.34	1.47
6.5	3.5	0.45	0.49	0.52	0.57	0.60	0.29	0.32	0.34	0.38	0.41	0.48	0.54	0.58	0.63	0.68	0.86	0.97	1.04	1.12	1.24
6.5	4.0	0.38	0.41	0.45	0.49	0.52	0.24	0.27	0.30	0.33	0.35	0.41	0.46	0.50	0.55	0.59	0.73	0.83	0.90	0.97	1.07
6.5	4.5	0.32	0.36	0.39	0.43	0.46	0.21	0.24	0.26	0.29	0.31	0.35	0.40	0.44	0.48	0.53	0.63	0.72	0.79	0.86	0.95
6.5	5.0	0.29	0.32	0.35	0.38	0.42	0.19	0.22	0.23	0.26	0.28	0.31	0.36	0.39	0.43	0.48	0.56	0.64	0.71	0.78	0.85
6.5	5.5	0.26	0.29	0.32	0.35	0.38	0.17	0.20	0.21	0.24	0.26	0.28	0.33	0.36	0.39	0.44	0.51	0.58	0.64	0.71	0.78
6.5	6.0	0.23	0.27	0.29	0.32	0.35	0.15	0.18	0.20	0.22	0.24	0.26	0.30	0.33	0.36	0.41	0.46	0.53	0.59	0.65	0.72
7.0	3.0	0.53	0.57	0.61	0.65	0.68	0.33	0.37	0.39	0.43	0.46	0.56	0.63	0.66	0.72	0.77	1.02	1.12	1.19	1.28	1.40
7.0	3.5	0.44	0.47	0.50	0.54	0.57	0.27	0.30	0.32	0.36	0.38	0.46	0.51	0.54	0.60	0.64	0.83	0.92	0.99	1.06	1.17
7.0	4.0	0.36	0.39	0.42	0.46	0.49	0.23	0.26	0.28	0.31	0.33	0.39	0.44	0.47	0.51	0.56	0.69	0.78	0.85	0.92	1.01
7.0	4.5	0.31	0.34	0.37	0.40	0.43	0.20	0.23	0.25	0.27	0.29	0.34	0.38	0.41	0.45	0.49	0.60	0.68	0.75	0.81	0.89
7.0	5.0	0.27	0.30	0.33	0.36	0.39	0.18	0.20	0.22	0.24	0.26	0.30	0.34	0.37	0.40	0.44	0.53	0.61	0.67	0.73	0.80
7.0	5.5	0.24	0.27	0.30	0.33	0.36	0.16	0.18	0.20	0.22	0.24	0.27	0.31	0.33	0.37	0.41	0.48	0.55	0.60	0.66	0.73
7.0	6.0	0.22	0.25	0.27	0.30	0.33	0.14	0.17	0.18	0.20	0.22	0.24	0.28	0.31	0.34	0.38	0.44	0.50	0.55	0.61	0.67
7.5	3.0	0.51	0.55	0.58	0.62	0.66	0.32	0.35	0.37	0.41	0.43	0.54	0.60	0.63	0.69	0.73	0.98	1.08	1.14	1.22	1.33
7.5	3.5	0.42	0.45	0.48	0.52	0.54	0.26	0.29	0.31	0.34	0.36	0.44	0.49	0.52	0.57	0.61	0.79	0.88	0.94	1.01	1.11
7.5	4.0	0.35	0.38	0.41	0.44	0.47	0.22	0.25	0.26	0.29	0.31	0.37	0.42	0.44	0.49	0.53	0.67	0.75	0.81	0.87	0.95
7.5	4.5	0.30	0.33	0.35	0.38	0.41	0.19	0.22	0.23	0.26	0.28	0.32	0.36	0.39	0.43	0.47	0.57	0.65	0.71	0.76	0.84
7.5	5.0	0.26	0.29	0.31	0.34	0.37	0.17	0.19	0.21	0.23	0.25	0.28	0.32	0.35	0.38	0.42	0.51	0.58	0.63	0.69	0.75
7.5	5.5	0.23	0.26	0.28	0.31	0.34	0.15	0.17	0.19	0.21	0.23	0.25	0.29	0.31	0.35	0.38	0.45	0.52	0.57	0.62	0.68
7.5	6.0	0.21	0.24	0.26	0.28	0.31	0.14	0.16	0.17	0.19	0.21	0.23	0.26	0.29	0.32	0.35	0.41	0.47	0.52	0.57	0.63
8.0	3.0	0.50	0.54	0.56	0.60	0.63	0.31	0.34	0.36	0.39	0.41	0.53	0.58	0.61	0.66	0.70	0.96	1.04	1.10	1.17	1.27
8.0	3.5	0.40	0.43	0.46	0.49	0.52	0.25	0.28	0.30	0.32	0.34	0.43	0.47	0.50	0.54	0.58	0.77	0.85	0.90	0.97	1.06
8.0	4.0	0.34	0.36	0.39	0.42	0.44	0.21	0.23	0.25	0.28	0.30	0.36	0.40	0.42	0.46	0.50	0.64	0.72	0.77	0.82	0.91
8.0	4.5	0.29	0.31	0.34	0.37	0.39	0.18	0.20	0.22	0.24	0.26	0.31	0.35	0.37	0.40	0.44	0.55	0.62	0.68	0.73	0.79
8.0	5.0	0.25	0.28	0.30	0.33	0.35	0.16	0.18	0.20	0.22	0.23	0.27	0.31	0.33	0.36	0.40	0.49	0.55	0.60	0.65	0.71
8.0	5.5	0.22	0.25	0.27	0.29	0.32	0.14	0.16	0.18	0.20	0.21	0.24	0.27	0.30	0.33	0.36	0.43	0.49	0.54	0.59	0.64
8.0	6.0	0.20	0.23	0.25	0.27	0.29	0.13	0.15	0.16	0.18	0.19	0.22	0.25	0.27	0.30	0.33	0.39	0.45	0.49	0.54	0.59

Panels with openings

As an alternative to using additional supports such as windposts to cope with doors and windows in masonry panels, it is possible in the majority of situations to use Brickforce® in the bed joints to enhance the wind load capacity of the panel. This is generally a far more cost-effective solution.
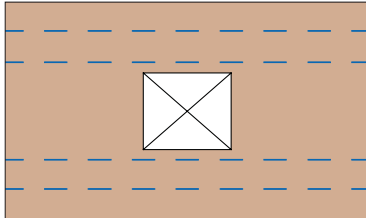

Panel designed with bands of Brickforce® above and below window, carrying wind load from central window band.
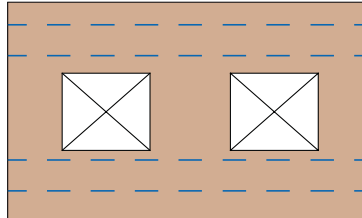
If masonry between windows can span vertically the depth of the window (carrying wind load from adjacent windows), the panel may be designed with bands of Brickforce® above and below.
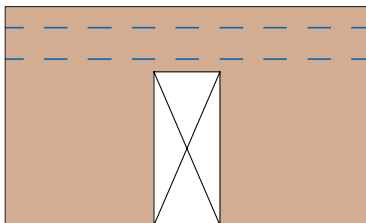
Panel designed with a band of Brickforce® over the door, carrying wind load from panel below. It is advisable to check the panel at the side of the door, although in most cases it has sufficient capacity unreinforced.
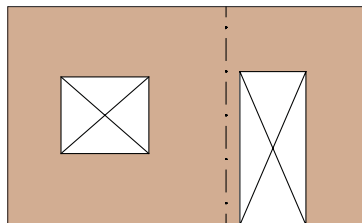
Invariably in this situation a support is required adjacent to the door, and the panel divided into sub-panels.

It should also be noted that the Brickforce®, which initially has been designed to carry the lateral wind loading, will also provide crack control for the openings

Typical window and door panel solutions

The following examples have been produced to demonstrate the capacity and flexibility of the Brickforce® range and certain assumptions have been made.

✔ **Outer leaf brickwork:**
- 7%-12% water absorption.
- 20 N/mm2 compressive strength.
- 2,000 Kg/m2 density.

✔ **Inner leaf blockwork:**
- 3.5 N/mm2 compressive strength
- 1,450 Kg/m2 density.

✔ Mortar designation: (iii)

✔ Characteristic tensile strength of steel: 500 N/mm2.

✔ Window assumed in middle third of panel.

✔ Door assumed in middle third of panel.

Note: If the door is outside the middle third, in the majority of cases the panel at the side of the door (2.1 m high) will have sufficient capacity unreinforced, but in extreme cases may require reinforcement. Contact Bekaert Technical Department.

Tables for panels with openings

Typical window panel

Factored lateral load capacities kN/m^2										
Wall makeup-102/Cavity/1OO With Brickforce® in both leaves at 225 centres						Wall makeup-102/Cavity/14O With Brickforce® in both leaves at 225 centres				
SBF30 W60	SBF35 W60	SBF40 W60	SBF45 W60	SBF50 W60	length of panel (X)	SBF30 W100	SBF35 W100	SBF40 W100	SBF45 W100	SBF50 W100
1.76	2.27	2.64	3.10	3.53	3,000	2.24	2.89	3.37	3.97	4.56
1.25	1.56	1.78	2.05	2.31	4,000	1.60	1.99	2.28	2.64	2.99
1.00	1.20	1.36	1.54	1.72	5,000	1.27	1.54	1.74	1.99	2.22
0.85	1.00	1.12	1.17	1.38	6,000	1.09	1.29	1.43	1.61	1.78
0.75	0.87	0.96	1.07	1.17	7,000	0.97	1.12	1.24	1.38	1.51
0.69	0.79	0.86	0.94	1.02	8,000	0.89	1.01	1.10	1.22	1.32

Typical panel above door

Factored lateral load capacities kN/m^2										
Wall makeup-102/Cavity/1OO With Brickforce® in both leaves over door only at 225 centres						Wall makeup-102/Cavity/14O With Brickforce® in both leaves over door only at 225 centres				
SBF30 W60	SBF35 W60	SBF40 W60	SBF45 W60	SBF50 W60	length of panel (X)	SBF30 W100	SBF35 W100	SBF40 W100	SBF45 W100	SBF50 W100
1.00	1.26	1.46	1.70	1.93	3,000	1.27	1.61	1.86	2.18	2.49
0.68	0.84	0.96	1.10	1.24	4,000	0.86	1.07	1.22	1.41	1.59
0.50	0.62	0.71	0.81	0.90	5,000	0.64	0.80	0.91	1.04	1.16
0.39	0.49	0.56	0.64	0.71	6,000	0.50	0.62	0.71	0.82	0.91
0.32	0.40	0.45	0.52	0.58	7,000	0.41	0.51	0.58	0.66	0.74
0.27	0.34	0.38	0.43	0.48	8,000	0.35	0.43	0.49	0.55	0.62

Typical panel below window
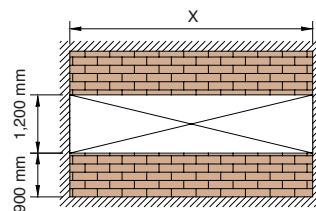
Factored lateral load capacities kN/m^2										
Wall makeup-102/Cavity/100 With Brickforce® in both leaves at 225 centres						Wall makeup-102/Cavity/140 With Brickforce® in both leaves at 225 centres				
SBF30 W60	SBF35 W60	SBF40 W60	SBF45 W60	SBF50 W60	length of panel (X)	SBF30 W100	SBF35 W100	SBF40 W100	SBF45 W100	SBF50 W100
1.47	1.85	2.14	2.49	2.81	3,000	1.86	2.36	2.72	3.18	3.62
1.00	1.24	1.41	1.62	1.81	4,000	1.27	1.58	1.80	2.07	2.34
0.74	0.92	1.05	1.20	1.33	5,000	0.94	1.18	1.34	1.53	1.71
0.58	0.72	0.82	0.94	1.04	6,000	0.74	0.92	1.05	1.21	1.35
0.48	0.59	0.67	0.76	0.85	7,000	0.61	0.75	0.85	0.98	1.09
0.41	0.50	0.56	0.64	0.71	8,000	0.52	0.64	0.72	0.82	0.91

BEKAERT

Design calculations

Typical design of wall panel to resist lateral loading

Where lateral loading occurs, and enhanced resistance to the load is required, bed joint reinforcement should be used as required by Clause A2.4 (Annex A) of BS5628 Part 2:2000. This states that it may be assumed the wall will have enhanced lateral load resistance compared with an unreinforced wall, if reinforcement with a minimum cross sectional area of 14 mm2 is placed at vertical centres not exceeding 450 mm.

It is normally more economic to reinforce a wall to resist horizontal pressure than to provide alternative solutions such as intermediate piers, windposts or an increase in wall thickness.

The following calculations show the design case A5 method 3 from BS5628 Part 2 using a modified orthogonal ratio. To enable this method to be used, bending moment co-efficient tables are also provided on pages 21 to 23.

Consider a panel 6 metres high and 7.5 metres long, simply supported on four sides.

7.5 m

6 m
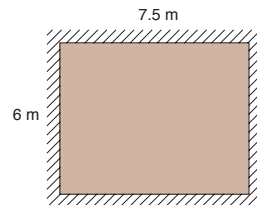
102 brick outer/50 cavity/140 block inner
Wind force unfactored $= 0.50$ kN/mm^2
Factored $= 0.5 \times 1.2$ $= 0.6$ kN/mm^2

Check without reinforcement
Brick compressive strength $= 20$ N/mm^2 Water absorption $= 7\% - 12\%$
Mortar designation $= $ (iii) γm $= 3.0$

Hence:-
Characteristic compressive strength $= 5.8$ N/mm^2
Characteristic flexural strength parallel to bed joint $= 0.4$ N/mm^2
Characteristic flexural strength perpendicular to bed joint $= 1.1$ N/mm^2
WALL PANEL: $\dfrac{H}{L} = \dfrac{6}{7.5} = 0.8$ **Orthogonal ratio $= \dfrac{0.4}{1.1} = 0.36$** $Z = \dfrac{10^3 \times 102^2}{6 \times 10^6}$

From Table 8, Condition 'E', BS5628 Part 1
Allowable $= \dfrac{Md}{\alpha \times L^2}$ where $Md = \dfrac{f_{kx} Z}{\gamma_m}$ $\therefore \alpha (W_k \gamma_f) L^2 = \dfrac{f_{kx} Z}{\gamma_m}$ $\therefore W_k \gamma_f = \dfrac{1.1 \times 10^3 \times 102^2}{3.0 \times 6 \times 10^6 \times 7.5^2 \times 0.05} = 0.21$ kN/m^2
Wind load
Block compressive strength $= 7.0$ N/mm^2
Mortar designation $= $ (iii)
Characteristic compressive strength $= 5.5$ N/mm^2
Characteristic flexural strength parallel to bed joint $= 0.22$ N/mm^2
Characteristic flexural strength perpendicular to bed joint $= 0.53$ N/mm^2
Orthogonal ratio $= \dfrac{0.22}{0.53} = 0.42$ $Z = \dfrac{10^3 \times 140^2}{6 \times 10^6}$

From Table 8, Condition 'E', BS5628 Part 1
$\alpha = 0.05$ $W_k \gamma_f = \dfrac{0.53 \times 10^3 \times 140^2}{3.0 \times 6 \times 10^6 \times 7.5^2 \times 0.05} = 0.21$ kN/m^2

Design strength of cavity wall $= 0.21 + 0.21$ $= 0.42$ kN/m <0.6 kN/m^2

PANEL FAILS

Design calculations

Typical design of wall panel to resist lateral loading

Therefore, we will need to enhance with Brickforce® bed joint reinforcement using A5 method 3 (BS5628 Part 2).

140 inner block

Moment of resistance (vertical) = $\dfrac{f_{kx}Z}{\gamma_m}$ = $\dfrac{.22 \times 3.267 \times 10^6}{3.0 \times 10^6}$ = 0.24 kNm/m

Moment of resistance horizontal (steel using BF50)

(5 mm equivalent diameter wires)

$= \dfrac{As\ f\gamma\ Z}{\gamma ms}$ $z = d\ (1 - 0.5\ As\ f\gamma\ \gamma mm) = \dfrac{}{b\ d\ f_k\ \gamma ms}$ 0.948d (0.95d max)

$= \dfrac{19.64 \times 500 \times 0.948 \times 116}{1.15 \times 10^6}$ As (one wire) = 19.64 mm^2

d = $\dfrac{140}{2} + \dfrac{92}{2}$ = 116 mm

$= 0.939$ kNm $\times \dfrac{1000}{450}$ b = 450 (spacing)

$= 2.09$ kNm/m   fk = 5.5 N/mm^2 (mortar iii)

Modified Orthogonal ratio $\gamma ms = 1.15$

$= \dfrac{0.24}{2.09} = 0.1148$ $\gamma mm = 3.5$

$\dfrac{H}{L} = 0.8$ $f\gamma = 500$ N/mm^2

(See copy table from Handbook to BS5628 Part 2)

$\alpha = 0.078$

Allowable wind strength = $\dfrac{2.09}{0.078 \times 7.5^2}$ **= 0.48 kN/m^2**

Brick leaf remains as previous   **= 0.21 kN/m^2**

Total wind strength = 0.48 + 0.21   **= 0.69**
> 0.6 kN/ m^2 ∴ satisfactory

(diagram: 140 mm, 70 mm, 116 mm, 92 mm)
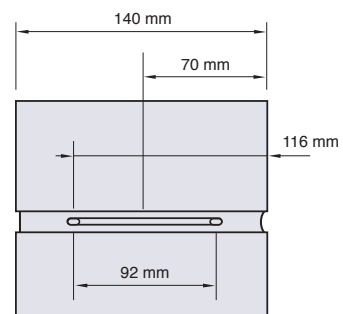
PANEL WORKS Therefore provide Brickforce® SBF50W100 in inner blockwork leaf at 450 centres.

Design tables 1

Bending moment co-efficients in laterally loaded wall panels taken from handbook to bs5628 part 2

Note 1
Linear interpolation of m and H/L is permitted.
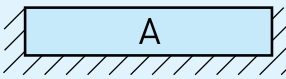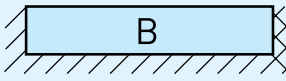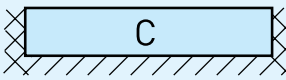
Note 2
When the dimensions of a wall are outside the range of H/L given in this table, it will usually be sufficient to calculate the moments on the basis of a simple span. For example, a panel of Type "A" having H/L less than 0.3 will tend to act as a free-standing wall, whilst the same panel having H/L greater than 1.75 will tend to span horizontally.
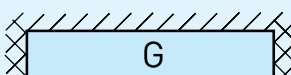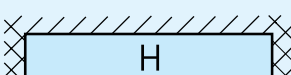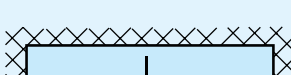
Key to support conditions

////// denotes simply supported edge

——— denotes free edge

XXXXX denotes an edge over which full continuity exists
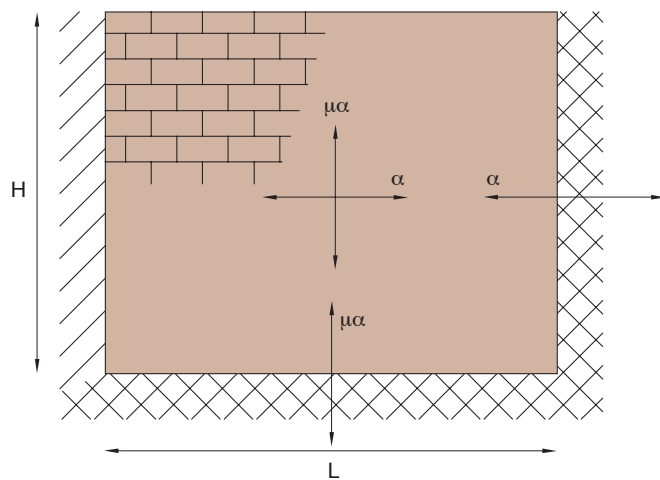
		Values of α						
μ	$\frac{H}{L}$ 0.30	0.50	0.75	1.00	1.25	1.50	1.75
A	0.25	0.050	0.071	0.085	0.094	0.099	0.103	0.106
	0.20	0.054	0.075	0.089	0.097	0.102	0.105	0.108
	0.15	0.060	0.080	0.093	0.100	0.104	0.108	0.110
	0.10	0.069	0.087	0.098	0.104	0.108	0.111	0.113
	0.05	0.082	0.097	0.105	0.110	0.113	0.115	0.116
B	0.25	0.039	0.053	0.062	0.068	0.071	0.073	0.075
	0.20	0.043	0.056	0.065	0.069	0.072	0.074	0.076
	0.15	0.047	0.059	0.067	0.071	0.074	0.076	0.077
	0.10	0.052	0.063	0.070	0.074	0.076	0.078	0.079
	0.05	0.060	0.069	0.074	0.077	0.079	0.080	0.081
C	0.25	0.032	0.042	0.048	0.051	0.053	0.054	0.056
	0.20	0.034	0.043	0.049	0.052	0.054	0.055	0.056
	0.15	0.037	0.046	0.051	0.053	0.055	0.056	0.057
	0.10	0.041	0.048	0.053	0.055	0.056	0.057	0.058
	0.05	0.046	0.052	0.055	0.057	0.058	0.059	0.059

BEKAERT

Design tables 2

	μ	$\frac{H}{L}$ 0.30	0.50	0.75	1.00	1.25	1.50	1.75
Values of α								
D	0.25	0.025	0.035	0.043	0.047	0.050	0.052	0.053
	0.20	0.027	0.038	0.044	0.048	0.051	0.053	0.054
	0.15	0.030	0.040	0.046	0.050	0.052	0.054	0.055
	0.10	0.034	0.043	0.049	0.052	0.054	0.055	0.056
	0.05	0.041	0.048	0.053	0.055	0.056	0.057	0.058
E	0.25	0.023	0.042	0.059	0.071	0.080	0.087	0.091
	0.20	0.026	0.046	0.064	0.076	0.084	0.090	0.095
	0.15	0.032	0.053	0.070	0.081	0.089	0.094	0.098
	0.10	0.039	0.062	0.078	0.088	0.095	0.100	0.103
	0.05	0.054	0.076	0.090	0.098	0.103	0.107	0.109
F	0.25	0.020	0.034	0.046	0.054	0.060	0.063	0.066
	0.20	0.023	0.037	0.049	0.057	0.062	0.066	0.068
	0.15	0.027	0.042	0.053	0.060	0.065	0.068	0.070
	0.10	0.032	0.048	0.058	0.064	0.068	0.071	0.073
	0.05	0.043	0.057	0.066	0.070	0.073	0.075	0.077
G	0.25	0.018	0.028	0.037	0.042	0.046	0.048	0.050
	0.20	0.020	0.031	0.039	0.044	0.047	0.050	0.052
	0.15	0.023	0.034	0.042	0.046	0.049	0.051	0.053
	0.10	0.027	0.038	0.045	0.049	0.052	0.053	0.055
	0.05	0.035	0.044	0.050	0.053	0.055	0.056	0.057
H	0.25	0.014	0.024	0.033	0.039	0.043	0.046	0.048
	0.20	0.016	0.027	0.035	0.041	0.045	0.047	0.049
	0.15	0.019	0.030	0.038	0.043	0.047	0.049	0.051
	0.10	0.023	0.034	0.042	0.047	0.050	0.052	0.053
	0.05	0.031	0.041	0.047	0.051	0.053	0.055	0.056
I	0.25	0.011	0.021	0.030	0.036	0.040	0.043	0.046
	0.20	0.013	0.023	0.032	0.038	0.042	0.045	0.047
	0.15	0.016	0.026	0.035	0.041	0.044	0.047	0.049
	0.10	0.020	0.031	0.039	0.044	0.047	0.050	0.052
	0.05	0.027	0.038	0.045	0.049	0.052	0.053	0.055

Design tables 3

Blackpool Football Club, Blackpool©
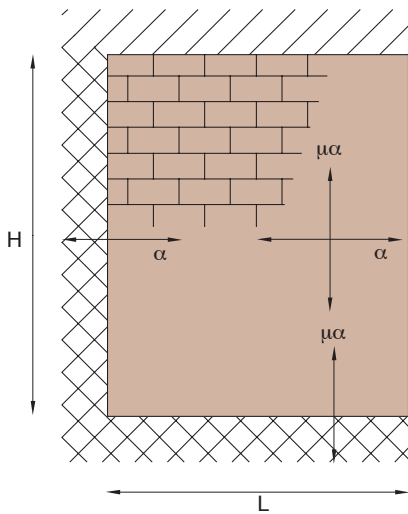
	μ	$\frac{H}{L}$	Values of α						
			0.30	0.50	0.75	1.00	1.25	1.50	1.75
J	0.25		0.032	0.071	0.122	0.180	0.240	0.300	0.362
	0.20		0.038	0.083	0.142	0.208	0.276	0.344	0.413
	0.15		0.048	0.100	0.173	0.250	0.329	0.408	0.488
	0.10		0.065	0.131	0.224	0.321	0.418	0.515	0.613
	0.05		0.106	0.208	0.344	0.482	0.620	0.759	0.898
K	0.25		0.028	0.056	0.091	0.123	0.150	0.174	0.196
	0.20		0.033	0.064	0.103	0.136	0.165	0.190	0.211
	0.15		0.040	0.077	0.119	0.155	0.184	0.210	0.231
	0.10		0.053	0.096	0.144	0.182	0.213	0.238	0.260
	0.05		0.080	0.136	0.190	0.230	0.260	0.286	0.306
L	0.25		0.021	0.044	0.073	0.101	0.127	0.150	0.170
	0.20		0.025	0.052	0.084	0.114	0.141	0.165	0.185
	0.15		0.031	0.061	0.098	0.131	0.159	0.184	0.205
	0.10		0.041	0.078	0.121	0.156	0.186	0.212	0.233
	0.05		0.064	0.114	0.164	0.204	0.235	0.260	0.281

Reinforced masonry lintels & beams

For many years Brickforce® has been successfully used to reinforce masonry lintels over openings. Providing temporary support is used during construction, this method is cost effective as generally only two courses of Brickforce® are required.

In many cases, if Brickforce® is being used for crack control, the lintel is redundant. The anchorage of Brickforce® is far superior to a lintel and a more monolithic structure results.

For walls being built on existing floors Brickforce® can be used to design the wall as a vertical beam, thus reducing the load on the floor and the subsequent deflection, and also protecting against cracking in the wall finish.

Software for masonry lintel/beam design is available on request.

Span of Lintel	Reinforcement Required
1.2 metres	2 courses of SBF35W60
1.5 metres	2 courses of SBF35W60
1.8 metres	2 courses of SBF40W60
2.1 metres	2 courses of SBF40W60
2.4 metres	2 courses of SBF50W60

Note: Assuming lintel is only carrying its self weight. i.e. no floor loads, roof loads etc.
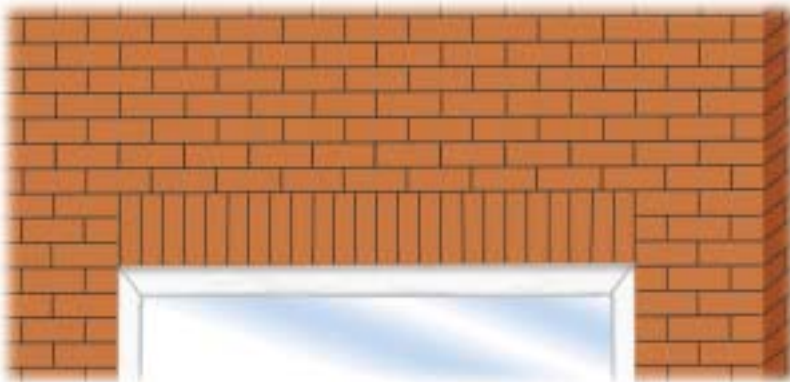
Design advice possible on request

✔ **Laterally loaded panels**
This software will design reinforced and unreinforced, brick and block panels for the range of support conditions shown in BS5628 Part 2 Annex A.

✔ **Serviceability and design**
If more than a 50% increase in the panel capacity is achieved by reinforcing, a check can be made to ensure compliance with BS5628 Part 2 Annex A.

✔ **Lintels and beams**
To demonstrate the effectiveness of using Brickforce® to reinforce masonry lintels and self supporting beams.

@ BEKAERT

Practical hints

Cover in bed joint

20 mm cover
20 mm cover
10 mm bed joint
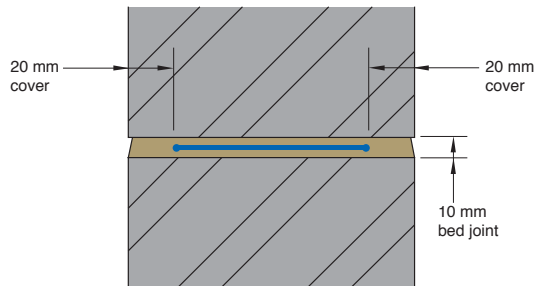
Note: Flattened wires allow wall ties in cavity wall applications to be placed correctly with mortar cover.

Movement joints

20 mm
20 mm
20 mm
20 mm
Joint filler
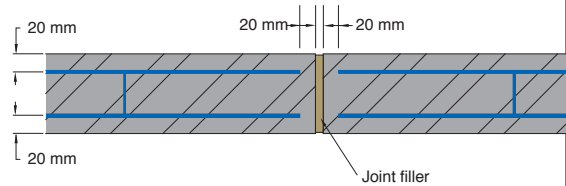
Note: Centres of movement joints may be extended with use of bed joint reinforcement.

Laps

With BRC Brickforce® 225 laps may be achieved in two ways:

(i) Side by side
225 mm lap

(ii) Over and under
225 mm lap
Overall thickness less than 6 mm
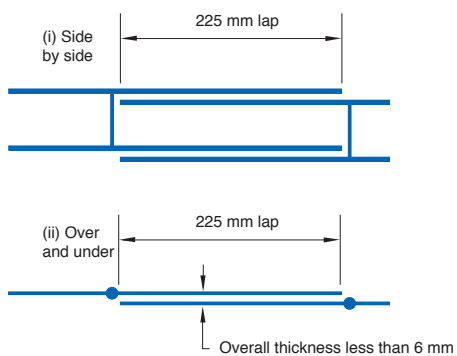
Method (ii) ensures wire cover corresponds with the design.

Positions of laps

225 mm min
Stagger the laps to suit panel sizes
225 mm min
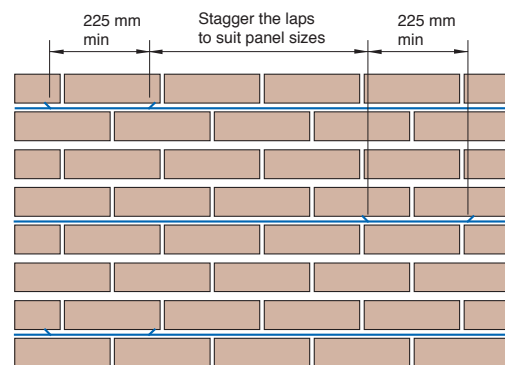
Laps in bed joint reinforcement should always be staggered.

Development, testing and quality control

Brickforce® together with Bekaert's other masonry reinforcement products is manufactured with CARES approval. Our Company Quality Management Systems (QMS) have also received BS EN IS0 9001:2000 recognition.

To assist in product traceability, each strip of Brickforce® is ink jetted at regular intervals along one wire with its reference and a manufacturing code. This ensures that the bricklayer uses the correct product and helps the Engineer to easily check on his specification - ensuring every strip can be traced to the day of manufacture and the original material from which it was made.

Production

Brickforce® is made and then checked to ensure that our reinforcement is in accordance with BS 5628-2 for structural reinforcement and BS EN 845-3 Specification for ancillary components for masonry. We test Brickforce® to BS EN 1002-1:2001 Tensile Testing of Metallic Materials for Structural Reinforcement. Regular daily checks are made on the size, strength, flatness and cross-sectional area of the wire. As the flattening process also elongates the wire and reduces the diameter, the production process is started with a larger diameter wire than required, so after the flattening loss of diameter, the minimum cross sectional area as stated is achieved.

British standards

Bed joint reinforcement is covered by the following British Standards to which Bekaert products conform:

- **BS5628 Part 2**
  Structural bed joint reinforcement (minimum material specification and design requirements).

- **BS5628 Part 3**
  The use of crack control bed joint reinforcement.

- **BS970, BS1554 and BS 10 088**
  Stainless steel as specified in BS5628 Part 2.

- **BS EN 10020 with BS EN 10244 - zinc coating**
  Galvanised steel wire for use in internal walls.

Daily testing of flattened wire

Checking raw material for traceability

Traceability code

Bekaert is committed to a sustainable future.

In addition to producing a range of products which enable the construction industry to create sustainable buildings, Bekaert also endeavours to reduce our own impact on the planet, and are working towards ISO 14001 qualification.

Our current in-house commitments include sourcing of sustainable paper for our printed literature and office use, recycling our office waste, and encouraging the use of energy efficient practices at all of our sites.

In addition to most of our products incorporating a high proportion of recyclable materials, many also make use of material that has already been recycled.

We continually monitor and make strenuous efforts to reduce our use, or requirement for fossil fuels or other natural resources; whether in controlling our working environment, in product packaging or delivering finished goods.

◙ BEKAERT

Product testing

In addition to materials testing during production, as part of our technical development, Bekaert is committed to an on-going testing programme and the following test information is available on request:

1. **Bricktie CF** - Comparison of strength to fish tail wall ties

2. **Bricktie CF** - Full scale fire test for collar jointed (double leaf) wall using Tarmac Topblocks

3. **Bricktor**® - Performance tests for crack control

4. **Brickforce**® - Anchorage values and load carrying capacity

We acknowledge the help of Ceram Building Technology, Stoke-on-Trent, who undertake our product testing.

Fire test of reinforced wall

Test load being applied

Failure of un-reinforced wall

⊚ BEKAERT

Free Brickforce® panel design service

As a leading supplier of masonry reinforcement, we can design masonry panels that provide structural and crack control benefits, whilst ensuring that each panel is designed to the most economical solution. To take advantage of our FREE design service, please complete this form and **fax back to our in-house team of masonry reinforcement Engineers on 0114 242 7490** or post to: **Technical Department, Bekaert Ltd, BU Building Products, The Gateway Business Centre, Unit 7, 5 Leeds Road, GB-Sheffield S9 3TY**

Name & address

Postcode

Project

Type of wall	:	Single leaf/cavity
Brick Width	:	
Strength	:	
Water absorption	:	
Cavity Width	:	
Block Width	:	
Strength	:	
Density (kg/m³)	:	
Lateral load Design or ultimate	:	
Dimensions	:	Add to panel types adjacent
Support conditions	:	Add to panel types adjacent
Partial safety factors	:	$\gamma f = 1.4/1.2$ $\gamma m = 3.0$
Vertical dead load on panel (kN/m)	:	

Date:

Required by:

Contact:

Phone:

Fax:

E-mail:

Plain panel

Window panel

Double window panel

Door panel

Misc. panel add details

@ BEKAERT