

## DESIGN NOTE 7: Characteristic compressive strength of masonry

The following tables show the characteristic compressive strength of masonry in  $\text{N/mm}^2$  for common sizes of UK masonry units.

Note that for some low strength units the characteristic compressive strength of the masonry can be slightly higher than the unit strength. This is a result of the use of the linear relationship in equation 3.1 of BS EN 1996-1-1 and was taken into account in the UK calibration.

### Normalised and characteristic compressive strengths in $\text{N/mm}^2$ for standard format Group 1 clay and calcium silicate bricks

Unit Strength $\text{N/mm}^2$	Unit width 102.5mm			
	Normalised strength	Characteristic compressive strength		
		M4 mortar	M6 mortar	M12 mortar
5.0	4.3	2.1	2.4	2.9
10.0	8.5	3.4	3.8	4.7
15.0	12.8	4.5	5.1	6.3
20.0	17.0	5.5	6.2	7.7
30.0	25.5	7.3	8.3	10.2
40.0	34.0	8.9	10.1	12.4
50.0	42.5	10.5	11.8	14.5
75.0	63.8	13.9	15.7	19.3
100.0	85.0	17.0	19.2	23.6
125.0	106.3	19.9	22.4	27.6
$\geq 129.4$	110.0	20.3	23.0	28.3

**Characteristic compressive strengths in N/mm<sup>2</sup> for concrete, aircrete and manufactured stone masonry units**

**GROUP 1 MASONRY UNITS**

**Characteristic compressive strengths for in N/mm<sup>2</sup> for 215mm high units with M4 mortar**

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	3.1	3.1	3.0	2.9	2.8	2.6	2.6	2.6	2.4
3.6	3.6	3.5	3.5	3.4	3.3	3.2	3.1	3.1	3.0
7.3	5.9	5.8	5.7	5.5	5.4	5.2	5.1	5.1	4.9
10.4	7.5	7.4	7.4	7.0	7.0	6.7	6.6	6.5	6.3
17.5	10.8	10.7	10.6	10.1	10.0	9.6	9.4	9.4	9.1
22.5	12.9	12.7	12.6	12.1	11.9	11.4	11.2	11.2	10.9
30.0	15.8	15.6	15.4	14.8	14.6	14.0	13.6	13.6	13.3
40.0	19.3	19.0	18.8	18.1	17.9	17.1	16.7	16.7	16.3

**Characteristic compressive strength in N/mm<sup>2</sup> for 190mm high units with M4 mortar**

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	3.0	2.9	2.9	2.7	2.6	2.6	2.4	2.4	2.3
3.6	3.5	3.4	3.4	3.3	3.2	2.9	3.0	3.0	2.9
7.3	5.7	5.6	5.5	5.3	5.3	5.0	4.9	4.9	4.8
10.4	7.3	7.2	7.1	6.8	6.7	6.4	6.2	6.2	6.1
17.5	10.5	10.4	10.2	9.8	9.7	9.3	9.0	9.0	8.8
22.5	12.5	12.4	12.2	11.7	11.6	11.0	10.8	10.8	10.5
30.0	15.3	15.1	14.9	14.3	14.1	13.5	13.1	13.1	12.9
40.0	18.7	18.5	18.3	17.5	17.3	16.5	16.1	16.1	15.8

**Characteristic compressive strength in N/mm<sup>2</sup> for 140mm high units with M4 mortar**

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	2.6	2.6	2.6	2.3	2.3	2.1	2.0	2.0	2.0
3.6	3.2	3.2	3.1	2.9	2.9	2.6	2.6	2.6	2.5
7.3	5.3	5.1	5.1	4.8	4.8	4.5	4.4	4.4	4.3
10.4	6.7	6.6	6.5	6.2	6.1	5.8	5.6	5.6	5.5
17.5	9.7	9.5	9.4	8.9	8.8	8.3	8.1	8.1	7.9
22.5	11.6	11.3	11.2	10.6	10.5	9.9	9.6	9.6	9.4
30.0	14.1	13.8	13.6	13.0	12.8	12.1	11.8	11.8	11.5
40.0	17.3	16.9	16.7	15.9	15.7	14.8	14.4	14.4	14.1

**Characteristic compressive strength in N/mm<sup>2</sup> for 65mm high units with M4 mortar**

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	2.0	1.9	1.9	1.7	1.6	1.6	1.5	1.5	1.4
3.6	2.4	2.3	2.3	2.1	2.0	2.0	1.9	1.9	1.7
7.3	4.3	4.2	4.1	3.8	3.7	3.6	3.5	3.5	3.4
10.4	5.5	5.3	5.2	4.9	4.8	4.6	4.5	4.5	4.3
17.5	7.8	7.6	7.5	7.0	6.9	6.6	6.5	6.5	6.2
22.5	9.4	9.1	9.0	8.4	8.2	7.9	7.7	7.7	7.4
30.0	11.4	11.2	11.0	10.2	10.1	9.7	9.5	9.5	9.1
40.0	14.0	13.6	13.4	12.5	12.3	11.8	11.6	11.6	11.1

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## Characteristic compressive strengths in N/mm<sup>2</sup> for concrete masonry units

### GROUP 2 MASONRY UNITS

#### Characteristic compressive strengths for in N/mm<sup>2</sup> for 215mm high units with M4 mortar

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	2.8	2.8	2.8	2.7	2.6	2.5	2.4	2.4	2.2
3.6	3.3	3.3	3.3	3.1	3.1	2.9	2.9	2.9	2.8
7.3	5.5	5.4	5.4	5.1	5.1	4.9	4.7	4.7	4.6
10.4	7.0	6.9	6.9	6.6	6.5	6.2	6.1	6.1	5.9
17.5	10.1	10.0	9.9	9.5	9.4	8.9	8.7	8.7	8.5
22.5	12.1	11.9	11.8	11.3	11.2	10.7	10.4	10.4	10.2
30.0	14.7	14.5	14.4	13.8	13.6	13.0	12.7	12.7	12.4
40.0	18.0	17.8	17.6	16.9	16.7	15.9	15.6	15.6	15.2

#### Characteristic compressive strength in N/mm<sup>2</sup> for 190mm high units with M4 mortar

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	2.8	2.7	2.7	2.5	2.5	2.4	2.2	2.3	2.2
3.6	3.2	3.2	3.2	3.0	3.0	2.7	2.8	2.8	2.7
7.3	5.3	5.2	5.2	5.0	4.9	4.7	4.5	4.5	4.5
10.4	6.8	6.7	6.6	6.4	6.3	6.0	5.8	5.8	5.7
17.5	9.8	9.7	9.6	9.1	9.0	8.6	8.4	8.4	8.2
22.5	11.7	11.5	11.4	10.9	10.8	10.3	10.0	10.0	9.8
30.0	14.3	14.1	13.9	13.3	13.2	12.6	12.3	12.3	12.0
40.0	17.5	17.2	17.0	16.3	16.1	15.4	15.0	15.0	14.7

#### Characteristic compressive strength in N/mm<sup>2</sup> for 140mm high units with M4 mortar

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	2.5	2.4	2.4	2.2	2.2	2.0	1.9	1.9	1.8
3.6	3.0	2.9	2.9	2.7	2.7	2.5	2.4	2.4	2.3
7.3	4.9	4.8	4.7	4.5	4.4	4.2	4.1	4.1	4.0
10.4	6.3	6.1	6.1	5.8	5.7	5.4	5.2	5.2	5.1
17.5	9.1	8.8	8.7	8.3	8.2	7.8	7.6	7.6	7.4
22.5	10.8	10.5	10.4	9.9	9.8	9.3	9.0	9.0	8.8
30.0	13.2	12.9	12.7	12.1	12.0	11.3	11.0	11.0	10.7
40.0	16.1	15.8	15.6	14.8	14.6	13.8	13.4	13.4	13.1

#### Characteristic compressive strength in N/mm<sup>2</sup> for 65mm high units with M4 mortar

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	1.8	1.8	1.8	1.5	1.5	1.5	1.4	1.4	1.3
3.6	2.2	2.2	2.2	2.0	1.9	1.8	1.8	1.8	1.6
7.3	4.0	3.9	3.8	3.5	3.5	3.4	3.3	3.3	3.2
10.4	5.1	5.0	4.9	4.5	4.5	4.3	4.2	4.2	4.0
17.5	7.3	7.1	7.0	6.6	6.4	6.2	6.1	6.1	5.8
22.5	8.7	8.5	8.4	7.8	7.7	7.4	7.2	7.2	6.9
30.0	10.7	10.4	10.2	9.6	9.4	9.0	8.8	8.8	8.5
40.0	13.0	12.7	12.5	11.7	11.5	11.0	10.8	10.8	10.4

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**Characteristic compressive strengths in N/mm<sup>2</sup> for concrete, aircrete and manufactured stone masonry units**

**GROUP 1 MASONRY UNITS**

**Characteristic compressive strength in N/mm<sup>2</sup> for 215mm high units with M6 mortar**

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	3.1	3.1	3.0	2.9	2.8	2.6	2.6	2.6	2.4
3.6	3.8	3.8	3.8	3.5	3.5	3.2	3.2	3.2	3.0
7.3	6.6	6.5	6.5	6.2	6.1	5.9	5.8	5.7	5.6
10.4	8.5	8.4	8.3	7.9	7.9	7.5	7.4	7.4	7.2
17.5	12.2	12.0	11.9	11.5	11.3	10.8	10.7	10.6	10.3
22.5	14.6	14.4	14.2	13.7	13.5	12.9	12.7	12.6	12.3
30.0	17.8	17.6	17.4	16.7	16.5	15.8	15.6	15.4	15.0
40.0	21.8	21.5	21.3	20.4	20.2	19.3	19.1	18.8	18.4

**Characteristic compressive strength in N/mm<sup>2</sup> for 190mm high units with M6 mortar**

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	3.0	2.9	2.9	2.7	2.6	2.5	2.4	2.4	2.3
3.6	3.7	3.8	3.8	3.7	3.6	3.4	3.4	3.4	3.3
7.3	6.4	6.3	6.3	6.0	5.9	5.6	5.6	5.5	5.4
10.4	8.2	8.1	8.0	7.7	7.6	7.3	7.2	7.1	6.9
17.5	11.9	11.7	11.6	11.1	10.9	10.5	10.3	10.2	10.0
22.5	14.1	13.9	13.8	13.2	13.0	12.5	12.3	12.2	11.9
30.0	17.3	17.0	16.9	16.1	16.0	15.2	15.0	14.8	14.6
40.0	21.2	20.8	20.6	19.7	19.5	18.6	18.4	18.2	17.8

**Characteristic compressive strength in N/mm<sup>2</sup> for 140mm high units with M6 mortar**

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	2.6	2.6	2.6	3.3	2.3	2.1	2.1	2.0	2.0
3.6	3.3	3.2	3.2	2.9	2.9	2.6	2.6	2.6	2.6
7.3	5.9	5.8	5.7	5.5	5.4	5.1	5.0	5.0	4.8
10.4	7.6	7.4	7.4	7.0	6.9	6.5	6.4	6.3	6.2
17.5	7.6	10.7	10.6	10.0	9.9	9.4	9.3	9.1	8.9
22.5	13.1	12.8	12.6	12.0	11.8	11.2	11.0	10.9	10.6
30.0	16.0	15.6	15.4	14.7	14.5	13.7	13.5	13.3	13.0
40.0	19.5	19.1	18.8	17.9	17.7	16.7	16.5	16.3	15.9

**Characteristic compressive strength in N/mm<sup>2</sup> for 65mm high units with M6 mortar**

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	2.0	1.9	1.9	1.7	1.6	1.6	1.5	1.5	1.4
3.6	2.4	2.3	2.3	2.1	2.0	2.0	1.9	1.9	1.7
7.3	4.8	4.7	4.6	4.2	4.1	3.9	3.8	3.8	3.5
10.4	6.2	6.0	5.9	5.5	5.4	5.2	5.2	5.1	4.9
17.5	8.9	8.6	8.5	7.9	7.8	7.5	7.4	7.4	7.0
22.5	10.6	10.3	10.1	9.4	9.3	8.9	8.8	8.7	8.4
30.0	12.9	12.6	12.4	11.6	11.4	10.9	10.8	10.7	10.3
40.0	15.8	15.4	15.2	14.1	13.9	13.4	13.2	13.1	12.6

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## Characteristic compressive strengths in N/mm<sup>2</sup> for concrete masonry units

### GROUP 2 MASONRY UNITS

#### Characteristic compressive strength in N/mm<sup>2</sup> for 215mm high units with M6 mortar

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	2.9	2.9	2.8	2.7	2.6	2.5	2.4	2.4	2.2
3.6	3.6	3.5	3.5	3.3	3.2	3.0	3.0	2.9	2.8
7.3	6.2	6.1	6.0	5.8	5.7	5.5	5.4	5.4	5.2
10.4	7.9	7.8	7.8	7.4	7.3	7.0	6.9	6.9	6.7
17.5	11.4	11.2	11.1	10.7	10.6	10.1	10.0	9.9	9.6
22.5	13.6	13.4	13.3	12.7	12.6	12.0	11.9	11.8	11.5
30.0	16.6	16.4	16.2	15.6	15.4	14.7	14.5	14.4	14.0
40.0	20.4	20.1	19.9	19.0	18.8	18.0	17.8	17.6	17.2

#### Characteristic compressive strength in N/mm<sup>2</sup> for 190mm high units with M6 mortar

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	2.8	2.7	2.7	2.5	2.5	2.3	2.3	2.2	2.2
3.6	3.4	3.6	3.6	3.4	3.4	3.2	3.2	3.2	3.1
7.3	6.0	5.9	5.8	5.6	5.5	5.3	5.2	5.1	5.1
10.4	7.7	7.6	7.5	7.2	7.1	6.8	6.7	6.6	6.5
17.5	11.1	10.9	10.8	10.3	10.2	9.8	9.6	9.5	9.3
22.5	13.2	13.0	12.9	12.3	12.2	11.6	11.5	11.3	11.1
30.0	16.2	15.9	15.7	15.1	14.9	14.2	14.0	13.9	13.6
40.0	19.8	19.5	19.2	18.4	18.2	17.4	17.2	16.9	16.6

#### Characteristic compressive strength in N/mm<sup>2</sup> for 140mm high units with M6 mortar

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	2.5	2.4	2.4	3.0	2.2	2.0	2.0	1.9	1.8
3.6	3.1	3.0	2.9	2.7	2.7	2.5	2.4	2.4	2.4
7.3	5.5	5.4	5.4	5.1	5.0	4.8	4.7	4.6	4.5
10.4	7.1	6.9	6.9	6.5	6.4	6.1	6.0	5.9	5.8
17.5	7.1	10.0	9.9	9.4	9.3	8.8	8.6	8.5	8.3
22.5	12.2	11.9	11.8	11.2	11.0	10.5	10.3	10.2	9.9
30.0	14.9	14.5	14.4	13.7	13.5	12.8	12.6	12.4	12.1
40.0	18.2	17.8	17.6	16.7	16.5	15.6	15.4	15.2	14.8

#### Characteristic compressive strength in N/mm<sup>2</sup> for 65mm high units with M6 mortar

Unit Strength	Width of unit in mm								
	75	90	100	140	150	190	200	215	≥250
2.9	1.8	1.8	1.8	1.5	1.5	1.5	1.4	1.4	1.3
3.6	2.2	2.2	2.2	2.0	1.9	1.8	1.8	1.8	1.6
7.3	4.5	4.4	4.3	3.9	3.8	3.6	3.6	3.5	3.3
10.4	5.8	5.6	5.5	5.1	5.0	4.9	4.8	4.8	4.6
17.5	8.3	8.1	7.9	7.4	7.3	7.0	6.9	6.9	6.6
22.5	9.9	9.6	9.4	8.8	8.7	8.3	8.3	8.2	7.8
30.0	12.0	11.8	11.6	10.8	10.6	10.2	10.1	10.0	9.6
40.0	14.7	14.4	14.1	13.2	13.0	12.5	12.3	12.2	11.7

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