Characteristic imposed load Q_k The live load produced by the occupants and usage of the building, obtained from BS 6399 'Design loading for buildings', Part 1 for floors or Part 3 for roofs.

Characteristic wind load W_k The wind load acting on the structure, obtained from CP 3 Chapter V Part 2 'Wind loads', eventually to become Part 2 of BS 6399.

4.7.2 Partial safety factors for load

As mentioned in relation to concrete design, the applied load may be greater in practice than the characteristic load for a number of reasons. To allow for such eventualities the respective characteristic loads are multiplied by a partial safety factor γ_f to give the ultimate design load appropriate to the load combination being considered. That is,

$$\text{Ultimate design load} = \gamma_f \times \text{characteristic load}$$

Values of γ_f are given in BS 5628 Part 1 for the following load combinations:

(a) Dead and imposed load
(b) Dead and wind load
(c) Dead, imposed and wind load
(d) Accidental damage.

Those for the dead and imposed load combination which would usually apply to vertically loaded walls are as follows:

Design dead load: $\gamma_f = 1.4G_k$
Design imposed load: $\gamma_f = 1.6Q_k$

4.7.3 Ultimate design load

The ultimate design load acting vertically on a wall will be the summation of the relevant characteristic load combinations multiplied by their respective partial safety factors. Therefore the ultimate design load for the dead plus imposed load combination on a vertically loaded wall would be expressed as follows:

$$\text{Ultimate design load dead} + \text{imposed} = \gamma_f G_k + \gamma_f Q_k = 1.4G_k + 1.6Q_k$$

4.8 Material properties

Like concrete, the strength of masonry materials in an actual wall can differ from their specified strength for a number of reasons. The characteristic strength f_k of the masonry units is therefore divided by a partial safety factor γ_m to arrive at the ultimate design strength of the units. In

relation to vertically loaded walls it is the compressive strength we are usually concerned with.

4.8.1 Characteristic compressive strength of masonry units

The characteristic compressive strength f_k for various masonry units is given in BS 5628 Part 1 Table 2a–d, reproduced here as Table 4.5a–d. It depends on the basic compressive strength of particular masonry units in conjunction with the designated mortar mix.

Table 4.5 Characteristic compressive strength of masonry f_k (N/mm^2) (BS 5628 Part 1 1978 Table 2)

(a) Constructed with standard format bricks

Mortar designation	Compressive strength of unit (N/mm^2)								
	5	10	15	20	27.5	35	50	70	100
(i)	2.5	4.4	6.0	7.4	9.2	11.4	15.0	19.2	24.0
(ii)	2.5	4.2	5.3	6.4	7.9	9.4	12.2	15.1	18.2
(iii)	2.5	4.1	5.0	5.8	7.1	8.5	10.6	13.1	15.5
(iv)	2.2	3.5	4.4	5.2	6.2	7.3	9.0	10.8	12.7

(b) Constructed with blocks having a ratio of height to least horizontal dimension of 0.6

Mortar designation	Compressive strength of unit (N/mm^2)							
	2.8	3.5	5.0	7.0	10	15	20	35 or greater
(i)	1.4	1.7	2.5	3.4	4.4	6.0	7.4	11.4
(ii)	1.4	1.7	2.5	3.2	4.2	5.3	6.4	9.4
(iii)	1.4	1.7	2.5	3.2	4.1	5.0	5.8	8.5
(iv)	1.4	1.7	2.2	2.8	3.5	4.4	5.2	7.3

(c) Constructed with hollow blocks having a ratio of height to least horizontal dimension of between 2.0 and 4.0

Mortar designation	Compressive strength of unit (N/mm^2)							
	2.8	3.5	5.0	7.0	10	15	20	35 or greater
(i)	2.8	3.5	5.0	5.7	6.1	6.8	7.5	11.4
(ii)	2.8	3.5	5.0	5.5	5.7	6.1	6.5	9.4
(iii)	2.8	3.5	5.0	5.4	5.5	5.7	5.9	8.5
(iv)	2.8	3.5	4.4	4.8	4.9	5.1	5.3	7.3

(d) Constructed from solid concrete blocks having a ratio of height to least horizontal dimension of between 2.0 and 4.0

Mortar designation	Compressive strength of unit (N/mm^2)							
	2.8	3.5	5.0	7.0	10	15	20	35 or greater
(i)	2.8	3.5	5.0	6.8	8.8	12.0	14.8	22.8
(ii)	2.8	3.5	5.0	6.4	8.4	10.6	12.8	18.8
(iii)	2.8	3.5	5.0	6.4	8.2	10.0	11.6	17.0
(iv)	2.8	3.5	4.4	5.6	7.0	8.8	10.4	14.6

The basic compressive strength of the individual masonry units given in each part of the table is based upon tests which take into account the presence of any voids or perforations in the unit. Thus the structural calculations for a wall constructed from either solid or hollow units can be made in exactly the same way.

The designation of mortar types is given in BS 5628 Part 1 Table 1, reproduced earlier as Table 4.3.

To obtain the respective value of f_k, reference should be made to the relevant part of Table 4.5 as explained in the following sections.

Bricks

Generally for bricks of standard dimensional format, f_k is obtained directly from Table 4.5a.