

Table 2.5 Partial factors and combinations for the accidental design situation

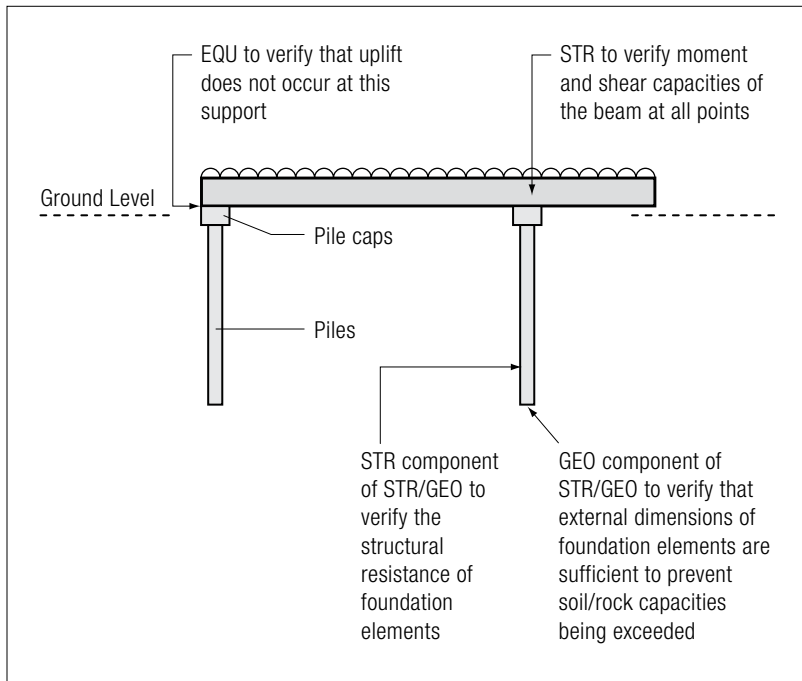
Accidental Design situation	Permanent actions ^a		Leading accidental action	Accompanying variable actions ^b	
	Unfavourable	Favourable		Main (if any)	Others
Expression 2.4 in this <i>Manual</i>	$G_{k,j}$	$G_{k,j}$	A_d	$\psi_{1,1} Q_{k,1}$	$\psi_{2,i} Q_{k,i}$

Notes

a This table assumes low variability in G_k and therefore that $G_{k,sup}$ and $G_{k,inf}$ need not be used (see Section 2.8.2).

b Variable actions are those listed in Table 2.6

Figure 2.1 illustrates the use of EQU, STR and GEO limit states in relation to a simple structure.

**Fig 2.1** Example to illustrate the application of ultimate limit states EQU, STR and GEO

With regard to the characteristic live loads (variable actions) Q_k , where only one variable action is being considered in the combination, this is chosen to be $Q_{k,1}$. When a number of variable actions act simultaneously, the leading action is chosen as $Q_{k,1}$ and the other actions (accompanying) are chosen as $Q_{k,i}$ and are reduced by an appropriate combination factor. Where it is not obvious which should be the leading variable action, each action should be checked in turn and the worst case taken. Characteristic values are used for $Q_{k,1}$ and $Q_{k,i}$.

For serviceability limit states the partial factors (γ factors) for actions should be taken as 1.0 unless specified otherwise in the Manuals for EC2 to EC6 or in the source Eurocodes EC2 to EC6.

The following notation applies to combinations (a) to (c) below:

G_k is the self-weight

$Q_{k,1}$ is the leading variable action, and

$Q_{k,2}$ is the accompanying variable action

ψ_0 , ψ_1 and ψ_2 (the combination factors) can be obtained from Table 2.6 for the leading and accompanying variable actions.

(a) Characteristic combination

The combination expression in EC0 for this case is:

$$\sum_{j \geq 1} G_{k,j} + P + Q_{k,1} + \sum_{i > 1} \psi_{0,i} Q_{k,i} \quad (6.14b \text{ in EC0})$$

A simplified version of this expression, likely to be applicable to many of the structures designed in accordance with this *Manual*, is:

$$E_d = G_k + Q_{k,1} + \psi_0 Q_{k,2} \quad (2.5)$$

(b) Frequent combination

The combination expression in EC0 for this case is:

$$\sum_{j \geq 1} G_{k,j} + P + \psi_{1,1} Q_{k,1} + \sum_{i > 1} \psi_{2,i} Q_{k,i} \quad (6.15b \text{ in EC0})$$

A simplified version of this expression, likely to be applicable to many of the structures designed in accordance with this *Manual*, is:

$$E_d = G_k + \psi_1 Q_{k,1} + \psi_2 Q_{k,2} \quad (2.6)$$

(c) Quasi-permanent combination

The combination expression in EC0 for this case is:

$$\sum_{j \geq 1} G_{k,j} + P + \sum_{i \geq 1} \psi_{2,i} Q_{k,i} \quad (6.16b \text{ in EC0})$$

Structural elements – Structural elements comprise the primary structural frame and supporting structures.

Non-structural elements – Non-structural elements are those that include completion and finishing elements connected with the structure, including road surfacing and non-structural parapets. They also include services and machinery fixed permanently to, or within, the structure.

Partitions – Non load bearing walls.

Movable partitions – Movable partitions are those which can be moved on the floor, be added or removed or re-built at another place.

3.3 Classification of actions

3.3.1 General

Classification of actions considers the variation of actions in time and space.

3.3.2 Self-weight

The self-weight of construction works is generally classified as a permanent fixed action. However,

- where this self-weight can vary in time, it should be taken into account by the upper and lower characteristic values (see Section 2.8.2)
- in some cases the self-weight is classified as a free action (e.g. for movable partitions).

Note movable partitions (see Section 3.7.3.3) should be treated as an additional imposed load.

Landscaping (e.g. trees, shrubs, hard/paved surfaces) and earth loads on roofs and terraces have to be considered as permanent actions. In this case the design needs to consider variations in moisture content and variation in depth that may be caused by uncontrolled accumulation during the design life of the structure. See also EC7.

3.3.3 Imposed loads

For the design of structures within the scope of this *Manual*, imposed loads are classified as variable free actions, unless otherwise specified.

In the Eurocodes imposed loads are taken into account as quasi-static actions (see Section 2.4). The load models may include dynamic effects if there is no risk of resonance or other significant dynamic response of the structure (see EC2 to EC9).

B.2 Supplementary advice on Section 2.8.3 (Values of variable actions – Q_k)

A variable action has four representative values. These are used for the appropriate design situations in ultimate and serviceability limit state verifications. They are:

- the characteristic value Q_k
- the combination value $\psi_0 Q_k$
- the frequent value $\psi_1 Q_k$
- the quasi-permanent value $\psi_2 Q_k$.

The combination value $\psi_0 Q_k$, the frequent value $\psi_1 Q_k$, and the quasi-permanent value $\psi_2 Q_k$ are shown in diagrammatic form in Figure B.1.

(a) The characteristic value Q_k

For variable actions, the characteristic value (Q_k) (its main representative value) corresponds to either:

- an upper value with an intended probability of not being exceeded during some specific reference period; or
- a lower value with an intended probability of being achieved during some specific reference period; or
- a nominal value, which may be specified in cases where a statistical distribution is not known.

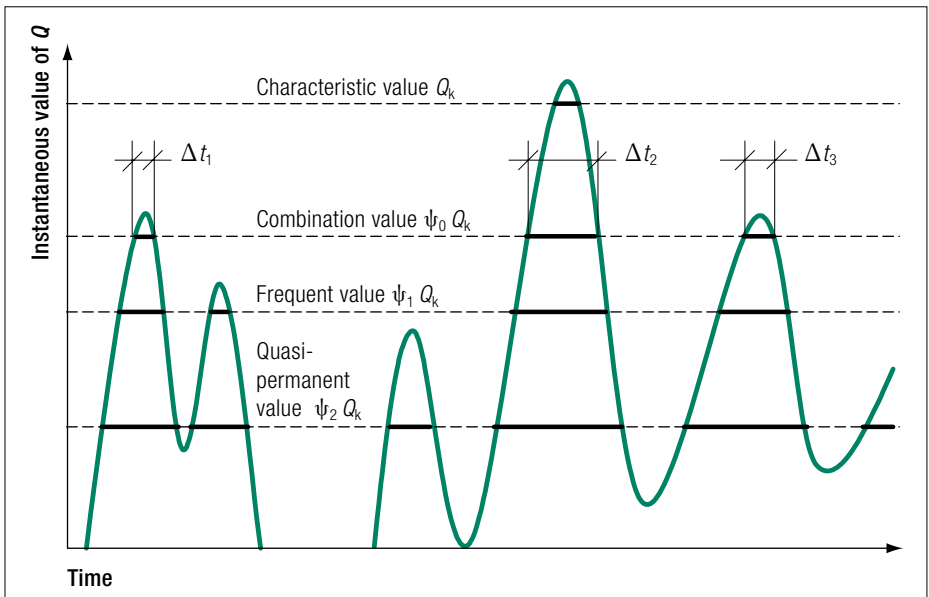


Fig B.1 Diagrammatic representation of representative values for actions