

# Design actions

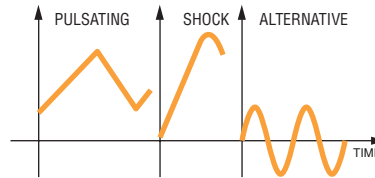
## TYPE OF LOADS

### Static or quasi-static loads



The static or quasi-static loads are dead loads of the element fixed, permanent and variable actions as wind, snow ...

### Dynamic loads



The dynamic loads are variable actions in time with a medium or high amplitude. For example, motor vibration, regular shock ...

Some dynamic loads could be considered as quasi-static loads (wind ...).

## DESIGN ACTION CALCULATION

The design actions for tensile and shear load in the ultimate limit state are calculated according to Eurocode 2 or 3.

### → In the simplest case

(permanent load "G" and one variable load "Q"), the design load is calculated as follows:

$$S_d = 1.35 \times G + 1.5 \times Q$$

The factor 1,35 and 1,5 are the partial safety factor applied on the action.

For simplification, in this book we have adopted the safety factor  $\gamma_F = 1,4$ :

$$S_d = \gamma_F \cdot S_k$$

with  $\gamma_F = 1,4$

$$S_k = G + Q$$

### → Other cases

The variable loads can be influenced by wind, or / and snow.

To calculate these actions in ultimate limit state, we will take the most unfavourable of the following actions combined.

Details on Eurocode 1 for the loading codes.

	Permanent load	Variable load			
		One with its characteristic value	Others with combination value		
U.L.S.	1.35 G	+	1.5 Q <sub>B</sub>	+	1.2 W
	1.35 G	+	1.5 W	+	1.3 $\Psi_0$ Q <sub>B</sub>
	1.35 G	+	1.5 S <sub>n</sub>	+	1.3 $\Psi_0$ Q <sub>B</sub>

Symbols: G= permanent load

Q<sub>B</sub>= imposed load

W= wind load

S<sub>n</sub>= snow load

$\Psi_0 = 0,77$  for all premises, except record offices and parking.

If the basic variable action is the snow,  $\Psi_0$  is increase by 10%.