

## CHAPTER 1 GENERAL CONCEPTS

### General

This chapter is devoted to description of basic concept when a structural design of buildings is implemented, and basic terminology which are needed in the estimation of loads with reference to these recommendations.

#### 1.1 Scope of Applications

These recommendations apply to the estimation of loads on ordinary buildings and similar structures or parts thereof. Estimated loads may be used in structural design of buildings and parts of them, and in assessment of structural performance.

#### 1.2 Fundamental concept

##### 1.2.1 Structural performance

(1) **Safety** Buildings must have an appropriate degree of safety against various loads. To meet this requirement, the appropriate load and its intensity have to be evaluated. The appropriate degree of safety must be determined based on social and economical considerations.

(2) **Serviceability** An appropriate degree of serviceability must be maintained to ensure that building functions are not lost under normal usage conditions. To meet this requirement, an appropriate load intensity has to be determined for relatively frequent loads. The appropriate degree of serviceability must be determined based on social and economical considerations.

(3) **Reparability** Buildings must be, if necessary, designed to maintain reparability when they are damaged. The appropriate degree of reparability must be determined based on social and economical considerations.

##### 1.2.2 Structural analysis

Load effects in terms of the stress or deformation of structural members and/or joints are obtained from structural analysis based on estimated loads. Structural analysis methods and procedures are not specified in the recommendations, but loads are estimated, in principle, for static analysis. Dynamic loads caused by strong wind or earthquake ground motions are evaluated for design as equivalent static loads.

### 1.2.3 Proper design and construction

Design load intensities are evaluated by assuming that buildings are properly designed and constructed. Therefore, not only proper design and construction are necessary to minimize reductions in safety and serviceability due to a human error, but also load intensities must be specified under the appropriate management and compliance.

## 1.3 Definitions

Terminology used in the recommendations is defined as follows:

- Limit state: A state beyond which either structure or part thereof no longer satisfies the prescribed requirements relating to safety or serviceability.
- Limit state design: design for targeted safety as well as serviceability limit states.
- Load effect: Stress, deformation, displacement, etc. induced within the structure by a single load or combined loads.
- Basic value of load: representative intensity of load as a reference for estimation of load effects. Basically, it is based on 100-year return period value of load.
- Load factor: Partial safety coefficients by which the basic value of the load effects are multiplied to obtain the design load effects.
- Return period: The expected time interval between which events greater than a certain magnitude are predicted to occur.