ANNEX 36

NATIONAL ANNEX

TO STANDARD

SFS-EN 1991-1-6 EUROCODE 1: ACTIONS ON STRUCTURES

Part 1-6: General actions – Actions during execution

Preface

This National Annex is used together with the Standard SFS-EN 1991-1-6: 2005.

This National Annex sets out:

a) The national parameters for the following paragraphs in Standard SFS-EN 1991-1-6 concerning buildings where national selection is permitted:

- 1.1(3)
- 2.2(4) Note 1
- 3.1(1)P
- 3.1(5) Note 1 and 2
- 3.1(7)
- 3.1(8) Note 1
- 3.3(2)
- 3.3(6)
- 4.9(6) Note 2
- 4.10(1)P
- 4.11.1(1) Table 4.1
- 4.11.2(1) Note 2
- 4.12(1)P Note 2
- 4.12(2)
- 4.12(3)
- 4.13(2)
- A1.1(1) Note 2
- A1.3(2)

b) Guidance for the use of informative annex B

1.1 Scope

1.1(3)

The instructions given in the standard SFS-EN 1991-1-6 and its National Annex on determining climatic actions can be applied in the design of auxiliary construction works. Unless stated otherwise in the standard SFS-EN 1991-1-6, standard SFS-EN 1990 and its National Annex can be applied in the combining of actions.

2.2 Construction Loads

2.2(4)

The location and the limits of the area where construction loads may move should be determined project-specifically. Instructions on location and the areas where actions may move should be provided as necessary in the planning documents. These areas should be presented in the plans when the magnitude of the actions is significant from the viewpoint of the structure. Significant actions may be caused i.e. due:

- heavy equipment
- heavy mobile construction machinery
- storage of materials or demolishing waste
- filling-up works and excavation works
- supports of the upper floor formworks and loads caused due to casting

3.1 General – identification of design situations

3.1(1)P

The design situation for the wind actions during exceptional weather conditions is the accidental situation.

Explanation:

In Finland the general practise is not to design structures for exceptional wind actions (e.g. due to tornados and hurricanes).

3.1(5) Note 1

Recommended return periods are presented in Table 3.1(FI).

Table 3.1(FI) Recommended return periods for the determination of the characteristic values of climatic action

Duration	Return period (years)
≤ 3 days	- [a]
≤ 3 months (but > 3 days)	5 [b]
≤ 1 year (but > 3 months)	10
> 1 year	50

[a] The concept of mean return period is generally not appropriate for short term duration. A nominal duration of three days, to be chosen for short execution phases, corresponds to the extent in time of reliable meteorological predictions for the location of the site. The magnitude of actions may be determined according to meteorological predictions. Determination according to meteorological predictions may be used for slightly longer execution phase if appropriate organizational measures are taken.

[b] Nominal duration of up to three months actions may be determined taking into account appropriate seasonal and shorter term meteorological climatic variations.

Explanation:

In the determination of snow load during the execution the seasonal variation, length of the execution phase and removal of the snow may be taken into account. When the snow load can occur, the minimum value of the load s should be at least 0,5 kN/m^2. The load s is the load on the roof or on the structure. During the execution when the snow load is affecting on the floors and not on the roof, the load may be taken as uniformly distributed and e.g. drifting due to obstacles need not to be taken into account.

3.1(5) Note 2

The fundamental value of the basic wind velocity $v_{b,0}$ during the execution for a nominal duration up to three months is 18 m/s in the sea areas, in the mainland of the entire country and at the bottom of the mountains in Lapland and 24 m/s on the top of the mountains in Lapland.

For duration less than three days the fundamental value of the basic wind velocity may be determined according meteorological predictions. The fundamental value of the basic wind velocity should be at least 10 m/s.

Explanation:

The peak velocity pressure during the execution for a nominal duration of up to three months is 75 % of the value for persistent design situation. For the wind load this is corresponding to 5 years return period.

3.1(7)

When combining wind action and snow action, no reductions are allowed if the used snow and wind actions are less than in persistent design situation.

3.1(8)

For the design situation during execution, the imperfections of the geometry of persistent design situation should be normally used.

However, the imperfections to be used must be determined project-specifically if the execution includes phases where a structure or a structural component is loaded when the structure or the structural component is in a different position or different location than in the final situation.

The imperfections caused by restraint actions during erection should be taken into consideration where necessary. The restraint actions and imperfections can arise, for example, when the erection of the structure is done at a temperature which differs from the temperature of persistent design situation (e.g. installation of a steel frame in winter conditions).

Where necessary, the imperfections caused by the inclination of the auxiliary construction structures must be taken into account if they differ from the imperfections of the persistent design situation.

3.3 Serviceability limit states

3.3(2)

The deformation during execution can be larger than the deformation permitted for the finished structure if the deformation is reversible when the actions due to execution are removed. However, any deformation during execution should not cause damage to the adjacent structures nor to the structural component's surface materials.

Compared to the persistent design situation the design situation during execution should not cause larger crack widths in the structure and the cracking should not reduce the stiffness of the structure, if this has not been taken into consideration in the persistent design situation.

3.3(6)

The auxiliary construction works should be so designed that the tolerances of the finished structure should not be exceeded.

4.9 Actions caused by water

4.9(6)

No values are presented. This section applies mainly to bridge construction, see National Annex drawn up by Finnish Road Administration.

4.10 Actions due to atmospheric icing

4.10(1)P

Actions due atmospheric icing are determined project-specifically by applying standards EN 1993-3 and ISO 12494.

Explanation:

Where necessary, the structures designed for atmospheric icing in the persistent design situation should be designed for atmospheric icing in the design situation during execution if the accumulation of ice on the structure is possible during execution phase.

4.11 Construction loads

4.11.1 General

4.11.1(1)

Table 4.1 Representation of construction loads (Q_c)

Notes 1 and 2:

The characteristic value of $q_{ca,k}$ is 1 kN/m^2. For precast slabs before grouting the characteristic value of $q_{ca,k}$ is 0,5 kN/m^2.

Note 3:

The characteristic values q_{cb} and F_{cb} for the actions caused by the temporary storage of material are determined project-specifically. Actions on bridges caused by the temporary storage of material, see National Annex drawn up by Finnish Road Administration.

4.11.2 Construction loads during the casting of concrete

4.11.2(1)

For the actions Q_{ca}, Q_{cc} and Q_{cf} the recommended values and recommended loaded areas presented in Table 4.2 should be used.

4.12 Accidental actions

4.12(1)P

The dynamic amplification factor in accidental situation is 2.

Explanation:
Structures are not normally designed for accidental actions during execution unless the accident would lead to disproportionate large damages compared to the initial incident. Structures and their joints should have such robustness that a minor collision or impact will not lead to the loss of the structure's bearing capacity.

4.12(2)

The dynamic effects are determined project-specifically.

Explanation:
Structures are not normally designed for actions due to falls of equipment. The actions caused by falling of the equipment are taken into consideration where necessary if the execution phase involves an exceptionally demanding work stage or structure, and if the falling of equipment will cause disproportionate large damages compared to the initial incident.

4.12(3)

The design values of the human impact force in the accidental situation are the following:

a) 2,5 kN applied over an area 200 mm × 200 mm, to account the stumbling effects

b) 6,0 kN applied over an area 300 mm × 300 mm, to account the falling effects.

Explanation:

Structures should be designed to human impact force in accidental situation when stumbling could lead to a person falling (Item a) or the designed structure should stop the fall of a person (Item b). Item a) can be applied in the design if collapse of the structure as a consequence of stumbling will lead to falling; and Item b) can be applied in the design of protective structures that will stop a person's fall.

4.13 Seismic actions

4.13(2)

No values are presented. Normally seismic actions need not be taken into account in the design in Finland

Annex A1 (Normative)
Supplementary rules for buildings

A.1.1 Ultimate limit states

A1.1(1) Note 2:

The combination factor ψ_0 for variable actions due to construction loads is the recommended value of 1,0; the value for the quasi-permanent combination factor ψ_2 for a variable actions is 0,3.

Explanation:

The value for quasi-permanent combination factor ψ_2 is used when actions are combined in an accidental situation, whereby the variable action due to construction loads simultaneously acts as accompanying variable action. This is an extremely rare design situation because structures are not generally designed for accidental actions during execution.

A.1.3 Horizontal actions

A1.3(2)

The characteristic value of equivalent horizontal forces is 3% of the vertical loads from the most unfavourable combination of actions. A smaller value can be used if the inclination of the vertical forces during the execution can be estimated (e.g. design rules applied to auxiliary construction structures).

When casting concrete it should be assumed that a variable horizontal point load acts in a random direction on the level of cast concrete's surface with a characteristic value of 1,5 kN.

Explanation:

Because for auxiliary construction structures, such as the vertical supports of formwork, the allowed inclination may be larger than for the structure itself, the horizontal force induced by the inclination could be larger than in persistent design situation.

Annex B (Informative)
Actions on structures during alteration, reconstruction or demolition

Informative Annex B may be used.