

**Eurocode
Basis of structural design
Amendment A1
Annex A2: Application for bridges**

**Eurokoodeks
Ehituskonstruksioonide projekteerimise alused
Muudatus A1
Lisa A2: Rakendamine sildade puhul**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard
EVS-EN 1990:2002/A1:2006+NA:2009 sisaldab
Euroopa standardi EN 1990/A1:2005 identset
inglisekeelset teksti ning rahvuslikku lisa NA:2009.

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This Estonian Standard
EVS-EN 1990:2002/A1:2006+NA:2009 consists of the
identical English text of the European Standard
EN 1990/A1:2005 and the Estonian National Annex
NA:2009.

This standard is ratified with an order of the Estonian
Centre for Standardisation dated 02.12.2009 and is
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ICS 91.010.30

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English Version

Eurocode - Basis of structural design

Eurocode - Bases de calcul des structures

Eurocode - Grundlagen der Tragwerksplanung

This amendment A1 modifies the European Standard EN 1990:2002; it was approved by CEN on 14 October 2004.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This amendment exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard (EN 1990:2002/A1:2005) has been prepared by Technical Committee CEN/TC 250 “Structural Eurocodes”, the secretariat of which is held by BSI.

This Amendment to the EN 1990:2002 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2006, and conflicting national standards shall be withdrawn at the latest by June 2006.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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Annex A2
(normative)
Application for bridges

National Annex for EN 1990 Annex A2

National choice is allowed in EN 1990 Annex A2 through the following clauses:

General clause

| Clause | Item |
|--------------------------------------|--|
| A2.1 (1) NOTE 3 | Use of Table 2.1: Design working life |
| A2.2.1(2) NOTE 1 | Combinations involving actions which are outside the scope of EN 1991 |
| A2.2.6(1) NOTE 1 | Values of ψ factors |
| A2.3.1(1) | Alteration of design values of actions for ultimate limit states |
| A2.3.1(5) | Choice of Approach 1, 2 or 3 |
| A2.3.1(7) | Definition of forces due to ice pressure |
| A2.3.1(8) | Values of γ factors for prestressing actions where not specified in the relevant design Eurocodes |
| A2.3.1 Table A2.4(A) NOTES 1 and 2 | Values of γ factors |
| A2.3.1 Table A2.4(B) | - NOTE 1: choice between 6.10 and 6.10a/b - NOTE 2: Values of γ and ξ factors - NOTE 4: Values of γ |
| A2.3.1 Table A2.4 (C) | Values of γ factors |
| A2.3.2(1) | Design values in Table A2.5 for accidental design situations, design values of accompanying variable actions and seismic design situations |
| A2.3.2 Table A2.5 NOTE | Design values of actions |
| A2.4.1(1) NOTE 1 (Table A2.6) NOTE 2 | Alternative γ values for traffic actions for the serviceability limit state Infrequent combination of actions |
| A2.4.1(2) | Serviceability requirements and criteria for the calculation of deformations |

Clauses specific for road bridges

| Clause | Item |
|------------------|--|
| A2.2.2 (1) | Reference to the infrequent combination of actions |
| A2.2.2(3) | Combination rules for special vehicles |
| A2.2.2(4) | Combination rules for snow loads and traffic loads |
| A2.2.2(6) | Combination rules for wind and thermal actions |
| A2.2.6(1) NOTE 2 | Values of $\psi_{1,infq}$ factors |
| A2.2.6(1) NOTE 3 | Values of water forces |

Clauses specific for footbridges

| Clause | Item |
|-----------|--|
| A2.2.3(2) | Combination rules for wind and thermal actions |
| A2.2.3(3) | Combination rules for snow loads and traffic loads |
| A2.2.3(4) | Combination rules for footbridges protected from bad weather |

| | |
|-------------|----------------------------------|
| A2.4.3.2(1) | Comfort criteria for footbridges |
|-------------|----------------------------------|

Clauses specific for railway bridges

| Clause | Item |
|-----------------------------------|---|
| A2.2.4(1) | Combination rules for snow loading on railway bridges |
| A2.2.4(4) | Maximum wind speed compatible with rail traffic |
| A2.4.4.1(1) NOTE 3 | Deformation and vibration requirements for temporary railway bridges |
| A2.4.4.2.1(4)P | Peak values of deck acceleration for railway bridges and associated frequency range |
| A2.4.4.2.2 – Table A2.7 NOTE | Limiting values of deck twist for railway bridges |
| A2.4.4.2.2(3)P | Limiting values of the total deck twist for railway bridges |
| A2.4.4.2.3(1) | Vertical deformation of ballasted and non ballasted railway bridges |
| A2.4.4.2.3(2) | Limitations on the rotations of non ballasted bridge deck ends for railway bridges |
| A2.4.4.2.3(3) | Additional limits of angular rotations at the end of decks |
| A2.4.4.2.4(2) – Table A2.8 NOTE 3 | Values of α_i and r_i factors |
| A2.4.4.2.4(3) | Minimum lateral frequency for railway bridges |
| A2.4.4.3.2(6) | Requirements for passenger comfort for temporary bridges |

A2.1 Field of application

A2.1.1 General

(1) This Annex A2 to EN 1990 gives rules and methods for establishing combinations of actions for serviceability and ultimate limit state verifications (except fatigue verifications) with the recommended design values of permanent, variable and accidental actions and ψ factors to be used in the design of road bridges, footbridges and railway bridges. It also applies to actions during execution. Methods and rules for verifications relating to some material-independent serviceability limit states are also given.

NOTE 1 Symbols, notations, Load Models and groups of loads are those used or defined in the relevant section of EN 1991-2.

NOTE 2 Symbols, notations and models of construction loads are those defined in EN 1991-1-6.

NOTE 3 Guidance may be given in the National Annex with regard to the use of Table 2.1 (design working life).

NOTE 4 Most of the combination rules defined in clauses A2.2.2 to A2.2.5 are simplifications intended to avoid needlessly complicated calculations. They may be changed in the National Annex or for the individual project as described in A2.2.1 to A2.2.5.

NOTE 5 This Annex A2 to EN 1990 does not include rules for the determination of actions on structural bearings (forces and moments) and associated movements of bearings or give rules for the analysis of bridges involving ground-structure interaction that may depend on movements or deformations of structural bearings.

(2) The rules given in this Annex A2 to EN 1990 may not be sufficient for:

- bridges that are not covered by EN 1991-2 (for example bridges under an airport runway, mechanically-moveable bridges, roofed bridges, bridges carrying water, etc.),
- bridges carrying both road and rail traffic, and
- other civil engineering structures carrying traffic loads (for example backfill behind a retaining wall).

A2.1.2 Symbols

For the purpose of this European Standard, symbols defined in EN1991-2 – Eurocode 1: General actions: Traffic loads on bridges, and the following complementary symbols apply:

Latin upper case letters

| | |
|------------|---|
| F_w | Wind force (general symbol) |
| F_{wk} | Characteristic wind force |
| F_w^* | Wind force compatible with road traffic |
| F_w^{**} | Wind force compatible with railway traffic |
| G_{set} | Permanent action due to uneven settlements |
| Q_{Sn} | Snow load |
| T | Thermal climatic action (general symbol) |
| T_k | Characteristic value of the thermal climatic action |