danish housing and planning authority

DS/EN 1994-1-1 DK NA:2019

National Annex to

Eurocode 4: Design of composite steel and concrete structures -

Part 1-1: General rules and rules for buildings

Foreword

This National Annex (NA) is a revision of DS/EN 1994-1-1 DK NA:2013 and replaces the latter as from 2019-09-09. For a transition period until 2019-12-31, this National Annex as well as the previous National Annex will be applicable.

Text has been added under 2.4.1.2(6)P Design values of material or product properties in relation to level of checking.

Previous, valid versions of the NAs as well as addenda to these can be found at www.eurocodes.dk.

This NA lays down the conditions for the implementation in Denmark of EN 1994-1-1 for construction works in conformity with the Danish Building Regulations.

This NA applies to construction works covered by section 16(1) of the Danish Building Regulations as well as to construction works covered by sections 24 to 27 of the Danish Building Regulations.

This NA includes:

- an overview of possible national choices and clauses containing complementary information;
- national choices;
- (non-contradictory) complementary information which may assist the user of the Eurocode.

For structures covered by sections 24 to 27 of the Danish Building Regulations BR18, or not covered by the Danish Building Regulations, levels of checking may still be used for the calculation of structures in ultimate limit states. For structures covered by section 16(1) of the Danish Building Regulations, levels of checking cannot be applied.

Overview of possible national choices and clauses containing complementary information

The overview below identifies the clauses where national choices are possible and the applicable/not applicable informative annexes. Furthermore, clauses giving complementary information are identified. Complementary information is given at the end of this document.

Clause	**Subject**	**National choice** [1)]	**Complementary information2)**
2.4.1.1(1)	Design values of actions	Unchanged	
2.4.1.2(5)P	Design values of material or product properties	National choice	
2.4.1.2(6)P	Design values of material or product properties	National choice	
2.4.1.2(7)P	Design values of material or product properties	National choice	
3.1(4)	Concrete		Complementary information
3.5(2)	Profiled steel sheeting for composite slabs in buildings	Unchanged	
6.4.3(1) h)	Lateral-torsional buckling of composite beams - Simplified verification for buildings without direct calculation		Complementary information
6.6.3.1(1)	Shear connection - Headed stud connectors in solid slabs and concrete encasement - Design resistance	National choice	
6.6.3.1(3)	Shear connection - Headed stud connectors in solid slabs and concrete encasement - Design resistance		Complementary information
6.6.4.1(3)	Shear connection - Design resistance of headed studs used with profiled steel sheeting in buildings - Sheeting with ribs parallel to the supporting beams		Complementary information
6.8.2(1)	Partial factors for fatigue assessment for buildings		Complementary information

Clause	Subject	National choice [1)]	Complementary information2[)]
6.8.2(2)	Partial factors for fatigue assessment for buildings	National choice	
9.1.1(2)P	Composite slabs with profiled steel sheeting for buildings - Scope	Unchanged	
9.6(2)	Verification of profiled steel sheeting as shuttering for serviceability limit states	Unchanged	
9.7.3(4) Note 1	Verification of composite slabs for ultimate limit states - Longitudinal shear for slabs without end anchorage	National choice	
9.7.3(8) Note 1	Verification of composite slabs for ultimate limit states - Longitudinal shear for slabs without end anchorage	National choice	
9.7.3(9)	Verification of composite slabs for ultimate limit states - Longitudinal shear for slabs without end anchorage	Unchanged	
B.2.5(1)	Tests on shear connectors – Test evaluation	National choice	
B.3.6(5)	Testing of composite floor slabs - Determination of the design values for $\tau_{u,Rd}$	National choice	

1)
Unchanged: Recommendations in the Eurocode to be followed.
National choice: A national choice has been made.

2)
Complementary information: Additional guidance on how to use the Eurocode.

National choices

2.4.1.2(5)P Design values of material or product properties

The following value is applied, including the factor (γ_0) for the partial factors for strength parameters and resistances, cf. National Annex to EN 1990, Table A1.2(B+C):

$\gamma_V = 1{,}35 \cdot \gamma_0 \cdot \gamma_3$

The factor γ_0 takes into account the combination of actions, cf. National Annex to EN 1990, Table A1.2(B+C).

Limit state	**STR/GEO**				**STR**
Combination of actions	1	2	3	4	5
γ_0	1,0	1,0	K_{FI}	K_{FI}	$1{,}2 \cdot K_{FI}$

The factor γ_3 takes account of the level of checking of the product and is defined in EN 1990 and stated in the National Annex to EN 1990, Annex F.The reduced level of checking is not used.

For the value of γ_V, the following types of failure according to the National Annex to EN 1990, Annex F, are applied:

γ_V: Warning of failure with residual resistance

For accidental and seismic design situations the following value is used:

$\gamma_V = 1{,}0$

2.4.1.2(6)P Design values of material or product properties

The following value is used: $\gamma_{VS}=1{,}35 \cdot \gamma_0 \cdot \gamma_3$

The factor γ_3 takes account of the level of checking of the product. The reduced level of checking is not used.

Extended level of checking: $\gamma_3 = 0{,}95$
Normal level of checking: $\gamma_3 = 1{,}00$

For structures covered by section 16(1) of the Danish Building Regulations BR18, the extended level of checking cannot be applied, and γ_3 is taken as 1,00.

The partial factors are determined in accordance with the National Annex to EN 1990, Annex F, where $\gamma_M = \gamma_1 \gamma_2 \gamma_3 \gamma_4$.

γ_1 takes into account the type of failure;

γ_2 takes into account the uncertainty related to the design model;
γ_3 takes into account the extent of checking;
γ_4 takes into account the variation of the strength parameter or resistance.

When determining γ_1, the following types of failure have been assumed:
γ_{VS}: Warning of failure with residual resistance

For accidental and seismic design situations the following value is used:
$\gamma_V = 1,0$

2.4.1.2(7)P Design values of material or product properties
The following value is used: $\gamma_{Mf,s}=1,1\cdot\gamma_0\cdot\gamma_3$

The factor γ_3 takes account of the level of checking of the product. The reduced level of checking is not used.
Extended level of checking: $\gamma_3 = 0,95$
Normal level of checking: $\gamma_3 = 1,00$

The partial factors are determined in accordance with the National Annex to EN 1990, Annex F, where $\gamma_M = \gamma_1 \gamma_2 \gamma_3 \gamma_4$.
γ_1 takes into account the type of failure;
γ_2 takes into account the uncertainty related to the design model;
γ_3 takes into account the extent of checking;
γ_4 takes into account the variation of the strength parameter or resistance.

When determining γ_1, the following types of failure have been assumed:
$\gamma_{Mf,s}$: Warning of failure with residual resistance

For accidental and seismic design situations the following value is used:
$\gamma_{Mf,s} = 1,0$

6.6.3.1(1) Shear connection - Headed stud connectors in solid slabs and concrete encasement - Design resistance
The following value is used: $\gamma_V=1,35\cdot\gamma_0\cdot\gamma_3$

6.8.2(2) Partial factors for fatigue assessment of buildings
Partial factors γ_{Ff} for fatigue actions are given in the National Annex to EN 1990.

9.7.3(4) Note 1 Verification of composite slabs for ultimate limit states - Longitudinal shear for slabs without end anchorage

The following value is used: $\gamma_{VS}=1{,}35\cdot\gamma_0\cdot\gamma$

9.7.3(8) Note 1 Verification of composite slabs for ultimate limit states - Longitudinal shear for slabs without end anchorage
The following value is used: $\gamma_{VS}=1{,}35\cdot\gamma_0\cdot\gamma_3$

B.2.5(1) Tests on shear connectors – Test evaluation
The following value is used: $\gamma_V=1{,}35\cdot\gamma_0\cdot\gamma_3$

B.3.6(5) Testing of composite floor slabs - Determination of the design values for $\tau_{u,Rd}$
The following value is used: $\gamma_{VS}=1{,}35\cdot\gamma_0\cdot\gamma_3$

(Non-contradictory) complementary information

3.1(4) Concrete
The recommended values in Annex C should be used, unless a more precise analysis is performed.

6.4.3(1)h) Lateral-torsional buckling of composite beams - Simplified verification for buildings without direct calculation
The values given in Table 6.1 should be used.

6.6.3.1(3) Shear connection - Headed stud connectors in solid slabs and concrete encasement - Design resistance
For further information, reference is made to specialist literature.

6.6.4.1(3) Shear connection - Design resistance of headed studs used with profiled steel sheeting in buildings - Sheeting with ribs parallel to the supporting beams
For further information, reference is made to specialist literature.

6.8.2(1) Partial factors for fatigue assessment of buildings
Reference is made to the National Annex to EN 1990.