

DS/EN 1993-1-4 DK NA:2019

National Annex to Eurocode 3: Design of steel structures – Part 1-4: General rules - Supplementary rules for stainless steels

Foreword

This National Annex (NA) is a revision of DS/EN 1993-1-4 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 Clause 5.1(2) Ultimate limit states – General 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 1993-1-4 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.

A National Annex contains national provisions, viz. nationally applicable values or selected methods. The Annex may furthermore provide non-contradictory, complementary information.

This NA includes:

- an overview of possible national choices and clauses containing complementary information;
- national choices;
- non-contradictory, complementary information.

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 complementary information

The list 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 National Annex.

Clause	Subject	National choice ¹⁾	Complementary information ²⁾
2.1.4(2)	Structural stainless steels – Fracture toughness	No further information	
2.1.5(1)	Structural stainless steels - Through-thickness properties	No further information	
5.1(2)	Ultimate limit states - General	National choice	
5.5(1) Note 1	Ultimate limit states - Uniform members in bending and axial compression	Unchanged	
5.5(1) Note 2	Ultimate limit states - Uniform members in bending and axial compression, as an alternative to expressions 5.13 to 5.17	No choice made	
5.6(2)	Ultimate limit states – Shear resistance	Unchanged	
6.1(2)	Connection design - General	No choice made	Complementary information
6.2(3)	Connection design – Bolted connections	Unchanged	
7(1)	Design assisted by testing	No choice made	
A.2(8)	Selection of materials, selection of CRF	No choice made	
A.2, Table A.1	Determination of corrosion resistance factor		Complementary information
A.3 Table A.4	In swimming pool environments, less frequent cleaning is permitted	No choice made	Complementary information
<p>¹⁾ Unchanged: Recommendations in the Eurocode to be followed. No choice made: The Eurocode does not recommend values or methods, but allows the option of determining national values or methods. National choice: A national choice has been made. No further information: The Eurocode allows further information – no additional information is given.</p> <p>²⁾ Complementary information: Additional guidance on how to use the Eurocode</p>			

National choices

5.1(2) Ultimate limit states – General

The below expressions for γ_{Mi} are used, 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):

$$\begin{aligned}\gamma_{M0} &= 1,1 \cdot \gamma_0 \cdot \gamma_3 \\ \gamma_{M1} &= 1,2 \cdot \gamma_0 \cdot \gamma_3 \\ \gamma_{M2} &= 1,35 \cdot \gamma_0 \cdot \gamma_3\end{aligned}$$

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
	1	2	3	4	5
Combination of actions					
γ_0	1,0	1,0	K_{FI}	K_{FI}	$1,2 \cdot K_{FI}$

For structures where execution supervision is based on the use of levels of checking, γ_3 is specified according to 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, 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 $\gamma_M = \gamma_1 \gamma_2 \gamma_3 \gamma_4$, where the values of γ_0 given above include the factor γ_{Mi} .

- 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_{M0} : Warning of failure with residual resistance
- γ_{M1} : Warning of failure without residual resistance
- γ_{M2} : No warning of failure

For accidental and seismic design situations the following values are used:

$$\begin{aligned}\gamma_{M0} &= 1,0 \\ \gamma_{M1} &= 1,0 \\ \gamma_{M2} &= 1,0\end{aligned}$$

Non-contradictory, complementary information.

5.4.2.1 Buckling curves

The use of Table 5.3 may result in a non-conservative resistance. For flexural buckling the values given in Table 5.3 are adjusted by the following values:

Type of member	Axis of buckling	Austenitic and duplex		Ferritic	
		α	$\bar{\lambda}_0$	α	$\bar{\lambda}_0$
Cold formed angles and channels	Any	0,76	0,2	0,76	0,2
Cold formed lipped channels	Any	0,49	0,2	0,49	0,2
Cold formed RHS	Any	0,49	0,3	0,49	0,2
Cold formed CHS/ EHS	Any	0,49	0,2	0,49	0,2
Hot finished RHS	Any	0,49	0,2	0,34	0,2
Hot finished CHS/EHS	Any	0,49	0,2	0,34	0,2
Welded or hot rolled open sections	Major	0,49	0,2	0,49	0,2
	Minor	0,76	0,2	0,76	0,2

6.1(2) Connection design – General

It is not possible to provide equations based on testing of the pull-out strength of self-tapping screws. Test results should be applied directly.

A.2(3) Selection of material

Procedures are supplemented by the following criteria:

- should not include exposure to oxidizing chemicals, e.g. cleaning agents;
- should not include permanent or frequent sea water immersion or sea water splashes;
- should not include buried or embedded structures.

A.2 Table A.1 Determination of corrosion resistance factor

Coastal areas in the Great Belt, the Little Belt, the Kattegat and Oresund may be assigned to $F_1=-10$.

A.3 Table A.4 Steel grades for indoor swimming pools

1.4410, 1.4501 or 1.4507 may be used if specified.

A.5 Galvanizing and contact with molten zinc

A.5 (2)

Normally the last sentence may be disregarded.