

Date: 20XX-XX

Høringsudgave 07.09.2026

DS/EN 1999-1-1:2023 DK NA:20xx

**National Annex to: Eurocode 9 - Design of aluminium structures -
Part 1-1: General rules**

**Nationalt Anneks til: Eurocode 9 - Aluminiumkonstruktioner -
Del 1-1: Generelle regler**

Foreword

Published [måned og år].

This National Annex (NA) to EN 1999-1-1:2023 forms part of the Danish national annexes to the second generation of Eurocodes.

This NA supersedes DS/ EN 1999-1-1 DK NA: 2019 upon its implementation in the Building Regulations (Bygningsreglementet 2018 – BR18) as an appendix.

During the transition period stated in the Building Regulations, both the first generation and the second generation of the Eurocodes and NAs may be applied.

This NA cannot be used in conjunction with the first generation of Eurocodes.

This NA lays down the conditions for the Danish implementation of DS/EN 1999-1-1:2023 for construction works in conformity with the Danish Building Regulations; Bygningsreglementet 2018 (BR18). Other parties may bring this NA into force by reference.

The Eurocodes establish the principle that certain parameters are left open for national determination. These parameters are referred to as *Nationally Determined Parameters* (NDP) and specifies the nationally applicable values, classes or methods. Furthermore, the NA may provide *Non-Contradictory, Complementary Information* (NCCI), i.e. additional guidance and alternative methods or values that support the application of the Eurocode without altering or contradicting its provisions.

Further, this National Annex includes NOTES. Notes have the status of guidance and provide additional information intended to assist the understanding or use of text of the national annex.

In conformity with the Danish Building regulations, the verbal forms used in this Eurocode and NA are to be understood as follows:

- “shall” expresses a requirement to be followed
- “should” expresses a recommendation. Alternative approaches could be used if technically justified
- “may” expresses permission within the limits of Danish Building Regulations
- “can” expresses a possibility or capability
- “is/are” expresses a statement of certainty or a fact

This NA includes:

- Foreword;
- An overview of clauses with possible Nationally Determined Parameters (NDPs) and of Non-Contradictory Complementary Information (NCCI);
- National choice to national Determined Parameters (NDP), and Non-Contradictory Complementary Information (NCCI)

Valid versions of the NAs as well as previous versions, addenda can be found at www.bygningsreglementet.dk.

Overview of possible Nationally Determined Parameters (NDPs) and Non-Contradictory Complementary Information (NCCI)

The list below identifies the clauses where Nationally Determined Parameters (NDPs) are possible, and whether a national choice has been made, and if an informative annex is applicable or not applicable. Furthermore, clauses providing complementary information (NCCI) are identified in the list below.

Clause	Subject	Nationally Determined Parameter	Non-Contradictory Complementary Information
4.1.2(3)	Design service life, durability, and robustness	Unchanged	
4.4.3(2)	Design resistances	National choice	
4.5(1)	Design assisted by testing	Unchanged	
5.2.1(1)	Range of materials	Unchanged	
9.1(2)	General	Unchanged	
9.2(2)	Deformations and dynamic effects for buildings	National choice	
10.6.2.2(1)	Characteristic strength of weld metal	Unchanged	
A.3.2(1)	Execution class	Unchanged	
A.4(1)	Selection process for execution class	Unchanged	
A.4(3) 2 choices	Selection process for execution class	National choice	
A.4(4)	Selection process for execution class	Unchanged	
A.5(1)	Evaluation of utilization grades	Unchanged	
E.3.1(2)	General design provisions	Unchanged	
E.3.1(3)	General design provisions	Unchanged	
H.2(6)	Scope and field of application	Unchanged	
O.2(2) S choices	Scope and field of application	Unchanged	
S.2(2)	Scope and field of application	Awaiting	
S.4.1.2(3)	Design service life	Awaiting	
S.4.1.2(4)	Design service life	Awaiting	
S.6(3)	Durability	Awaiting	

Clause	Subject	Nationally Determined Parameter	Non-Contradictory Complementary Information
S.10.4(1)	Damage equivalence factors	Awaiting	
Annex B	Finite Element Methods of analysis (FEM)	Informative	Complementary information
Annex C	Material selection	Informative	
Annex D	Corrosion and surface protection	Informative	
Annex F	Analytical models for stress-strain relationship	Informative	
Annex G	Geometrical properties of cross-sections	Informative	
Annex H	Behaviour of cross-sections beyond elastic limit	Informative	
Annex I	Lateral-torsional buckling of beams and torsional or torsional-flexural buckling of compressed members	Informative	
Annex J	Shear lag effects in member design	Informative	
Annex K	Plastic hinge method for continuous beams	Informative	
Annex L	Cross-sectional ductility and rotation capacity	Informative	
Annex M	Classification of joints	Informative	
Annex N	The use of the component method for joints	Informative	
Annex O	Screw grooves and screw ports	Informative	
Annex P	Adhesive bonded joints	Informative	
Annex Q	Determining the extent of HAZ from hardness tests	Informative	
Annex R	Weld studs connected by arc stud welding with tip ignition	Informative	
Annex T	Lattice spatial roof structures	Informative	
Annex U	Composite Aluminium Concrete Beams.	Informative	
NOTE Unchanged: Recommendations in the Eurocode to be followed. National choice: A National Determined Parameter is chosen and defined. Complementary information: (Non-contradictory) complementary information on how to use the Eurocode.			

Clause	Subject	Nationally Determined Parameter	Non- Contradictory Complementary Information
Normative: The Annex shall be used. Informative: The Annex may be used. Not applicable: The Annex cannot be used. No further information: The Eurocode allows further information. No further information is given.			

National Determined Parameter (NDP) and Non-contradictory complementary Information (NCCI)

4.4.3(2) Design resistances

(NDP)

For ultimate limit states the following material partial factors in Table 4.1.a NA for γ_{M1} and γ_{M2} and Table 4.1 for the other γ_{Mi} shall be used for all materials according to 5 together with the design formulas in EN 1999 all parts. The basis for partial factors for persistent and transient design situations for γ_{M1} and γ_{M2} is provided in Table 4.1.b NA.

The partial factors should only be used together with the resistance obtained by the relevant load and resistance models specified in the appropriate Eurocode for resistances and loads in EN1991, EN1992, ... EN1999.

NOTE Partial factors for e.g. application of advanced numerical models can be determined using Annex D and DK Annex FF in NA to DS/EN 1990:2023.

Table 4.1.a NA — Partial factors

		In Persistent and transient design situations For aluminium with $f_u/f_o \geq 1,1$	In accidental or seismic design situations
Resistance of cross-sections and resistance of members to instability based on f_o.	γ_{M1}	1,15	1,00
Resistance of cross-sections to fracture and resistance of joints in tension, shear and bearing, based on f_u	γ_{M2}	1,25	1,00
NOTE The partial safety factors are based on the extra safety on the material strength. The partial safety factors also include the extra safety, which is included in formulas for analysis used in EN 1999 all parts. See b_2 and b_3 in Table 4.1b NA.			

Table 4.1.b NA — Basis for partial factors for persistent and transient design situations

	γ_1 Failure mode	γ_2 Calculation model		b_2 Bias	γ_3 Strength parameter		b_3 Bias
		$V_{2,XR}^a$	$V_{2,XRT}^b$	^c	$V_{3,R}^d$	$V_{3,RT}^e$	^f
γ_{M1}	warning without residual resistance	10%	0%	1.0	6,2%	0%	1,08
γ_{M2}	No warning	5%	0%	1.1	5%	0%	1,03
NOTE The sub partial factors (γ_1 , γ_2 and γ_3) are based on the assumptions shown in Table 4.1.a NA and γ_M is determined following DK NA EN1990 Annex FF.							
a	Coefficient of variation of uncertainty of calculation model in laboratory conditions.						
b	Coefficient of variation of uncertainty associated with the transfer from laboratory conditions to conditions in a real structure for calculation model.						
c	Bias is the conservatism included in the Eurocode calculation model.						
d	Coefficient of variation of strength parameter in laboratory conditions.						
e	Coefficient of variation of uncertainty associated with the transfer from laboratory conditions to conditions in a real structure for the strength parameter.						
f	Bias is the extra conservatism included in the representative (nominel) value of the strength parameter compared to the value of the characteristic 5% fractile.						

9.2(2) Deformations and dynamic effects for buildings

(NDP)

Requirements for deflections shall be agreed with the owner of the building.

For vertical or horizontal deflections, the following recommendations is normally sufficient for buildings, though some flooring, cladding, insulation, glass areas etc. will often require more strict deformation limits:

Table 9.2.a NA — Sufficient vertical or horizontal deformation

Area	Deformation limit
Beams in floors, roofs and facades exposed to one characteristic load without dynamic factor:	
Floor	L/400
Roof and facade	L/200
Secondary thin plated structures:	
Uninsulated roof or facade	L/90
Roof with insulation and asphalt roofing:	
for L < 4,5 m	L/150
for 4,5 m ≤ L < 6,0 m	30 mm
for 6,0 m ≤ L	L/200
NOTE	L is the span width for simply supported beams or continuous beams and twice the length of a cantilever beam.

For horizontal deflections of a frame or a column the following recommendations is normally sufficient for buildings, though some cladding, insulation, glass areas etc. will often require more strict deformation limits:

Table 9.2.b NA — Sufficient horizontal deflection of a frame or column

Area	Deformation limit
Frame without crane	H/150
Column in one story building	H/300
Columns in building with more than one story:	
Column per story	H/300
The top of the building	H _e /500
NOTE 1	H is the height of the single column.
NOTE 2	H _e is the height of the building.

A.4(3) Selection process for execution class

(NDP)

DS/EN 1999-1-1:2023 Table A.1 is replaced by Table A.1.a NA:

Table A.1.a NA — Selection of execution class based on the type of loading (EXC)

Consequence class (CC)	Type of loading	
	Static Quasi-static ^d	Fatigue ^a
CC3	EXC3 ^b	EXC3 ^c
CC2b	EXC3	EXC3 ^c
CC2a	EXC2	EXC3
CC1	EXC1	EXC2
a	See DS/EN 1993-1-9	
b	EXC4 may be considered for critical elements and/or joints	
c	EXC4 should be used for specific critical details of the structure where fatigue is the dominant design situation. The special requirement according to DS/EN 1090-3 should also be provided.	
d	This also covers the seismic action in Denmark.	

NOTE 2 Execution classes should be determined based on consequence classes given in Table A.1 NA.

S.2(2) Scope and field of application

(NDP)

Under development; depends on Annex S for bridges.

S.4.1.2(3) Design service life

(NDP)

Under development; depends on Annex S for bridges.

S.4.1.2(4) Design service life

(NDP)

Under development; depends on Annex S for bridges.

S.6(3) Durability

(NDP)

Under development; depends on Annex S for bridges.

S.10.4(1) Damage equivalence factors

(NDP)

Under development; depends on Annex S for bridges.

Annex B (Informative) Finite Element Methods of analysis (FEM)

(NCCI)

For documentation, validation, and verification of the models see DS/EN1993-1-14.