The Minister for Infrastructure and Transport

In agreement with

the Minister for the Interior

and

The Head of the Civil Protection Department

HAVING REGARD TO Decree-Law No 173 of 11 November 2022, which, with effect from 12 November 2022, provided for, inter alia, the renaming of the '*Ministry for Infrastructure and Sustainable Mobility' as the 'Ministry for Infrastructure and Transport*';

HAVING REGARD TO Law No 1086 of 5 November 1971, containing standards for the regulation of works in reinforced, normal and pre-stressed concrete and steel frameworks;

HAVING REGARD TO Law No 64 of 2 February 1974 laying down measures for buildings with special requirements for seismic areas;

HAVING REGARD TO the Single Text detailing provisions and regulations on construction, as given in Presidential Decree No 380 of 6 June 2001, and in particular Articles 52, 60 and 83;

HAVING REGARD TO the Decree of the Minister for the Interior of 9 March 2007 laying down '*Fire resistance performance of buildings in activities subject to the control of the National Fire Brigade*';

HAVING REGARD TO the Decree of the Minister for the Interior of 9 May 2007 laying down '*Directives for the implementation of the engineering approach to fire safety*'

HAVING REGARD TO Presidential Decree No 151 of 1 August 2011 issuing the '*Regulation on the simplification of guidelines for fire safety procedures, pursuant to Article 49(4c) of Decree-Law 78 of 31 May 2010, converted, as amended, by Law 122 of 30 July 2010*';

HAVING REGARD TO Decree No 246 of the President of the Republic of 21 April 1993 laying down the '*Regulation implementing Directive 89/106/EEC relating to construction products*'

HAVING REGARD TO Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC;

HAVING REGARD TO Legislative Decree No 106 of 16 June 2017, published in the Official Gazette General Series No 159 of 10 July 2017 on the '*Adaptation of national legislation to the provisions of Regulation (EU) No 305/2011 laying down harmonised conditions for the marketing of construction products and repealing Directive 89/106/EEC*';

HAVING REGARD TO the Decree of the Minister for Infrastructure and Transport of 31 July 2012, published in the Official Gazette General Series No 73 of 27 March 2013 – Ordinary Supplement No 21, on the '*Approval of the National Annexes containing the technical parameters for the application of Eurocodes*';

HAVING REGARD TO the Decree of the Minister for Infrastructure and Transport dated 17 January 2018, published in the Official Gazette General Series No 42 of 20 February 2018 – Ordinary Supplement No 8, on the '*Updating of the technical standards for construction*';

HAVING REGARD TO Circular No 7 of the Council of Public Works on 21 January 2019 laying down '*Instructions for the application of the Update of the New Technical Standards for Construction referred to in the Ministerial Decree of 17 January 2018*'

WHEREAS the update of the technical standards for construction, approved with the aforementioned Interministerial Decree of 17 January 2018, in Chapter 1 'Subject', the third paragraph, regarding the application indications for obtaining the prescribed performances, establishes that, for what is not expressly specified by the same new technical standards for constructions reference may be made to standards of proven validity and to other technical documents listed in Chapter 12 and that, in particular, those provided by the Eurocodes with the relative National Annexes constitute indications of proven validity and provide the systematic application support of the same standards;

WHEREAS Chapter 12 'Technical References' of the new technical standards for construction, approved by the aforementioned Interministerial Decree of 17 January 2018, in the first paragraph, states that, unless otherwise specified in the same technical standards for construction, the indications set out in the Structural Eurocodes published by the CEN, with the specifications set out in the National Annexes, are consistent with the principles underlying them;

WHEREAS Circular No 7 of the High Council for Public Works of 21 January 2019 confirms that, with regard to Chapter 12 of the new technical standards for construction, the Structural Eurocodes published by CEN constitute an important reference for the application of technical standards;

WHEREAS, for the use of Structural Eurocodes it is therefore necessary that the national parameters regarding the safety levels of the works that fall within the Member States' competence be defined in Technical Annexes;

WHEREAS, therefore, the Eurocodes, with the relevant National Annexes, provide the systematic application support of the technical standards for construction, approved by the aforementioned Interministerial Decree of 17 January 2018, when expressly referred to or for technical aspects not expressly or fully treated in them, in compliance with the principles and safety levels of the same technical standards for construction;

HAVING REGARD TO the Recommendation of the European Commission of 11 December 2003 on the implementation and use of Eurocodes for construction works and structural construction products notified under number C (2003) 4639 published in the Official Journal of the European Union No L 332 of 19 December 2003, and in particular Article 2 thereof, according to which Member States should set the parameters to be used in their territory as 'parameters specified at national level';

WHEREAS it was considered necessary to establish, in accordance with Article 2 of the aforementioned Recommendation of 11 December 2003, the National Annexes indicating those 'parameters specified at national level' of the structural Eurocodes, in order to fully implement the technical standards for construction referred to in the Interministerial Decree of 17 January 2018;

HAVING REGARD TO letter ref. 10610 of 3 December 2019 in which the High Council for Public Works transmitted Opinion No 57/2017 of the General Assembly, delivered at the meeting of 26 July 2019, in which it expressed a favourable opinion on the National Annexes containing the technical parameters for the application of Eurocodes;

HAVING REGARD TO letter ref. ______ of _____________2023 by which the High Council for Public Works transmitted the revised National Annexes, incorporating the latest corrigenda and amending documents issued by the European Committee for Standardization;

HAVING CONSULTED the High Council for Public Works by the aforementioned letter ref. ______ of _____________2023, pursuant to Article 83 of Presidential Decree No 380 of 2001;

HAVING CONSULTED the National Research Council with letter ref. ______ of _____________2023, pursuant to Article 83 of Presidential Decree No 380 of 2001;

HAVING REGARD TO the agreement expressed by the Minister for the Interior in letter ref. 14676 of 22 July 2020 and the subsequent confirmation received by letter ref. ______ of _____________2023, pursuant to Article 52 and Article 83 of Presidential Decree No 380 of 2001;

HAVING REGARD TOthe agreement expressed by the Head of the Department of Civil Protection in letter ref. 7704 of 12 February 2021 2020 and the subsequent confirmation received by letter ref. ______ of _____________2023, pursuant to Article 5(2) of Decree-Law No 136 of 2004;

HAVING OBTAINED agreement at the Joint Conference held at the sitting of ________ 2023, pursuant to Articles 54 and 93 of Legislative Decree No 112 of 31 March 1998, and Article 83 of Presidential Decree No 380 of 6 June 2001;

WHEREAS this measure, by letter ref. XXXXXX of XXXXXXXX, was sent, through the Ministry for Enterprises and Made in Italy, to the European Commission, pursuant to Article 5(1) of Directive 2015/1535 of the European Parliament and of the Council of 9 September 2015;

Hereby decrees:

SOLE ARTICLE

The technical Parameters are established as given in the National Annexes to the Eurocodes given in the annexes which form an integral part of the present decree, and whose references are listed in the following table.

	EUROCODE	**PUBLISHED EACH YEAR**	**TITLE**
1	UNI-EN 1990	2006	General structural design criteria – Annex A1 and Annex A2
2	UNI-EN 1991-1-1	2004	Actions on structures – Part 1-1: General actions – Densities, self-weight, imposed loads for building
3	UNI-EN 1991-1-2	2004	Actions on structures - Part 1-2: General actions – Actions on structures exposed to fire
4	UNI-EN 1991-1-3	2015	Actions on structures – Part 1-3: General actions – Snow loads
5	UNI-EN1991-1-4	2010	Actions on structures Part 1-4: General actions - Wind actions
6	UNI EN 1991-1-5	2004	Actions on structures – Part 1-5: General actions – Thermal actions
7	UNI EN 1991-1-6	2005	Actions on structures – Part 1-6: General actions – Actions during construction
8	UNI EN 1991-1-7	2014	Actions on structures – Part 1-7: General actions – Exceptional actions
9	UNI-EN1991 – 2	2005	Actions on structures Part 2: Traffic loads on bridges
10	UNI-EN-1991-3	2006	Actions on structures'; Part 3: Actions induced by cranes and machinery
11	UNI EN 1991-4	2006	Actions on structures – Part 4: Actions on silos and tanks
12	UNI-EN1992-1-1	2015	Design of concrete structures Part 1-1: General rules and rules for buildings
13	UNI-EN 1992-1-2	2019	Design of concrete structures Part 1-2: General rules – Structural fire design
14	UNI-EN 1992-2	2006	Design of concrete structures Part 2 – Concrete bridges – Specifications and construction details

15	UNI-EN1992-3	2006	Design of concrete structures Part 3: Liquid retaining and containment structures
16	UNI-EN1992-4	2018	Design of concrete structures Part 4: Design of fastenings for use in concrete
17	UNI-EN-1993-1-1	2014	Design of steel structures Part 1-1: General rules and rules for buildings
18	UNI-EN 1993-1-2	2005	Design of steel structures Part 1-2: General rules – Structural fire design
19	UNI-EN-1993-1-3	2007	Design of steel structures Part 1-3: General rules – Supplementary rules for cold-formed members and sheeting.
20	UNI-EN-1993-1-4	2021	Design of steel structures Part 1-4: General roles –supplementary rules for stainless steel
21	UNI-EN-1993-1-5	2019	Design of steel structures Part 1-5: Plated structural elements
22	UNI-EN-1993-1-6	2017	Design of steel structures Part 1-6: Strength and stability of shell structures
23	UNI-EN-1993-1-7	2007	Design of steel structures Part 1-7: Plated structures subject to out of plane loading
24	UNI-EN-1993-1-8	2005	Design of steel structures Part 1-8: Design of joints
25	UNI-EN-1993-1-9	2005	Design of steel structures Part 1-9 – Fatigue
26	UNI-EN-1993-1-10	2005	Design of steel structures Part 1-10: Material toughness and through-thickness properties
27	UNI-EN-1993-1-11	2007	Design of steel structures Part 1-11: Design of structures with tension components
28	UNI-EN-1993-1-12	2007	Design of steel structures Part 1-12: Additional rules for the extension of EN 1993 up to steel grades S 700
29	UNI-EN-1993–2	2007	Design of steel structures Part 2: Steel bridges
30	UNI-EN-1993-3-1	2007	Design of steel structures Part 3-1: Towers, masts and chimneys – Towers and masts
31	UNI-EN-1993-3-2	2007	Design of steel structures Part 3-1: Towers, masts and chimneys – Chimneys.
32	UNI-EN-1993-4-1	2017	Design of steel structures Part 4-1: Silos
33	UNI-EN-1993-4-2	2017	Design of steel structures Part 4-2: Tanks

34	UNI-EN-1993-5	2007	Design of steel structures Part 5: Piling
35	UNI-EN-1993-6	2007	Design of steel structures Part 6: Crane supporting structures.
36	UNI-EN-1994-1-1	2005	Design of composite steel and concrete structures Part 1-1: General rules and rules for buildings
37	UNI-EN1994-1-2	2014	Design of composite steel and concrete structures Part 1-2: General rules -Structural fire design.
38	UNI-EN-1994 – 2	2006	Design of composite steel and concrete structures Part 2: General rules and rules for bridges
39	UNI-EN 1995-1-1	2014	Design of timber structures Part 1-1: General - Common rules and rules for buildings
40	UNI-EN1995-1-2	2005	Design of timber structures – Part 1-2: General rules -Structural fire design.
41	UNI-EN 1995-2	2005	Design of timber structures – Part 2: Bridges
42	UNI-EN-1996-1-1	2013	Design of masonry structures Part 1-1: General rules for reinforced and non-reinforced masonry structures
43	UNI-EN1996-1-2	2005	Design of masonry structures – Part 1-2: General rules -Structural fire design.
44	UNI-EN-1996-2	2006	Design of masonry structures Part 2: Design considerations, selection of materials and execution of masonry
45	UNI-EN-1996-3	2006	Design of masonry structures Part 3: Simplified calculation methods for unreinforced masonry structures
46	UNI-EN-1997-1	2013	Geotechnical design Part 1: General rules
47	UNI-EN-1997-2	2007	Geotechnical design Part 2: Ground investigation and testing
48	UNI-EN-1998-1	2013	Design of structures for earthquake resistance. Part 1- General rules, seismic actions and rules for buildings
49	UNI-EN-1998–2	2011	Design of structures for earthquake resistance. Part 2: Bridges
50	UNI-EN-1998-3	2005	Design of structures for earthquake resistance. Part 3: Assessment and retrofitting of buildings
51	UNI-EN-1998-4	2006	Design of structures for earthquake resistance. Part 4 - Silos, tanks and pipelines.
52	UNI-EN-1998-5	2005	Design of structures for earthquake resistance. Part 5: Foundations, retaining structures and geotechnical aspects
53	UNI-EN-1998-6:2005	2005	Design of structures for earthquake resistance. Part 6 - Towers, masts and chimneys

54	UNI-EN1999-1-1	2014	Design of aluminium structures Part 1-1: General structural rules
55	UNI-EN 1999-1-2	2007	Design of aluminium structures Part 1-2: General rules -Structural fire design.
56	UNI-EN1999-1-3:2011	2011	Design of aluminium structures Part 1-3: Structures susceptible to fatigue
57	UNI-EN 1999-1-4	2011	Design of aluminium structures Part 1-4: Cold formed structural sheeting
58	UNI-EN-1999-1-5	2007	Design of aluminium structures Part 1-5: Shells

* * *

This Decree and its annexes are forwarded to the inspection bodies and subsequently published in the Official Gazette of the Italian Republic and on the official website of the Ministry for Infrastructure and Transport.

THE MINISTER FOR INFRASTRUCTURE AND TRANSPORT

THE MINISTER OF THE INTERIOR

THE HEAD OF THE CIVIL DEFENCE DEPARTMENT

NATIONAL ANNEX

UNI-EN 1990:2006 (includes update A1:2005 and corrigendum AC:2010)
Basis of structural design
Annex A2 – Application for bridges

EN 1990:2002+A1:2005 (incorporating corrigenda December 2008 and April 2010)
Basis of structural design
Annex A2 – Application for bridges

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1990:2006 and the corresponding Annex A2.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1990:2006 and Annex A2 below:

A1.1(1) Note	A2.1.1(1) Note 3
A1.2.1(1) Note 1 and 2	A2.2.1(2) Note 1
A1.2.2(1) Note [Table A.1.1]	A2.2.6(1) Note 1
A1.3.1(1) Note [Table A1.2(A), Table A1.2(B), Table A1.2(C)]	A2.3.1(1)
A1.1(5) Note	A2.3.1(5)
A1.3.2 [Table A1.3]	A2.3.1(7)
A1.4.2(2) Note	A2.3.1(8)
	A2.3.1 Table A2.4(A) - Notes 1 and 2
	A2.3.1 Table A2.4(B) - NOTE 1
	A2.3.1 Table A2.4(B) - NOTE 2
	A2.3.1 Table A2.4(B) - NOTE 4
	A2.3.1 Table A2.4(C)
	A2.3.2(1) Table A2.5
	A2.3.2 Table A2.5 Note
	A2.4.1(1) Note 1 (Table A2.6)
	A2.4.1(1) Note 2
	A2.4.1(2)
	A2.2.2 (1)
	A2.2.2(3)
	A2.2.2(4)
	A2.2.2(6)
	A2.2.6(1) Note 2
	A2.2.6(1) Note 3
	A2.2.3(2)
	A2.2.3(3)

A2.2.3(4)
A2.4.3.2(1)
A2.2.4(1)
A2.2.4(4)
A2.4.4.1(1)
NOTE 3
A2.4.4.2.1(4)P
A2.4.4.2.2
Table A2.7 Note
A2.4.4.2.2(3)P
A2.4.4.2.3(1)
A2.4.4.2.3(2)
A2.4.4.2.3(3)
A2.4.4.2.4(2) Note
A2.4.4.2.4(2) Table A2.8 Note 3
A2.4.4.2.4(3)
A2.4.4.3.4(6)

Paragraph 3 below also contains national indications on the use of the Informative Annexes B, C and D for buildings and other civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN-1990:2006 and Annex A2 thereof in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents that explicitly refer to UNI-EN-1990:2006 – Basis of structural design and its related Annex A2 – Application for bridges of UNI-EN-1990:2006, as well as when designing structures involving materials or actions other than those falling within the scope and field of application of EN 1991 to EN 1999.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI EN 1990:2006 and Annex A2 thereof.

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>A1.1(1)</td><td>Note</td><td>The Table below shows a different classification of structural works than that of Table 2.1, together with the minimum values of the nominal design lifetime to be adopted for the different types of buildings.
<table>
<tr><th>TYPE</th><th>DESCRIPTION</th><th>Minimum V_N values (in years)</th></tr>
<tr><td>1</td><td>Temporary and provisional buildings</td><td>10</td></tr>
<tr><td>2</td><td>Buildings with ordinary performance levels</td><td>50</td></tr>
<tr><td>3</td><td>Buildings with high performance levels</td><td>100</td></tr>
</table>
These values can also be used to define time-dependent performance.
Constructions or parts thereof that can be dismantled with the intention of being reused are not to be considered temporary.
For new construction works for which the design construction phase is anticipated to span a duration equal to P_N, the working life related to this phase of construction, for the purposes of the evaluation of seismic actions, should be assumed to be no less than P_N, and in any case no less than 5 years.
Seismic monitoring of constructions of type 1 or constructions at the construction stage may be omitted when the project anticipates that such condition will persist for less than 2 years.</td></tr>
<tr><td>A1.2.1(1)</td><td>Note 1</td><td>All actions which may occur simultaneously must be considered, without limit in number.</td></tr>
<tr><td>A1.2.1(1)</td><td>Note 2</td><td>No changes are foreseen for climatic reasons to the expressions of the combinations of actions 6.9a to 6.12b, to be used for the ultimate limit state checks, and from 6.14a to 6.16b, to be used for service limit state checks.</td></tr>
<tr><td>A1.2.2(1)</td><td>Note</td><td>The coefficient values ψ shown in the table below apply
<table>
<tr><th>Category/Variable action</th><th>ψ_{0j}</th><th>ψ_{1j}</th><th>ψ_{2j}</th></tr>
<tr><td>Category A Environments for residential use</td><td>0.7</td><td>0.5</td><td>0.3</td></tr>
<tr><td>Category B Offices</td><td>0.7</td><td>0.5</td><td>0.3</td></tr>
<tr><td>Category C Environments susceptible to crowding</td><td>0.7</td><td>0.7</td><td>0.6</td></tr>
<tr><td>Category D Environments for commercial use</td><td>0.7</td><td>0.7</td><td>0.6</td></tr>
<tr><td>Category E Areas for storage, commercial and industrial use, libraries, archives and warehouses and environments for industrial use</td><td>1.0</td><td>0.9</td><td>0.8</td></tr>
<tr><td>Category F Garages, car parks and areas for vehicle traffic (for motor vehicles with weight $\leq$ 30 kN)</td><td>0.7</td><td>0.7</td><td>0.6</td></tr>
<tr><td>Category G Garages, car parks and vehicle traffic areas (for vehicles weighing $>$ 30 kN)</td><td>0.7</td><td>0.5</td><td>0.3</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td></td><td>
<table>
<tr><td>Category H only</td><td>Roofing accessible for maintenance</td><td>0.0</td><td>0.0</td><td>0.0</td></tr>
<tr><td>Category I</td><td>Accessible roofing</td><td colspan="3" rowspan="2">to be assessed on a case-by-case basis</td></tr>
<tr><td>Category K heliports ...)</td><td>Roofing for special uses (equipment,</td></tr>
<tr><td colspan="2">Wind</td><td>0.6</td><td>0.2</td><td>0.0</td></tr>
<tr><td colspan="2">Snow (at ≤ 1 000 m above sea level)</td><td>0.5</td><td>0.2</td><td>0.0</td></tr>
<tr><td colspan="2">Snow (at > 1 000 m above sea level)</td><td>0.7</td><td>0.5</td><td>0.2</td></tr>
<tr><td colspan="2">Thermal variations</td><td>0.6</td><td>0.5</td><td>0.0</td></tr>
</table>
</td></tr>
<tr><td>A1.3.1(1)</td><td>Note</td><td>The indicated partial coefficient values in Tables A1.2 (A) to (C) are replaced by the values given in the Tables in the following points.
Two coefficients are distinguished γ_G: γ_{G1} and γ_{G2} for structural and non-structural permanent loads respectively.
In each verification of the ultimate limit state structural loads are considered as all those deriving from the presence of structures and materials which, in the modelling used, contribute to the behaviour of the work with characteristics of strength and rigidity. In particular, considered within the structural load will be the weight of the soil in verification of slopes and embankments, the force on support structures, etc.
Loads such as those relating to external cladding, interior partitions, screeds, insulation, floors and coverings of the walking plane, plasterwork, suspended ceilings, equipment, etc. are considered permanent non-structural loads acting on the building during its normal operation, even though in some cases it is necessary to consider transitional situations when they are not present.
In the event that the intensity of the permanent non-structural loads or part of them (e.g. permanent load-bearing loads) is well defined at the design stage, the same partial coefficients may be adopted for such loads or the known part of them as for structural permanent actions</td></tr>
<tr><td>A1.3.1(1)</td><td>Table A1.2(A)
Note 1</td><td>The values of γ shown in the table below are adopted.
<table>
<tr><td></td><td>γ_{G1}</td><td>γ_{G1}</td><td>γ_{G2}</td><td>γ_{G2}</td><td>γ_{Qj}</td><td>γ_{Qj}</td></tr>
<tr><td></td><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td></tr>
<tr><td>EQU</td><td>0.9</td><td>1.1</td><td>0.8</td><td>1.5</td><td>0.0</td><td>1.5</td></tr>
</table>
In the event that the action consists of ground thrust, the indications given in EN 1997-1 shall apply to the choice of the partial safety coefficients.</td></tr>
<tr><td>A1.3.1(1)</td><td>Table A1.2(A)
Note 2</td><td>Should the static balance verification involve resistance of the structural elements, two separate verifications must be carried out, based on Tables A1.2(A) and A1.2(B). A combined verification is not permitted.</td></tr>
<tr><td>A1.3.1(1)</td><td>Table A1.2(B)
Note 1</td><td>Expression 6.10 is adopted.</td></tr>
</table>

<table>
<tr><td>A1.3.1(1)</td><td>Table A1.2(B)
Note 2</td><td>The values of γ shown in the table below are adopted.
<table><tr><td></td><td>γ_{G1}</td><td>γ_{G1}</td><td>γ_{G2}</td><td>γ_{G2}</td><td>γ_{Qj}</td><td>γ_{Qj}</td></tr><tr><td></td><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td></tr><tr><td>STR</td><td>1.0</td><td>1.3</td><td>0.8</td><td>1.5</td><td>0.0</td><td>1.5</td></tr></table>
In the event that the action consists of ground thrust, the indications given in EN 1997-1 shall apply to the choice of the partial safety coefficients.
The partial coefficient of the pre-stressing is assumed to be γ_P = 1.0</td></tr>
<tr><td>A1.3.1(1)</td><td>Table A1.2(B)
Note 4</td><td>The values of the partial coefficients γ_G and γ_Q are adopted; the value of γ_{SD} is therefore not specified.</td></tr>
<tr><td>A1.3.1(1)</td><td>Table A1.2(C)
Note</td><td>The values of γ shown in the table below are adopted.
<table><tr><td></td><td>γ_{G1}</td><td>γ_{G1}</td><td>γ_{G2}</td><td>γ_{G2}</td><td>γ_{Qj}</td><td>γ_{Qj}</td></tr><tr><td></td><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td></tr><tr><td>GEO</td><td>1.0</td><td>1.0</td><td>0.8</td><td>1.3</td><td>0.0</td><td>1.3</td></tr></table>
The partial coefficients on ground resistance are given in EN 1997-1</td></tr>
<tr><td>A1.3.1(5)</td><td>Note</td><td>Approach 1 or alternatively approach 2 may be adopted, except in the case of other explicit requirements.</td></tr>
<tr><td>A1.3.2</td><td>Table A1.3
(*)</td><td>In exceptional project situations for the main variable action, the quasi-permanent value is adopted. In combinations of seismic actions the semi-permanent value is adopted for the main variable action. The combination of seismic actions is valid for verifications of the ultimate limit state of strength, and for verifications of the damage limit state (see EN1998)</td></tr>
<tr><td>A1.4.2(2)</td><td>Note</td><td>Restrictions are generally reported in the single Eurocodes from EN1992 to EN1999.</td></tr>
<tr><td>A2.1.1(1)</td><td>Note 3</td><td>The following statement applies:
<table><tr><td>TYPE</td><td>DESCRIPTION</td><td>Minimum values of V_N (years)</td></tr><tr><td>1</td><td>Temporary and provisional constructions[(1)]</td><td>10</td></tr><tr><td>2</td><td>Buildings with ordinary performance levels</td><td>50</td></tr><tr><td>3</td><td>Buildings with ordinary performance levels</td><td>100</td></tr></table>[(1)] Constructions or parts thereof that can be dismantled with the intention of being reused are not to be considered temporary.
For new construction works for which the design construction phase is anticipated to span a duration equal to P_N, the working life</td></tr>
</table>

<table>
<tr><td></td><td></td><td>related to this phase of construction, for the purposes of the evaluation of seismic actions, should be assumed to be no less than P_N, and in any case no less than 5 years. Seismic monitoring of constructions of type 1 or constructions at the construction stage may be omitted when the project anticipates that such condition will persist for less than 2 years.</td></tr>
<tr><td>A2.2.1(2)</td><td>Note 1</td><td>Additional information may be provided for the single design</td></tr>
<tr><td>A2.2.6(1)</td><td>Note 1</td><td>The recommended values ψ in Table A.2.1 are adopted</td></tr>
<tr><td>A2.3.1(1)</td><td>Note</td><td>For permanent actions, three coefficients γ_G are distinguished: γ_{G1}, γ_{G2} e γ_{G3}, respectively for the own weight of the structural elements g_1, for permanent load-bearing loads (road paving, pavements, noise barriers, road safety barriers, railings, finishes, water drainage system, road equipment, backfills and the like) g_2, other permanent actions: g_3 (ground thrust, hydraulic thrust, etc.) g_3.

In each verification of the ultimate limit state structural loads are considered as all those deriving from the presence of structures and materials which, in the modelling used, contribute to the behaviour of the work with characteristics of strength and rigidity. In particular, considered within the structural load shall be the weight of the soil in the verifications on slopes and embankments, the force on support structures, etc.

For design distortions and prestresses, the coefficients γ_P are adopted for removal, viscosity and unintentional failures, the coefficients γ_ε are adopted</td></tr>
<tr><td>A2.3.1(5)</td><td>Note</td><td>Approach 1 or alternatively approach 2 may be adopted, except in the case of other explicit requirements.</td></tr>
<tr><td>A2.3.1(7)</td><td>Note</td><td>To be defined by the individual design in accordance with EN 1991-1-6, where relevant</td></tr>
<tr><td>A2.3.1(8)</td><td>Note</td><td>Unless otherwise indicated in the relevant Eurocode, the values of γ_P are to be assumed in accordance with Tables A2.4(A), A2.4(B) and A2.4(C)</td></tr>
<tr><td>A2.3.1</td><td>Table A2.4(A)
Notes 1 and 2</td><td>The recommended γ values are adopted in the notes with the following modifications.
<table>
<tr><td colspan="2">γ_{G1}, γ_{G3}</td><td colspan="2">γ_{G2}</td><td colspan="2">γ_P</td><td colspan="2">γ_ε</td><td colspan="2">γ_B</td></tr>
<tr><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td></tr>
<tr><td>0.9</td><td>1.1</td><td>0.0</td><td>0.9</td><td>0.9</td><td>1.0(1)</td><td>0.0</td><td>1.2</td><td>0.9</td><td>1.5</td></tr>
</table>
where γ_B is the partial coefficient for ballast.
(1) γ_P=1.30 for instability of structures with external prestressing
γ_Q for the loads of railway traffic (groups of loads from 1 to 4 of Table 6.11 of EN1991-2 which has been modified) is equal to 1.45, if unfavourable, or to 0, if favourable.
In the event that the intensity of the permanent load-bearing loads or part of them is well defined at the design stage, the same coefficients may be adopted for such loads or the known part of</td></tr>
</table>

<table>
<tr><td></td><td></td><td>them as for permanent actions. The above is not applicable to ballast. When significant variations in load are foreseen owing to ballast, this must be taken into account explicitly in the individual verifications.
The partial coefficients related to ground resistance are given in EN 1997-1</td></tr>
<tr><td>A2.3.1</td><td>Table A2.4(B)
Note 1</td><td>Expression 6.10 is adopted.</td></tr>
<tr><td>A2.3.1</td><td>Table A2.4(B)
Note 2</td><td>The recommended γ values are adopted in the notes with the following modifications.
<table>
<tr><td colspan="2">γ_{G1}, γ_{G3}</td><td colspan="2">γ_{G2}</td><td colspan="2">γ_P</td><td colspan="2">γ_ε</td><td colspan="2">γ_B</td></tr>
<tr><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td></tr>
<tr><td>1.0</td><td>1.35</td><td>0.0</td><td>1.5</td><td>1.0</td><td>1.0[(1)]</td><td>0.0</td><td>1.2</td><td>1.0</td><td>1.5</td></tr>
</table>
Where:
γ_B is the partial coefficient for ballast.
(1) γ_P=1.20 for local effects
γ_Q for the loads of railway traffic (groups of loads from 1 to 4 of Table 6.11 of EN1991-2 which has been modified) is equal to 1.45, if unfavourable, or to 0, if favourable.
In the event that the intensity of the permanent load-bearing loads or part of them is well defined at the design stage, the same coefficients may be adopted for such loads or the known part of them as for permanent actions. The above is not applicable to ballast. When significant variations in load are foreseen owing to ballast, this must be taken into account explicitly in the individual verifications.
The partial coefficients related to ground resistance are given in EN 1997-1</td></tr>
<tr><td>A2.3.1</td><td>Table A2.4(B) -
Note 4</td><td>The reference to Note 4 is deleted.</td></tr>
<tr><td>A2.3.1</td><td>Table A2.4(C)</td><td>The recommended γ values are adopted in the notes with the following modifications.
<table>
<tr><td colspan="2">γ_{G1}, γ_{G3}</td><td colspan="2">γ_{G2}</td><td colspan="2">γ_P</td><td colspan="2">γ_ε</td><td colspan="2">γ_B</td></tr>
<tr><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td><td>fav.</td><td>unfav.</td></tr>
<tr><td>1.0</td><td>1.0</td><td>0.0</td><td>1.3</td><td>1.0</td><td>1.0</td><td>0.0</td><td>1.0</td><td>1.0</td><td>1.3</td></tr>
</table>
where γ_B is the partial coefficient for ballast.

γ_Q for the loads of railway traffic (groups of loads from 1 to 4 of Table 6.11 of EN1991-2 which has been modified) is equal to 1.25, if unfavourable, or to 0, if favourable.
In the event that the intensity of the permanent load-bearing loads or part of them is well defined at the design stage, the same coefficients may be adopted for such loads or the known part of them as for permanent actions. The above is not applicable to ballast. When significant variations in load are foreseen owing to ballast, this must be taken into account explicitly in the individual</td></tr>
</table>

		verifications. The partial coefficients related to ground resistance are given in EN 1997-1
A2.3.2(1)	Table A2.5	In exceptional project situations for the main variable action, the quasi-permanent value is adopted. In combinations of seismic actions the semi-permanent value is adopted for the main variable action. For railway bridges, in combinations of seismic actions a coefficient $\psi_2 = 0.2$ is considered the semi-permanent value of the materials corresponding to traffic loads. The combination of seismic actions is valid for verifications of the Ultimate Limit State of strength, and for verifications of the Damage Limit State (see EN1998)
A2.3.2	Table A2.5 - Note	The recommended value $\gamma = 1$ is adopted.
A2.4.1(1)	Table A2.6 - Note 1	The recommended values $\gamma = 1$ are adopted.
A2.4.1(1)	Note 2	Verifications with infrequent combinations are not required.
A2.4.1(2)	Note	The requirements and verification criteria for SLS are to be defined for the individual project
Paragraphs specific to road bridges.		
A2.2.2(1)	Note	Verifications with infrequent combinations are not required.
A2.2.2(3)	Note	The combination rules for special vehicles are to be defined for the individual design in accordance with EN 1991-2
A2.2.2(4)	Note	Snow and traffic actions shall not be combined, except for covered bridges
A2.2.2(6)	Note	Wind and thermal actions are combined (see Table A2.1)
A2.2.6(1)	Note 1	The recommended values with F$F^*_w=\psi_0 F_{wk}$ are adopted. Wind action on bridge load is determined considering an exposed surface of vehicles of a height of 3 m, measured from the road surface.
A2.2.6(1)	Note 2	Verifications with infrequent combinations are not required.
A2.2.6(1)	Note 3	Actions of hydraulic origin must be defined for the individual design.
Paragraphs specific to pedestrian bridges.		
A2.2.3(2)	Note	Wind and thermal actions are combined (see Table A2.2)
A2.2.3(3)	Note	Snow and traffic actions shall not be combined, except for covered bridges
A2.2.3(4)	Note	Reference is made, as recommended, to combinations of actions similar to those for buildings (Annex A1) by adopting the coefficients ψ of Table A2.2
A2.4.3.2(1)	Note	Recommended maximum acceleration values are adopted.
Paragraphs specific to railway bridges		
A2.2.4(1)	Note	Snow and traffic actions shall not be combined, except for covered

		bridges
A2.2.4(4)	Note	Additional limitations are not provided (a wind action of $\psi_0 F_{wk}$ must be considered)
A2.4.4.1(1)	Note 3	Limitations are to be defined for the individual design
A2.4.4.2.1(4)P	Note	Recommended values for peak acceleration are adopted.
A2.4.4.2.2	Table A2.7 - Note	Recommended *t* values are adopted. For speed V > 200 km/h verification must be made that for real trainsets, multiplied by the relative dynamic increase, *t* is ≤ 1.2 mm/3 m.
A2.4.4.2.2(3)	Note	For t_T the t_T=6 mm/3 m is adopted.
A2.4.4.2.3(1)	Note	To be defined for each design
A2.4.4.2.3(2)	Note	To be defined for each design
A2.4.4.2.3(3)	Note	To be defined for each design
A2.4.4.2.4(2)	Note	To be defined for each design
A2.4.4.2.4(2)	Table A2.8 - Note 3	The recommended α_i and r_i values are adopted.
A2.4.4.2.4(3)	Note	The recommended f_{h0}=1.25 value is adopted. Hz
A2.4.4.3(6)	Note	To be defined for each design
	Use of informative Annexes B, C and D.	Annexes B, C and D retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI EN 1991-1-1:2004	(includes corrigendum AC:2009) Eurocode 1 ‘Actions on structures – Part 1-1: General actions – Densities, self-weight, imposed loads for building’
EN 1991-1-1:2002	(Incorporating Corrigendum March 2009) Eurocode 1 “Actions on structures – Part 1-1: General actions – Densities, self-weight, imposed loads for buildings”

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1991-1-1:2004.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1991-1-1:2004 below:

2.2 (3)	5.2.3 from (1) to (5)	6.2.2(1) 6.3.1.1(1)P - Table 6 6.3.1.2(1)P - Table 6.2 6.3.1.2 (10) and (11) 6.3.2.2(1)P - Table 6.4 6.3.3.2(1) - Table 6.8 6.3.4.2 - Table 6.10 6.4(1) - Table 6.12

Paragraph 3 below also contains national indications on the use of the Informative Annexes A and B for buildings and other civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN-1991-1-1:2004 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to EN 1991-1-1:2004 ‘Actions on structures – Part 1-1: General actions – Densities, self-weight, imposed loads for building’.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI EN 1991-1-1:2004.

Paragraph	Citation	National parameter - value or requirement
2.2(3)	Note	No additional statement
5.2.3 from (1) to (5)	Note	No value and no additional statement
6.2.2(1)	Note	No additional statement
6.3.1.1(P)	Table 6.1	<u>Category A</u> – Environments for residential use - Areas for domestic and residential activities; this category includes living rooms and related services, hotels (excluding crowded areas), hospital rooms - Common stairs, balconies, galleries <u>Category B</u> – Offices, is divided into: - B1 (offices not open to the public) - B2 (offices open to the public) - Common stairs, balconies, galleries <u>Category C</u> – Environments susceptible to crowding, the following categories C1 to C5 are adopted, with the addition specified below: - C1 Areas with tables, such as schools, cafes, restaurants, banquet rooms, reading rooms and reception halls - C2 Areas with fixed seating, such as churches, theatres, cinemas, conference rooms, waiting rooms, lecture halls and auditoriums - C3 Environments free of obstacles preventing the movement of people, such as museums and access areas to offices, hotels, hospitals and railway stations - C4 Areas where physical activities may be performed, such as dance halls, gyms and stages. - C5 Areas susceptible to large crowds, such as buildings for public events, concert halls, arenas for sports and related seating areas, stairways and railway platforms. - Common stairs, balconies, galleries <u>Category D</u> – Environments for commercial use, Categories D1 and D2 are adopted with the addition specified below: - D1 Shops - D2 Shopping malls, markets, department stores - Common stairs, balconies, galleries
6.3.1.2(1)P	Table 6.2	In Category A, a distinction is made between internal staircases of residential or commercial units and common staircases, incorporated in Category C2 The following values are adopted: q_k (kN/m^2) Q_k (kN) <u>Category A</u>

		Areas for domestic and residential activities	2.00	2.00
		Common stairs, balconies, galleries	4.00	4.00
		<u>Category B</u>		
		B1 – Offices not open to the public	2.00	2.00
		B2 – Offices open to the public	3.00	2.00
		Common stairs, balconies, galleries	4.00	4.00
		<u>Category C</u>		
		C1	3.00	3.00
		C2	4.00	4.00
		C3	5.00	5.00
		C4	5.00	5.00
		C5	5.00	5.00
		Common stairs, balconies, galleries	According to the category of use required, with the following limitations ≥ 4.00	≥ 4.00
		<u>Category D</u>		
		D1	4.00	4.00
		D2	5.00	5.00
		Common stairs, balconies, galleries	According to the category of use required	
6.3.1.2 (10) and (11)	Note	The recommended values for α_A and α_n are adopted.		
6.3.2.2(1)P	Table 6.4	The following values are adopted:	q_k (kN/m^2)	Q_k (kN)
		<u>Category E</u>		
		E1 - Areas for the accumulation of goods and related access areas, such as libraries, archives, warehouses, depots and manufacturing laboratories	≥ 6.00	7.00
6.3.3.2(1)	Note 3 to Table 6.8	The following values are adopted:	q_k (kN/m^2)	Q_k (kN)
		<u>Category F</u>	2.50	2x10.00
		<u>Category G</u>	To be assessed on a case-by-case basis and in any case not less than 5.00	2x50.00
6.3.4.2(1)	Table 6.10	The following values are adopted:	q_k (kN/m^2)	Q_k (kN)
		<u>Category H</u>	0.50	1.20

6.4(1)	Table 6.12	The following values are adopted: | | H_K (kN/m) | |---|---| | <u>Category A</u> | | | Areas for domestic and residential activities | 1.00 | | Common stairs, balconies, galleries | 2.00 | | <u>Category B</u> | | | B1 – Offices not open to the public | 1.00 | | B2 – Offices open to the public | 1.00 | | Common stairs, balconies, galleries | 2.00 | | <u>Category C</u> | | | C1 | 1.00 | | C2 | 2.00 | | C3 | 3.00 | | C4 | 3.00 | | C5 | 3.00 | | Common stairs, balconies, galleries | According to the category of use required, with the following limitations ≥ 2.00 | | <u>Category D</u> | | | D1 | 2.00 | | D2 | 2.00 | | Common stairs, balconies, galleries | According to the category of use required | | <u>Category E</u> | | | E1 | 1.00(*) | | E2 | To be assessed on a case-by-case basis | | <u>Category F</u> | 1.00(**) | | <u>Category G</u> | To be assessed on a case-by-case basis and not less than 1.00(**) | (*) Does not include any horizontal actions resulting from absorbed materials. (**) For parapets or partitions in pedestrian areas. Actions on barriers resulting from lorries should be evaluated on a case-by-case basis.
	Use of Informative Annexes A and B	Annexes A and B retain their informative character and may be used insofar as they do not conflict with the requirements of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI EN 1991-1-2:2004	(includes corrigenda EC1:2010 and EC2:2013) Eurocode 1: Actions on structures - Part 1-2: General actions Actions on structures exposed to fire
EN 1991-1-2:2002	(incorporating corrigendum March 2009, November 2012, February 2013) Eurocode 1: Actions on structures – Part 1-2: General actions Actions on structures exposed to fire

1. BASIS

This Annex contains the national determination parameters for UNI-EN 1991-1-2:2004.

2. INTRODUCTION

2.1. Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs o UNI-EN 1991-1-2:2004 below:

2.4 (4) Note 1	3.1 (10)	4.2.2 (2)
2.4 (4) Note 2	3.3.1.2 (1) Note 1	4.3.1 (2)
	3.3.1.3 (1)	
	3.3.2 (2)	

Paragraph 3 below also contains national indications on the use of the Informative Annexes A, B, C, D, E, F and G for buildings and other civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN 1991-1-2:2004 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN1991-1-2:2004 ‘Actions on structures – Part 1-2: General actions – Actions on structures exposed to fire

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI EN 1991-1-2:2004

Paragraph	Citation	National parameter – value or requirement
2.4 (4)	Note 1	In general, the specified time period is provided in the national fire prevention regulations issued by the Minister for the Interior in the form of technical fire prevention regulations. For activities subject to inspection by the National Fire Brigade without technical fire prevention regulations, it is still possible to refer to: - Decree of the Minister for the Interior 9 March 2007; - Annex 1 – Section S.2 'Fire resistance' of the Decree of the Minister for the Interior of 3 August 2015
2.4 (4)	Note 2	Limited verification time periods with natural fire models are set out in Annex 1 – Section S.2 'Fire resistance' of the Decree of the Minister for the Interior of 3 August 2015, which can be used as an alternative to the Decree of the Minister for the Interior of 9 March 2007 or the Decree of the Minister for the Interior of 9 May 2007
3.1 (10)	Note	Both methods referred to in Paragraphs 3.2 and 3.3 are allowed. For buildings in which there are activities subject to inspection by the National Fire Brigade not covered by specific technical fire prevention regulations, further indications are provided in the Decree of the Minister for the Interior of 9 March 2007 with reference to the nominal temperature-time curve and in the Decree of the Minister for the Interior of 9 May 2007 with reference to the natural fire model. As an alternative to the Decree of the Minister for the Interior of 9 March 2007 and the Decree of the Minister for the Interior of 9 May 2007, it is possible to refer to the Decree of the Minister for the Interior of 3 August 2015
3.3.1.2 (1)	Note 1	Specific indications are provided in the Decree of the Minister for the Interior of 3 August 2015
3.3.1.3 (1)	Note 1	Various methods of proven validity may be used, for the calculation of thermal actions consequent to localised fires. A simplified method is provided in Annex C. Further information is provided in the Decree of the Minister for the Interior of 3 August 2015
3.3.2 (2)	Note	In the case of one-zone, two-zone or computational fluid dynamics models, various proven methods can be used to calculate thermal actions for temperature calculations. A method is provided in Annex D. Further information is provided in the Decree of the Minister for the Interior of 3 August 2015
4.2.2 (2)	Note	No specific information is provided
4.3.1 (2)	Note	The recommended value $\psi_{2,1}$ is adopted Q_1

Use of Informative Annexes	Annexes A, B, C, D and G retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules of the various structural types and the requirements set out in the current Technical Standards for Construction Annex E is not adopted. The indications contained in the Decree of the Minister for the Interior of 9 March 2007, supplemented by Circular DCPREV P414/4122, 55 of 28 March 2008 or, alternatively, in the Decree of the Minister for the Interior of 3 August 2015, as amended, apply. Annex F is not adopted.

NATIONAL ANNEX

UNI EN 1991-1-3:2015	(includes update A1:2015 and corrigendum AC:2009) Eurocode 1 ‘Actions on structures – Part 1-3: General actions – Snow loads’
EN 1991-1-3:2003+A1:2015	(incorporating corrigendum March 2009) Eurocode 1 “Actions on structures – Part 1-3: General actions – Snow loads”

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1991-1-3:2015.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1991-1-3:2015 below:

1.1(2)	5.2(2)	5.3.5(1)
1.1(3)	5.2(5)	5.3.5(3)
1.1(4)	5.2(6)	5.3.6(1)
2(3)	5.2(7)	5.3.6(3)
2(4)	5.2(8)	6.2(2)
3.3(1)	5.3.1(1)	6.3(1)
3.3(2)	5.3.1(3) (through Table 5.2)	6.3(2)
3.3(3)	5.3.2(3)	
4.1(1)	5.3.3(4)	A(1) (through Table A1)
4.1(2)	5.3.4(3)	
4.2(1)	5.3.4(4)	
4.3(1)		

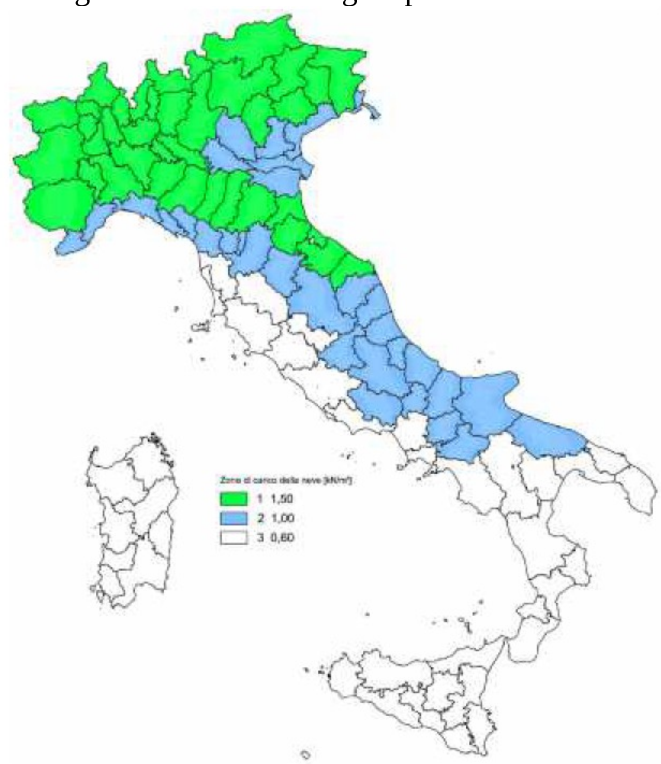
Paragraph 3 below also contains national indications on the use of Information Appendices C, D and E for buildings and other civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN-1991-1-3:2015 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN 1991-1-3:2015 ‘Actions on structures – Part 1-3: Snow loads’.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI EN 1991-1-3:2015.

Paragraph	Citation	National parameter - value or requirement
1.1(2)	Note	For altitudes above 1 500 m a.s.l. reference must be made to local climate and exposure conditions using snow load values not lower than those envisaged for an altitude of 1 500 m
1.1(3)	Note	Case A in Table A.1 is applied for the entire national territory
1.1(4)	Note	Use of Annex B is not allowed
2(3)	Note	The case of exceptional snow actions does not apply in Italy
2(4)	Note	The case of exceptional accumulations of snow does not apply in Italy
3.3(1)	Note 2	The case of exceptional conditions does not apply in Italy
3.3(2)	Note 2	The case of exceptional accumulations of snow does not apply in Italy
3.3(3)	Notes 2 and 3	The case of exceptional conditions does not apply in Italy
4.1(1)	Note 1	The minimum characteristic values of snow load on the ground are given in the following map.  **Zone I – Alpine** Aosta, Belluno, Bergamo, Biella, Bolzano, Brescia, Como, Cuneo, Lecco, Pordenone, Sondrio, Turin, Trento, Udine, Verbano-Cusio-Ossola, Vercelli, Vicenza: $q_{sk} = 1.50$ kN/m^2 $a_s \leq 200$ m $q_{sk} = 1,39$ [1+[]^2] kN/m^2 $a_s > 200$ m **Zone I – Mediterranean**

		Alessandria, Ancona, Asti, Bologna, Cremona, Forlì-Cesena, Lodi, Milan, Modena, Monza Brianza, Novara, Parma, Pavia, Pesaro e Urbino, Piacenza, Ravenna, Reggio Emilia, Rimini, Treviso, Varese: $q_{sk} = 1.50$ kN/m^2 $a_s \leq 200$ m $q_{sk} = 1,35\ [1+[]^2]$ kN/m^2 $a_s > 200$ m **Zone II** Arezzo, Ascoli Piceno, Avellino, Bari, Barletta-Andria-Trani, Benevento, Campobasso, Chieti, Fermo, Ferrara, Firenze, Foggia, Frosinone, Genoa, Gorizia, Imperia, Isernia, L'Aquila, La Spezia, Lucca, Macerata, Mantova, Massa Carrara, Padua, Perugia, Pescara, Pistoia, Prato, Rieti, Rovigo, Savona, Teramo, Trieste, Venice, Verona: $q_{sk} = 1.00$ kN/m^2 $a_s \leq 200$ m $q_{sk} = 0,85\ [1+[]^2]$ kN/m^2 $a_s > 200$ m **Zone III** Agrigento, Brindisi, Cagliari, Caltanisetta, Carbonia-Iglesias, Caserta, Catania, Catanzaro, Cosenza, Crotone, Enna, Grosseto, Latina, Lecce, Livorno, Matera, Medio Campidano, Messina, Napoli, Nuoro, Ogliastra, Olbia-Tempio, Oristano, Palermo, Pisa, Potenza, Ragusa, Reggio Calabria, Roma, Salerno, Sassari, Siena, Siracusa, Taranto, Terni, Trapani, Vibo Valentia, Viterbo: $q_{sk} = 0.60$ kN/m^2 $a_s \leq 200$ m $q_{sk} = 0,51\ [1+[]^2]$ kN/m^2 $a_s > 200$ m
4.1(1)	Note 2	The map of characteristic snow load on the ground is based on the map in Annex C, for Alpine and Mediterranean regions
4.1(2)	Note 1	No further information is required
4.2(1)	Note	The recommended values in Table 4.1 are adopted.
4.3(1)	Note	The case of exceptional accumulations of snow does not apply in Italy
5.2(2)	Note	The case of exceptional accumulations of snow does not apply in Italy and the use of Annex B is not allowed
5.2(5)	Note 2	No additional information
5.2(6)	Note	No additional information
5.2(7)	Note	The values of coefficients of exposure C_e, for various topographic conditions, are the following: - wind beaten $C_e = 0.9$ - normal $C_e = 1.0$ - repaired $C_e = 1.1$

5.2(8)	Note 1	The recommended value C_t = 1.0 is adopted The adoption of values below the unit of the thermal coefficient is generally not recommended. Where appropriately justified, it may only apply to roofs in locations where the snow load on the ground exceeds 1.5 kN/m^2 and characterised by transmittance exceeding 1 W/m^2 K° For buildings where the internal temperature is intentionally maintained below 0 °C (cold buildings, ice skating facilities, etc.), it is recommended to assume a thermal coefficient value of 1,2, regardless of the value of the snow load on the ground.
5.3.1(1)	Note	The case of exceptional accumulations of snow does not apply in Italy and the use of Annex B is not allowed
5.3.1(3)	Table 5.2	The recommended value $\mu_1(0°)$ = 0.8 is adopted with the following additional information. The wind-driven reduction of the roof covering becomes gradually less effective as the building's plan dimensions increase. It is recommended that these effects be taken into account for an extended covering, through an appropriate increase in the coefficient μ_1 referred to in Table 5.2, according to formulations contained in documents of proven validity. In the absence of more specific indications, the equivalent dimension L_C of the facility is defined $L_c = 2W - \frac{W^2}{L}$ where: - *W* in m, is the smaller of the covering facility dimensions - *L* in m, is the largest of the covering facility dimensions 'extended' coverings are those with L_C > 50 m and where coefficient μ_1 can be assumed to be equal to: $\mu_1 = 0{,}8\,C_{e,F}$ where: $C_{e,F} = \begin{cases} 1{,}0 \text{ per } L_c < 50\,m \\ 1{,}25 - 0{,}25\,e^{-(L_c - 50\,m)/200\,m} \end{cases}$ 1.0 for L_c<50m
5.3.2(3)	Note	The use of alternative load distribution is not accepted
5.3.3(4)	Note	The use of alternative load distribution is not accepted
5.3.4(3)	Note	There are no exceptional conditions for accumulation and the use of Annex B is not permitted
5.3.4(4)	Note	For α_1 or α_2 > 60° the value of μ_3 cannot be assumed to be less than μ_3=1.6
5.3.5(1)	Note 1	The recommended value for the upper limit of the coefficient μ_4 = 2.0, as shown in Figure 5.4
5.3.5(1)	Note 2	If the lowermost end of the covering features a parapet, a

		barrier or another obstruction, then the coefficient of form cannot be assumed as less than 0.8 regardless of the angle α.
5.3.5(3)	Note	The use of alternative load distribution is not accepted
5.3.6(1)	Note 1	The recommended values for the coefficient μ_W variation limits are adopted: $0.8 \leq \mu_w \leq 4.0$
5.3.6(1)	Note 2	The recommended values for limiting the extension of accumulation are adopted $5 \leq l_s \leq 15$ m
5.3.6(3)	Note	The case of exceptional accumulations of snow does not apply in Italy and the use of Annex B is not allowed
6.2(2)	Note	The case of exceptional accumulations of snow does not apply in Italy and the use of Annex B is not allowed
6.3(1)	Note	Use is permitted for quotes greater than 800 m a.s.l.
6.3(2)	Note	It adopts the recommended value for $k = 3/d$, with $k \leq d\gamma$
A.1	Table A.1 Note 1	Case A is applied
A.1	Table A.1 Note 2	Cases B1, B2 and B3 do not apply
	Use of Informative Annexes C, D and E	Annexes C, D and E retain their informative character and may be used insofar as they do not conflict with the requirements of the various structural types and the requirements set out in the current Technical Standards for Construction. For the use of the formula (D.1), the variation coefficient V in the series of annual maximum levels of snow load may be assumed equal to $V = 0.6$, unless specific appropriate and documented studies are carried out

NATIONAL ANNEX

UNI-EN1991-1-4: 2010	(includes update A1:2010 and corrigendum AC:2010) Actions on structures Part 1-4: General actions - Wind actions
EN1991–1-4: 2005 + A1: 2010	(Incorporating corrigenda July 2009 and January 2010) Action on structures Part 1-4: General actions – Wind actions

1. BASIS

This Annex contains the national determination parameters for UNI-EN1991-1-4: 2010.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1991-1-4: 2010 below:

1.5(2) Note	7.2.3 (2) Note	7.13(2) Note
4.1(1) Note	7.2.3(4) Note 1	8.1(1) Notes 1 and 2
4.2(1)P Note 2	7.2.4(1) Note	8.1(4) Note
4.2(2)P Notes 1, 2, 3 and 5	7.2.4(3) Note	8.1(5) Note
4.3.1(1) Notes 1 and 2	7.2.5(1) Note	8.2(1) Note 1
4.3.2(1) Note	7.2.5(3) Note	8.3(1) Note
4.3.2(2) Note	7.2.6(1) Note	8.3.1(2) Note
4.3.3(1) Note	7.2.6(3) Note	8.3.2(1) Note
4.3.4(1) Note	7.2.8(1) Note	8.3.3(1) Note 1
4.3.5(1) Note	7.2.9(2) Note	8.3.4(1) Note
4.4(1) Note 2	7.2.10(3) Notes 1 and 2	8.4.2(1) Note 1
4.5(1) Notes 1 and 2	7.3(6) Note	A.2(1) Note
5.3(5) Note	7.4.1 (1) Note	E.1.3.3(1) Note
6.1(1) Note	7.4.3(2) Note	E.1.5.1(1) Notes 1 and 2
6.3.1(1) Note 3	7.6(1) Note 1	E.1.5.1(3) Note
6.3.2(1) Note	7.7(1) Note 1	E.1.5.2.6(1) Note 1
7.1.2(2) Note	7.8(1) Note	E.1.5.3(2) Note 1
7.1.3(1) Note	7.9.2(2) Note	E.1.5.3(4) Note
7.2.1(1) Note 2	7.10(1) Note 1	E.1.5.3(6) Note
7.2.2(1) Note	7.11(1) Note 2	E.3(2) Note
7.2.2(2) Note 1	7.13(1) Note	

Paragraph 3 below also contains national indications on the use of Informative Annexes A, B, C, D, E and F.
These national decisions relating to the paragraphs mentioned above must be applied for the use in Italy of UNI-EN-1991-1-4: 2010.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to EN 1991-1-4: 2010 Actions on structures – Part 1-4: Wind actions

3. NATIONAL DECISIONS

	joining Cape Teulada with the island of La Maddalena)			
7	Liguria	28	1000	0.54
8	Province of Trieste	30	1500	0.50
9	Islands (with the exception of	31	500	0.32

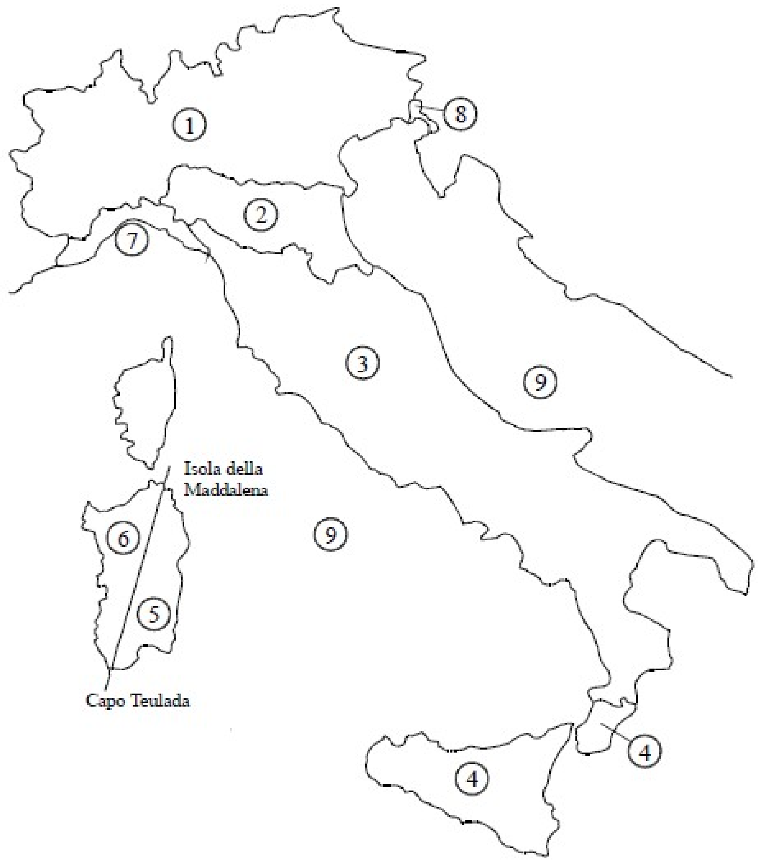
<table>
<tr><td></td><td></td><td>
<table><tr><td></td><td>Sicily and Sardinia) and open water</td><td></td><td></td><td></td></tr></table>
Table N.A.1
For altitudes above 1 500 m above sea level, baseline speed values may be derived from appropriate documentation or appropriately substantiated statistical surveys referring to local climate and exposure conditions. Without prejudice to these evaluations, as recommended in the proximity of peaks and ridges, the values used should not be less than those anticipated for an altitude of 1 500 m.


Figure N.A.1
<table>
<tr><td>Isola di Maddalena</td><td>Island of Maddalena</td></tr>
<tr><td>Capo Teulada</td><td>Capo Teulada</td></tr>
</table>
</td></tr>
<tr><td>4.2 (2) P</td><td>Note 2</td><td>The recommended value $c_{dir} = 1$ is adopted.</td></tr>
<tr><td>4.2 (2) P</td><td>Note 3</td><td>The recommended value $c_{season} = 1$ is adopted</td></tr>
<tr><td>4.2 (2) P</td><td>Note 5</td><td>The recommended values K = 0.20 and n = 0.5 are adopted.</td></tr>
<tr><td>4.3.1 (1)</td><td>Note 1</td><td>The recommended value co = 1.0 is adopted unless different indications are given in Paragraph 4.3.3.</td></tr>
<tr><td>4.3.1 (1)
4.3.2 (1)</td><td>Note 2
Note</td><td>The value $v_m(z)$ is given by the expression (4.3). For $c_r(z)$ we adopt the formula (4.4) where the parameters k_r, z_o and z_{min} are given from the next Table N.A.2 depending on the exposure category of the</td></tr>
</table>

construction site. This category is assigned using the diagrams in Figure N.A.2 below, depending on the geographical location of the site and the terrain ruggedness class specified in Table N.A.3 below.

Exposure category	k_r	z_o (m)	z_{min} (m)
I	0.17	0.01	2
II	0.19	0.05	4
III	0.20	0.10	5
IV	0.22	0.30	8
V	0.23	0.70	12

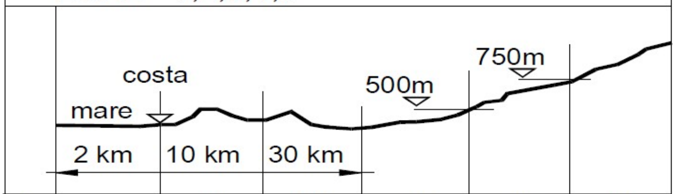
Table N.A.2

Ruggedness class	Description
A	Urban areas where at least 15 % of the surface area is covered by buildings with an average height exceeding 15 m.
B	Urban areas (not class A), suburbs, industrial areas and wooded land
C	Areas scattered with obstacles (trees, houses, walls, fences,....); areas with a ruggedness not attributable to classes A, B or D
D	Areas free from obstacles (open countryside, airports, agricultural areas, pastures, wetlands or sandy areas, snowy or icy areas, seas, lakes, ...)

Table N.A.3

Assignment of ruggedness class does not depend on the plate structure of the land. So that a construction can be placed in Class A or B, the area distinguishing the classes must continue around the construction for not less than 1 km and not less than 20 times the height of the construction. Where there are doubts about the ruggedness class, in the absence of detailed analysis, the least favourable class will be assigned. z_{max} = 200 m is assumed as recommended.

ZONE 1,2,3,4,5

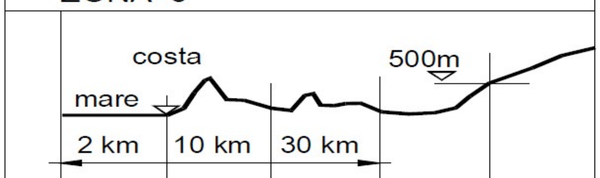


A	- -	IV	IV	V	V	V
B	- -	III	III	IV	IV	IV
C	- -	*	III	III	IV	IV
D	I	II	II	II	III	**

* Categoria II in zona 1,2,3,4
Categoria III in zona 5

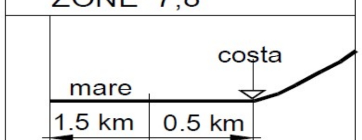
** Categoria III in zona 2,3,4,5
Categoria IV in zona 1

ZONA 6



A	- -	III	IV	V	V
B	- -	II	III	IV	IV
C	- -	II	III	III	IV
D	I	I	II	II	III

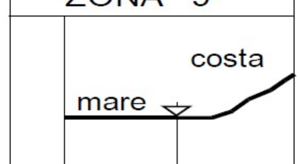
ZONE 7,8



A	- -	- -	IV
B	- -	- -	IV
C	- -	- -	III
D	I	II	*

* Categoria II in zona 8
Categoria III in zona 7

ZONA 9



A	- -	I
B	- -	I
C	- -	I
D	I	I

Figure N.A.2

ZONE 1,2,3,4,5	ZONES 1,2,3,4,5
mare	sea
costa	coast
Categoria II in zona 1,2,3,4	Category II in zones 1,2,3,4
Categoria III in zona 5	Category III in zone 5

		Categoria III in zona 2,3,4,5 — Category III in zones 2,3,4,5 Categoria IV in zona 1 — Category IV in zone 1 ZONA 6 — ZONE 6 ZONE 7,8 — ZONE 7.8 ZONA 9 — ZONA 9 Categoria II in zona 8 — Category II in zone 8 Categoria III in zona 7 — Category III in zone 7
4.3.2 (2)	Note	Further to these recommendations (Annex A2) other procedures may be used.
4.3.3 (1)	Note	The recommended procedure set out in Annex A.3 is adopted.
4.3.4 (1)	Note	The recommended procedure set out in Annex A.4 is adopted.
4.3.5 (1)	Note	The recommended procedure set out in Annex A.5 is adopted.
4.4 (1)	Note 2	The recommended value k_l = 1.0 is adopted.
4.5 (1)	Note 1	The recommended expression is adopted (4.8)
4.5 (1)	Note 2	The recommended value ρ = 1.25 kg/m³ is adopted
5.3 (5)	Note	No additional information
6.1 (1) 6.3.1 (1)	Note Note 3	The $c_s c_d$ coefficient (not separated in the two coefficients c_s and c_d) is calculated according to the procedure in Annex B
6.3.2 (1)	Note	The Annex B method is adopted
7.1.2 (2)	Note	The recommended procedures are adopted
7.1.3 (1)	Note	No additional information
7.2.1 (1)	Note 2	The recommended procedure in Figure 7.2 is adopted
7.2.2 (1)	Note	The recommended procedure for using construction height as the height of reference is adopted
7.2.2 (2)	Note 1	The recommended values in Table 7.1 are adopted In addition, the global pressure coefficients c_{pe} defined in Paragraph C3.3.8.1 of Circular No 7 of 21 January 2019 are adopted
7.2.3 (2)	Note	The areas recommended in Figure 7.6 are adopted In addition, the areas of application of the global pressure coefficients c_{pe} defined in Paragraph C3.3.8.1.2 of Circular No 7 of 21 January 2019 are adopted
7.2.3 (4)	Note 1	The recommended values in Table 7.2 are adopted In addition, the global pressure coefficients c_{pe} defined in Paragraph C3.3.8.1.2 of Circular No 7 of 21 January 2019 are adopted
7.2.4 (1)	Note	The areas recommended in Figure 7.7 are adopted In addition, guidelines for the application of the coefficients c_{pe} defined in Paragraph C3.3.8.1.3 of Circular No 7 of 21 January 2019 are adopted
7.2.4 (3)	Note	The values recommended in Table 7.3a and Table 7.3b are adopted.

		In addition, the global pressure coefficients c_{pe} defined in Paragraph C3.3.8.1.3 of Circular No 7 of 21 January 2019 are adopted
7.2.5 (1)	Note	The areas recommended in Figure 7.8 are adopted. In addition, guidelines for the application of the coefficients c_{pe} defined in Paragraph C3.3.8.1.4 of Circular No 7 of 21 January 2019 are adopted
7.2.5 (3)	Note	The values recommended in Table 7.4a and Table 7.4b are adopted. In addition, the global pressure coefficients c_{pe} defined in Paragraph C3.3.8.1.4 of Circular No 7 of 21 January 2019 C.S.LL.PP. are adopted
7.2.6 (1)	Note	The areas recommended in Figure 7.9 are adopted In addition, guidelines for the application of the coefficients c_{pe} defined in Paragraph C3.3.8.1.5 of Circular No 7 of 21 January 2019 C.S.LL.PP. are adopted
7.2.6 (3)	Note	The recommended values in Table 7.5 are adopted In addition, the global pressure coefficients c_{pe} defined in Paragraph C3.3.8.1.5 of Circular No 7 of 21 January 2019 are adopted
7.2.7 (4)	----	The indications contained in 7.2.7 (4) shall apply, with the additional information contained in Paragraph C3.3.8.1.6 of Circular No 7 of 21 January 2019.
7.2.8 (1)	Note	The recommended values in Figures 7.11 and 7.12 are adopted
7.2.9 (2)	Note	No additional information
7.2.10(3)	Notes 1 and 2	No additional information
7.3 (6)	Note	The recommended position in Figure 7.16 is adopted as the pressure centre
7.4.1 (1)	Note	The recommended values in Table 7.9 are adopted.
7.4.3 (2)	Note	The recommended value $e = \pm 0.25\ b$ is adopted
7.6 (1)	Note 1	The recommended values in Figure 7.24 are adopted
7.7 (1)	Note 1	The recommended value $c_{f,0} = 2$ is adopted
7.8 (1)	Note	The recommended values in Table 7.11 are adopted.
7.9.2 (2)	Note	No additional information
7.10 (1)	Note 1	The recommended values in Figure 7.30 are adopted
7.11 (1)	Note 2	No additional information
7.13 (1)	Note	No additional information
7.13 (2)	Note	The recommended values in Table 7.16 and Figure 7.36 are adopted
8.1 (1)	Note 1	No additional information
8.1 (1)	Note 2	No additional information

8.1 (4)	Note	It is assumed that $v^{*}_{b,o} = 0.9\ v_{b,o}$
8.1 (5)	Note	It is assumed that $v^{**}_{b,o} = v_{b,o}$
8.2 (1)	Note 1	No specific procedure is provided
8.3 (1)	Note	No additional information, please refer to the application of section 7.4
8.3.1 (2)	Note	No additional statement
8.3.2 (1)	Note	The recommended values in Table 8.2 are adopted.
8.3.3 (1)	Note 1	The recommended value is adopted
8.3.4 (1)	Note	The recommended values are adopted
8.4.2 (1)	Note 1	No simplified rules are provided
8.4.2 (1)	Note 2	The recommended procedure is adopted
	Use of Informative Annexes A, B, C, D, E and F	Annex A, B, C, D, E and F maintain the informative character and may be used in so far as they are not contrary to the requirements set out in the implementing rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI EN 1991-1-5:2004	(includes corrigendum AC:2009) Eurocode 1 ‘Actions on structures – Part 1-5: General actions – Thermal actions’
EN 1991-1-5:2003	(Incorporating corrigendum March 2009) Eurocode 1 “Actions on structures – Part 1-5: General actions – Thermal actions”

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1991-1-5:2004.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1991-1-5:2004 below:

5.3(2) (Tables 5.1, 5.2 and 5.3)
6.2.1(1) P
6.1.1 (1) (Note 1)
6.2.2(1)
6.1.2(2)
6.2.2(2) (Note 1)
6.1.3.1(4)
6.1.3.2(1) P
6.1.3.3(3) (Note 2)
6.1.4(3)
6.1.4.1(1)
6.1.4.2(1) (Note 1)
6.1.4.3(1)
6.1.4.4(1)
6.1.5(1) (Note 1)
6.1.6(1) (Note)
7.2.1(1) P
7.5(3) Note 1
7.5(4)
A.1(1) (Notes 1 and 2)
A.1(3)
A.2(2) Note 1
B(1) (Tables B.1, B.2 and B.3)

Paragraph 3 below also contains national indications on the use of the Informative Annexes C and D for buildings and other civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN1991-1-5:2004 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN1991-1-5:2004 ‘Actions on structures – Part 1-5: Thermal actions’

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN1991-1-5:2004.

Paragraph	Citation	National parameter - value or requirement
5.3 (2)	Tables 5.1, 5.2 and 5.3	Table 5.1: - $T_{int}=T_1=T_2=20°C$ Table 5.2: - Tmax = 45 °C - Tmin = -15 °C For surfaces exposed to the North-East, the following is assumed: - T3 = 0 °C - T4 = 2 °C - T5 = 4 °C For surfaces exposed to the South-West, the following is assumed: - T3 = 18 °C - T4 = 30 °C - T5 = 42 °C Table 5.3: - T6 = 8 °C - T7 = 5 °C - T8 = -5 °C - T9 = -3 °C
6.1.1 (1)	Note 1	No additional information is provided
6.1.2 (2)	Note	Approach 1 is used.
6.1.3.1(4)	Note	The recommended values in Figure 6.1 are adopted
6.1.3.2(1)P 7.2.1(1) P A.1(1)	Note Note Note 1	In the absence of adequate statistical surveys based on specific data relating to the site in question, T_{max} or T_{min} must be calculated on the basis of the following expressions, for the various areas indicated in the following figure. This zoning does not take account of specific and local aspects that, if needed, should be defined individually.

ZONA I	ZONE I
ZONA II	ZONE II
ZONA III	ZONE III
ZONA IV	ZONE IV

In the following expressions, T_{max} or T_{min} are expressed in °C; the reference altitude a.s. (expressed in m) is the altitude of the ground above sea level at the construction site.

Zone I

Valle d'Aosta, Piedmont, Lombardy, Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia, Emilia Romagna:

$$T_{min} = -15\text{-}4\ a_s/1000$$
$$T_{max} = 42\text{-}6\ a_s/1000$$

Zone II

Liguria, Tuscany, Umbria, Lazio, Sardinia, Campania, Basilicata:

$$T_{min} = -8\text{-}6\ a_s/1000$$
$$T_{max} = 42\text{-}2\ a_s/1000$$

Zone III

Marche, Abruzzo, Molise, Puglia:

$$T_{min} = -8\text{-}7\ a_s/1000$$
$$T_{max} = 42\text{-}0.3\ a_s/1000$$

Zone IV

Calabria, Sicily:

		T_{min} = – 2-9 a_s/1000 T_{max} = 42-2 a_s/1000
6.1.3.3(3)	Note 2	The recommended values are adopted: The uniform temperature change (the values of which are specified as indicated for 6.1.3.1(4)) shall be increased by 50 % for all types of decks exclusively for the calculation of the excursions of joints and support devices on railway bridges.
6.1.4(3)	Note	For the initial temperature difference, the value ΔT = 15 °C is assumed.
6.1.4.1(1)	Note	**Road bridges** For the values of $\Delta T_{M,heat}$ and $\Delta T_{M,cool}$ the values recommended in Table 6.1 are adopted. **Railway bridges** In addition to uniform thermal variation, a 5 °C temperature gradient is considered between the top slab and bottom of the deck in the direction to be determined on a case by case basis. In steel-concrete mixed structure bridges, a temperature difference of 5 °C between the concrete insole and the steel beam should also be considered. For the checking of horizontal and vertical deformations of the decks, with the exclusion of comfort analyses, temperature differences between extradox and intradox and between the outermost surfaces of the decks of 10 °C must be considered. For these temperature differences, a linear trend can be assumed between the said extremes, considering the same thermal gradients directed both in one direction and in the other
6.1.4.2(1)	Note 1	As Approach 1 is used, Paragraph 6.1.4.2 does not apply.
6.1.4.3(1)	Note	**Road bridges** For the horizontal temperature difference, the value ΔT = 5 °C is adopted. **Railway bridges** See the indication in Paragraph 6.1.4.1(1)
6.1.4.4(1)	Note	**Road bridges** For the temperature difference, the recommended value ΔT = 15 °C is adopted. **Railway bridges** For the temperature difference, the value ΔT = 5 °C is adopted in the two cases of higher/lower internal temperature than that outside
6.1.5(1)	Note 1	The recommended values are adopted: - ω_N = 0.35 - ω_M = 0.75
6.1.6(1)	Note	In the absence of specific special assessments based on experimental evidence, the recommended values shall be adopted
6.2.1(1)P	Note	**Road bridges** No specific procedure is provided, the recommended procedure is used. **Railway bridges** For the usual types of hollow piles, barring more accurate determinations, the approximate assumptions described below can be

		used: - difference in temperature between the interior and exterior of 10 °C (with interior hotter than the exterior or vice versa), considering an elastic module E, not reduced; - uniform thermal variation between shaft, pile and embedded foundation slab of 5 °C (foundation slab colder than the pile and vice versa) with linear variation between the top of the foundation slab and a height to be assumed, barring more precise determinations, equal to 5 times the thickness of the pile wall.
6.2.2(1)	Note	The recommended value, ΔT = 5 °C, is adopted.
6.2.2(2)	Note 1	**Road bridges** The recommended value, ΔT = 15 °C, is adopted. **Railway bridges** See the indications referred to in Paragraph 6.2.1(1)P
7.5(3)	Note 1	The recommended value, ΔT = 15 °C, is adopted.
7.5(4)	Note	The recommended value, ΔT = 15 °C, is adopted.
A.1(1)	Note 2	See the indications in footnote 1 to point A1(1)
A.1(3)	Note	The value T_0 = 15 °C is adopted.
A.2(2)	Note 1	The recommended values are adopted
B.1.	Table B.1, B.2 and B.3.	As approach 1 is used, the values mentioned in the Tables do not apply
	Use of Informative Annexes C and D	Annexes C and D retain their informative character and may be used insofar as they do not conflict with the requirements of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI EN 1991-1-6:2005	(includes corrigenda AC:2008 and AC:2013) Eurocode 1 ‘Actions on structures – Part 1-6: General actions - Actions during construction
EN 1991-1-6:2005	(Incorporating corrigendum July 2008 and February 2013) Eurocode 1 “Actions on structures – Part 1-6: General actions – Actions during execution”

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1991-1-6:2005.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1991-1-6:2005 below:

1.1(3)	3.3(6)	4.13(2)
2.2(4) Note 1	4.9(6) Note 2	Annex A1 A1.1(1)
3.1(1)P	4.10(1)P	Annex A1 A1.3(2)
3.1(5) Note 1	4.11.1(2) Table 4.1	Annex A2 A2.3(1)
3.1(5) Note 2	4.11.2(2)	Annex A2 A2.4(2)
3.1(7)	4.12(1)P Note 2	Annex A2 A2.4(3)
3.1(8) Note 1	4.12(2)	Annex A2 A2.5(2)
3.3(2)	4.12 (3)	Annex A2 A2.5(3)

Paragraph 3 below also contains national indications on the use of the Informative Annex B for buildings and other civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN1991-1-6:2005 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN1991-1-6:2005 ‘Actions on structures – Part 1-6: Actions during construction’

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN1991-1-6:2005.

Paragraph	Citation	National parameter - value or requirement
1.1 (3)	Note	No additional information
2.2 (4)	Note 1	No additional information
3.1 (1)P	Note	No additional information
3.1 (5)	Note 1	For construction phases or transitional phases with a project duration not exceeding three months, $T_R \geq 5$ years is assumed. For construction phases or transitional phases with a project duration of between three months and one year, $T_R \geq 10$ years is assumed. For construction phases or transitional phases with a project duration of more than one year, $T_R=50$ years is assumed.
3.1 (5)	Note 2	There is no minimum value prescribed to wind speed
3.1 (7)	Note	In normal conditions construction loads caused by personnel must not be combined with snow and wind loads. For construction loads such as storage of materials, etc., effects of snow and wind actions must be assessed with particular attention to interactions of these last with the structure being executed with the completed part.
3.1 (8)	Note 1	No additional information
3.3 (2)	Note	No additional information
3.3 (6)	Note	No additional information
4.9 (6)	Note 2	No additional information
4.10 (1)P	Note	No additional information
4.11.1 (2)	Table 4.1	The recommended values are used
4.11.2 (1)	Note 2	The recommended values in Table 4.2 are adopted The use of different load patterns, sufficiently justified, is permitted
4.12 (1)P	Note 2	Where any dynamic effects are relevant, specific additional verifications will be carried out with dynamic amplification factors of static loads equal to 2.0. See also EN 1991-1-7
4.12 (2)	Note	No additional information
4.12 (3)	Note	The example values indicated are adopted
4.13 (2)	Note	See the National Annex to EN 1998-1
Annex A1 A1.1(1)	Note 2	The recommended values are adopted (ψ_0=1.0 ψ_2=0.2)
Annex A1 A1.3(2)	Note	The recommended value is adopted
Annex A2 A2.3(1)	Note	In the absence of project-specific indications, the recommended values are adopted as minimum values
Annex A2 A2.4(2)	Note	The recommended value is adopted
Annex A2 A2.4(3)	Note	The use of this rule is allowed, by adopting x % of the recommended value
Annex A2 A2.5(2)	Note	The recommended value is adopted
Annex A2	Note 1 and	The values of the friction coefficients should be defined for the

A2.5(3)	Note 2	individual project. For devices with a low friction coefficient, the specifications set out in Note 2 and the relevant recommended values shall be adopted
	Use of Informative Annex B	Annex B retains its informative character and may be used insofar as it does not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI EN 1991-1-7:2014	(includes update A1:2014 and corrigendum AC:2010) Eurocode 1 ‘Actions on structures – Part 1-7: General actions - Exceptional actions’
EN 1991-1-7:2006+A1:2014	(Incorporating corrigendum February 2010) Eurocode 1 “Actions on structures – Part 1-7: General actions – Accidental actions”

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1991-1-7:2014.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1991-1-7:2014 below:

2 (2)	4.3.2 (2)	4.5.2(4)
3.1(2) Note 4	4.3.2 (3)	4.6.1(3) Note 1
3.2(1) Note 3	4.4 (1)	4.6.2(1)
3.3(2)P Notes 1, 2 and 3	4.5(1)	4.6.2(2)
3.4(1) Note 4	4.5.1.2(1) Notes 1 and 2	4.6.2(3) Note 1
3.4(2)	4.5.1.4(1)	4.6.2(4)
4.1(1) Note 1	4.5.1.4(2)	4.6.3(1)
4.1(1) Note 3	4.5.1.4(3)	4.6.3(3)
4.3.1(1) Notes 1, 2 and 3	4.5.1.4(4)	4.6.3(4)P
4.3.1(2)	4.5.1.4(5)	4.6.3(5) Note 1
4.3.1(3)	4.5.1.5(1)	5.3 (1)P
4.3.2 (1) Notes 1, 3 and 4	4.5.2(1)	A.4 (1)

Paragraph 3 below also contains national indications on the use of the Informative Annexes A, B, C and D for buildings and other civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN1991-1-7:2014 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN1991-1-7:2014 ‘Actions on structures – Part 1-7: Exceptional loads’

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN1991-1-7:2014.

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>2 (2)</td><td>Note</td><td>No additional information</td></tr>
<tr><td>3.1(2)</td><td>Note 4</td><td>No additional information</td></tr>
<tr><td>3.2(1)</td><td>Note 3</td><td>No additional information</td></tr>
<tr><td>3.3(2)</td><td>Note 1</td><td>The model of distributed load and recommended value is accepted</td></tr>
<tr><td>3.3(2)</td><td>Note 2</td><td>The limit of acceptability of the total collapse, caused by the removal of a pillar, column or panel, is equal to the lesser of 100 m^2 and 15 % of the surface of each of the two contiguous floors, supported by the removed vertical element</td></tr>
<tr><td>3.3(2)</td><td>Note 3</td><td>The strategy contained in Annex A, point A.4, is followed, depending on the consequence class, with the following amendment: for structures in consequence class 3, in addition to what is envisaged for structures in consequence class 2, more in-depth analyses must be carried out, which may also include risk analysis</td></tr>
<tr><td>3.4(1)</td><td>Note 4</td><td>The following classification is adopted, which is not intended to be exhaustive, and should be supplemented by case-by-case assessments.
<table>
<tr><th>Consequence class</th><th>Examples of classification of structures</th></tr>
<tr><td>CC1</td><td>Buildings where people are only occasionally present, agricultural buildings</td></tr>
<tr><td>CC2 – low risk</td><td>Buildings used by normal numbers of people, without contents that are a risk to the environment and without essential public and social functions. Industries performing activities that are not harmful to the environment. Bridges, infrastructural works, road networks not falling into higher consequence classes</td></tr>
<tr><td>CC2 – high risk</td><td>Buildings used by significant numbers of people. Industries performing activities that are harmful to the environment. Non-urban road networks do not fall into Consequence class 3. Bridges and rail networks, the interruption of which may result in emergency situations</td></tr>
<tr><td>CC3</td><td>Buildings with important public or strategic functions, which are also connected to the management of civil protection in the event of a disaster. Industries with activities that are particularly dangerous for the environment. Bridges and rail networks of critical importance for the maintenance of communication channels</td></tr>
</table></td></tr>
<tr><td>3.4(2)</td><td>Note</td><td>No additional information</td></tr>
<tr><td>4.1 (1)</td><td>Note 1</td><td>No additional information</td></tr>
<tr><td>4.1 (1)</td><td>Note 3</td><td>No additional information</td></tr>
<tr><td>4.3.1 (1)</td><td>Note 1</td><td>In the absence of more accurate determinations and neglecting the dissipative capacity of the structure, the equivalent static design forces are given in the following Table:

Table 4.1
<table>
<tr><th>ROAD TYPE</th><th>VEHICLE TYPE</th><th>FORCE $F_{d,x}$ (kN)</th></tr>
<tr><td>Motorways, non-urban roads</td><td>-</td><td>1000</td></tr>
<tr><td>Local roads</td><td>-</td><td>750</td></tr>
<tr><td>Urban roads</td><td>-</td><td>500</td></tr>
<tr><td rowspan="2">Parking areas and garages</td><td>Cars</td><td>50</td></tr>
<tr><td>Vehicles for the transport of goods, with a maximum weight greater than 3.5 t</td><td>150</td></tr>
</table>

$F_{d,y}$ may be assumed to be equal to 50 % of $F_{d,x}$</td></tr>
<tr><td>4.3.1 (1)</td><td>Note 2</td><td>No additional information, see also Annex C</td></tr>
<tr><td>4.3.1 (1)</td><td>Note 3</td><td>No additional information</td></tr>
</table>

<table>
<tr><td>4.3.1 (2)</td><td>Note</td><td>In the verifications, two actions may be considered, not simultaneously, in parallel ($F_{d,x}$) and perpendicular ($F_{d,y}$) directions to the normal driving direction</td></tr>
<tr><td>4.3.1 (3)</td><td>Note</td><td>For car crashes, the recommended conditions are adopted.
For crashes with other motor vehicles that are not cars, the recommended conditions are adopted, with the application height of the collision force resulting from the running surface assumed to be 1.25 m</td></tr>
<tr><td>4.3.2 (1)</td><td>Note 1</td><td>The equivalent static actions defined in Paragraph 4.3.1(1) (Table 4.1) are adopted</td></tr>
<tr><td>4.3.2 (1)</td><td>Note 3</td><td>The recommended values are adopted</td></tr>
<tr><td>4.3.2 (1)</td><td>Note 4</td><td>The recommended value is adopted</td></tr>
<tr><td>4.3.2 (2)</td><td>Note</td><td>The recommended procedure is adopted</td></tr>
<tr><td>4.3.2 (3)</td><td>Note</td><td>The recommended impact area size is adopted</td></tr>
<tr><td>4.4 (1)</td><td>Note</td><td>In constructions where forklifts are regularly present, a horizontal static action can be considered equivalent to exceptional impacts, applied to the height of 0.75 m from the plane, equal to:
$$F = 5\,W$$
where W is the total weight of the forklift and the maximum transportable load.</td></tr>
<tr><td>4.5 (1)</td><td>Note</td><td>No additional information</td></tr>
<tr><td>4.5.1.2 (1)</td><td>Note 1</td><td>No additional information</td></tr>
<tr><td>4.5.1.2 (1)</td><td>Note 2</td><td>No additional information</td></tr>
<tr><td>4.5.1.4 (1)</td><td>Note</td><td>In the absence of specific risk analysis the following equivalent static actions may be adopted, variable depending on distance ‘d’ of the exposed elements from the axis of the track:
<table>
<tr><th>Distance ‘d’ of the exposed elements from the axis of the track

(m)</th><th>Force F_{dx}

(kN)</th><th>Force F_{dy}

(kN)</th></tr>
<tr><td>d ≤ 5.0 m</td><td>4000</td><td>1500</td></tr>
<tr><td>5<d≤15 m</td><td>2000</td><td>750</td></tr>
<tr><td>D>15 m</td><td>0</td><td>0</td></tr>
</table>
These forces, to be considered valid for convoy speeds of up to 120 km/h, shall not be considered as acting simultaneously</td></tr>
<tr><td>4.5.1.4 (2)</td><td>Note</td><td>No reduction in impact actions is envisaged</td></tr>
<tr><td>4.5.1.4 (3)</td><td>Note</td><td>The recommended value is adopted</td></tr>
<tr><td>4.5.1.4.(4)</td><td>Note</td><td>No reduction in impact actions is envisaged</td></tr>
<tr><td>4.5.1.4 (5)</td><td>Note</td><td>In the absence of project-specific indications, values not lower than those specified in Paragraph 4.5.1.4 (1) shall be adopted.</td></tr>
<tr><td>4.5.1.5 (1)</td><td>Note</td><td>No additional information</td></tr>
<tr><td>4.5.2 (1)</td><td>Note</td><td>No additional information</td></tr>
<tr><td>4.5.2 (4)</td><td>Note</td><td>The recommended values are adopted</td></tr>
<tr><td>4.6.1 (3)</td><td>Note 1</td><td>The classification in Table C.4 of Annex C is adopted</td></tr>
</table>

4.6.2 (1)	Note	No additional information
4.6.2 (2)	Note	The recommended value is adopted
4.6.2 (3)	Note 1	The indicated values are used
4.6.2 (4)	Note	The indicated value is used
4.6.3 (1)	Note	The values of Table C.4 of Annex C are adopted. Relative values for boats of a different mass may be obtained through linear interpolation
4.6.3 (3)	Note	The recommended value is adopted
4.6.3 (4) P	Note	The recommended values are adopted
4.6.3 (5)	Note 1	The value of 10 % is adopted
5.3 (1)P	Note	The procedure for natural gas explosions contained in Annex D is adopted
A.4(1)	Note 1	No additional information
	Use of Informative Annexes A, B, C and D	Annexes A, B, C and D retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN1991 – 2: 2005 (includes corrigendum AC:2010)
Actions on structures Part 2: Traffic loads on bridges

EN1991 – 2: 2003 (Incorporating corrigendum February 2010)
Action on structures Part 2 – Traffic loads on bridges

1. BASIS

This Annex contains the national determination parameters for UNI-EN1991-2: 2005

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1991-2: 2005 below

1.1(3) Note
2.2.(2) Note 2
2.3(1)
2.3(4)

3(5)
4.1(1) Note 2
4.1(2) Note 1
4.2.1(1) Note 2
4.2.1(2)
4.2.3(1)
4.3.1(2) Note 2
4.3.2(3) Notes 1 and 2
4.3.2(6)
4.3.3(2)
4.3.3(4) Note 2
4.3.4(1)
4.4.1(2) Note 2
4.4.1(3) Note
4.4.1(6)
4.4.2(4)
4.5.1. Table 4.4a Note a
4.5.2(1) Note 3
4.6.1(2) Point c)
4.6.1(2) Point e)
4.6.1(2) Note 2
4.6.1(2) Note 4
4.6.1(3) Note 1
4.6.1(6)
4.6.4(3)
4.6.5(1) Note 2
4.6.6(1)
4.7.2.1(1)
4.7.2.2(1) Note 1
4.7.3.3(1) Note 3
4.7.3.3(1) Note 1
4.7.3.3(2)
4.7.3.4(1)
4.8(1) Note 2

5.2.3(2)
5.3.2.1(1)
5.3.2.2(1)
5.3.2.3 (1)P Note 1
5.4(2)
5.6.1(1)
5.6.2.1(1)
5.6.2.2(1)
5.6.3(2) Note 2
5.7(3)

6.1(2)
6.1(3)P
6.1(7)
6.3.2(3)P
6.3.3(4)P
6.4.4
6.4.5.2(3)P
6.4.5.3(1)
6.4.5.3 Table 6.2
6.4.6.1.1(6)
6.4.6.1.1(7)
6.4.6.1.2(3) Table 6.5
6.4.6.3.1(3)
6.4.6.3.2(3)
6.4.6.3.3(3) Note 1
6.4.6.3.3(3) Note 2
6.4.6.4(4)
6.4.6.4(5)
6.5.1(2)
6.5.3(5)
6.5.3(9)P
6.5.3(9)P
6.5.4.1(5)
6.5.4.3(2) Notes 1 and 2
6.5.4.4(2)
6.5.4.5
6.5.4.5.1(2)
6.5.4.5.1(2)
6.5.4.6
6.5.4.6.1(1)
6.5.4.6.1(4)
6.6.1(3)
6.7.1(2)P
6.7.1(8)P

Annex C(3)P Note 1
Annex C(3)P Note 2
Annex D2(2)

4.8(3)
4.9.1(1) Note 1

6.7.3(1)P
6.8.1(11)P Table 6.10
6.8.2(2) Table 6.11
6.8.3.1(1)
6.8.3.2(1)
6.9(6)
6.9(7)

Paragraph 3 below also contains national indications on the use of Informative Annexes A, D, E, F, G and H for bridges.

These national decisions relating to the paragraphs mentioned above must be applied for the use in Italy of UNI-EN-1991-2: 2005

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to EN 1991-2: 2005 Actions on structures - Part 2: Traffic loads on bridges'

3. NATIONAL DECISIONS

Paragraph	**Citation**	**National parameter - value or requirement**
1.1(3)	Note	No additional rules are provided
2.2.(2)	Note 2	The use of infrequent values is not prescribed
2.3(1)	Note	No specific definition of appropriate protection is proposed
2.3(4)	Note	Collision force values are to be defined for each design. Recommended collision force values for boats are given in EN 1991-1-7
3(5)	Note	Appropriate rules are to be defined for each design
4.1(1)	Note 2	In the absence of specific studies, the load actions defined in this section are also valid for spread loads longer than 200 m. In the absence of specific studies and as an alternative to the generally precautionary main load model, for light works greater than 300 m, for the purposes of the total static of the bridge, reference can be made to the following loads $q_{L,a}$, $q_{L,b}$ and $q_{L,c}$: - $q_{L,a} = 128{,}95 \left(\frac{1}{L} \right)^{0{,}25}$ [KN/m] - $q_{L,b} = 88{,}71 \left(\frac{1}{L} \right)^{0{,}38}$ [KN/m] - $q_{L,c} = 77{,}12 \left(\frac{1}{L} \right)^{0{,}38}$ [KN/m] L being the length of the loaded area, in m. A load $q_{L,a}$ will be placed on lane no 1, a load $q_{L,b}$ on lane no 2, a load $q_{L,c}$ on lane no 3 and on the other lanes and on the remaining area a distributed load with an intensity of 2.5 kN/m^2 will be placed. Loads $q_{L,a}$, $q_{L,b}$ and $q_{L,c}$ are arranged in alignment with the respective lanes
4.1(2)	Note 1	Specific models are to be defined for the individual design

4.2.1(1)	Note 2	No further models are defined
4.2.1(2)	Note	No specific models are defined. When significant, the table of special vehicles is adopted with the application rules set out in Annex A
4.2.3(1)	Note	The minimum height for pavements that cannot be surmounted adopted is 200 mm (instead of the recommended value of 100 mm)
4.3.1(2)	Note 2	No additional rules are provided for the use of LM2
4.3.2(3)	Note 1	The following adaptation coefficient values are adopted: - $\alpha_{Q1} = \alpha_{qi} = \alpha_{qr} = 1$.
4.3.2(3)	Note 2	Only one class of traffic is considered.
4.3.2(6)	Note	No alternative load patterns are defined
4.3.3(2)	Note	The recommended criterion is adopted, therefore β_Q=1
4.3.3(4)	Note 2	For the wheel of load pattern 2, the rectangular contact surface is adopted
4.3.4(1)	Note	When significant, the table of special vehicles is adopted with the application rules set out in Informative Annex A
4.4.1(2)	Note 2	The recommended value 900 kN is adopted
4.4.1(3)	Note	A horizontal load concurrent with the special vehicle equal to 60 % of the weight of the special vehicle, in any case not exceeding 900 kN, is adopted
4.4.1(6)	Note	The recommended value Q_{lk} = 0.6 α_{Q1} is adopted Q_{1k}
4.4.2(4)	Note	As a minimum value of transverse action the recommended value is adopted, equal to 25 % of longitudinal breaking or acceleration angle
4.5.1	Table 4.4a Note a	In the gr1a load group, a combination value for horizontal forces equal to zero is adopted
4.5.1	Table 4.4a Note b	In the gr1a load group, a combination value of 2.5 kN/m^2 is adopted for the uniformly distributed vertical load on pavements and cycle paths.
4.5.2(1)	Note 3	Verifications with infrequent combinations are not required.
4.6.1(2)	Point c)	No specific conditions are provided
4.6.1(2)	Point e)	No additional specific data or conditions are defined. The possibility of interactions between vehicles must be assessed on a case by case basis
4.6.1(2)	Note 2	Point d applies only to Models 3 and 4 (see the note in Paragraph 4.6.6(1)) and not to Model 5
4.6.1(2)	Note 4	No reductions in the values of fatigue load models 1 and 2 are allowed
4.6.1(3)	Note 1	In the absence of specific studies, on slow lanes the recommended annual flows of heavy vehicles indicated in Table 4.5 are adopted. For fast lanes, flows equal to 10 % of the considered flow of slow lanes are adopted.
4.6.1(6)	Note	For the dynamic coefficient $\Delta\varphi_{fat}$, the recommended expression (4.7) is adopted
4.6.4(3)	Note	The recommended arrangements for the application of the second

<table>
<tr><td></td><td></td><td>vehicle on a single lane shall be adopted</td></tr>
<tr><td>4.6.5(1)</td><td>Note 2</td><td>No other standard vehicles or other traffic compositions are defined</td></tr>
<tr><td>4.6.6(1)</td><td>Note</td><td>Model 5 can be used for both damage verifications and verifications on unlimited fatigue life. Annex B is adopted</td></tr>
<tr><td>4.7.2.1(1)</td><td>Note</td><td>For impacts due to erratic vehicles action can be taken as follows.
For piles or other structural support elements of the bridge, vehicle impacts may be represented through equivalent horizontal forces
In the absence of more accurate determinations and neglecting the dissipative capacity of the structure, if the impact is considered to occur in the direction of travel of the vehicle, the equivalent static forces $F_{d,x}$ given in the Table may be adopted.
<table>
<tr><th>Road type</th><th>Force $F_{d,x}$ [kN]</th></tr>
<tr><td>Motorways, main and secondary non-urban roads</td><td>1000</td></tr>
<tr><td>Local roads</td><td>750</td></tr>
<tr><td>Urban roads</td><td>500</td></tr>
</table>
If the impact is considered to come in the direction of travel perpendicular to the direction of travel $F_{d,y}=0.5 \cdot F_{d,x}$ is adopted.
These forces shall be considered to be applied over an area of 0.5 m in height and width equal to the minimum value between the width of the element and 1.50 m, the centre of gravity of which is situated at a height of 1.25 m above the road surface.
See also EN 1991-1-7</td></tr>
<tr><td>4.7.2.2(1)</td><td>Note 1</td><td>Impacts on horizontal elements located above the road due to abnormally high vehicles may be simulated, in the absence of specific studies and neglecting the structure's capacity of loss, through a resulting collision force F, applied on the vertical surface (facing the structural element) and distributed on a square of 0.25 m per side. Force F, to be used for the verification of static equilibrium or resistance or the deformation capacity of structural elements, shall be given by $F=r \cdot F_{d,x}$, $F_{D,x}$ being that given in the note to Paragraph 4.7.2.1(1). Factor r is equal to 1.0 for underpass heights of up to 5.0 m is equal to 0 for heights greater than 6.0 m and varies linearly between 5.0 and 6.0 m. On the intrados of the structural element the same impact load F above is considered, with an upward inclination of 10°.
See also EN 1991-1-7</td></tr>
<tr><td>4.7.3.3(1)</td><td>Note 1</td><td>The guardrails and the structural elements to which they are connected shall be sized according to the containment class required for the specific use by the national standards in force.
In the absence of specific indications, a horizontal force of a value of not less than 100 kN, recommended for Class A in Table 4.9(a), shall be considered.</td></tr>
</table>

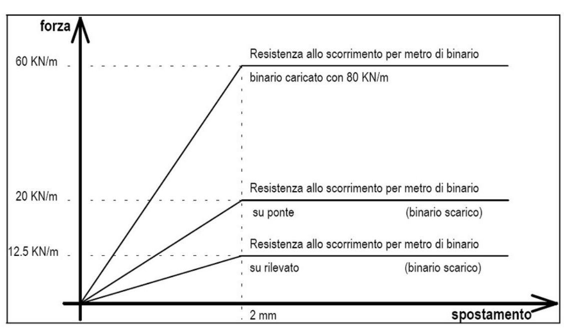
4.7.3.3(1)	Note 3	In the design of the deck an exceptional load condition must be considered where the horizontal impact force on the crash barrier is associated with an isolated vertical load on the road bed made up of ML2, positioned adjacent to the barrier itself and located in the most onerous position. In the absence of such assessments, the system of horizontal forces can be determined by reference to the characteristic resistance of the main structural elements involved in the overall mechanism of the barrier and must be applied at an altitude h, measured from the road surface, equal to the smaller of dimensions h_1 and h_2, where h_1 = (height of the barrier – 0.10 m) and h_2 = 1.00 m. In the sizing of the structural elements to which the barrier is connected, account shall be taken of any overlapping of the diffusion zones of this system of forces, depending on the geometry of the barrier and its constraint conditions. For the dimensioning of the deck, the horizontal forces thus determined shall be amplified by a factor of 1.50. The partial safety coefficient for the load combination at the ULS for the vehicle impact in a derailment shall be taken as a unit
4.7.3.3(2)	Note	The design load of the structure the railing is attached to must not be less than 1.5 times the characteristic strength of the railing
4.7.3.4(1)	Note	The proposed wording is adopted, so that the forces to be considered are those indicated in Paragraph 4.7.2.1(1)
4.8(1)	Note 2	For actions on pedestrian railings, pedestrian or cycle bridges and service walkways, a value of 1.5 kN/m shall be adopted; as a variable load, applied horizontally or vertically to the head of the railing
4.8(3)	Note	For the design load of the structure that holds the railing, a 1.5 times the characteristic strength of the railing is adopted
4.9.1(1)	Note 1	The recommended model is adopted
5.2.3(2)	Note	The recommended models are adopted
5.3.2.1(1)	Note	The recommended value q_{fk}=5.0 kN/m^2 is adopted. The use of the reduced load derived from equation (5.1) is not allowed
5.3.2.2(1)	Note	The recommended value is adopted
5.3.2.3(1)P	Note 1	The service vehicle defined in 5.6.3 is adopted as recommended
5.4(2)	Note	The recommended value is adopted
5.6.1(1)	Note	Other forces of impact are to be defined for the individual design
5.6.2.1(1)	Note 1	For impacts due to erratic vehicles action can be taken as follows. For piles or other structural support elements of the bridge, vehicle impacts may be represented through equivalent horizontal forces. In the absence of more accurate determinations and neglecting the dissipative capacity of the structure, if the impact is considered to occur in the direction of travel of the vehicle, the equivalent static forces $F_{d,x}$ given in the Table may be adopted.

Road type	**Force** $F_{d,x}$ [kN]
Motorways, main and secondary non-urban roads	1000

		Local roads — 750 Urban roads — 500 If the impact is considered to come in the direction of travel perpendicular to the direction of travel $F_{d,y}=0.5 \cdot F_{d,x}$ is adopted. These forces shall be considered to be applied over an area of 0.5 m in height and width equal to the minimum value between the width of the element and 1.50 m, the centre of gravity of which is situated at a height of 1.25 m above the road surface. See also EN 1991-1-7
5.6.2.2(1)	Note 1	Impacts on horizontal elements located above the road due to abnormally high vehicles may be simulated, in the absence of specific studies and neglecting the dissipative capacity of the structure, through a resulting collision force F, applied on the vertical surface (facing the structural element) and distributed on a square of 0.25 m per side. Force F, to be used for the verification of static equilibrium or resistance or the deformation capacity of structural elements, shall be given by $F=r \cdot F_{d,x}$, $F_{D,x}$ being that given in the note to Paragraph 4.7.2.1(1). Factor r is equal to 1.0 for underpass heights of up to 5.0 m is equal to 0 for heights greater than 6.0 m and varies linearly between 5.0 and 6.0 m. On the intrados of the structural element the same impact load F above is considered, with an upward inclination of 10°. See also EN 1991-1-7
5.6.3(2)	Note 2	The recommended model is adopted
5.7(3)	Note	The procedure laid down in paragraph A2.4.3.1 of EN 1990 is adopted
	Additional information for railway bridges	The decisions that in EN1991-2 are delegated to the competent authority in relation to railway bridges will be prepared by the client of the work, following the opinion of the High Council for Public Works, for safety aspects
6.1(2)	Note	No additional information is provided. Alternative load models may be defined for the individual design
6.1(3)P	Note	To be defined for each design
6.1(7)	Note	To be defined for each design
6.3.2(3)P	Note	Adaptation coefficient values α are variable depending on the infrastructure type (normal railways, light railways, metropolitan, etc.). The adaptation coefficient multiplies the load models LM71, SW/0 and SW/2. For ordinary railways, the following adaptation coefficients are adopted: - α=1,1 for models LM71 and SW/0 - α=1.0 for model SW/2
6.3.3(4)P	Note	To be defined for each design
6.4.4	Note	A dynamic analysis must be carried out when designing railway bridges, adopting real convoys and specific control parameters of the infrastructure and the type of traffic anticipated.

		- when the frequency of the structure does not fall into the zone indicated in Figure 6.10, independently of the travelling speed, for normal bridges; - in any case, for non-conventional bridges (cable-stayed bridges, suspension bridges, bridges with large spans, metal bridges that differ from the types used in railways, etc.).
6.4.5.2(3)P	Note	To be defined for each design
6.4.5.3(1)	Note	The recommended values in Table 6.2 are adopted with the following amendments: - in 2.3 L_Φ=light of the crossbeam - in 3.2 Φ_3=2 where not further specified - in 3.4 L_Φ:light of the crossbeam - in 4.5 if e $\leq$ 0.5 m: Φ_2=1.67 and adding to Points 5.3.a (slabs and other box elements), 6.1 and 6.2 (structural supports): • *5.3.a Slabs and other box elements* Slabs and other box elements for one or more tracks (underside clearance of $\leq$ 5.0 m and ground clearance of $\leq$ 8.0 m): Φ_2 = 1.20; Φ_3 = 1.35. For boxes that do not comply with the above limits, point 5.3 applies, disregarding the presence of the lower slab and considering a reduction coefficient of Φ 0.9, to be applied to the coefficient Φ • *6.1 Piles with slimness λ>30* L_Φ = Sum of the lengths of the spans adjacent to the pile • *6.2 Supports, calculation of contact stresses underneath them and suspension rods* L_Φ = Length of the supported elements
6.4.5.3	Table 6.2	Note ‘a’ becomes: ‘In general all brackets with a span greater than 0.50 m subjected to railway traffic loads require a dedicated study in accordance with 6.4.6 and with a load to be defined for each design’
6.4.6.1.1(6)	Table 6.4	No additional specifications are added for the use of HSLM-A and HSLM-B models on complex structures or continuous beams
6.4.6.1.1(7)	Note	To be defined for each design
6.4.6.1.2(3)	Table 6.5	The load referred to in note ‘a’ is to be defined for each design
6.4.6.3.1(3)	Table 6.6	In the absence of specific special assessments based on experimental evidence for similar types of bridges, the values recommended in Table 6.6 are adopted for the coefficient ζ
6.4.6.3.2(3)	Note	More reliable material density values can be derived from test results conducted in accordance with EN 1990, EN 1992 and ISO 6784.
6.4.6.3.3(3)	Note 1	More reliable values of the elastic module E_{cm} can be deduced based on results of tests conducted in accordance with EN 1990, EN 1992 and ISO 6784
6.4.6.3.3(3)	Note 2	Does not apply
6.4.6.4(4)	Note 1	Does not apply
6.4.6.4(4)	Note 2	The values provided in 6.4.6.4(4) are adopted for $\Delta\zeta$

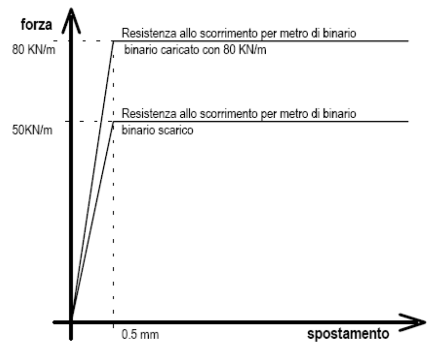
<table>
<tr><td>6.4.6.4(5)</td><td>Note</td><td>The values provided in Annex C are adopted for φ''</td></tr>
<tr><td>6.5.1(2)</td><td>Note</td><td>The value provided in Paragraph 6.5.1(2) is adopted for h_t</td></tr>
<tr><td>6.5.3(5)</td><td>Note</td><td>To be defined for each design</td></tr>
<tr><td>6.5.3(9)P</td><td>Note</td><td>For double line bridges two trains in transit in opposite directions must be considered, one accelerating, the other braking.
For bridges with more than two tracks, the following must be considered:
- a first track with the maximum braking force;
- a second track with the maximum starting force in the same direction as the braking force;
- a third and fourth track with 50 % of the braking force, in agreement with the above;
- any other tracks free from horizontal forces</td></tr>
<tr><td>6.5.4.1(5)</td><td>Note</td><td>To be defined for each design</td></tr>
<tr><td>6.5.4.3.(2)</td><td>Notes 1 and 2</td><td>For works directly exposed to atmospheric actions, in the absence of in-depth studies, the following values are adopted for ΔT_N:
- Concrete decks, c.a. and c.a.p.
$\Delta T = \pm 15$ °C
- Mixed steel-concrete deck
$\Delta T = \pm 15$ °C
- Steel deck with ballast reinforcements
$\Delta T = \pm 20$ °C
- Steel deck with direct reinforcements
$\Delta T = \pm 25$ °C
- Concrete structures
$\Delta T = \pm 15$ °C.
The temperature change indicated above shall be increased by 50 % for all types of decks exclusively for the calculation of the excursions of joints and support devices</td></tr>
<tr><td>6.5.4.4(2)</td><td>Figure 6.20
Note 1</td><td>Figure 6.20 is replaced with the following Figures 6.20.a, 6.20.b and 6.20.c in which the links are given between longitudinal resistance to sliding and longitudinal sliding per metre for the single track, in the case of installation on ballast, direct installation with traditional indirect type K attachment and direct elastic attachment, respectively.



<table><tr><td>forza</td><td>force</td></tr><tr><td>Resistenza allo scorrimento per</td><td>Resistance to sliding per metre of</td></tr></table></td></tr>
</table>

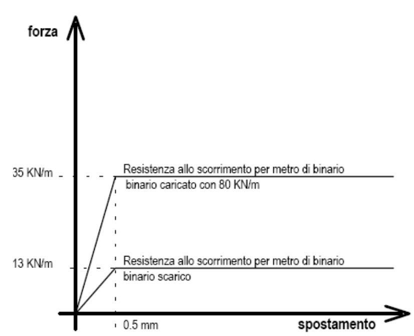
metro di binario	track
binario caricato con 80 KN/m	track loaded with 80 KN/m
su ponte	on bridge
su rilevato	on embankment
(binario scarico)	(rail unloading)
spostamento	displacement

Figure 6.20.a – Link between resistance to sliding and longitudinal sliding per metre for single track (laying on ballast)



forza	force
Resistenza allo scorrimento per metro di binario	Resistance to sliding per metre of track
binario caricato con 80 KN/m	track loaded with 80 KN/m
binario scarico	(rail unloading)
spostamento	displacement

Figure 6.20.b – Link between resistance to sliding and longitudinal sliding per metre for single track (direct laying with traditional indirect type K attachment)

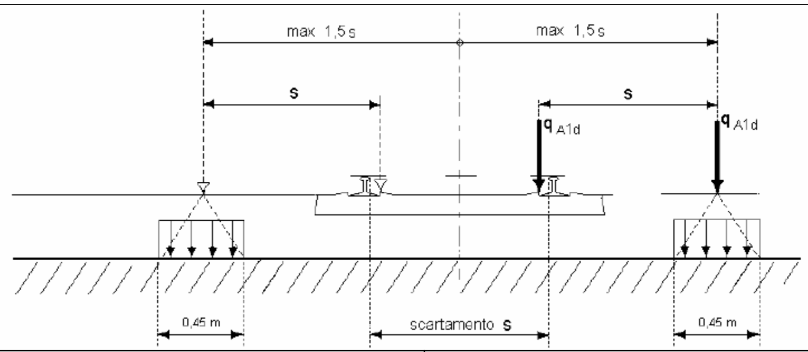


forza	force
Resistenza allo scorrimento per metro di binario	Resistance to sliding per metre of track
binario caricato con 80 KN/m	track loaded with 80 KN/m
binario scarico	(rail unloading)
spostamento	displacement

Figure 6.20.a – Link between resistance to sliding and longitudinal sliding per metre for single track (direct laying with elastic attachment)

In the case of a ballast installation, the longitudinal sliding force q, in the absence of a vertical traffic load, is assumed to be equal to

		12.5 kN/m on embankments and 20 kN/m on bridges, while in the presence of a vertical traffic load of 80 kN/m, it is assumed to be equal to 60 kN/m. For different loads, the resistance values will be obtained by linear interpolation or extrapolation. In all cases, a displacement threshold of 2 mm is assumed, so the initial rigidity is unambiguously defined. With a directly laid track, resistance to sliding q depends on the type of connection and tightening force, as well as the applied vertical load, as described in the following. Said standards do not apply to structures with innovative types of reinforcement. For the traditional type K indirect connection, the longitudinal sliding force q is assumed, for wheelbases between the crosspiece of 0.6 m, 50 kN/m in the absence of vertical traffic load and 80 kN/m in the presence of a vertical traffic load of 80 kN/m. For the elastic connection, the longitudinal sliding force q is assumed equal to 13 kN/m in the absence of vertical traffic load and 35 kN/m in the presence of a vertical traffic load of 80 kN/m. In the case of direct laying and for other vertical traffic loads, the resistance values will be obtained by linear interpolation or extrapolation. In all cases, a displacement threshold of 0.5 mm is assumed, so the initial rigidity is unambiguously defined.
6.5.4.5	Note	No alternative requirements are provided
6.5.4.5.1(2)	Note 1	In all cases r ≥ 1 500 m is adopted
6.5.4.5.1(2)	Note 2	For UIC 60 rails with a strength of 900 N/mm^2 the values proposed in Paragraph 6.5.4.5.1(1) are adopted.
6.5.4.6	Note	Alternative calculation methods are not specified
6.5.4.6.1(1)	Note	The recommended criteria are adopted
6.5.4.6.1(4)	Note	The values given in the preceding point 6.5.4.4.(2) are adopted
6.6.1(3)	Note	The recommended values in Paragraphs 6.6.2 to 6.6.6 are adopted
6.7.1(2)P	Note	No alternative requirements and/or loads are specified
6.7.1(8)P	Notes 1 and 2	The models and values given below are adopted: **Derailment over the bridge** In addition to considering vertical load models for rail traffic, in order to perform verifications on the structure, the alternative possibility of a train or heavy carriage derailing must be taken into account, examining separately the two following design situations: ***Case 1:*** Two linear vertical loads q_{A1d} = 60 kN/m are considered (including dynamic effect) each (Figure a). Transversely the loads are separated by s (track gauge) and may assume all the positions included within the limits indicated in Figure a. For this condition slight damage is tolerated, provided that it may be easily repaired, whilst damage to the main load-bearing structures is to be avoided.

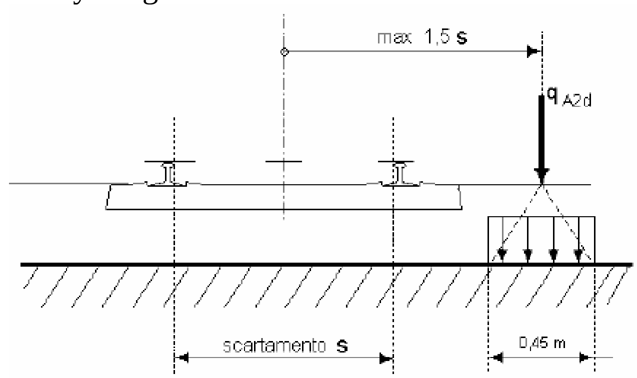


scartamento	gauge

Figure a – Derailment on the bridge – case 1

Case 2: A single linear load q_{A2d}=80 kN/m×1.4=112 kN/m extended by 20 m is considered and arranged with a maximum eccentricity, on the external side, of 1.5 s relative to the axis of the track (Figure b). For this conventional load condition the overall stability of the structure will be verified, as will the tipping of the deck, the collapse of the slab, etc.

For metal decks with direct superstructure, Case 2 must be considered only for general verifications.



scartamento	gauge

Figure b – Derailment on the bridge – case 2

Derailment below the bridge

In the positioning of structural elements adjacent to the railway, with the exception of artificial tunnels with curtain wall, it must be taken into account that for an area of width of 3.5 m measured crosswise from the axis of the nearest track, the ban on building applies.

At distances greater than 4.50 m, the building of isolated pillars is permitted. For intermediate distances, structural elements with increasing rigidity must be provided as the distance of the track decreases.

The actions produced by the derailed train on vertical support elements adjacent to the railway seating must be determined on the basis of a specific risk analysis, bearing in mind the presence of any protective or sacrificial elements (buffers) or of conditions of use which may reduce the risk of the event occurring (pavements,

<table>
<tr><td></td><td></td><td>check-rails, etc.).
In the absence of specific risk analysis the following equivalent static actions may be adopted, variable depending on distance ‘d’ of the exposed elements from the axis of the track:
• *for a distance d ≤ 5 m:*
- 4 000 kN parallel to the direction of travel of train convoys;
- 1 500 kN perpendicular to the direction of travel of train convoys;
• *for a distance 5 m < d ≤ 15 m:*
- 2 000 kN parallel to the direction of travel of train convoys;
- 750 kN perpendicular to the direction of travel of train convoys;
• *zero for a distance d > 15 m.*
These forces should be applied at 1.80 m from the rail head and should not be considered simultaneous agents</td></tr>
<tr><td>6.7.3(1)P</td><td>Note</td><td>The actions provided in Paragraph 6.7.3(1)P are accepted.
Further actions may be specified for each design.
As an exceptional action, the possibility of the overhead contact line breaking at the most unfavourable point for the bridge structure must be considered. The force transmitted to the structure following a similar event is considered as a static force of nature acting in a parallel direction to the axis of the track, of an intensity equal to ± 20 kN and applied on the supports to the portion of wire.
Depending on the number of tracks present on the structure the simultaneous rupture is estimated as:
- 1 overhead contact line for bridges with one track
- 2 overhead contact lines for bridges with between 2 and 6 tracks
- 3 overhead contact lines for bridges with more than six tracks
During the verifications, the overhead contact lines considered broken will be those which determine the least favourable effect.</td></tr>
<tr><td>6.8.1(11)P</td><td>Table 6.10
Note</td><td>To be defined for each design</td></tr>
<tr><td>6.8.2(2)</td><td>Table 6.11
Note</td><td>Instead of those provided in Table 6.11, the following group of actions is adopted
<table>
<tr><th>LOAD TYPE</th><th colspan="2">Vertical actions</th><th colspan="3">Horizontal actions</th><th rowspan="2">Comments</th></tr>
<tr><th>Load group</th><th>Vertical load (1)</th><th>Unloaded train</th><th>Braking and starting</th><th>Centrifugal force</th><th>Nosing</th></tr>
<tr><td>**Group 1 (2)**</td><td>1.00</td><td>-</td><td>0.5 (0.0)</td><td>1.0 (0.0)</td><td>1.0 (0.0)</td><td>greatest vertical and lateral action</td></tr>
<tr><td>**Gruppo.2 (2)**</td><td>-</td><td>1.00</td><td>0.00</td><td>1.0 (0.0)</td><td>1.0 (0.0)</td><td>lateral stability</td></tr>
<tr><td>**Group 3 (2)**</td><td>1.0 (0.5)</td><td>-</td><td>1.00</td><td>0.5 (0.0)</td><td>0.5 (0.0)</td><td>maximum longitudinal action</td></tr>
<tr><td>**Group 4**</td><td>0.8 (0.6; 0.4)</td><td>-</td><td>0.8 (0.6; 0.4)</td><td>0.8 (0.6; 0.4)</td><td>0.8 (0.6; 0.4)</td><td>cracking</td></tr>
</table></td></tr>
</table>

		☐ Dominant action (1) Including all factors relating to these (Φ,α, etc.) (2) Two or three entire characteristic values occurring at the same time (assumption of various factors equal to 1), although improbable, has been considered as simplification for Load Groups 1, 2 and 3 without this having significant design consequences. When the action is favourable as regards the verifications being carried out, the values indicated in parenthesis in the table are assumed. Group 4 is to be considered exclusively for cracking verifications. The values shown in parenthesis are assumed equal to: (0.6) for decks with 2 loaded tracks and (0.4) for decks with three or more loaded tracks
6.8.3.1(1)	Note	When relevant, the recommended rule is adopted. For cracking verifications, load group 4 of the table in Paragraph 6.8.2.2(2) is considered.
6.8.3.2(1)	Note	The recommended value zero is adopted
6.9(6)	Note	The recommended value 100 years is adopted
6.9(7)	Note	To be defined for each design

Annex C(3)P	Note 1	When the expression (C.2) is not properly specified, the expression (C.1) must be adopted as recommended
Annex C(3)P	Note 2	Does not apply
Annex D2(2)	Note	The recommended value $\gamma_{FF} = 1.00$ is adopted
	Use of Informative Annexes A, D, E, F, G and H	Annexes A, D, E, F, G and H retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction

4. NON-CONTRADICTORY ADDITIONAL INFORMATION

With reference to Paragraph 4.6.1(4), it is specified that vehicles of fatigue load models 3, 4 and 5 are considered to be positioned in the axis of conventional lanes. However, it is possible to adopt more favourable vehicle positions, considering that 10 % of the flow takes place on conventional lanes and 90 % on physical lanes. In this case, the position of the vehicles in the physical lanes shall be such as to determine the most severe effects in detail.

NATIONAL ANNEX

UNI-EN-1991-3:2006 (includes corrigendum AC:2012)
Actions on structures'; Part 3: Actions induced by cranes and machinery

EN-1991-3:2006 (including corrigendum December 2012)
Actions on structures – Part 3: Actions induced by cranes and machinery

1. BASIS

This Annex contains the national determination parameters for UNI-EN1991-3:2006.

2. INTRODUCTION

2.1 Scope

The document contains, in point 3 below, the decisions on the national parameters to be laid down in UNI-EN1991-3:2006 with regard to the following Paragraphs:

2.1(2)
2.5.2.1(2)
2.5.3(2)
2.7.3(3)
A2.2(1)
A2.2(2)
A2.3(1)

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN1991-3:2006 in Italy.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN1991-3:2006 'Actions on structures Actions induced by cranes and machinery'.

3. NATIONAL DECISIONS

Paragraph	**Citation**	**National parameter - value or requirement**
2.1(2)	Note	For the purposes of the design and verification of the tracks, the values of actions specified in the design of cranes may be used
2.5.2.1(2)	Note	The recommended value is adopted: e = 0.25 b_t
2.5.3(2)	Note	The recommended Table 2.3 is adopted
2.7.3(3)	Note 2	The recommended values are adopted: - μ = 0.20 for steel-steel contact - μ = 0.50 for steel-rubber contact
A.2.2(1)	Note 2	The recommended values in Table A.1 are adopted
A.2.2(2)	Note	The following values are adopted: - γ_{Gsup} = 1.10 - γ_{Ginf} = 0.90 For other cases, A.2.2(1) applies (with amendments)
A.2.3(1)	Note	The recommended values are adopted

Non-contradictory additional information (ICNC): in formula (3.5), currently under review, the term ‘e_m’ should be understood as ‘e’ (base of natural logarithms).

Annex B retains informational value.

NATIONAL ANNEX

UNI EN 1991-4:2006	(includes corrigendum AC:2012) Actions on structures – Part 4: Actions on silos and tanks
EN 1991-4:2006	(including corrigenda November 2012) Actions on structures – Part 4: Silos and tanks

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1991-4:2006.

2 INTRODUCTION

2.1 Scope

The document contains, in point 3 below, the decisions on the national parameters to be laid down in UNI EN 1991-4:2006 with regard to the following Paragraphs:

2.5 (5)	3.6 (2)	5.2.4.3.1 (3) 5.4.1 (3) 5.4.1 (4)	A.4 (3) B.2.14 (1)

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI EN 1991-4:2006 in Italy.

2.2 Normative references

This Annex is to be considered when using the standards documents referring to UNI EN 1991-4:2006 – Actions on structures – Part 4 – Actions on silos and tanks.

3. NATIONAL DECISIONS

Paragraph	Citation	National parameter - value or requirement
2.5	(5)	The classification given in Table 2.1 is adopted
3.6	(2)	No additional information
5.2.4.3.1	(3)	The recommended values are adopted
5.4.1	(3)	The recommended procedure is adopted
5.4.1	(4)	The recommended procedure is adopted
Annex A		Annex A retains its informative character
A.4	(3)	The following values and combinations are adopted: - Table A.1 - Table A.2: use not allowed - Table A.3, as subsequently amended - Table A.4, as subsequently amended - Table A.5, as subsequently amended. Table A.3 The values of $\psi_{1,1}$ or $\psi_{2,1}$, in the column '*Accompanying variable action 1 (main)*', for both rows 'E' and 'V', are supplemented by: *Liquid Content* $\psi_{1,1}=\psi_{2,1}=1.0$ Table A.4 The values of $\psi_{1,1}$ or $\psi_{2,1}$, in column '*Accompanying variable action 1 (main)*', in row 'SF' are supplemented by: *Liquid Content* $\psi_{1,1}=\psi_{2,1}=1.0$ The values of $\psi_{1,1}$ or $\psi_{2,1}$, in the column '*Accompanying variable action 1 (main)*', in row 'SE' are amended by: *Solid or Liquid Content* $\psi_{1,1}=\psi_{2,1}=0.0$ Table A.5 The values of $\psi_{1,1}$ o $\psi_{2,1}$, in the column '*Accompanying variable action 1 (main)*', in all rows are supplemented by: *Liquid Content* $\psi_{1,1}=\psi_{2,1}=1.0$.
Annex B		Annex B retains its informative character
B.2.14	(1)	No additional information is provided

Annex F		Annex F retains its informative character
Annex H		Annex H retains its informative character

NATIONAL ANNEX

UNI-EN1992-1-1:2015	(includes update A1:2014 and corrigendum AC:2010) Design of concrete structures Part 1-1: General rules and rules for buildings
EN 1992-1-1: 2004+A1:2014	(Incorporating corrigendum January 2008 and November 2010) Design of concrete structures Part 1-1: General rules and rules for buildings

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1992-1-1:2015.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1992-1-1:2015 below:

2.3.3 (3) Note	4.4.1.3 (3) Note	6.2.4 (4) Note	8.3 (2) Note	9.8.3 (2) Note
2.4.2.1 (1) Note	4.4.1.3 (4) Note	6.2.4 (6) Note	8.6 (2) Note	9.8.4 (1) Note
2.4.2.2 (1) Note	5.1.3 (1)P Note	6.4.3 (6) Note	8.8 (1) Note	9.8.5 (3) Note
2.4.2.2 (2) Note	5.2 (5) Note	6.4.4 (1) Note	9.2.1.1 (1) Note 2	9.10.2.2 (2) Note
2.4.2.2 (3) Note	5.5 (4) Note	6.4.5 (3) Note	9.2.1.1 (3) Note	9.10.2.3 (3) Note
2.4.2.3 (1) Note	5.6.3 (4) Note	6.4.5 (4) Note	9.2.1.2 (1) Note 1	9.10.2.3 (4) Note
2.4.2.4 (1) Note	5.8.3.1 (1) Note	6.5.2 (2) Note	9.2.1.4 (1) Note	9.10.2.4 (2) Note
2.4.2.4 (2) Note	5.8.3.3 (1) Note	6.5.4 (4) a) b)	9.2.2 (4) Note	11.3.5 (1)P Note
2.4.2.5 (2) Note	5.8.3.3 (2) Note 1	and c) Note	9.2.2 (5) Note	11.3.5 (2)P Note
3.1.2 (2)P Note	5.8.5 (1) Note	6.5.4 (6) Note	9.2.2 (6) Note	11.3.7 (1) Note
3.1.2 (4) Note	5.8.6 (3) Note	6.8.4 (1) Note 1	9.2.2 (7) Note	11.6.1 (1) Note
3.1.6 (1)P Note	5.10.1 (6) Note	and Note 2	9.2.2 (8) Note	11.6.2 (1) Note
3.1.6 (2)P Note	5.10.2.1 (1)P Note	6.8.4 (5) Note	9.3.1.1(3) Note	11.6.4.1 (1) Note
3.2.2 (3)P Note	5.10.2.1 (2) Note	6.8.6 (1) Note	9.5.2 (1) Note	12.3.1 (1) Note
3.2.7 (2) Note 1	5.10.2.2 (4) Note	6.8.6 (3) Note	9.5.2 (2) Note	12.6.3 (2) Note
3.3.4 (5) Note	5.10.2.2 (5) Note	6.8.7 (1) Note	9.5.2 (3) Note	C.1 (1) Note
3.3.6 (7) Note	5.10.3 (2) Note	7.2 (2) Note	9.5.3 (3) Note	C.1 (3) Note 1
4.4.1.2 (3) Note	5.10.8 (2) Note	7.2 (3) Note	9.6.2 (1) Note 1	and Note 2
4.4.1.2 (5) Note	5.10.8 (3) Note	7.2 (5) Note	and Note 2	E.1 (2) Note
4.4.1.2 (6) Note	5.10.9 (1)P Note	7.3.1 (5) Note	9.6.3 (1) Note	J.1(2) Note
4.4.1.2 (7) Note	6.2.2 (1) Note	7.3.2 (4) Note	9.7 (1) Note	J.2.2(2) Note
4.4.1.2 (8) Note	6.2.2 (6) Note	7.3.4 (3) Note	9.8.1 (3) Note	J.3(2) Note
4.4.1.2 (13) Note	6.2.3 (2) Note	7.4.2 (2) Note	9.8.2.1 (1) Note	J.3(3) Note
4.4.1.3 (1) Note	6.2.3 (3) Note	8.2 (2) Note	9.8.3 (1) Note	

Paragraph 3 below also contains national indications on the use of the Informative Annexes A, B, D, E, F, G, H, I, E and J for buildings and other civil engineering works.
Finally, this National Annex contains additional non-contradictory information referring to UNI-EN 1992-1-1:2015.

These national decisions, relating to the paragraphs mentioned above, must be applied for the use of UNI-EN-1992-1-1:2015 in Italy

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to EN 1992-1-1:2015 ‘Design of concrete structures – Part 1-1: General rules and rules for buildings

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode EN 1992-1-1:2015

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>2.3.3 (3)</td><td>Note</td><td>The recommended value is adopted: d_{joint} = 30 m. For prefabricated structures this value may be higher than for cast-in-place structures to compensate for the viscous deformation and shrinkage that occurs prior to construction</td></tr>
<tr><td>2.4.2.1 (1)</td><td>Note</td><td>The recommended value γ_{SH} = 1.0 is adopted</td></tr>
<tr><td>2.4.2.2 (1)</td><td>Note</td><td>The recommended value $\gamma_{P,fav}$ = 1.0 is adopted for persistent and transient design situations. The value $\gamma_{P,fav}$ = 1.0 can also be used for fatigue testing</td></tr>
<tr><td>2.4.2.2 (2)</td><td>Note</td><td>For global analysis the recommended value $\gamma_{P.unfav}$ = 1.3 is adopted</td></tr>
<tr><td>2.4.2.2 (3)</td><td>Note</td><td>The recommended value $\gamma_{P.unfav}$ = 1.2 is adopted</td></tr>
<tr><td>2.4.2.3 (1)</td><td>Note</td><td>The recommended value $\gamma_{F,fat}$ = 1.0 is adopted</td></tr>
<tr><td>2.4.2.4(1)</td><td>Note</td><td>The values contained in Statement 2.1N are adopted:

Statement 2.1N: Partial safety coefficient for ultimate limit states for materials:
<table>
<tr><th>Design situations</th><th>γ_C
for concrete</th><th>γ_S
for ordinary reinforcing steels</th><th>γ_S
for pre-stressed steels</th></tr>
<tr><td>Persistent and transient</td><td>1.5*</td><td>1.15</td><td>1.15</td></tr>
<tr><td>Exceptional</td><td>1.0</td><td>1.0</td><td>1.0</td></tr>
</table>
* In the case of cast-in-place flat elements (slabs, walls, etc.) and with a thickness of less than 50 mm, γ_C = 1.875 is assumed
* The coefficient γ_C may be reduced from 1.5 to 1.4 for continuous production of elements or structures, subject to continuing checks of concrete, which results in a coefficient of variation (ratio between the standard deviation and the average value) of strength not greater than 10 %. These productions must be included in a quality system referred to in Paragraph 11.8.3 of the 2018 NTC</td></tr>
<tr><td>2.4.2.4 (2)</td><td>Note</td><td>For situations not covered by specific sections of this Eurocode, the recommended value γ_c =1 and γ_s = 1</td></tr>
<tr><td>2.4.2.5 (2)</td><td>Note</td><td>The value k_f = 1.0 is adopted</td></tr>
</table>

Paragraph	Citation	National parameter - value or requirement
3.1.2 (2)P	Note	The recommended value C_{max} = 90/105 is adopted, bearing in mind that, for the use of classes C80/95 and C90/105, CE marking is required on the basis of the relevant 'European Technical Assessment' (ETA), or a 'Technical Assessment Certificate' issued by the Chairperson of the High Council for Public Works. For strength classes greater than C45/55, the characteristic strength and all mechanical and physical parameters that influence the strength and durability of the concrete are to be examined before work begins through an appropriate preliminary trial, and production should follow specific quality control procedures. (see also the additional information to point 4 below)
3.1.2 (4)	Note	The value K_t = 1.0 is adopted
3.1.6 (1)P	Note	The value α_{cc} = 0.85 is adopted In fire resistance verifications only, α_{cc} = 1.0 is assumed
3.1.6 (2)P	Note	The recommended value α_{ct} = 1.0 is adopted
3.2.2 (3)P	Note	The upper limit f_{yk} = 450 is adopted MPa Only the following steels may be used: - B450C for diameters of $6 \leq \phi \leq 40$ mm - B450A for diameters of $5 \leq \phi \leq 10$ mm
3.2.7 (2)	Note 1	The recommended value $\varepsilon_{ud} = 0.9\ \varepsilon_{uk}$ is adopted
3.3.4 (5)	Note	The recommended value k = 1.1 is adopted, provided that the prestressed reinforcement must have the mechanical properties defined in the 2018 NTC in Paragraph 11.3.3.2.
3.3.6 (7)	Note	The recommended value ud$\varepsilon_{ud} = 0.9\varepsilon_{uk}$ is adopted. If no more accurate values are known, the recommended values are ε_{ud} = 0.02 and $f_{p0,1k}/f_{pk}$ = 0.9

Paragraph	Citation	National parameter - value or requirement
4.4.1.2 (3)	Note	For circular and rectangular sheaths for adhesive post-tensioned reinforcements and for pre-stressed pretensioned reinforcements, the following values are adopted for $c_{min,b}$: • *For pre-stressed sheaths for post-tension:* - circular cross-section sheaths $c_{min,b}$ = diameter of the sheath - rectangular cross-section sheaths $c_{min,b}$ = smaller dimension or half of the bigger dimension, if the latter is greater There are no requirements for covers for circular or rectangular sheaths greater than 80 mm • *For pre-tensioned reinforcements:* - $c_{min,b}$ = 2.0 x the diameter of the strand or the fine wire - $c_{min,b}$ = 1.5 x the diameter of the strand or the fine wire in the floors - $c_{min,b}$ = 3.0 x the diameter of the indented wire
4.4.1.2 (5)	Note	The recommended S4 structural class (50 year design lifetime) is adopted for the indicative concrete strengths given in Annex E – Table E.1N with the structural class changes recommended in Table 4.3N. The minimum Structural Class recommended is S1. The recommended values of $c_{\mathrm{min,dur}}$ are given in Table 4.4N (ordinary reinforcement steels) and in Table 4.5N (pre-stressed steels)
4.4.1.2 (6)	Note	The recommended value $\Delta c_{\mathrm{dur},\gamma}$ = 0 mm is adopted.
4.4.1.2 (7)	Note	The recommended value $\Delta c_{\mathrm{dur.st}}$ = 0 mm is adopted
4.4.1.2 (8)	Note	The recommended value $\Delta c_{\mathrm{dur.add}}$ = 0 mm is adopted
4.4.1.2 (13)	Note	The recommended values k_1= 5 mm; k_2 = 10 mm and k_3 = 15 mm are adopted
4.4.1.3 (2)	Note	The recommended value Δc_{dev} = 10 mm is adopted
4.4.1.3 (3)	Note	The recommended values are adopted: - if the execution is subjected to a secure quality control system, including measurements of concrete covers, the acceptable tolerance of the design, Δc_{dev}, may be reduced: $10\text{ mm} \geq \Delta c_{dev} \geq 5\text{ mm}$ (4.3N) - if it is assured that a very accurate measuring system is used for monitoring and that non-conforming elements are rejected (for ex. prefabricated elements), the acceptable tolerance Δc_{dev} may be reduced: $10\text{ mm} \geq \Delta c_{dev} \geq 0\text{ mm}$ (4.4N)
4.4.1.3 (4)	Note	The recommended values k_1 = 40 mm and k_2 = 75 mm are adopted

Paragraph	Citation	National parameter - value or requirement
5.1.3 (1)P	Note	For buildings, the recommended simplified load regulations are adopted: a) Alternate spans loaded with variable and permanent design loads ($\gamma_Q Q_k + \gamma_G G_k + P_m$), the remaining spans loaded with only the permanent design load, $\gamma_G G_k + P_m$. b) Two adjacent spans loaded with variable and permanent design loads ($\gamma_Q Q_k + \gamma_G G_k + P_m$), all other spans loaded with only permanent design load, $\gamma_G G_k + P_m$
5.2 (5)	Note	The recommended value $\theta_0 = 1/200$ is adopted
5.5 (4)	Note	The recommended values are adopted $k_1 = 0.44$, $k_2 = 1.25\ (0.6 + 0.0014 / \varepsilon_{cu2})$, $k_3 = 0.54$, $k_4 = 1.25\ (0.6 + 0.0014 / \varepsilon_{cu2})$, $k_5 = 0.7$ For k_6 the following value is adopted: $k_6 = 0.85$ ε_{cu2} is the final deformation according to Table 3.1
5.6.3 (4)	Note	The recommended values of $\theta_{pl,d}$ are adopted. The recommended values for Classes B and C of steel (use of Class A steel is not advised for plastic analysis) and classes of strength of concrete less than or equal to C50/60 and C90/105 are given in Figure 5.6N. Strength classes of concrete from C 55/67 to C 90/105 may be interpolated. The values apply for a shear slimness λ = 3.0. For different values of shear slimness, it is recommended to multiply $\theta_{pl,d}$ for k_λ: - $k_\lambda = \sqrt{\lambda / 3}$ (5.11N) Where λ is the ratio between the distance between the points of zero moment and maximum moment after redistribution is the useful height, d. More simply λ it may be calculated by the joint design values of bending moment and shear: $\lambda = M_{Sd} / (V_{Sd} \cdot d)$ (5.12N)
5.8.3.1 (1)	Note	The following value is adopted: $\square_{lim} = \frac{25}{\sqrt{n}}$ where $n = N_{Ed} / (A_c f_{cd})$
5.8.3.3 (1)	Note	The recommended value $k_1 = 0.31$ is adopted
5.8.3.3 (2)	Note 1	The recommended value $k_2 = 0.62$ is adopted
5.8.5 (1)	Note	Both simplified methods, (a) and (b), may be adopted

Paragraph	**Citation**	**National parameter - value or requirement**
5.8.6 (3)	Note	The recommended value γ_{cE} = 1.2 is adopted
5.10.1 (6)	Note	General methods A and B are adopted. In particular cases, methods C, D, E may be adopted, with adequate justification
5.10.2.1 (1)P	Note	The values are adopted: - k_1 = 0.80 pre-tensioned reinforcement - k_1 = 0.75 post-tension reinforcement - k_2 = 0.90 pre-tensioned reinforcement - k_2 = 0.85 post-tensioned reinforcement
5.10.2.1 (2)P	Note	The recommended value k_3 = 0.95 is adopted
5.10.2.2 (4)	Note	The recommended values k_4 = 50 and k_5 = 30 are adopted
5.10.2.2 (5)	Note	The value k_6 = 0.70 is adopted
5.10.3 (2)	Note	The recommended values k_7 = 0.75 and k_8 = 0.85 are adopted
5.10.8 (2)	Note	The recommended value $\Delta\sigma_{p,ULS}$ = 100 MPa is adopted
5.10.8 (3)	Note	The recommended values $\gamma_{\Delta P,sup}$ = 1.2 and $\gamma_{\Delta P,inf}$ = 0.8 are adopted. If linear analysis is performed with non-cracked sections, a lower deformation limit can be adopted and the recommended value for both $\gamma_{\Delta P,sup}$ and $\gamma_{\Delta P,inf}$ is 1.0
5.10.9 (1)P	Note	The recommended values are adopted: - for pre-tensioned reinforcements or non-adhesive reinforcements r_{sup} = 1.05 and r_{inf} = 0.95 - for adhesive post-tensioned reinforcements r_{sup} = 1.10 and r_{inf} = 0.90 When appropriate measures are taken (e.g. direct pre-compression measurement), $r_{sup} = r_{inf}$ = 1.0
6.2.2 (1)	Note	The recommended values are adopted: - $C_{Rd,c} = 0.18/\gamma_c$, - $v_{min} = 0.035\, k^{3/2} f_{ck}^{1/2}$ (6.3N) - k_1 = 0.15.
6.2.2 (6)	Note	The following value is adopted: ν = 0.5 up to class C70/85 (6.6N) $v = 0{,}6\left[1 - \frac{f_{ck}}{250}\right]$ for Classes C80/95 and C90/105 For the use of classes C80/95 and C90/105, see 3.1.2(2)P
6.2.3 (2)	Note	The recommended limits are adopted: $1 \leq \cot\theta \leq 2.5$ (6.7N)

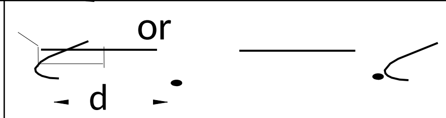
Paragraph	Citation	National parameter - value or requirement
6.2.3 (3)	Note	The following values of ν_1 and α_{cw} are adopted $\nu_1 = \nu$ is adopted even when the calculation tension of the shear reinforcement is less than 80 % of the characteristic yield tension f_{yk} (for the values of ν see 6.2.2 (6)). The recommended value of α_{cw} is: - 1 for $\sigma cp = 0$ - $(1 + \sigma_{cp}/f_{cd})$ per $0 < \sigma_{cp} \leq 0,25\ f_{cd}$ (6. 11.aN) - 1.25 for $0.25\ f_{cd} < \sigma_{cp} \leq 0.5\ f_{cd}$ (6. 11.bN) - $2.5\ (1 - \sigma_{cp}/f_{cd})$ per $0.5\ f_{cd} < \sigma_{cp} < 1.0\ f_{cd}$ (6. 11.cN) where σ_{cp} is the mean stress tension, considered positive, in concrete due to the calculated axial force. This is achieved as an average value on the concrete section taking into account the reinforcements. The value of σ_{cp} need not necessarily be calculated at a lower distance of 0.5d $\cot\theta$ from the edge of the support
6.2.4 (4)	Note	In the absence of more rigorous calculations, the recommended values are adopted: - $1.0 \leq \cot \theta_f \leq 2.0$ for pre-stressed lintels ($45^\circ \geq \theta_f \geq 26.5^\circ$) - $1.0 \leq \cot \theta_f \leq 1.25$ for tensioned lintels ($45^\circ \geq \theta_f \geq 38.6^\circ$)
6.2.4 (6)	Note	The recommended value k = 0.4 is adopted
6.4.3 (6)	Note	The recommended values in Figure 6.21N are adopted A - internal pillar $\beta = 1.15$ B - on-board pillar $\beta = 1.4$ C - corner pillar $\beta = 1,5$
6.4.4 (1)	Note	The recommended values are adopted: - *Crd,c = 0.18/γc,* - *vmin is given by the expression (6.3N)* - *k1 = 0.1*
6.4.5 (3)	Note	The following value is adopted $v_{Rd,max} = 0.4\ \nu\ f_{cd}$ for the values of ν see 6.2.2 (6)
6.4.5 (4)	Note	The recommended value k = 1.5 is adopted
6.5.2 (2)	Note	The following value is adopted: - $\nu' = 0.83$ up to class C70/85 - $v' = 1 - \frac{f_{ck}}{250}$ for Classes C80/95 and C90/105 For use of Classes C80/95 and C90/105, there is specific authorisation from the Central Technical Service of the High Council for Public Works.
6.5.4 (4a)	Note	The recommended value $k_1 = 1.0$ is adopted

Paragraph	Citation	National parameter - value or requirement
6.5.4 (4b)	Note	The recommended value k_2 = 0.85 is adopted
6.5.4 (4c)	Note	The recommended value k_3 = 0.75 is adopted
6.5.4 (6)	Note	The recommended value k_4 = 3.00 is adopted
6.8.4 (1)	Note 1	The recommended value $\gamma_{F,fat}$ = 1.0 is adopted
6.8.4 (1)	Note 2	The recommended values given in Tables 6.3N and 6.4N for ordinary and pre-stressed steels respectively are adopted
6.8.4 (5)	Note	The recommended value k_2=5.0 is adopted
6.8.6 (1)	Note	The recommended value k_1 = 70 is adopted Mpa
6.8.6 (1)	Note	The recommended value k_2 = 35 is adopted MPa
6.8.6 (3)	Note	The recommended value k_3 = 0.9 is adopted
6.8.7 (1)	Note	The recommended value N = 10^6 cycles is adopted
6.8.7 (1)	Note	The recommended value k_1 = 0.85 is adopted
7.2 (2)	Note	The recommended value k_1 = 0.60 is adopted In the case of cast-in-place flat elements (slabs, walls, etc.) and with a concrete thickness of less than 50 mm, the value of k_1 will be reduced by 20 %.
7.2 (3)	Note	The recommended value k_2 = 0.45 is adopted. In the case of cast-in-place flat elements (slabs, walls, ...) and with a concrete thickness of less than 50 mm, the value of k_2 will be reduced by 20 %
7.2 (5)	Note	The value k_3 = 0.80 is adopted
7.2 (5)	Note	The value k_4 = 0.90 is adopted
7.2 (5)	Note	The value k_5 = 0.70 is adopted

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>7.3.1 (5)</td><td>Note</td><td>The values in the Table are adopted
Table 4.1.IV - Selection criteria for cracking limit states
<table>
<tr><th rowspan="3">Groups of needs</th><th rowspan="3">Environmental conditions</th><th rowspan="3">Combination of actions</th><th colspan="4">Reinforcement</th></tr>
<tr><th colspan="2">Sensitive</th><th colspan="2">Less sensitive</th></tr>
<tr><th>Limit state</th><th>w_k</th><th>Limit state</th><th>w_k</th></tr>
<tr><td rowspan="2">A</td><td rowspan="2">Ordinary</td><td>frequent</td><td>crack openings</td><td>$\leq w_2$</td><td>crack openings</td><td>$\leq w_3$</td></tr>
<tr><td>almost permanent</td><td>crack openings</td><td>$\leq w_1$</td><td>crack openings</td><td>$\leq w_2$</td></tr>
<tr><td rowspan="2">B</td><td rowspan="2">Aggressive</td><td>frequent</td><td>crack openings</td><td>$\leq w_1$</td><td>crack openings</td><td>$\leq w_2$</td></tr>
<tr><td>almost permanent</td><td>decompression</td><td>-</td><td>crack openings</td><td>$\leq w_1$</td></tr>
<tr><td rowspan="2">C</td><td rowspan="2">Very aggressive</td><td>frequent</td><td>crack formation</td><td>-</td><td>crack openings</td><td>$\leq w_1$</td></tr>
<tr><td>almost permanent</td><td>decompression</td><td>-</td><td>crack openings</td><td>$\leq w_1$</td></tr>
</table>
w_1=0.2 mm; w_2=0.3 mm; w_3=0.4 mm
The environmental conditions are thus defined
<table>
<tr><th>ENVIRONMENTAL CONDITIONS</th><th>EXPOSURE CLASS</th></tr>
<tr><td>Ordinary</td><td>X0, XC1, XC2, XC3, XF1</td></tr>
<tr><td>Aggressive</td><td>XC4, XD1, XS1, XA1, XA2, XF2, XF3</td></tr>
<tr><td>Very aggressive</td><td>XD2, XD3, XS2, XS3, XA3, XF4</td></tr>
</table></td></tr>
<tr><td>7.3.2 (4)</td><td>Note</td><td>The recommended value $\sigma_{ct,p}$ = $f_{ct,eff}$ is adopted in accordance with paragraph 7.3.2 (2)</td></tr>
<tr><td>7.3.4 (3)</td><td>Note</td><td>The recommended values are adopted:
- k_3 = 3.4
- k_4 = 0.425</td></tr>
<tr><td>7.4.2 (2)</td><td>Note</td><td>The recommended K values, given in Table 7.4N, are adopted. This table also provides the values obtained by applying expression (7.16) to common cases (C30, σ_s = 310 Mpa, different structural systems, reinforcement ratios ρ = 0.5 % and ρ = 1.5 %)</td></tr>
<tr><td>8.2.(2)</td><td>Note</td><td>The recommended values are adopted:
- k1 = 1 mm
- k2 = 5 mm</td></tr>
</table>

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>8.3 (2)</td><td>Note</td><td>The recommended $\phi_{m,min}$ values in Table 8.1N are adopted.

Table 8.1N: Minimum diameter of the mandrel to avoid damage to the reinforcement

a) for bars and wires
<table>
<tr><th>Bar diameter</th><th>Minimum diameter of the mandrel for bends, fasteners, hooks (see Figure 8.1)</th></tr>
<tr><td>$\phi \leq 16$ mm</td><td>4ϕ</td></tr>
<tr><td>$\phi > 16$ mm</td><td>7ϕ</td></tr>
</table>
b) for welded folded bars and grids bent after welding
<table>
<tr><th colspan="2">Minimum diameter of mandrel</th></tr>
<tr><td></td><td>
</td></tr>
<tr><td>5ϕ</td><td>d ≥ 3ϕ: 5ϕ
d < 3ϕ or welding internal bending: 20ϕ</td></tr>
<tr><td colspan="2">Note: The diameter of the mandrel for bending the bars or grids in the event of internal welding in the bending area, may be reduced to 5 Φ if welding is carried out in accordance with Annex B of standard EN ISO 17660.</td></tr>
</table></td></tr>
<tr><td>8.6 (2)</td><td>Note</td><td>The recommended value is adopted, determined by
$F_{btd} = l_{td}\ \phi_t\ \sigma_{td}$ but not greater than F_{wd} (8.8N)</td></tr>
<tr><td>8.8 (1)</td><td>Note</td><td>The recommended value ϕ_{large} = 32 mm is adopted</td></tr>
<tr><td>9.2.1.1 (1)</td><td>Note 2</td><td>The recommended value is adopted:
$A_{s,min} = 0,26 \frac{f_{ctm}}{f_{yk}} b_t d$ but not less than $0.0013\ b_t d$ (9.1N)
where:
- b_t represents the average width of the tensioned area; for a T-beam with a compressed lintel, when calculating the value of b_t only the width of the core is considered
- f_{ctm} is determined according to the corresponding strength class in accordance with Table 3.1
Alternatively, for secondary elements, where a risk of brittle fracture may be accepted, $A_{s,min}$ may be taken as equal to 1.2 times the area required for the verification of ultimate limit state.

Formula (9.1N) does not apply to pre-compressed structures with only adhesive pre-tensioned reinforcements</td></tr>
</table>

Paragraph	**Citation**	**National parameter - value or requirement**
9.2.1.1 (3)	Note	The recommended value $A_{s,max} = 0.04A_c$ is adopted
9.2.1.2 (1)	Note 1	The recommended value $\beta_1 = 0.15$ is adopted
9.2.1.4 (1)	Note	The recommended value $\beta_2 = 0.25$ is adopted
9.2.2 (4)	Note	The recommended value $\beta_3 = 0.50$ is adopted
9.2.2 (5)	Note	The recommended value given by the expression $\rho_{w,min} = (0,08\sqrt{f_{ck}})/f_{yk}$ (9.5N) is adopted
9.2.2 (6)	Note	The recommended value given by the expression $s_{l,max} = 0.75d\ (1 + \cot\alpha)$ (9.6N) α being the inclination of the shear reinforcement of the longitudinal axis of the beam.
9.2.2 (7)	Note	The recommended value given by the expression $s_{b,max} = 0.6\ d\ (1 + \cot\alpha)$ (9.7N) is adopted
9.2.2 (8)	Note	The value given by the expression $s_{t,max} = 0.75d \leq 300$ mm is adopted
9.3.1.1 (3)	Note	The following value is adopted: - for the main reinforcement, $2h \leq 350$ mm, where h is the total height of the plate - for the secondary reinforcement, $3h \leq 400$ mm In areas with concentrated loads or maximum momentum, the previous value, for the main reinforcement, becomes: $2h \leq 250$ mm
9.5.2 (1)	Note	The value $\phi_{min} = 12$ mm is adopted
9.5.2 (2)	Note	The value given by the expression (9.12N) $A_{s,min} = \frac{0,10 \cdot N_{Ed}}{f_{yd}}$ or 0.003 A_c is adopted, whichever is the greater where: - f_{yd} is the calculated yield of the reinforcement - N_{Ed} is the axial stress force calculated
9.5.2 (3)	Note	The recommended value $A_{s,max} = 0.04A_c$ is adopted outside overlapping areas unless it can be demonstrated that the integrity of the concrete is not affected, and that the entire resistance at the ultimate limit state is reached. This limit is increased to 0.08 A_c in the overlap areas
9.5.3 (3)	Note	For $s_{cl,tmax}$ the minimum value between the following distances is adopted: - 12 times the minimum diameter of the longitudinal bars - the lower dimension of the pillar - 250 mm
9.6.2 (1)	Note 1	The value $A_{s,vmin} = 0.002\ A_c$ is adopted

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>9.6.2 (1)</td><td>Note 2</td><td>The recommended value $A_{s,vmax} = 0.04\ A_c$ is adopted outside overlapping areas unless it can be demonstrated that the integrity of the concrete is not affected, and that the entire resistance at the ultimate limit state is reached. This limit may be doubled in the overlap areas</td></tr>
<tr><td>9.6.3 (1)</td><td>Note</td><td>The recommended adopted value, or if $A_{s,hmin}$ is the greater of the two values: 25 % of the vertical reinforcement, $0.001A_c$</td></tr>
<tr><td>9.7 (1)</td><td>Note</td><td>The recommended value $A_{s,dbmin}$ = 0.001Ac is adopted, but not less than 150 mm^2/m on each surface and in each direction</td></tr>
<tr><td>9.8.1 (3)</td><td>Note</td><td>The value ϕ_{min} = 12 mm is adopted</td></tr>
<tr><td>9.8.2.1 (1)</td><td>Note</td><td>The value ϕ_{min} = 12 mm is adopted</td></tr>
<tr><td>9.8.3 (1)</td><td>Note</td><td>The value ϕ_{min} = 12 mm is adopted</td></tr>
<tr><td>9.8.3 (2)</td><td>Note</td><td>The recommended value q_1 = 10 kN/m is adopted</td></tr>
<tr><td>9.8.4 (1)</td><td>Note</td><td>The recommended values q_2 = 5 Mpa and ϕ_{min} = 8 mm are adopted</td></tr>
<tr><td>9.8.5 (3)</td><td>Note</td><td>The recommended values are adopted: The recommended value for h_1 is 600 mm and that of $A_{s,bpmin}$ is given in Statement 9.6N. It is recommended to distribute this reinforcement along the border of the section.

Statement 9.6N: Minimum area of suggested longitudinal reinforcement in bored piles cast in place
<table>
<tr><th>Cross-section of the pile
A_c</th><th>Minimum area of longitudinal reinforcement
$A_{S,bpmin}$</th></tr>
<tr><td>A_c ≤£ 0.5 m^2</td><td>A_S ≥³ 0.005 ·× A_c</td></tr>
<tr><td>0.5 m^2 << A_c ≤£ 1.0 m^2</td><td>A_S ≥³ 25 cm^2</td></tr>
<tr><td>A_c >> 1.0 m^2</td><td>A_S ≥³ 0.0025 ·× A_c</td></tr>
</table>
It is recommended that the minimum diameter of the longitudinal bars is not less than 16 mm, that the piles have at least 6 longitudinal bars and that the net distance between the bars measured along the outline of the pile is not greater than 200 mm</td></tr>
<tr><td>9.10.2.2 (2)</td><td>Note</td><td>The recommended values q_1 = 10 kN/m and q_2 = 70 kN are adopted</td></tr>
<tr><td>9.10.2.3 (3)</td><td>Note</td><td>The recommended value $F_{tie,int}$ = 20 kN/m is adopted</td></tr>
<tr><td>9.10.2.3 (4)</td><td>Note</td><td>The recommended values q_3 = 20 kN/m and Q_4 = 70 kN are adopted</td></tr>
</table>

Paragraph	Citation	National parameter - value or requirement
9.10.2.4 (2)	Note	The recommended values $F_{tie,fac}$ = 20 kN and $F_{tie, col}$ = 150 kN are adopted
11.3.5 (1)P	Note	The recommended value α_{lcc} = 0.85 is adopted
11.3.5 (2)P	Note	The recommended value α_{lct} = 0.85 is adopted
11.3.7 (1)	Note	The recommended value is adopted, that is: - k =1.1 for concrete with light aggregates with sand as fine aggregate - k = 1.0 for concrete with light aggregates (fine and large)
11.6.1 (1)	Note	The recommended values are adopted: - $C_{l\mathrm{Rd,c}} = 0.15/\gamma_c$ - $v_{l,min} = 0.028\, k^{3/2} f_{lck}^{1/2}$ - $k_1 = 0.15$
11.6.2 (1)	Note	The recommended value is adopted: $\nu_1 = 0.50\,(1 - f_{lck}/250)$ (11.6.6N)
11.6.4.1 (1)	Note	The recommended value k_2 = 0.08 is adopted
12.3.1 (1)	Note	The recommended values $\alpha_{cc,pl} = \alpha_{ct,pl}$ = 0.8 are adopted
12.6.3 (2)	Note	The recommended value k = 1.5 is adopted
Annex A		This Annex retains an informative nature (subject to the coefficient values indicated in the regulatory articles)
Annex B		This Annex retains an informative nature
Annex C		This Annex retains an informative nature
C.1 (1)	Note	For values relating to the interval of fatigue tension with an upper limit of $\beta\, f_{yk}$ and relating to the minimum area of grooves the recommended values which are given in Statement C.2N are adopted. For β the recommended value β = 0.6 is adopted
C.1 (3)	Note 1	For a, the recommended value is adopted. The recommended value for f_{yk} is 10 MPa and for k and ε_{uk} it is 0.

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>C.1 (3)</td><td>Note 2</td><td>For the minimum and maximum values of f_{yk}. k and ε_{uk}, the values in the following Table are adopted

Table C.3N. Absolute limit of experimental results

<table>
<tr><td>Characteristic value</td><td>Minimum value</td><td>Maximum value</td></tr>
<tr><td>Yield f_{yk}</td><td>0.95 × minimum C_v</td><td>1.03× maximum C_v</td></tr>
<tr><td>k</td><td>0.96 × minimum C_v</td><td>1.02 × maximum C_v</td></tr>
<tr><td>ε_{uk}</td><td>0.93 × minimum C_v</td><td>Not applicable</td></tr>
</table></td></tr>
<tr><td colspan="2">Annex D</td><td>This Annex retains an informative nature</td></tr>
<tr><td colspan="2">Annex E</td><td>This Annex retains an informative nature</td></tr>
<tr><td>E.1 (2)</td><td>Note</td><td>For the value of the indicative strength classes, the values given in Table E.1N are adopted

Table E.1N: Indicative strength classes

<table>
<tr><td></td><td colspan="10">Exposure classes in accordance with Table 4.1</td></tr>
<tr><td colspan="11">Corrosion</td></tr>
<tr><td></td><td colspan="4">Corrosion induced by carbonation</td><td colspan="3">Corrosion induced by chloride ions</td><td colspan="3">Corrosion induced by chloride ions of marine origin</td></tr>
<tr><td></td><td>XC1</td><td>XC2</td><td>XC3</td><td>XC4</td><td>XD1</td><td>XD2</td><td>XD3</td><td>XS1</td><td>XS2</td><td>XS3</td></tr>
<tr><td>Indicative strength classes</td><td>C25/30</td><td>C25/30</td><td colspan="2">C30/37</td><td colspan="2">C30/37</td><td>C35/45</td><td>C30/37</td><td colspan="2">C35/45</td></tr>
</table>
<table>
<tr><td colspan="8">Damage to concrete</td></tr>
<tr><td></td><td>No risk</td><td colspan="3">Freeze/thaw attack</td><td colspan="3">Chemical attack</td></tr>
<tr><td></td><td>X0</td><td>XF1</td><td>XF2</td><td>XF3</td><td>XA1</td><td>XA2</td><td>XA3</td></tr>
<tr><td>Indicative strength classes</td><td>C12/15</td><td>C30/37</td><td>C30/37</td><td>C30/37</td><td colspan="2">C30/37</td><td>C35/45</td></tr>
</table></td></tr>
<tr><td colspan="2">Annex F</td><td>This Annex retains an informative nature</td></tr>
<tr><td colspan="2">Annex G</td><td>This Annex retains an informative nature</td></tr>
<tr><td colspan="2">Annex H</td><td>This Annex retains an informative nature</td></tr>
<tr><td colspan="2">Annex I</td><td>This Annex retains an informative nature</td></tr>
</table>

Paragraph	**Citation**	**National parameter - value or requirement**
Annex J		This Annex retains an informative nature
J.1 (2)	Note	The recommended value $A_{s,surf,min}$ = 0.01 $A_{ct,ext}$ is adopted, where $A_{ct,ext}$ is the area of tensioned concrete outside the brackets (see Figure J.1)
J.2.2 (2)	Note	For the limit values, the recommended values are adopted: for the lower limit $\tan\theta = 0.4$ and for the upper limit $\tan\theta = 1$
J.3. (2)	Note	The recommended value $k_1 = 0.25$ is adopted
J.3 (3)	Note	The recommended value $k_2 = 0.5$ is adopted

4. NON-CONTRADICTORY ADDITIONAL INFORMATION

3.1 CONCRETE

Classes of concrete
In relation to specific uses the minimum classes of resistance indicated in the following table must be used:

INTENDED STRUCTURES	MINIMUM STRENGTH CLASSES
For non-reinforced structures or with structures with low percentage of reinforcement	C8/10
For standard reinforced structures	C16/20
For pre-stressed structures	C30/37

11. CONCRETE STRUCTURES WITH LIGHT AGGREGATES

11.3.1 CONCRETE

Resistance classes up to class LC55/60 are permitted.
Also for lightweight concrete, in relation to specific uses, the minimum classes of resistance indicated in the previous table must be used for ordinary concrete.

NATIONAL ANNEX

UNI EN 1992-1-2:2019	(includes corrigenda AC:2008 and update A1:2019) Design of concrete structures Part 1-2: General rules Structural fire design
EN 1992-1-2:2004+A1:2019	(incorporating corrigenda July 2008) Design of concrete structures Part 1-2: General rules – Structural fire design

1. BASIS

This Annex contains the national determination parameters for UNI-EN 1992-1-2:2019.

2. INTRODUCTION

2.1. Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN 1992-1-2: 2019 below:

2.1.3(2) Note	3.2.3(5) Note	4.1(1)P Note 3	5.2(3) Note	6.1(5) Note
2.3(2)P Note 1	3.2.4(2) Note	4.5.1(2) Note	5.3.1(1) Note	6.2(2) Note
2.4.2 (3) Note 1	3.3.3(1) Note 1		5.3.2(2) Note 1	6.3(1) Note 1
			5.6.1(1) Note	6.4.2.1(3) Note
			5.7.3(2) Note	6.4.2.2(2) Note

Paragraph 3 below also contains national indications on the use of Informative Annexes A, B C, D and E for buildings and other civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN 1992-1-2:2019 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN 1992-1-2:2019 Eurocode 2: Design of concrete structures – Part 1-2: General rules -Structural fire design.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI EN 1992-1-2:2019.

Paragraph	Citation	National parameter – value or requirement
2.1.3(2)	Note	The recommended values are adopted: - $\Delta\theta_1$ = 200 K - $\Delta\theta_2$ = 240 K
2.3(2)P	Note 1	The recommended value $\gamma_{M,fi}$ = 1.0 is adopted
2.4.2 (3)	Note 1	The values of η must be calculated by reference to the partial factors set out in the National Annex to UNI EN 1990 and UNI EN 1991-1-2
3.2.3(5)	Note	The recommended Class N is adopted
3.2.4(2)	Note	Class B is adopted
3.3.3(1)	Note 1	The value of λ_c is assumed to coincide with the lower limit (2) of Figure 3.7
4.1(1)P	Note 3	No specific information is provided
4.5.1(2)	Note	In the absence of more accurate assessments, the recommended value k = 3 % is adopted
5.2(3)	Note	No specific information is provided
5.3.1(1)	Note	No specific information is provided
5.3.2(2)	Note 1	For the maximum value of the first-order eccentricity under fire conditions, e_{max} = 0.15 h (or b) is adopted
5.6.1(1)	Note	No specific information is provided
5.7.3(2)	Note	No specific information is provided
6.1(5)	Note	For the values of $f_{c,\theta}/f_{ck}$ the data provided in Table 6.1N are adopted. For C 55/67 and C 60/75 concrete Class 1 is adopted, for C 70/85 and C 80/95 concrete class 2 is adopted and for C 90/105 concrete class 3 is adopted. See also the note to Paragraph 6.4.2.1(3) and Paragraph 6.4.2.2(2)
6.2(2)	Note	No specific information is provided
6.3(1)	Note 1	The value of λ_c is assumed to coincide with the upper limit [1] of Figure 3.7

6.4.2.1(3)	Note	The recommended values of k are adopted: 1.1 for Class 1 and 1.3 for Class 2. For Class 3 more accurate methods are adopted
6.4.2.2(2)	Note	The recommended values set out in Table 6.2N are adopted. More accurate methods are adopted for Class 3
Use of informative annexes		Annex A, B, C, D and E maintain the informative character and may be used in so far as they are not contrary to the requirements set out in the implementing rules of the various structural types and the current Technical Standards for Construction

4. NON-CONTRADICTORY ADDITIONAL INFORMATION

Paragraph	**Citation**	**National parameter – value or requirement**
3.3.2(2)	Addition Note	For ordinary concrete elements in environments with normal humidity, in the absence of specific assessments, a conventional humidity of 2 % by weight is assumed (50 kg of water per m^3 of concrete) to which $c_{p.peack}$ = 1653 J/kgK corresponds
4.1.(1)P	Addition to Note 1	When calculation methods are used, for the required integrity (E), further to said reference regarding joints, attention is drawn to respect of the minimum values of thinness and reinforcement provided for calculation at ordinary temperature (UNI EN 1992-1-1). Particular attention should be paid to the danger of concrete encapsulating combustible material bursting

NATIONAL ANNEX

UNI-EN 1992-2:2006	(includes corrigendum AC:2008) Design of concrete structures Part 2 – Concrete bridges – Specifications and construction details
EN-1992– 2: 2005	(incorporating corrigendum July 2008) Design of concrete structures Part 2 – Concrete bridges - design and detailing rules

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1992-2:2006.

2. INTRODUCTION

2.1 Scope

The document contains, in point 3 below, the decisions on the national parameters to be laid down in UNI-EN1992-2:2006 with regard to the following paragraphs:

3.1.2 (102)P	5.1.3 (101)P	7.2 (102)	9.1 (103)
3.1.6 (101)P	5.2 (105)	7.3.1 (105)	9.2.2 (101)
3.1.6 (102)P	5.3.2.2 (104)	7.3.3 (101)	9.5.3 (101)
3.2.4 (101)P	5.5 (104)	7.3.4 (101)	9.7 (102)
4.2 (105)	5.6 (101)P	8.9.1 (101)	9.8.1 (103)
4.2 (106)	5.7 (105)	8.10.4 (105) Note 1	11.9 (101)
4.2 (106)	6.1 (109)	8.10.4 (105) Note 2	113.2 (102)
4.3 (103)	6.1 (110)	8.10.4 (107)	113.3.2 (103)
4.4.1.2 (109)	6.2.2 (101)		
	6.2.3 (103)		
	6.2.3 (107)		
	6.2.3 (109)		
	6.8.1 (102)		
	6.8.7 (101)		
	6.8.7 (101) Note		

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1992-2:2006 in Italy

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1992–2:2006 Design of concrete structures – Part 2 – Concrete bridges – Design and construction details

3. NATIONAL DECISIONS

Paragraph	Citation	National parameter - value or requirement
3.1.2 (102)P	Note	Minimum class: - C25/30 for c.a. - C28/35 for c.a.p. Maximum class: C70/85 For strength classes greater than C45/55, the characteristic strength and all mechanical and physical parameters that influence the strength and durability of the concrete are to be examined before work begins through an appropriate preliminary trial, and production should follow specific quality control procedures. For the use of classes C80/95 and C90/105, CE marking is required on the basis of the relevant 'European Technical Assessment' (ETA), or a 'Technical Assessment Certificate' issued by the Chairperson of the High Council for Public Works.
3.1.6 (101)P	Note	The recommended value α_{cc} = 0.85 is adopted
3.1.6 (102)P	Note	The value α_{ct} = 0.85 is adopted
3.2.4 (101)P	Note	For bridges B450C steel must be used. The use of B450A steels with diameters between 5 and 10 mm is allowed for nets and trellises; it is also not permitted to be used for transversal reinforcements
4.2 (105)	Note	The recommended class (XC3) is adopted
4.2 (106)	Note 1	The recommended distances (x = 6m, y = 6m) are adopted
4.2 (106)	Note 2	The recommended classes of exposure are adopted
4.3 (103)		National Authority means the High Council for Public Works
4.4.1.2 (109)	Note	The recommended value is adopted (see Paragraph 4.4.1.2(3) of EN1992-1-1)
5.1.3 (101)P	Note	No simplifications are allowed
5.2 (105)	Note	The recommended value θ_0 =1/200 is adopted
5.3.2.2 (104)	Note	The recommended value is adopted
5.5 (104)	Note	The recommended values of k_i are adopted
5.6.1 (101)P		The use of plastic analysis is allowed for verifications of the ULS
5.7 (105)	Note 1	The recommended procedures and values are adopted

6.1 (109)	Note	All three approaches can be adopted. Should approach B be used the recommended value f_{ctx} is adopted, f_{ctx}= f_{ctm}
6.1 (110)	Note	The recommended value of k_{cm} is adopted, k_{cm}=2.0
6.1 (110)	Note	The recommended value of k_p is adopted, k_p=1.0
6.2.2 (101)	Note	The recommended values are adopted
6.2.3 (103)	Note 2	The following values of ν_1 and α_{cw} are adopted. The following is adopted: $\nu_1 = \nu$ even when the calculated tension of the shear frame is less than 80 % of the characteristic yield f_{yk}. The recommended value of α_{cw} is: - 1 for $\sigma cp = 0$ - $(1 + \sigma_{cp}/f_{cd})$ per $0 < \sigma_{cp} \leq 0,25\ f_{cd}$ (6. 11.aN) - 1.25 for $0.25\ f_{cd} < \sigma_{cp} \leq 0.5\ f_{cd}$ (6. 11.bN) - $2.5\ (1 - \sigma_{cp}/f_{cd})$ per $0.5\ f_{cd} < \sigma_{cp} < 1.0\ f_{cd}$ (6. 11.cN) where σ_{cp} is the mean stress tension, considered positive, in concrete due to the calculated axial force. This is achieved as an average value on the concrete section taking into account the reinforcements. The value of σ_{cp} need not necessarily be calculated at a lower distance of 0.5d cot θ from the edge of the support
6.2.3 (107)	Note	The recommended procedure is adopted (Figure 6.102N)
6.2.3 (109)	Note	The recommended value h_{red} = 0.5 h is adopted
6.8.1 (102)	Note	No additional information is provided
6.8.7 (101)		For load models and traffic data reference must be made to EN1991-2, using the recommended S-N curve (expression 6.72 of EN1992-1-1)
6.8.7 (101)	Note 1	The recommended value k_1 = 0.85 is adopted
7.2 (102)	Note	The recommended values are adopted
7.3.1 (105)	Note	With reference to paragraph 7.3.1(5) of EN1992-1-1, the values in the Table are adopted

Requirement groups	Environmental conditions	Combination of actions	Reinforcement			
			Sensitive		Less sensitive	
			Limit state	w_k	Limit state	w_k
a	Ordinary	frequent	crack openings	$\leq w_2$	crack openings	$\leq w_3$
		almost permanent	crack openings	$\leq w_1$	crack openings	$\leq w_2$
b	Aggressive	frequent	crack openings	$\leq w_1$	crack openings	$\leq w_2$

		almost permanent	decompression	-	crack openings	$\leq w_1$
c	Very aggressive	frequent almost permanent	crack formation decompression		crack openings	$\leq w_1$

w_1=0.2 mm; w_2=0.3 mm; w_3=0.4 mm

7.3.1 (105)	Note	The compressed area near the adhesive pre-stressed cables or their sheaths shall be extended by at least 100 mm (recommended value) from the edge of the adhesive reinforcement or sheath, respectively
7.3.3 (101)	Note	The recommended method is adopted
7.3.4 (101)	Note	The recommended method is adopted other methods may also be adopted, provided that they are recognised as valid
8.9.1 (101)	Note	As recommended, no additional restrictions are introduced
8.10.4 (105)	Note 1	The recommended values are adopted
8.10.4 (105)	Note 2	The recommended values in Table 8.101N are adopted
8.10.4 (107)	Note	Openings and cavities for anchorages of pre-stressed cables on the upper side of the slab are prohibited in aggressive environments
9.1 (103)	Note	No additional information is provided
9.2.2 (101)	Note	The recommended forms are adopted
9.5.3 (101)	Note	The minimum recommended diameters are adopted ϕ_{min}=6 mm and $\phi_{min,mesh}$=5 mm
9.7 (102)	Note	The recommended value for s_{mesh} is adopted
9.8.1 (103)	Note	The recommended value d_{min}=12 mm is adopted
11.9 (101)	Note	Further restrictions are not introduced
113.2 (102)	Note	Horizontal or vertical upward pressure, acting on one of the two brackets of a bridge brought about before the beam is assumed to be x= 300 N/m^2
113.3.2 (103)	Note	The value k = 0.70 is adopted
Use of Informative Annexes		Use of Annexes A and NN is not permitted. The other Informative Annexes B, C, D, E, F, G, H, I, J, KK, LL, MM, OO, PP and QQ retain their informative nature

NATIONAL ANNEX

UNI-EN1992-3:2006	Design of concrete structures Part 3: Liquid retaining and containment structures
EN 1992-3:2006	Design of concrete structures Part 3: Liquid retaining and containment structures

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1992-3:2006.

2. INTRODUCTION

2.1. Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1992-3:2006 below:

7.3.1 (111)	8.10.1.3 (103)	9.11.1 (102)
7.3.1 (112)		

The above-mentioned national decisions relating to the Paragraphs mentioned above must be applied for the use in Italy of UNI-EN 1992-3:2006.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN 1992-3:2006 Design of concrete structures – Part 3: Liquid retaining and containment structures.

3. NATIONAL DECISIONS

For all parameters listed in paragraph 2.1 above, the recommended values are adopted.

NATIONAL ANNEX

UNI-EN1992-4:2018	Design of concrete structures Part 4: Design of fastenings for use in concrete
EN 1992-4:2018	Design of concrete structures Part 4: Design of fastenings for use in concrete

1. BASIS

This Annex contains the national determination parameters for UNI-EN 1992-4:2018

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs o UNI-EN 1992-4:2018 below:

4.4.1 (2) Note	C.2 (2) Note	D.2 (2) Note
4.4.2.2 (2) Note	C.4.4 (1) Note	
4.4.2.3 Note	C.4.4 (3) Note	
4.4.2.4 Note		
4.7 (2) Nota2		

Paragraph 3 also contains national indications on the use of Informative Annexes B, D, E and G.
The above-mentioned national decisions relating to the Paragraphs mentioned above must be applied for the use in Italy of UNI-EN 1992-4:2018.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to EN 1992-4:2018 Design of concrete structures – Part 4: Design of fastenings for use in concrete.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI EN 1992-4:2018.

Paragraph	Citation	National parameter - value or requirement
4.4.1 (2)	Note	The recommended value γ_{ind} = 1.2 for breaking of the concrete side and γ_{ind} = 1.0 for other kinds of breaking is adopted. For fatigue loads the recommended value $\gamma_{F,fat}$ = 1.0 is adopted

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>4.4.2.2 (2)</td><td>Note</td><td>
The recommended values in Statement 4.1 are adopted:

Statement 4.1:
<table>
<tr><th rowspan="2">Breaking manner</th><th colspan="3">Partial factors</th></tr>
<tr><th colspan="2">In a fundamental, characteristic, frequent or almost permanent combination</th><th>In an exceptional combination</th></tr>
<tr><td colspan="4">Breaking of the steel side – anchors</td></tr>
<tr><td>Traction</td><td>γ_{Ms}</td><td>$= 1.2 \cdot f_{uk}/f_{yk} \geq 1.4$</td><td>$= 1.05 \cdot f_{uk}/f_{yk} \geq 1.25$</td></tr>
<tr><td rowspan="2">Shear in the presence or not of a lever arm</td><td rowspan="2">γ_{Ms}</td><td>$= 1.0 \cdot f_{uk}/f_{yk} \geq 1.25$
for
$f_{uk} \leq 800$ N/mm^2
and
$f_{yk}/f_{uk} \leq 0.8$</td><td>$= 1.0 \cdot f_{uk}/f_{yk} \geq 1.25$
for
$f_{uk} \leq 800$ N/mm^2
and
$f_{yk}/f_{uk} \leq 0.8$</td></tr>
<tr><td>= 1.5
for
$f_{uk} > 800$ N/mm^2
or
$f_{yk}/f_{uk} > 0.8$</td><td>= 1.3
for
$f_{uk} > 800$ N/mm^2
or
$f_{yk}/f_{uk} > 0.8$</td></tr>
<tr><td colspan="4">Breaking of the steel side – anchor profiles</td></tr>
<tr><td>Traction in the anchor and hammerhead bolt</td><td>γ_{Ms}</td><td>$= 1.2 \cdot f_{uk}/f_{yk} \geq 1.4$</td><td>$= 1.05 \cdot f_{uk}/f_{yk} \geq 1.25$</td></tr>
<tr><td rowspan="2">Shear in the anchor and shear in the presence or not of a lever arm in the hammerhead bolt</td><td rowspan="2">γ_{Ms}</td><td>$= 1.0 \cdot f_{uk}/f_{yk} \geq 1.25$
for
$f_{uk} \leq 800$ N/mm^2
and
$f_{yk}/f_{uk} \leq 0.8$</td><td>$= 1.0 \cdot f_{uk}/f_{yk} \geq 1.25$
for
$f_{uk} \leq 800$ N/mm^2
and
$f_{yk}/f_{uk} \leq 0.8$</td></tr>
<tr><td>= 1.5
for
$f_{uk} > 800$ N/mm^2
and
$f_{yk}/f_{uk} > 0.8$</td><td>= 1.3
for
$f_{uk} > 800$ N/mm^2
and
$f_{yk}/f_{uk} > 0.8$</td></tr>
<tr><td>Connection between anchor and profile in traction or shear</td><td>$\gamma_{Ms,ca}$</td><td>= 1.8</td><td>= 1.6</td></tr>
<tr><td>Local breakage of the anchor profile by flexion of the edge in traction or shear</td><td>$\gamma_{Ms,l}$</td><td>= 1.8</td><td>= 1.6</td></tr>
<tr><td>Flexion of the profile</td><td>$\gamma_{Ms,flex}$</td><td>= 1.15</td><td>= 1.0</td></tr>
<tr><td colspan="4">Breaking of the steel side – supplementary reinforcement</td></tr>
<tr><td>Traction</td><td>$\gamma_{Ms,re}$</td><td>= 1.15[a]</td><td>= 1.0</td></tr>
<tr><td colspan="4">Breaking manner relating to concrete</td></tr>
<tr><td rowspan="5">Breaking by extraction of a concrete cone, breaking of the concrete edge, breaking blow-out of the concrete and breaking by detachment of the concrete in the opposite direction to the applied shear load (pry-out)</td><td>γ_{Mc}</td><td>$= \gamma_c \cdot \gamma_{inst}$</td><td>$= \gamma_c \cdot \gamma_{inst}$</td></tr>
<tr><td>γ_c</td><td>= 1.5
for restoration or reinforcement of existing structures, see EN 1998</td><td>= 1.2
for restoration or reinforcement of existing structures, see EN 1998</td></tr>
<tr><td rowspan="3">γ_{inst}</td><td colspan="2">= 1.0
for peg anchors and anchor profiles meeting the requirements of 4.6 (tensile and shear)</td></tr>
<tr><td colspan="2">≥ 1.0
for post-inserted traction anchors, see the relevant European Technical Reference Specification</td></tr>
<tr><td colspan="2">= 1.0
for post-inserted shear anchors</td></tr>
<tr><td>Splitting of concrete</td><td>γ_{Msp}</td><td colspan="2">$= \gamma_{Mc}$</td></tr>
<tr><td>Pull-out and combined extraction and pull-out breakage</td><td>γ_{Mp}</td><td colspan="2">$= \gamma_{Mc}$</td></tr>
</table>
</td></tr>
<tr><td>4.4.2.3</td><td>Note</td><td>The recommended values are adopted
$\gamma_{Mc,fat} = \gamma_{Msp,fat} = \gamma_{Mp,fat} = 1,5\ \gamma_{inst}$ for breakage of the concrete side.
For breakage of the steel side, the value $\gamma_{Ms,fat} = 1.35$ is adopted.</td></tr>
</table>

Paragraph	Citation	National parameter - value or requirement
4.4.2.4	Note	The recommended value γ_M = 1.00 is adopted
4.7 (2)	Nota2	The recommended value σ_{adm} = 0 is adopted
Annex B		This Annex retains its informative nature and may be used insofar as it is not contrary to the requirements of the technical standards in force
C.2 (2)	Note	Paragraph 11.4.1 of the 2018 NTC refers to the ETAG 001 European Technical Approval Guideline for the qualification of structural anchors. This document has been replaced by document EAD 330232-00-0601 and the referenced Table 1.1 of Annex E of ETAG 001, concerning the minimum recommended categories for the qualification of anchors in the presence of seismic actions, is the same as Table C.1 of EN 1992-4. As indicated in Paragraph 11.4.1 of the 2018 NTC, for all use classes referred to in 2.4.2 of the 2018 NTC, C2 is adopted as the performance category to be met.
C.4.4 (1)	Note	The seismic demand on non-structural elements is determined as set out in Paragraph 7.2.3 of the 2018 NTC and in Application Circular No 7 of 11 February 2019
C.4.4 (3)	Note	The demand relating to vertical earthquakes on non-structural elements is assessed as indicated in Paragraph 3.2.3 of the 2018 NTC. The effects of the vertical earthquake shall also be considered, in addition to what is indicated in Paragraph 7.2.2 of the 2018 NTC, in the situations indicated with number 1 in Figure C.3 of EN 1992-4
Annex D		This Annex retains its informative character and may be used insofar as it does not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction
D.2 (2)	Note	The recommended value $\gamma_{M,fi} = 1.0\ \gamma_{inst}$ for traction breaking of the concrete side and $\gamma_{M,fi} = 1.0$ for breaking of the steel side or for shear of the concrete side is adopted
Annex E		The values of the partial coefficients γ for the assessment of the design strength of the anchors shall be not less than the corresponding values specified in this National Annex

Paragraph	Citation	National parameter - value or requirement
Annex G		This Annex retains its informative character and may be used insofar as it does not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction. In the application of simplified methods, the values of the partial coefficients γ_M adopted for qualification in the technical product specification must be such as to ensure the attainment of safety levels equal to or higher than those obtained by the use of non-simplified methods. For use in Italy, compliance with this requirement must be the subject of a specific declaration in the technical product specification.

Non-contradictory supplementary information (ICNC): for the use of products subject to fatigue, the fatigue resistance class of the connector shall, in any case, comply with the description and requirements for tensile bolts and threaded bars contained in Table 8.1 of EN1993-1-9:2005 (class 50).

NATIONAL ANNEX

UNI-EN-1993-1-1:2014	(includes update A1:2014 and corrigendum AC:2009) Design of steel structures Part 1-1: General rules and rules for buildings
EN-1993-1-1:2005+A1:2014	(incorporating corrigenda February 2006 and April 2009) Design of steel structures Part 1-1: General rules and rules for buildings

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-1-1:2014.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-1-1:2014 below:

2.3.1(1) Note 1	5.2.2(8) Note	6.3.2.4(2)B Note B
3.1(2) Note	5.3.2(3) Note	6.3.3(5) Note 2
3.2.1(1) Note	5.3.2(11) Note 2	6.3.4(1) Note
3.2.2(1) Note	5.3.4(3) Note	7.2.1(1)B Note B
3.2.3 (1)P Note	6.1(1) Notes 1 and 2B	7.2.2(1)B Note B
3.2.3(3)B Note B	6.3.2.2(2) Note	7.2.3(1)B Note B
3.2.4(1)B Note 3B	6.3.2.3(1) Note	C.2.2(3) Note 1
5.2.1(3) Note	6.3.2.3(2) Note	C.2.2(4) Note
	6.3.2.4(1)B Note 2B	BB.1.3(3)B Note

Paragraph 3 below also contains national indications on the use of Annexes A, B, C, AB and BB for buildings and other civil engineering works.
These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-1-1:2014 in Italy.

2.2 Normative references

This Annex must be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-1-1:2014 Design of steel structures – Part 1-1: General rules and rules for buildings.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-1-1:2014.

Paragraph	Citation	National parameter - value or requirement
2.3.1(1)	Note 1	Specific actions for particular regional, climatic or exceptional situations are not provided
3.1(2)	Note	Other materials different to those given in Table 3.1 are not added
3.2.1(1)	Note	For nominal values of yield stress f_y and the last f_u, reference is made to the values reported in European harmonised UNI EN 10025-1, UNI EN 10210-1 and UNI EN 10219-1. At the design stage, the nominal values of yield stress f_y and breaking stress f_u set out in Tables 4.2.I and 4.2.II of the 2018 NTC can be assumed in the calculations
3.2.2(1)	Note	The following values are adopted: - $f_u/f_y \geq 1.10$ - elongation at breakage ≥ 15 % - $\varepsilon_u \geq 15\varepsilon_y$ The following additional rules shall apply for applications in the dissipative areas of the construction subject to seismic action: - the ratio of the characteristic values of the breaking stress f_{tk} and the yield stress f_{yk} must be greater than 1.10 and the elongation at breakage A5, measured on standard specimens, must not be less than 20 % - the mean yield stress $f_{y,mean}$ must be less than 1.20 f_{yk} for S235 and S275 steel, or 1.10 f_{yk} for S355, S420 and S460 steels Such requirements, where applicable, must be specified in the design documents and verified by the Project Manager.
3.2.3(1)P	Note	The minimum service temperature assumed in the design must not be greater than the minimum environmental temperature of the site with return period of 50 years for unprotected structures, not greater than the temperature as stated above, increasing by 15 °C for protected structures. Should no local statistical data on temperature be available, –25 °C may be assumed as the minimum service temperature for unprotected structures and –10 °C for protected structures
3.2.3(3)B	Note B	For the resilience limit value for compressed building elements, Table 2.1 of EN 1993-1-10 is adopted for $\sigma_{Ed} = 0,25f_y(t)$
3.2.4(1)B	Note 3B	Z_{Ed}, values must be evaluated in accordance with Table 3.2 in the case of buildings. For other cases please refer to EN 1993-1-10.
5.2.1(3)	Note	The global analysis can be conducted using first-order theory in cases where the effects of deformations on the magnitude of stresses, on instability phenomena and on any other response parameter of the structure may be considered negligible. This condition can be assumed as verified if the following relationship is satisfied:

		- $\alpha_{cr} \geq 10$ for elastic analysis - $\alpha_{cr} \geq 15$ for plastic analysis
5.2.2(8)	Note	No additional clarification
5.3.2(3)	Note	The recommended values in Table 5.1 are adopted.
5.3.2 (11)	Note 2	No additional clarification
5.3.4(3)	Note	The recommended value is adopted: - k = 0.5
6.1(1)	Note 1	For structures not included in parts 2 to 6 of EN 1993, the same values are adopted as for bridges set out in the National Annex to UNI EN 1993-2 (Design of steel bridges)
6.1(l)	Note 2B	The following values for buildings are adopted: - $\gamma_{M0} = 1.05$ - $\gamma_{M1} = 1.05$ - $\gamma_{M2} = 1.25$
6.3.2.2(2)	Note	The recommended values in Table 6.3 are adopted.
6.3.2.3(1)	Note	The following values are adopted: $0,20 \leq \bar{\lambda}_{LT,0} \leq 0,40$ $0,75 \leq \beta \leq 1,00$ With the following limitations Cross-section / h/b limits / Instability curve: I rolled section: h/b≤2 → b; h/b>2 → c Welded compound section: h/b≤2 → c; h/b>2 → d
6.3.2.3(2)	Note	The factor f considers the actual distribution of the flexural moment between the torsional retentions of the inflected element, and is defined by the formula $f = 1 - 0,5(1 - k_c)\left[1 - 2,0(\bar{\lambda}_{LT} - 0,8)^2\right]$ with $f \leq 1.0$ where the corrective factor k_c assumes the values set out in Table 6.6 of EC3
6.3.2.4(1)B	Note 2B	The recommended value is adopted: $\bar{\lambda}_{c0} = \bar{\lambda}_{LT,0} + 0,1$
6.3.2.4(2)B	Note B	A corrective factor k_{fl} equal to 1.10 is adopted in the case of laminated profiles, and equal to 1.00 in the case of welded profiles
6.3.3(5)	Note 2	Both methods may be used
6.3.4(1)	Note	The method may be used when the methods given in 6.3.1, 6.3.2

Nested table in row 6.3.2.3(1):

Cross-section	h/b limits	Instability curve
I rolled section	h/b≤2	b
	h/b>2	c
Welded compound section	h/b≤2	c
	h/b>2	d

		and 6.3.3 are not applicable. The method allows the verification of the resistance against lateral and lateral-torsional instability for structural elements such as: individual structures, composite or not, uniform or uneven, with complex or non-complex constraint conditions, flat structures or substructures composed of structures subject to compression and/or simple bending in the plane, which do not contain rotational plastic hinges. The multipliers of design loads $\alpha_{ult,k}$ $\alpha_{cr,op}$ can be determined using numerical models, provided they are validated by reference to reliable experimental findings
7.2.1(1)B	Note B	In the absence of more precise indications, the following limits for vertical movements may be adopted (δ_{max} arrow in the final state, cleared of the initial mount; δ_2 variation due to the application of variable loads): - roofs in general $\delta_{max}/L \leq 1/200$, $\delta_2/L \leq 1/250$ - feasible roofing $\delta_{max}/L \leq 1/250$, $\delta_2/L \leq 1/300$ - floors in general $\delta_{max}/L \leq 1/250$, $\delta_2/L \leq 1/300$ - floors or roofs bearing plaster or other fragile finishing materials or inflexible partitions: $\delta_{max}/L \leq 1/250$, $\delta_2/L \leq 1/350$ - floors that support columns: $\delta_{max}/L \leq 1/400$, $\delta_2/L \leq 1/500$ Should shifting compromise the appearance of the building: $\delta_{max}/L \leq 1/250$ In case of specific technical and/or functional requirements the limits of which should be suitably reduced
7.2.2(1)B	Note B	In the absence of more precise indications, the following values may be adopted for horizontal movements (Δ horizontal movement at the top; δ relative movement of the plane): - single-storey industrial buildings without an overhead travelling crane: $\delta/h \leq 1/150$; - other single-storey buildings: $\delta/h \leq 1/300$; - multi-storey buildings: $\delta/h \leq 1/300$; $\Delta/H \leq 1/500$. In case of specific technical and/or functional requirements the limits of which should be suitably reduced
7.2.3(1)B	Note B	In the case of floors subject to a load of persons, the lowest natural frequency of the structure shall generally not be less than 3 Hz. In the case of floors subject to cycling excitations, the lowest natural frequency of the structure shall generally not be less than 5 Hz.

		As an alternative to such restrictions, an acceptability check may be conducted on the perception of vibrations
	Use of Annexes A, B, C, AB and BB	Annex A, B, AB and BB retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction. Annex C retains regulatory value
C.2.2(3)	Note 1	The execution class must be selected according to the consequence class, as defined in Table C.1
C.2.2(4)	Note	The choice of the recommended execution class is adopted
BB.1.3(3)B	Note	No additional information

NATIONAL ANNEX

UNI EN 1993-1-2:2005	(includes corrigendum AC:2005; corrigendum AC:2009) Eurocode 3: Design of steel structures Part 1-2: General rules Structural fire design
EN 1993-1-2:2005	(incorporating corrigendum December 2005, March 2009) Eurocode 3: Design of steel structures Part 1-2: General rules – Structural fire design

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-1-2:2005.

2. INTRODUCTION

2.1. Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-1-2:2005 below:

2.3 (1) Note 2.4.2 (3) Note 1 4.1 (2) Note 4.2.3.6 (1) Note 2 4.2.4 (2) Note
2.3 (2) Note

Paragraph 3 below also contains national indications on the use of Information Appendices C, D and E for buildings and other civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN 1993-1-2:2005 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN 1993-1-2:2005 Eurocode 3: Design of steel structures – Part 1-2: General rules -Structural fire design.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-1-2:2005.

Paragraph	**Citation**	**National parameter – value or requirement**
2.3(1)	Note	The recommended value is adopted: $\gamma_{M,fi} = 1.0$
2.3(2)	Note	The recommended value is adopted: $\gamma_{M,fi} = 1.0$
2.4.2(3)	Note 1	The values of η must be calculated by reference to the partial factors set out in the National Annex to EN 1990 and EN 1991-1-2

4.1(2)	Note	No specific information is provided
4.2.3.6(1)	Note 2	The recommended value is adopted: θ_{crit} = 350 °C
4.2.4(2)	Note	No specific information is provided
	Use of Informative Annexes	Annexes C, D and E retain their informative character and may be used in so far as they are not contrary to the requirements set out in the implementing rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN-1993-1-3:2007	(includes corrigendum AC:2009) Design of steel structures Part 1-3: General rules – Supplementary rules for cold-formed members and sheeting.
EN-1993-1-3:2006	(incorporating corrigendum November 2009) Design of steel structures Part 1-3: General rules – Supplementary rules for cold-formed members and sheeting

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-1-3:2007.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-1-3:2007 below.

2(3)P Note	8.3(2) Table 8.1 Note [*1].	9(2) Note 1
2(5) Note	Table 8.2 Note [*2]	10.1.1(1) Note
3.1(3) Notes 1 and 2	Table 8.3 Note [*3]	10.1.4.2(1) Note
3.2.4(1) Note	Table 8.4 Note [*4]	A.1(1) Notes 2 and 3
5.3(4) Note	8.4(5) Note	A.6.4(4) Note
8.3(5) Note	8.5.1(4) Note	E(1) Note

Paragraph 3 below also contains national indications on the use of Informative Annexes B C, D and E for buildings and other civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN-1993-1-3:2007 in Italy.

2.2 Normative references

This Annex must be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-1-3:2007 Design of steel structures – Part 1-3: General rules – Supplementary rules for cold-formed members and sheeting.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-1-3:2007.

Paragraph	**Citation**	**National parameter - value or requirement**

<table>
<tr><td>2(3)P</td><td>Note</td><td>The following values are adopted for partial coefficients γ_M:
- $\gamma_{M0} = 1.05$
- $\gamma_{M1} = 1.05$
- $\gamma_{M2} = 1.25$
For bridges (road and railway), the following values are adopted for partial coefficients γ_M:
- $\gamma_{M0} = 1.05$
- $\gamma_{M1} = 1.10$
- $\gamma_{M2} = 1.25$</td></tr>
<tr><td>2(5)</td><td>Note</td><td>The recommended value $\gamma_{M,ser} = 1.00$ is adopted</td></tr>
<tr><td>3.1(3)</td><td>Note 1</td><td>A reduction in the nominal values of the mechanical characteristics (yield strength f_{yb} and breaking resistance f_u) is not accepted.
The amendment of the proposed text seems necessary since it deals with a regulatory requirement. The change of symbols is required for consistency with EN 1993-1-3</td></tr>
<tr><td>3.1(3)</td><td>Note 2</td><td>Table 3.1b of EN 1993-1-3 is replaced by the following Table
<table>
<tr><td>Type of steel</td><td>Standard</td><td>Quality of steel</td><td>f_{yk} [N/mm^2]</td><td>f_{tk} [N/mm^2]</td></tr>
<tr><td>Steel strips and sheets for structural use, galvanised for continuous hot dip galvanising. Technical conditions of delivery.</td><td>UNI EN 10326</td><td>S250GD+Z
S280GD+Z
S320GD+Z
S350GD+Z</td><td>250
280
320
350</td><td>330
360
390
420</td></tr>
<tr><td>Flat hot laminated steel products at high yield limit for cold-forming. Conditions of supply for steel made using thermomechanical lamination.</td><td>UNI EN 10149-2</td><td>S 315 MC
S 355 MC
S 420 MC
S 460 MC</td><td>315
355
420
460</td><td>390
430
480
520</td></tr>
<tr><td>Flat hot laminated steel products at high yield limit for cold-forming. Conditions of supply of standardised steels or standardised laminates.</td><td>UNI EN 10149-3</td><td>S 260 NC
S 315 NC
S 355 NC
S 420 NC</td><td>260
315
355
420</td><td>370
430
470
530</td></tr>
</table></td></tr>
<tr><td>3.2.4(1)</td><td>Note</td><td>The following restrictions are adopted:
- panels and members 0.8 mm $\leq t_{cor} \leq$ 16 mm
- connections 0.8 mm $\leq t_{cor} \leq$ 4 mm (for $t_{cor} \geq$ 4 mm EN 1993-1-8 applies)
In both cases the lower limit (0.8 mm) can be reduced to 0.7 mm when walkability of the panels or corrugated sheets is guaranteed</td></tr>
<tr><td>5.3(4)</td><td>Note</td><td>The recommended values are adopted:
- $e_0/L = 1/600$ for elastic analysis
- $e_0/L = 1/500$ for plastic analysis</td></tr>
<tr><td>8.3(5)</td><td>Note</td><td>The recommended partial factor $\gamma_{M2} = 1.25$ is adopted</td></tr>
<tr><td>8.3(2)</td><td>Table 8.1</td><td>Information on the shear strength, tensile strength, etc. of blind</td></tr>
</table>

	Note *1	nails must be deduced by experiments, with an appropriate statistical basis, on specific products. In this regard, reference may be made to documents of proven validity and to EOTA documents that may be applicable
8.3(2)	Table 8.2 Note *2	Information on the shear strength, tensile strength, etc. of self-tapping or self-masking screws must be deduced by experiments, with an appropriate statistical basis, on specific products. In this regard, reference may be made to documents of proven validity and to EOTA documents that may be applicable
8.3(2)	Table 8.3 Note *3	Information on the shear strength, tensile strength, pull-out strength, etc. of fired nails must be deduced by experiments, with an appropriate statistical basis, on specific products. In this regard, reference may be made to documents of proven validity and to EOTA documents that may be applicable
8.3(2)	Table 8.4 Note *4	No additional information or requirement
8.4(5)	Note	The recommended partial factor is adopted: $\gamma_{M2} = 1.25$
8.5.1(4)	Note	The recommended partial factor is adopted: $\gamma_{M2} = 1.25$
9(2)	Note 1	No additional information or requirement
10.1.1(1)	Note	No additional information or regulations regarding the trial phase
10.1.4.2(1)	Note	For verifications the recommended stability curve 'b' is adopted. However, when the effective area has principal axes of inertia significantly different from those of the gross area, those criteria are not applicable and specific numerical investigations must be carried out
A.1(1)	Note 2	No additional guidance or requirements on experimental procedures are provided
A.1(1)	Note 3	The recommended criteria are adopted
A6.4(4)	Note	The partial factors γ_M determined by experimentation must be determined in accordance with EN 1990, but will not be less than: - $\gamma_{M0} = 1.05$ - $\gamma_{M1} = 1.05$ - $\gamma_{M2} = 1.25$ For bridges (road and railway) the following restrictions must be respected: - $\gamma_{M0} = 1.05$ - $\gamma_{M1} = 1.10$ - $\gamma_{M2} = 1.25$
E.1.	Note	No additional information or regulation

	Use of Informative Annexes B, C, D and E	The Informative Annexes B, C, D and E retain their informative character and may be used in so far as they are not contrary to the requirements set out in the implementing rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN-1993-1-4:2021	(includes update A1:2015 and update A2: 2020) Design of steel structures Part 1-4: General roles –supplementary rules for stainless steel
EN-1993-1-4:2006+A2:2020	(Incorporating A1:2015) Design of steel structures Part 1-4: General rules – Supplementary rules for stainless steels

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-1-4:2021.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-1-4:2021 below.

2.1.4(2) Note 2

2.1.5(1) Note

5.1(2) Note

5.5(1) Notes 1 and 2

5.6(2) Note

6.1(2) Note 2

6.2(3) Note

7(1) Note

A2(8) Note

A3 Table A.4 Note

Paragraph 3 below also contains national indications on the use of Annexes A, B and C for buildings and other civil engineering works.
These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-1-4:2021 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-1-4:2021 Design of steel structures – Part 1-4: General rules – Supplementary rules for stainless steel.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-1-4:2021.

Paragraph	Citation	National parameter - value or requirement
2.1.4(2)	Note 2	No additional information or requirement
2.1.5(1)	Note	No additional information or requirement
5.1(2)	Note	The recommended values of the partial coefficients γ_M are adopted: - $\gamma_{M0} = 1.10$ - $\gamma_{M1} = 1.10$ - $\gamma_{M2} = 1.25$ These values may also be adopted for bridges (road and railway).
5.5(1)	Note 1	Alternative formulas for coefficients k_y, k_z and k_{LT} are not proposed and the recommended formulas are adopted.
5.5(1)	Note 2	Alternative interaction formulas are not proposed and the formulas from 5.13 to 5.17 are to be adopted.
5.6(2)	Note	The recommended value η= 1.20 is adopted.
6.1(2)	Note 2	No new additional formulas are proposed
6.2(3)	Note	The recommended values of the coefficient are adopted α:
7(1)	Note	No additional information is provided
A2(8)	Note	Less strict corrosion resistance factor (CRF) values than those prescribed are not permitted
A3 Table A.4	Note	Less frequent cleaning of load-bearing members than that specified is not permitted
	Use of Annex A, B and C	Annex A retains regulatory value. Annexes B and C retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN-1993-1-5:2019	(includes corrigendum AC:2009, update A1:2017 and update A2:2019) Design of steel structures Part 1-5: Plated structural elements
EN-1993-1-5:2006+A2:2019	(incorporating corrigendum April 2009 e A1:2017) Design of steel structures Part 1-5: Plated structural elements

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-1-5:2019.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-1-5:2019 below.

2.2(5)	Note 1	10(1)	Note 2
3.3(1)	Note 1	10(5)	Note 2
4.3(6)	Note	C.2(1)	Note
5.1(2)	Note 2	C.5(2)	Note 1
6.4(2)	Note	C.8(1)	Note 1
8(2)	Note	C.9(3)	Note
9.1(1)	Note	D.2.2(2)	Note
9.2.1(9)	Note		

Paragraph 3 below also contains national indications on the use of the Informative Annexes A, B, C and D for buildings and other civil engineering works.
These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-1-5:2019 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-1-5:2019 Design of steel structures – Part 1-5: Plated structural elements.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-1-5:2019.

Paragraph	Citation	National parameter - value or requirement
2.2(5)	Note 1	The recommended value ρ_{lim} = 0.5 is adopted
3.3(1)	Note 1	The recommended method c) is adopted
4.3(6)	Note	The recommended value ϕ_h = 2.0 is adopted
5.1(2)	Note 2	The recommended value η = 1.20 is adopted for steels up to grade S460. Use of higher grade steel is not permitted.
6.4(2)	Note	No additional information The recommended rules are adopted
8(2)	Note	No additional information
9.1(1)	Note	No additional information
9.2.1(9)	Note	The recommended value θ = 6 is adopted
10(1)	Note 2	No limitations on use of the method
10(5)	Note 2	No additional information
C.2(1)	Note	No limitation on use of FEM analysis
C.5(2)	Note 1	The recommended value is adopted
C.8(1)	Note 1	The recommended value is adopted
C.9(3)	Note	The values of the partial coefficients set out in the relevant parts of EN1993 are adopted as recommended: - $\gamma M1$ = 1.05 - $\gamma M1$ = 1.10 for road and rail bridges - $\gamma M2$ = 1.25
D.2.2(2)	Note	No additional information The recommended formulations are adopted.
	Use of Informative Annexes A, B, C and D	Annexes A, B, C and D retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN-1993-1-6:2017	Design of steel structures Part 1-6: Strength and stability of shell structures
EN-1993-1-6:2007+A1:2017	(incorporating corrigendum April 2009) Design of steel structures Part 1-6: Strength and stability of shell structures

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-1-6:2017.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-1-6:2017 below.

3.1(4) Note
4.1.4(3) Note
5.2.4(1) Note
6.2.1(6) Note 2
6.3(5) Note
7.3.1(1) Note 2
7.3.2(1) Note
8.4.2(3) Note
8.4.3(2) Note
8.4.3(4) Note 1
8.4.4(4) Note 1
8.4.5(1) Note
8.5.2(2) Note
8.6.3(5) Note
8.8.2(9) Note
8.8.2(18) Note
8.8.2(20) Note 1
8.8.2(20) Note 2
9.2.1(2) P Note
E.1.2.3(3) Note

Paragraph 3 below also contains national indications on the use of Annexes A, B, C, D and E for buildings and other civil engineering works.
These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-1-6:2017 in Italy.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-1-6:2017 Design of steel structures – Part 1.6: Strength and stability of shell structures.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-1-6:2017.

Paragraph	Citation	National parameter - value or requirement

3.1(4)	Note	The application field of the standard is limited to temperatures lower than 150 °C. No information on property of materials at other temperatures is provided.
4.1.4(3)	Note	The recommended value N_f = 10 000 is adopted
5.2.4(1)	Note	The recommended value $(r/t)_{min}$ = 25 is adopted
6.2.1(6)	Note 2	Recommended value j=3 is adopted
6.3(5)	Note	The recommended value $n_{mps}=(66-f_{yd}/15)$ is adopted
7.3.1(1)	Note 2	No additional information on more refined rules of analysis
7.3.2(1)	Note	The recommended value $\varepsilon_{p.eq.Ed} = 25\ f_{yd} / E$ is adopted
8.4.2(3)	Note	The recommended values in Table 8.1 are adopted.
8.4.3(2)	Note	The recommended values in Table 8.2 are adopted.
8.4.3(4)	Note 1	The recommended values in Table 8.3 are adopted.
8.4.4(4)	Note 1	Recommended relative values of concavity given in Table 8.4 are adopted
8.4.5(1)	Note	The recommended value β_θ = 0.1 % = 0.001 radians is adopted
8.5.2(2)	Note	The recommended value γ_{M1}= 1.1 is adopted
8.6.3(5)	Note	The values indicated in Annex E are adopted
8.8.2(9)	Note	The recommended value β = 0.1 radiants is adopted
8.8.2(18)	Note	Additional information on the trend of geometric imperfections to be introduced into the numeric modelling
8.8.2(20)	Note 1	The recommended value n_i = 25 is adopted
8.8.2(20)	Note 2	The recommended values in Table 8.5 are adopted.
9.2.1(2)P	Note	The partial factor γ_{MF} is taken into account according to Table 3.1 of Standard EN 1993-1-9
	Use of Annexes	Annexes A, B, C, D and E retain regulatory value
E.1.2.3(3)	Note	No specific values are provided

NATIONAL ANNEX

UNI-EN-1993-1-7:2007	(includes corrigendum AC:2009) Design of steel structures Part 1-7: Plated structures subject to out of plane loading
EN-1993-1-7:2007	(incorporating corrigendum April 2009) Design of steel structures Part 1- 7: Plated structures subject to out of plane loading

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-1-7:2007.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the Paragraph of UNI-EN-1993-1-7:2007 below.

6.3.2(4) Note 1

Paragraph 3 below also contains national indications on the use of Informative Annexes A, B and C for buildings and other civil engineering works.
These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-1-7:2007 in Italy.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-1-7:2007 Design of steel structures – Part 1-7: Plated structures subject to out of plane loading.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-1-7:2007.

Paragraph	**Citation**	**National parameter - value or requirement**
6.3.2(4)	Note 1	The recommended value n_{eq} = 25 is adopted
	Use of Informative Annexes A, B and C	Annexes A, B and C retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN-1993-1-8:2005	(includes corrigendum AC:2009) Design of steel structures Part 1-8: Design of joints
EN-1993-1-8:2005	(incorporating corrigenda December 2005, July 2009) Design of steel structures Part 1-8: Design of joints

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-1-8:2005.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-1-8:2005 below:

1.2.6 Note

2.2(2) Note

3.1.1(3) Note

3.4.2(1) Note

5.2.1(2) Note

6.2.7.2(9) Note

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-1-8:2005 in Italy.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-1-8:2005 Design of steel structures – Part 1.8: Design of connections.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-1-8:2005.

Paragraph	Citation	National parameter - value or requirement
1.2.6	Note	No additional reference legislation
2.2(2)	Note	The recommended values in Table 2.1 are adopted.
3.1.1(3)	Note	The use of all bolt classes in Table 3.1 is permitted
3.4.2(1)	Note	When the preload is not explicitly considered for resistance to

		friction, but is required for the purposes of execution or quality requirements, the preload level applied must conform to the information in Paragraph 8.3 of EN 1090-2(8.3).
5.2.1(2)	Note	No additional information is provided
6.2.7.2(9)	Note	No other situations are defined in which it is possible to use the equation (6.26)

NATIONAL ANNEX

UNI-EN-1993-1-9:2005	(includes corrigendum AC:2009) Design of steel structures Part 1-9 – Fatigue
EN-1993-1-9:2005	(incorporating corrigenda December 2005, April 2009) Design of steel structure Part 1 – 9 – Fatigue

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-1-9:2005.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the Paragraphs of UNI-EN-1993-1-9:2005 below

1.1(2) Notes 1 and 2	6.1(1) Note
2(2) Note	6.2(2) Note
2(4) Note	7.1(3) Note 2
3(2) Note 2	7.1(5) Note
3(7) Note	8(4) Note 4
5(2) Note 2	

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-1-9:2005 in Italy.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-1-9:2005 Design of steel structures – Part 1-9: Fatigue.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-1-9:2005.

Paragraph	Citation	National parameter - value or requirement
1.1(2)	Note 1	No specific information is provided
1.1(2)	Note 2	No supplementary information is provided
2(2)	Note	Fatigue testing can be conducted through the following alternative approaches: - based on the hypothesis of linear accumulation of damage $D_d \leq 1.0$ - based on the use of the tension change range $\frac{\gamma_{Ff}\,\Delta\sigma_{E,2}}{\Delta\sigma_C / \gamma_{Mf}} \leq 1,0$ or $\frac{\gamma_{Ff}\,\Delta\tau_{E,2}}{\Delta\tau_C / \gamma_{Mf}} \leq 1,0$
2(4)	Note	No additional requirements are provided
3(2)	Note 2	No specific requirements are given. In works of particular relevance the inspection program must be specified on a case by case basis
3(7)	Note	Both methods of carrying out fatigue verifications are applicable. The choice depends on the spectrum of tension, detail, consequences of the crisis and ability to inspect and repair said detail. For partial coefficients γ_{Mf} the recommended values in Table 3.1 are adopted
5(2)	Note 2	No restrictions on the use of Class 4 sections are prescribed
6.1(1)	Note	The delta tensions $\Delta\sigma$ to be used in verifications must be coherent with those used in the definition of S-N curves. Should reference be made to peak tension it is necessary that the calculated tensions are determined with the same method adopted to obtain the test peak values
6.2(2)	Note	No additional information is provided
7.1(3)	Note 2	The calculation may be carried out with reference to categories of detail determined through tests according to the process indicated in Note 1
7.1(5)	Note	No additional categories of detail are provided
8(4)	Note 2	That which is indicated in the preceding Point 2(2) is valid

Non-contradictory supplementary information (ICNC): formula (A.3) of Paragraph A.6 of Annex A, currently under review, is not applicable

NATIONAL ANNEX

UNI-EN-1993-1-10:2005	(includes corrigendum AC:2009) Design of steel structures Part 1-10: Material toughness and through-thickness properties
EN-1993-1-10:2005	(incorporating corrigenda December 2005, March 2009) Design of steel structures Part 1-10: Material toughness and through-thickness properties

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-1-10:2005.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-1-10:2005 below:

2.2(5) Notes 1, 3 and 4

3.1(1) Note

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-1-10:2005 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-1-10:2005 Design of steel structures – Part 1-10: Material toughness and through-thickness properties.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-1-10:2005.

Paragraph	Citation	National parameter - value or requirement
2.2(5)	Note 1	The recommended value $\Delta T_R = 0°$ is adopted
2.2(5)	Note 3	For structural elements whose failure could have serious consequences in terms of safety and economy, the validity of permitted through-thickness values in Table 2.1 must be limited with the following criterion: - for $\sigma_{ED} \geq 0.75\ f_y$ $T_{27j} \leq T_{ED} + 30$ °C - for $0.5\ f_y < \sigma_{ED} < 0.75\ f_y$ $T_{27j} \leq T_{ED} + 40$ °C
2.2(5)	Note 4	The use of Table 2.1 is permitted for steels indicated in the Table up to and including grade S460; the use of grade S690 steel is excluded under EN 1993-1-1
3.1(1)	Note	The recommended Class 1 is adopted

NATIONAL ANNEX

UNI-EN-1993-1-11:2007	(includes corrigendum AC:2009) Design of steel structures Part 1-11: Design of structures with tension components
EN-1993 1-11:2006	(incorporating corrigendum April 2009) Design of steel structures Part 1-11: Design of structures with tension components

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-1-11:2007.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-1-11:2007 below:

2.3.6(1)	Note	6.2(2)	Note 4
2.3.6(2)	Note 1	6.3.2(1)	Note
2.4.1(1)	Note	6.3.4(1)	Note
3.1(1)	Note 6	6.4.1 (1)P	Note 1
4.4(2)	Note 1	7.2(2)	Note 1
4.5(4)	Note 1	A.4.5.1(1)	Note
5.2(3)	Note	A.4.5.2(1)	Note
5.3(2)	Note	B(6)	Note

Paragraph 3 below also contains national indications on the use of Informative Annexes A, B and C for buildings and other civil engineering works.
These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-1-11:2007 in Italy.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993:2007 Design of steel structures – Part 1-11: Design of structures with tension components.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-1-11:2007.

Paragraph	Citation	National parameter - value or requirement
2.3.6(1)	Note	For this transient condition the partial factors of the relevant loads of the exceptional combination are adopted. For component and joint verifications, partial factors γ_M are adopted as provided for persistent situations
2.3.6(2)	Note 1	No supplementary information is provided
2.4.1(1)	Note	Partial factors of permanent loads during assembly phases. The following values are adopted of partial factors of permanent loads during assembly: - $\gamma_G = 1.20$ for a short period (a few hours) for the installation of the first forestay; - $\gamma_G = 1.30$ for the installation of the next forestays; - $\gamma_G = 1.00$ for favourable effects (in general); - $\gamma_G = 0.90$ for favourable effects (for EQU verifications)
3.1(1)	Note 6	The recommended values are adopted: • steel wires: - round wires – nominal strength of 1 770 N/mm^2 - shaped wires – nominal strength of 1 570 N/mm^2 • stainless steel wires: - round wires – nominal strength of 1 450 N/mm^2
4.4(2)	Note 1	No specific requirements are provided
4.5(4)	Note 1	No specific information is provided
5.2(3)	Note	The recommended value $\gamma_P = 1.00$ is adopted
5.3(2)	Note	No additional information is provided
6.2(2)	Note 4	The following values are adopted: - presence of measures aimed at reducing the effects of bending on anchorage $\gamma_R = 1.00$ - absence of measures aimed at reducing the effects of bending on anchorage $\gamma_R = 1.10$
6.3.2(1)	Note	The recommended value $\gamma_{M,fr}$= 1.65 is adopted
6.3.4(1)	Note	For k, the recommended value k = 1.10 is adopted
6.4.1(1)P	Note 1	The recommended partial factor $\gamma_{M,fr}$= 1.65 is adopted
7.2(2)	Note 1	The following limit values are adopted: *Limit tensions for construction phases f_{const} (Table 7.1)* - Tensioning of the first component (for a few hours) $f_{const} \leq 0.57\ \sigma_{uk}$ - After the tensioning of other components $f_{const} \leq 0.52\ \sigma_{uk}$ *Limit tensions for conditions of service f_{sls} (Table 7.2)* - Fatigue design taking into account the effects of flexion $f_{sls} \leq 0.47\ \sigma_{uk}$ - Fatigue design ignoring the effects of flexion

		$f_{sls} \leq 0.43\ \sigma_{uk}$
A.4.5.1(1)	Note	No specific test indications are provided
A.4.5.2	Note	No specific test indications are provided
B(6)	Note	No specific monitoring and inspection information is provided
	Use of Informative Annexes A, B and C	Annexes A, B and C retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN-1993-1-12:2007	(includes corrigendum AC:2009) Design of steel structures Part 1-12: Additional rules for the extension of EN 1993 up to steel grades S 700
EN-1993-1-12:2007	(incorporating corrigendum April 2009) design of steel structures Part 1-12: Additional rules for the extension of EN 1993 up to steel grades S 700

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-1-12:2007.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-1-12:2007 below.

2.1 (3.1(2)) Note 1

2.1 (3.2.2(1)) Note

2.1 (5.4.3(1)) Note

2.1 (6.2.3(2)) Note

2.8 (4.2(2)) Note

3(1) Note

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-1-12:2007 in Italy.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-1-12:2007 Design of steel structures – Part 1-12: Additional rules for the extension of EN 1993 up to steel grades S700.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-1-12:2007.

Paragraph	Citation	National parameter - value or requirement
2.1 (3.1(2))	Note 1	Steels above grades S460 and up to S700 can be used for the construction of structural elements or works, subject to the authorisation of the High Council for Public Works. For the types of steel to be used and their mechanical characteristics, the yield stress values recommended in Tables 1 and 2 are adopted. It shall also be ensured that the values of the breaking stresses are equal to the maximum of the recommended value and that obtained by applying the indications of Paragraph 2.1 (3.2.2(1))
2.1 (3.2.2(1))	Note	The recommended values are adopted: - $f_u/f_y \geq 1.05$ - elongation at breakage not less than 10 % - $\varepsilon_u \geq 15\ f_y/E$ The following additional rules shall apply for applications in the dissipative areas of the construction subject to seismic action: – the ratio of the characteristic values of the breaking stress f_{tk} and the yield stress f_{yk} must be greater than 1.10 and the elongation at breakage A_5, measured on standard specimens, must not be less than 20 % – the mean yielding stress $f_{y,mean}$ must be less than 1.10 f_{yk} Such requirements, where applicable, must be specified in the design documents and verified by the Project Manager.
2.1 (5.4.3(1))	Note	No additional requirements are provided
2.1 (6.2.3(2))	Note	The recommended value $\gamma_{M12}=\gamma_{M2}= 1.25$ is adopted
2.8 (4.2(2))	Note	No restrictions on use of sub-resistant electrodes
3(1)	Note	No specific limitations are prescribed

NATIONAL ANNEX

UNI-EN-1993–2:2007 (includes corrigendum AC:2009)
Design of steel structures
Part 2: Steel bridges

EN-1993–2:2006 (incorporating corrigendum July 2009)
Design of steel structure
Part 2: Steel bridges

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993–2:2007.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993–2:2007 below.

2.1.3.2(1)	Note 1	6.3.2.3(1)	Note	9.5.2(2)	Note
2.1.3.3(5)	Note	6.3.4.2(1)	Note	9.5.2(3)	Note
2.1.3.4(1)	Note	6.3.4.2(7)	Note	9.5.2(5)	Note
2.1.3.4(2)	Note 2	7.1(3)	Note 2	9.5.2(6)	Note
2.3.1(1)	Note 2	7.3(1)	Note	9.5.2(7)	Note
3.2.3(2)	Note 2	7.4(1)	Note	9.5.3(2)	Notes 1 and 3
3.2.3(3)	Note	8.1.3.2.1(1)	Note	9.6(1)	Notes 1 and 2
3.2.4(1)	Note	8.1.6.3(1)	Note	9.7(1)	Note
3.4(1)	Note	8.2.1.4(1)	Note	A.3.3(1)P	Note
3.5(1)	Note	8.2.1.5(1)	Note	A 3.6(2)	Note
3.6(1)	Note	8.2.1.6(1)	Note	A.4.2.1(2)	Note
3.6(2)	Note	8.2.10(1)	Note	A.4.2.1(3)	Note
4(1)	Note	8.2.13(1)	Note	A.4.2.1(4)	Note 1
4(4)	Note	8.2.14(1)	Note	A.4.2.4(2)	Note
5.2.1(4)	Note	9.1.2(1)	Note	C.1.1(2)	Note
5.4.1(1)	Note	9.1.3(1)	Note	C.1.2.2(2)	Note
6.1(1)P	Note 2	9.3.(1)P	Note	E.2(1)	Note
6.2.2.3(1)	Note	9.3 (2)P	Note		
6.2.2.5(1)	Note	9.4.1(6)	Note		

Paragraph 3 below also contains national indications on the use of Informative Annexes A, B, C, D and E for steel bridges.

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993–2:2007 in Italy.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993–2:2007 Design of steel structures – Part 2: Steel bridges.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993–2:2007.

Paragraph	Citation	National parameter - value or requirement
2.1.3.2(1)	Note 1	For bridges of small dimensions or of normal importance a rated life of not less than 50 years is adopted. For bridges of large dimensions or strategic importance the rated life must not be assumed less than 100 years
2.1.3.3(5)	Note	No additional recommendations are given
2.1.3.4(1)	Note	No additional recommendations are given
2.1.3.4(2)	Note 2	Both methods of carrying out fatigue verifications are applicable. The choice depends on the spectrum of tension, detail, consequences of the crisis and ability to inspect and repair said detail
2.3.1(1)	Note 2	No additional information is provided
3.2.3(2)	Note 2	No additional information is provided
3.2.3(3)	Note	The recommended values in Table 2.1 of EN 1993-1-10 for σ_{Ed}=0.25 f_y(t) are adopted
3.2.4(1)	Note	The recommended values in Table 3.2 are adopted
3.4(1)	Note	No specific information is provided
3.5(1)	Note	No additional information is provided
3.6(1)	Note	Safety barriers must be type-approved in accordance with Ministerial Decree 2367 of 21 June 2004 as amended: *“Technical instructions for the design, type-approval and use of restraint devices in road constructions”* For the other elements no additional information is provided
3.6(2)	Note	No additional information is provided
4(1)	Note	No specific information is provided
4(4)	Note	No additional information is provided
5.2.1(4)	Note	No additional information is provided
5.4.1(1)	Note	In exceptional design situations it is acceptable to use plastic

		global analysis
6.1(1)P	Note 2	The recommended values of the coefficients γ_{Mi} are adopted, with the exception of the coefficient γ_{M0}=1.05
6.2.2.3(1)	Note	No additional information is provided
6.2.2.5(1)	Note	No specific method is indicated
6.3.2.3(1)	Note	No additional information is provided
6.3.4.2(1)	Note	The recommended values are adopted
6.3.4.2(7)	Note	The recommended method is adopted
7.1(3)	Note	No specific information is provided
7.3(1)	Note 2	The value γ_{Mser}=1.05 is adopted
7.4(1)	Note	No specific cases are indicated
8.1.3.2.1(1)	Note	Injection bolts may be used after testing in the Official Laboratory in accordance with 2.5 of EN 1993-1-1. Reference may be made to the recommendations relating to the 'design supported by evidence'
8.1.6.3(1)	Note	The use of hybrid joints is permitted, in accordance with 3.9.3(1) of EN1993-1-8
8.2.1.4(1)	Note	Partial penetration welds are only accepted for secondary components, not subject to fatigue and not involving the global stability of the bridge
8.2.1.5(1)	Note	Weld beads are only accepted for secondary components, not subject to fatigue and not involving the global stability of the bridge
8.2.1.6(1)	Note	Flared throat welds are only accepted for secondary components, not subject to fatigue and not involving the global stability of the bridge. They are still permitted, however, in cases of coupling of tubular elements with cordons subject to prevailing $\sigma_{//}$
8.2.10(1)	Note	In joint overheads, cord connections of a single angle or partial penetration of one side only are not permitted
8.2.13(1)	Note	No additional information is provided
8.2.14(1)	Note	No additional information is provided
9.1.2(1)	Note	No information is provided
9.1.3(1)	Note	No information is provided
9.3(1)P	Note	The recommended value γ_{FF}=1.00 is adopted
9.3(2)P	Note	The recommended values of γ_{Mf} (Table 3.1 of EN1993-1-9) are adopted
9.4.1(6)	Note	No further information is provided (see EN1991-2)

9.5.2(2)	Note	The recommended values of λ_1 are adopted only for simply supported beams and in the absence of more refined evaluation. For continuous beams or more complex static patterns specific calibrations are necessary, considering equivalence in terms of damage. In these cases, to assess λ_1 , an expression like the following can be adopted: $$\lambda_1 = \left(\frac{100 \cdot N_0}{2 \cdot 10^6}\right)^{\frac{1}{m}} \cdot \left(\frac{\sum_i n_i \cdot \Delta\sigma_i^m}{N_s \cdot \Delta\sigma_P^m}\right)^{\frac{1}{m}}$$ where $\Delta\sigma_P$ is the maximum tension delta induced by EN1991-2 fatigue model No. 3, N_0 is the annual reference flow ($N_0=0.5 \cdot 10^6$), the summation is extended to the tension spectrum induced by the N_s load spectrum vehicles, and m is an appropriate coefficient dependent on the slope of the S-N curve and the total vehicle flow
9.5.2(3)	Note	In the absence of more refined assessments the recommended value is adopted. When more refined calculations are needed, this can be done: $$\lambda_2 = k \cdot \frac{Q_{m1}}{Q_0} \cdot \sqrt[m]{\frac{N_{obs}}{N_0}}$$, with $$k = \frac{D_{ef}}{D_v} \cdot \frac{Q_0}{Q_{m1}}$$ where D_V is the damage produced by N_0 fatigue vehicles and D_{ef} is the damage produced by N_0 real vehicles. For m a suitable value must be adopted which is dependent on the shape of the S-N curve and on N_{obs}
9.5.2(5)	Note	The recommended value t_{Ld}=100 years is adopted
9.5.2(6)	Note	In the absence of more refined assessments, for λ_4 the following value can be adopted: $$\lambda_4(l, N_1) = \sqrt[5]{\frac{N_1^*}{N_1} + \sum_i \left[\frac{N_i^*}{N_1} \cdot \left(\frac{\eta_i}{\eta_1}\right)^5\right] + \sum_i \left[\frac{N_{comb}}{N_1} \cdot \left(\frac{\eta_{comb}}{\eta_1}\right)^5\right]}$$ where N_1 is the flow on the first lane, N_I it's the flow on the i-th lane, η_i is the maximum ordinate of the area of influence corresponding to the i-th lane, N_i^{*} is the flow of non-interacting vehicles on the i-th lane, N_{comb} is the number of vehicles interacting on the i-th lane and η_{comb} is the global ordinate of the area of influence for interacting lanes, being the second summation extended to all relevant combinations of vehicles in the spectrum across multiple lanes In the significant case of two lanes subjected to the same flow, it may be assumed that:

		$\lambda_4 = \sqrt[5]{\frac{\eta_1 + \eta_2}{\eta_1}} \cdot \left(1.03 + 0.01 \cdot \frac{L \cdot N}{v \cdot 10^6}\right)$ where L is the base length of the area of influence surface in m, v is the average speed of heavy-duty vehicles in m/s, and η_1 and η_2, $\eta_1 \geq \eta_2$ are the coefficients of influence of the two lanes, respectively
9.5.2(7)	Note	The recommended values of λ_{max} are adopted
9.5.3(2)	Note 1	No additional information is provided
9.5.3(2)	Note 3	The recommended values of λ_1 are not adopted. The values of λ_1 to be adopted must be appropriately adapted to the specific case, considering the equivalence in terms of damage
9.6(1)	Note 1	No exclusions are expected in advance of details
9.6(1)	Note 2	No additional information is provided
9.7(1)	Note	No specific information is provided
A.3.3(1)P	Note	The recommended values γ_μ=2.00 are adopted for friction of steel on steel and γ_μ=1.20 for friction of steel on concrete
A 3.6(2)	Note	The recommended values of α (Table A.2) are adopted, where n is the number of supports
A.4.2.1(2)	Note	No additional information is provided
A.4.2.1(3)	Note	For ΔT_0 the values recommended in Table A.4 are adopted
A.4.2.1(4)	Note 1	The additional thermal variation ΔT_γ must comply with the ratio $\left\|\Delta T_\gamma\right\| \geq 5°C$
A.4.2.4(2)	Note	No additional information is provided
C.1.1(2)	Note	The information provided has only an informative nature and in no case implies automatic fulfilment of the fatigue verifications
C.1.2.2(1)	Note 1	The recommended values shall be adopted, with the exception of point 1: for the minimum thickness of the deck plate t≥12 mm is adopted
C.1.2.2(2)	Note	The values shown in Figure C.4 are for information purposes only
E.2(1)	Note	The combination factor is assumed equal to 1.00
	Use of Informative Annexes A, B, C, D and E	Annexes A, B, C, D and E retain their informative character and may be used in so far as they are not contrary to the requirements set out in the implementing rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN-1993-3-1:2007	(includes corrigendum AC:2009) Design of steel structures Part 3-1: Towers, masts and chimneys – Towers and masts
EN-1993-3-1:2006	(incorporating corrigendum July 2009) Design of steel structures Part 3-1: Towers, masts and chimneys – Towers and masts

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-3-1:2007.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-3-1:2007 below.

2.1.1(3)P Note	6.4.2(2) Note	C.2(1) Note
2.3.1(1) Note	6.5.1(1) Note	C.6(1) Note
2.3.2(1) Note	7.1(1) Note	D.1.1(1) Note
2.3.6(2) Note 1	9.5(1) Note	D.1.2(2) Note
2.3.7(1) Note	A.1(1) Note	D.3(6) Notes 1 and 2
2.3.7(4) Note	A.2(1)P Notes 2 and 3	D.4.1(1) Note
2.5(1) Note	B.1.1(1) Note	D.4.2(3) Note
2.6(1) Note	B.2.1.1(5) Note	D.4.3(1) Note
4.1(1) Note 1	B.2.3(1) (Table B.2.1) Note 4 Table B.2.2 Note	D.4.4(1) Note
4.2(1) Note	B.3.2.2.6(4) Note 1	F.4.2.1(1) Note
5.1(6) Note	B.3.3(1) Note	F.4.2.2(2) Note
5.2.4(1) Note	B.3.3(2) Note	G.1(3) Note
6.1(1) Note 1	B.4.3.2.2(2) Note 2	H.2(5) Note
6.3.1(1) Note 1	B.4.3.2.3(1) Note	H.2(7) Note
6.4.1(1) Note	B.4.3.2.8.1(4) Note	

Paragraph 3 below also contains national information on the use of Informative Annexes B, C, E, F, G and H for civil engineering works.
These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-3-1:2007 in Italy.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-3-1:2007 Design of steel structures – Part 3-1: Towers, masts and chimneys – Towers and masts.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-3-1:2007.

Paragraph	Citation	National parameter - value or requirement
2.1.1(3)P	Note	The recommended procedures set out in Annex E are adopted
2.3.1(1)	Note	The recommendation to refer to Annex B is adopted
2.3.2(1)	Note	The recommendation to refer to Annex C is adopted
2.3.6(2)	Note 1	The following values are adopted: - variable load on platforms 2 kN/m^2 (2.1a) - variable load on railings 1 kN/m (2.1b)
2.3.7(1)	Note	No additional information is provided
2.3.7(4)	Note	No additional information is provided
2.5(1)	Note	No additional information is provided
2.6(1)	Note	The service life must be correlated to that of the plant and the planned maintenance plan
4.1(1)	Note 1	No additional information is provided
4.2(1)	Note	No specific information is provided
5.1(6)	Note	No additional information is provided
5.2.4(1)	Note	No additional information is provided
6.1(1)	Note 1	The following values are adopted for partial resistance factors: - γ_{M0} = 1.05 - γ_{M1} = 1.05 - γ_{M2} = 1.25 - γ_{Mg} = 2.00 (forestays) - γ_{Mi} = 2.50 (isolators)
6.3.1(1)	Note 1	Requirements for choice between two proposed methods are not provided
6.4.1(1)	Note	The following values, recommended in Table 2.1 of EN 1993-1-8 of partial factors of strength: - γ_{M2} = 1.25 Resistance bolts, nails, pin connections, welds and contact plates - γ_{M3} = 1.25 Sliding resistance – ULS - γ_{M3} = 1.10 Sliding resistance – SLS - $\gamma_{M6,ser}$ = 1.00 Pin connection resistance – SLS - γ_{M7} = 1.10 Bolt preload at high strength

6.4.2(2)	Note	No additional requirements are provided
6.5.1(1)	Note	No additional information is provided
7.1(1)	Note	No additional information regarding serviceability limit states is provided and the recommended partial factor is adopted
9.5(1)	Note	Values of recommended partial factors γ_{Ff} =1.00 and γ_M are adopted as indicated in Table 3.1 in EN 1993-1-9
A.1(1)	Note	Only one class of reliability, corresponding to Class 2 of Table A.1
A.2(1)P	Note 2	Table A.2 is amended in the following way *Table A.2 Partial factors for permanent and variable actions* (see table below)
A.2(1)P	Note 3	No indications for dynamic analysis of wind effects are provided
B.1.1(1)	Note	No additional information is provided
B.2.1.1(5)	Note	No additional information is provided
B.2.3(1)	Table B.2.1 Note 4	The adopted values are shown in Table
B.2.3(1)	Table B.2.2 Note	The adopted values are shown in Table
B.3.2.2.6(4)	Note 1	The recommended value K_x = 1.00 is adopted
B.3.3(1)	Note	No additional information is provided
B.3.3(2)	Note	No additional information is provided
B.4.3.2.2(2)	Note 2	The recommended value K_s = 3.50 is adopted
B.4.3.2.3(1)	Note 2	The recommended value K_s = 3.50 is adopted
B.4.3.2.8.1(4)	Note 1	The recommended value K_x = 1.00 is adopted
C.2(1)	Note	No additional information is provided
C.6(1)	Note	The recommended values are adopted
D.1.1(2)	Note	No additional information is provided
D.1.2(2)	Note	No additional information is provided
D.3(6)	Note 1	No additional information is provided
D.3(6)	Note 2	No information is provided

Table A.2 Partial factors for permanent and variable actions

Type of effect	Reliability class	Permanent Actions	Variable Actions (Qs)
Unfavourable	2	1.35	1.50
Favourable	2	1.00	0.00
Exceptional Situations		1.00	1.00

D.4.1(1)	Note	No further information is provided
D.4.2(3)	Note	No information is provided
D.4.3(1)	Note	No information is provided
D.4.4(1)	Note	No information is provided
F.4.2.1(1)	Note	The recommended value is adopted
F.4.2.2(2)	Note	The recommended value is adopted
G.1(3)	Note	The recommended values are adopted for reduction of resistance factors η
H.2(5)	Note	Should the distance of intermediate joints exceed the prescribed limits in Paragraph 6.4.4 of EN 1993-1-1 the following may be referred to. The verification of the rod can be conducted as for a simple rod, but assuming an equivalent slimness of: $\lambda_{eq} = (\lambda^2 + \lambda_1^2)^{0.5}$ where: λ slimness of the rod; $\lambda_1 = L_0 / i_{1min}$ L_0 the wheelbase of the joints; i_{1min} minimum ray of inertia of single-angle steel; with the limitation: - $\lambda_1 \leq 50$ for S235 and S275 - $\lambda_1 \leq 40$ for S355 and S 430 The intermediate joints must be at least two [2] in number and must be made up of a welded padded plate or joined with at least two [2] bolts (friction preloaded or in precision coupling, defined in the next Paragraph H.2(7) – Note 2).
H.2(7)	Note 2	The joint, if bolted, must be made up of at least two bolts arranged along the axis of the frame in precision coupling (bolt clearance hole equal to 0.3 mm per bolt up to M20, 0.5 mm per bolt of higher diameter)
	Use of Informative Annexes A, B, E, F, G and H	Annexes B, C, E, F, G and H retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction

Annex A and D retain regulatory value.

NATIONAL ANNEX

UNI-EN-1993-3-2:2007	Design of steel structures Part 3-1: Towers, masts and chimneys – Chimneys.
EN-1993-3-2:2006	Design of steel structures – Part 3-1: Towers, masts and chimneys – Chimneys

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-3-2: 2006.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-3-2:2007 below.

2.3.3.1(1)	Note 1	6.4.3(2)	Note 1
2.3.3.5(1)	Note 1	7.2(1)	Note
2.6(1)	Note	7.2(2)	Note 1
4.2(1)	Note	9.1(3)	Note 1
5.1(1)	Note	9.1(4)	Note
5.2.1(3)	Note	9.5(1)	Note
6.1(1)P	Note	A.1(1)	Note
6.2.1(6)	Note	A.2(1)	Notes 2 and 3
6.4.1(1)	Note	C.2(1)	Note
6.4.2(1)	Note		

Paragraph 3 below also contains national information on the use of Informative Annexes B, C, D and E for civil engineering works.
These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-3-2:2007 in Italy.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-3-2:2007 Design of steel structures – Part 3-2: Towers, masts and chimneys – Chimneys.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-3-2:2007.

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>2.3.3.1(1)</td><td>Note 1</td><td>The following values are adopted:
- variable load on platforms 2 kN/m² (2.1a)
- variable load on railings 1 kN/m (2.1b)</td></tr>
<tr><td>2.3.3.5(1)</td><td>Note 1</td><td>ISO 12494 may be referred to</td></tr>
<tr><td>2.6(1)</td><td>Note</td><td>The service life must be correlated to that of the plant and the planned maintenance plan</td></tr>
<tr><td>4.2(1)</td><td>Note</td><td>The recommended values in Table 4.1 are adopted.</td></tr>
<tr><td>5.1(1)</td><td>Note</td><td>No specific information is provided</td></tr>
<tr><td>5.2.1(3)</td><td>Note</td><td>The recommended criteria are adopted</td></tr>
<tr><td>6.1(1)P</td><td>Note</td><td>The following values are adopted for partial resistance factors:
- $\gamma_{M0} = 1.05$
- $\gamma_{M1} = 1.15$
- $\gamma_{M2} = 1.25$</td></tr>
<tr><td>6.2.1(6)</td><td>Note</td><td>The recommended restrictions are adopted</td></tr>
<tr><td>6.4.1(1)</td><td>Note</td><td>The following values are adopted for partial resistance factors:
- $\gamma_{M2} = 1.25$ Resistance bolts, nails, pin connections, welds and contact plates
- $\gamma_{M3} = 1.25$ Sliding resistance – ULS
- $\gamma_{M3} = 1.10$ Sliding resistance – SLS
- $\gamma_{M6,ser} = 1.00$ Pin connection resistance – SLS
- $\gamma_{M7} = 1.10$ Bolt preload at high strength</td></tr>
<tr><td>6.4.2(1)</td><td>Note</td><td>No additional information is provided</td></tr>
<tr><td>6.4.3(2)</td><td>Note 1</td><td>No additional information is provided</td></tr>
<tr><td>7.2(1)</td><td>Note</td><td>The recommended value $\delta_{max} = h / 50$ is adopted</td></tr>
<tr><td>7.2(2)</td><td>Note 2</td><td>Reference is made to reliability class 2 only and the recommended value is adopted in Table 7.1</td></tr>
<tr><td>9.1(3)</td><td>Note 1</td><td>No additional information is provided.</td></tr>
<tr><td>9.1(4)</td><td>Note</td><td>No additional information is provided</td></tr>
<tr><td>9.5(1)</td><td>Note</td><td>Values of recommended partial factors $\gamma_{Ff} = 1.00$ and γ_M are adopted as indicated in Table 3.1 in EN 1993-1-9</td></tr>
<tr><td>A.1(1)</td><td>Note</td><td>Only one class of reliability, corresponding to Class 2 of Table A.1</td></tr>
<tr><td>A.2(1)</td><td>Note 2</td><td>Table A.2 is amended in the following way
Table A.2 Partial factors for permanent and variable actions
<table>
<tr><th>Type of effect</th><th>Reliability class</th><th>Permanent Actions</th><th>Variable Actions (Qs)</th></tr>
<tr><td>Unfavourable</td><td>2</td><td>1.35</td><td>1.50</td></tr>
<tr><td>Favourable</td><td>2</td><td>1.00</td><td>0.00</td></tr>
<tr><td colspan="2">Exceptional Situations</td><td>1.00</td><td>1.00</td></tr>
</table></td></tr>
</table>

A.2(1)	Note 3	No specific information is provided
C.2(1)	Note	No additional information is provided
	Use of Informative Annexes B, C, D and E	Annexes B, C, D and E retain their informative character and may be used in so far as they are not contrary to the requirements set out in the implementing rules of the various structural types and the current Technical Standards for Construction

Annex A retains regulatory value.

NATIONAL ANNEX

UNI-EN-1993-4-1:2017	(includes corrigendum AC:2009) Design of steel structures Part 4-1: Silos
EN-1993-4-1:2007+A1:2017	(incorporating corrigenda April 2009) Design of steel structures Part 4-1: Silos

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-4-1:2017.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-4-1:2017 below.

2.2(1) Note	5.3.3.5(1) Note	8.3.3(4) Note
2.2(3) Note	5.3.3.5(2) Note	8.4.1(6) Note 1
2.9.2.2 (3)P Note	5.3.4.3.2(2) Note	8.4.2(5) Note 1
3.4(1) Note	5.3.4.3.3(2) Note	8.5.3(3) Note
4.1.4(2) Note	5.3.4.3.3(6) Note	9.5.1(3) Note
4.1.4(4) Note 1	5.3.4.3.4(5) Note	9.5.1(4) Note
4.2.2.3(6) Note	5.3.4.5(3) Note	9.5.2(5) Note
4.3.1(6) Note	5.4.4(2) Note	9.8.2(1) Note
4.3.1(8) Note	5.4.4(3) b) Note	9.8.2(2) Note
5.3.2.3(3) Note	5.4.4(3) c) Note	A.2(1) Note
5.3.2.4(10) Note	5.4.7(3) Note	A.2(2) Note
5.3.2.4(12) Note	5.5.2(3) Note	A.3.2.1(6) Note
5.3.2.4(15) Note	5.6.2(1) Note	A.3.2.2(6) Note
5.3.2.5(10) Note	5.6.2(2) Note	A.3.2.3(2) Note
5.3.2.5(14) Note	6.1.2(4) Note	A.3.3(1) Note
5.3.2.6(3) Note	6.3.2.3(2) Note	A.3.3(2) Note
5.3.2.6(6) Note	6.3.2.3(4) Note	A.3.3(3) Note
5.3.2.8(2) Note	6.3.2.7(4) Note	A.3.4(4) Note
5.3.3.3(6) Note	7.3.1(4) Note	

Paragraph 3 below also contains national information on the use of Informative Annexes A, B and C for civil engineering works.
These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-4-1:2017 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-4-1:2017 Design of steel structures – Part 4-1: Silos.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-4-1:2017.

Paragraph	Citation	National parameter - value or requirement
2.2(1)	Note	The consequence classes for silos are defined by reference only to the size and type of action to be considered, as indicated in Paragraph 2.2(3)
2.2(3)	Note	Depending on the dimension and type of action to be considered, the classes indicated in Table 2.1 are adopted. Silos capacity classes are defined according to the recommended limit values W_{1a} W_{1b}, W_{3c}, W_{3b}, W_{3c}
2.9.2.2(3)P	Note	The following values are adopted: - γ_{M0}=1.05 - γ_{M1}=1.15 - γ_{M2}=1.25 - γ_{M4}=1.05 - γ_{M5}=1.25 - γ_{M6}=1.10
3.4(1)	Note	No specific information is provided
4.1.4(2)	Note	The recommended value Δt_a=2 mm is adopted, except where required to consider greater thinness where required by the specific usage
4.1.4(4)	Note 1	No specific information is to be given
4.2.2.3(6)	Note	For the purposes of the calculation of hollow beams and wall tensions, the area of hollow beams may be combined with that of the wall, so that the distance between hollow beams is not greater than $n_{vs} \cdot (rt)^{0.5}$. For n_{vs} the recommended value N_{vs}=5 is adopted
4.3.1(6)	Note	For the purposes of the calculation of the orthotropic plate of hollow beams and wall tensions, the area of horizontal hollow beams may be combined with that of the wall, so that the distance between hollow beams is not greater than $n_s \cdot$ t. For n_s the recommended value n_s=40 is adopted
4.3.1(8)	Note	The width of the collaborative plate is given by $n_{ew} \cdot$ t. For n_{ew} the value n_{ew}=15 is adopted
5.3.2.3(3)	Note	The recommended values for j_i are adopted
5.3.2.4(10)	Note	The recommended value ψ_b=0.40 is adopted

5.3.2.4(12)	Note	The recommended values are adopted: α_L=0.7α; k_1=0.5; k_2=0.25
5.3.2.4(15)	Note	The recommended values are adopted for β and η
5.3.2.5(10)	Note	The recommended value α_n= 0.5 is adopted
5.3.2.5(14)	Note	The recommended value k_1 = 0.1 is adopted
5.3.2.6(3)	Note	The recommended value k_s=0.1 is adopted
5.3.2.6(6)	Note	The recommended value α_τ=0.8 is adopted
5.3.2.8(2)	Note	The recommended value N_f=10000 is adopted
5.3.3.3(6)	Note	The recommended value $\mathrm{k_s}$=0.5 is adopted
5.3.3.5(1)	Note	The recommended value k_s=0.1 is adopted
5.3.3.5(2)	Note	The recommended value k_t = 4.0 is adopted
5.3.4.3.2(2)	Note	The recommended value α_X= 0.8 is adopted
5.3.4.3.3(2)	Note	The recommended value is adopted k_{dx}=9.1
5.3.4.3.3(5)	Note	The recommended value α_X= 0.8 is adopted
5.3.4.3.4(6)	Note	The recommended value k_s=6.0 is adopted
5.3.4.5(3)	Note	The recommended value $k_{d\theta}$=7.4 is adopted
5.4.4(2)	Note	The recommended values are adopted: - $(r/t)_{max}$=400 - k_1=2.0 - k_2=1.0 - k_3=1.0
5.4.4(3) b)	Note	The recommended value k_s=0.10 is adopted
5.4.4(4) c)	Note	The recommended value k_L=4.0 is adopted.
5.4.7(3)	Note	For Class 1 and 2 silos the recommended harmonic coefficient values are adopted. For Class 3 silos, as recommended please refer to Informative Annex C
5.5.2(3)	Note	The recommended value k_{d1}=0.02 is adopted
5.6.2(1)	Note	The recommended value k_{d2}=0.02 is adopted
5.6.2(2)	Note	The recommended values k_{d3}=0.05 and k_{d4}=20.0 are adopted
6.1.2(4)	Note	The value γ_{M0g}=1.5 is adopted
6.3.2.3(2)	Note	The recommended value g_{asym}=1.2 is adopted for coefficients of intensification of stress through effects of asymmetry
6.3.2.3(4)	Note	The recommended value k_r=0.9 is adopted
6.3.2.7(4)	Note	The recommended value α_{XH}=0.30 is adopted
7.3.1(4)	Note	The recommended value α_P= 0.20 is adopted
8.3.3(4)	Note	The recommended value β_{lim}=20° is adopted.

8.4.1(6)	Note 1	The recommended values are adopted: - β_{lim}= 10° - k_L = 10 - k_R = 0.04
8.4.2(5)	Note 1	The recommended values are adopted: - β_{lim}= 10° - k_L = 10 - k_R = 0.04
8.5.3(3)	Note	The recommended value k = 0.10 is adopted
9.5.1(3)	Note	The recommended values are adopted: - C_{sc} = 1.0 - C_{ss} = 1.2
9.5.1(4)	Note	The recommended values are adopted: - $k_{Lf} = 4.0$ - $k_{Le} = 2.0$
9.5.2(5)	Note	The recommended value k_s=0.01 is adopted
9.8.2(1)	Note	The recommended values are adopted: - $k_1=0.02$ - $k_2=10$
9.8.2(2)	Note	The recommended value k_3 = 0.05 is adopted
A.2(1)	Note	The recommended value k_M = 1.10 is adopted
A.2(2)	Note	The recommended value is adopted k_H=1.20
A.3.2.1(6)	Note	The recommended values of j_i are adopted
A.3.2.2(6)	Note	The value γ_{M1}=1.15 is adopted
A.3.2.3(2)	Note	The values are adopted: - $\alpha_n=0.5$ - $\gamma_{M1}=1.15$
A.3.3(1)	Note	The value γ_{M0g}=1.50 is adopted
A.3.3(2)	Note	The recommended value g_{asym} = 1.2
A.3.3(3)	Note	The recommended values are adopted: - $k_r=0.90$ - $\gamma_{M2}=1.25$
A.3.4(4)	Note	The value γ_{M0}=1.05 is adopted
	Use of Informative Annexes A, B and C	Annexes A, B and C retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN-1993-4-2:2017	(includes A1:2017) Design of steel structures Part 4-2: Tanks
EN-1993-4-2: 2007+A1:2017	(incorporating corrigendum July 2009) Design of steel structures Part 4-2: Tanks

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-4-2:2017.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-4-2:2017 below.

2.2 (1) Note
2.2 (3) Note
2.9.2.1 (1)P Note
2.9.2.1 (2)P Note
2.9.2.1 (3)P Note
2.9.2.2 (3)P Note
2.9.3 (2) Note
3.3 (3) Note
4.1.3(7) Note
4.1.4 (3) Note

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-4-2:2017 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-4-2:2017 Design of steel structures – Part 4.2: Tanks.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-4-2:2017.

Paragraph	Citation	National parameter - value or requirement
2.2(1)	Note	The consequence classes for tanks are defined in Paragraph 2.2(3)
2.2(3)	Note	Depending on the dimension and type of action to be considered, the recommended classes given in Table 2.1 are adopted
2.9.2.1(1)P	Note	The recommended values in Table 2.1 are adopted
2.9.2.1(2)P	Note	The recommended values in Table 2.1 are adopted
2.9.2.1(3)P	Note	The recommended values in Table 2.1 are adopted
2.9.2.2(3)P	Note	The following values are adopted: - γ_{M0}=1.05 - γ_{M1}=1.15 - γ_{M2}=1.25 - γ_{M4}=1.05 - γ_{M5}=1.25 - γ_{M6}=1.10
2.9.3(2)	Note	The recommended value γ_{Mser}=1.0 is adopted
3.3(3)	Note	No additional information is provided
4.1.3(7)	Note	No specific values are provided
4.1.4(3)	Note	The recommended value N_f=10000 is adopted

NATIONAL ANNEX

UNI-EN-1993-5:2007	(includes corrigendum AC:2009) Design of steel structures Part 5: Piling
EN-1993-5:2007	(incorporating corrigendum May 2009) Design of steel structures Part 5: Piling

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-5:2007.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-5:2007 below:

3.7(1) Note	6.4(3) Note 1
3.9 (1)P Note	7.1(4) Note
4.4(1) Note	7.2.3(2) Note 1
5.1.1(4) Note	7.4.2(4) Note
5.2.2(2) Note 2	A.3.1(3) Note
5.2.2(13) Note	B.5.4(1) Note 1
5.2.5(7) Note	D.2.2(5) Note
5.5.4(2) Note	

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-5:2007 in Italy.
Paragraph 3 below also contains national information on the use of Informative Annexes B, C and D for civil engineering works.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-5:2007 Design of steel structures – Part 5: Piling.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-5:2007.

Paragraph	Citation	National parameter - value or requirement
3.7(1)	Note	The maximum strength of steels (according to EN 1537) used for anchorages shall be $f_{y.spec.max} \leq 460$ N/mm^2
3.9(1)P	Note	The minimum working temperature to consider in the calculations and choice of materials must not exceed -15 °C
4.4(1)	Note	The values recommended and set out in Tables 4-1 and 4-2 are adopted
5.1.1(4)	Note	The following values are adopted for partial resistance factors: - $\gamma_{M0} = 1.05$ - $\gamma_{M1} = 1.15$ - $\gamma_{M2} = 1.25$
5.2.2(2)	Note 2	No specific information is provided
5.2.2(13)	Note	For the minimum length of the initial and final sections, the recommended value L = 500 mm is adopted. This length must not be less than the length of the intermediate sections
5.2.5(7)	Note	The recommended value $\beta_R = 0.80$ is adopted
5.5.4(2)	Note	The recommended value, $h \leq 5$ m is adopted
6.4(3)	Note 1	No specific information is provided
7.1(4)	Note	The recommended values are adopted: - $\gamma_{M2} = 1.25$ - $\gamma_{Mt,ser} = 1.10$
7.2.3(2)	Note 1	The recommended value $k_t = 0.90$ is adopted
7.4.2(4)	Note	No specific design requirements are provided
A.3.1(3)	Note	The recommended values for the ratio f_u/f_y elongation at breakage and ultimate deformation ε_u are adopted
B.5.4(1)	Note 1	For the cases indicated the recommended value $\eta_{sys} = 1.00$ is adopted
D.2.2(5)	Note	No specific information is provided
	Use of Informative Annexes B, C and D	Annexes B, C and D retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN-1993-6:2007	(includes corrigendum AC:2009) Design of steel structures Part 6: Crane supporting structures.
EN-1993-6:2007	(incorporating corrigendum July 2009) Design of steel structures Part 6: Crane supporting structures

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1993-6:2007.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1993-6:2007 below:

2.1.3.2 (1)P Note	7.3(1) Note
2.8 (2)P Note	7.5(1) Note
3.2.3(1) Note	8.2(4) Note
3.2.3 (2)P Note	9.1(2) Note
3.2.4(1) Note 2	9.2 (1)P Note
3.6.2(1) Note	9.2 (2)P Note
3.6.3(1) Note	9.3.3(1) Note
6.1(1) Note	9.4.2(5) Note
6.3.2.3(1) Note	

Paragraph 3 below also contains national information on the use of Informative Annex A for civil engineering works.
These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1993-6:2007 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1993-6:2007 Design of steel structures – Part 6: Crane supporting structures.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN-1993-6:2007.

Paragraph	Citation	National parameter - value or requirement
2.1.3.2(1)P	Note	The recommended values are adopted
2.8(2)P	Note	The recommended value $\gamma_{F,test}$ = 1.1 is adopted
3.2.3(1)	Note	In the absence of more precise determinations a service temperature of air inside the construction equal to 0 °C is adopted
3.2.3(2)P	Note	The recommended indication to refer to Table 2.1 of EN 1993-1-10 is adopted for: - $\sigma_{Ed} = 0.25\, f_y(t)$
3.2.4(1)	Note 2	For the resistance properties of steel through thickness the recommended values as stated in Table 3.2 are adopted
3.6.2(1)	Note	No specific information is provided
3.6.3(1)	Note	No specific information is provided
6.1(1)	Note	The following values are adopted. For members - γ_{M0} = 1.05 - γ_{M1} = 1.05 - γ_{M2} = 1.25 For joints - γ_{M2} = 1.25 Resistance bolts, nails, pin connections, welds and contact plates - γ_{M3} = 1.25 Sliding resistance – ULS - $\gamma_{M3,\,ser}$= 1.10 Sliding resistance – SLS - $\gamma_{M6,ser}$ = 1.00 Pin connection resistance – SLS - γ_{M7} = 1.10 Bolt preload at high strength
6.3.2.3(1)	Note	As an alternative to the simplified method referred to in Paragraph 6.3.2.3, the method set out in Annex A may be followed
7.3(1)	Note	The recommended values in Tables 7.1 and 7.2 are adopted
7.5(1)	Note	The value $\gamma_{M,ser}$ = 1.10 is adopted
8.2(4)	Note	Recommended classes of cranes are adopted
9.1(2)	Note	Number of cycles below which no fatigue checks are required: the recommended number is adopted, $C_0 = 10^4$
9.2(1)P	Note	The recommended value γ_{Ff} = 1.0 is adopted
9.2(2)P	Note	For the partial factor γ_{Mf}, the recommendation to refer to Table 3.1 of EN1993-1-9 is adopted
9.3.3(1)	Note	The recommended indications are adopted
9.4.2(5)	Note	The recommended criterion to refer to Table 2.12 of EN 1991-3 is adopted
	Use of Informative	Annex A retains its informative character and may be used insofar as it does not conflict with the requirements set out in the

	Annex	execution rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN-1994-1-1: 2005	Eurocode 4 (includes corrigendum AC:2009) Design of composite steel and concrete structures Part 1-1: General rules and rules for buildings
EN-1994-1-1: 2004	Eurocode 4 (incorporating Corrigendum April 2009) Design of composite steel and concrete structures – Part 1-1: General rules and rules for buildings

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1994-1-1: 2005.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1994-1-1:2005 below:

2.4.1.1(1)
2.4.1.2(5)P
2.4.1.2(6)
2.4.1.2(7)
3.1(4)
3.5(2)
6.4.3(1)(h)
6.6.3.1(1)
6.6.3.1(3)
6.6.4.1(3)
6.8.2(1)
6.8.2(2)
9.1.1(2)P
9.6(2)
9.7.3(4)
9.7.3(8)
9.7.3(9)
B.2.5(1)
B.3.6(5)

These national decisions relating to the paragraphs mentioned above must be applied for the use in Italy of UNI-EN-1994-1-1: 2005.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1994-1-1: 2005 Design of composite steel and concrete structures – Part 1-1: General rules and rules for buildings.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI EN 1994-1-1:2005.

Paragraph	Citation	National parameter - value or requirement
2.4.1.1(1)	Note	The recommended value γ_P = 1.0 is adopted
2.4.1.2(5)P	Note	The recommended value γ_V = 1.25 is adopted
2.4.1.2(6)P	Note	The recommended value γ_{VS} = 1.25 is adopted
2.4.1.2(7)P	Note	The recommended value $\gamma_{Mf,s}$ =1.0 is adopted
3.1(4)	Note	The values recommended in Annex C are adopted
3.5(2)	Note	The minimum nominal thickness of the corrugated plate used in composite slabs is 0.8 mm; however, it is possible to reduce the thickness of the plate to 0.7 mm when appropriate measures are designed to allow the safe passage of equipment and personnel during the construction phase
6.4.3(1)h	Note	The recommended values in Table 6.1 are adopted.
6.6.3.1(1)	Note	The recommended value γ_V = 1.25 is adopted
6.6.3.1(3)	Note	No additional information is given
6.6.4.1(3)	Note	The construction details indicated in Paragraph 6.6.5.4 are confirmed
6.8.2(1)	Note	The recommended value $\gamma_{Mf,s}$ =1.0 is adopted
6.8.2(2)	Note	For the coefficient γ_{Ff}, refer to Paragraph 9.3(1)P of UNI-EN 1993-2: 2007
9.1.1(2)P	Note	The recommended value for the maximum ratio b_r/b_s = 0.6 is adopted
9.6(2)	Note	The inflection δ_s of the plates at the casting stage, as a result of the actual weight of the plate and concrete, must not exceed the quantity $\delta_{s,max}$ = min (L/180; 20 mm). Such limits may be increased should greater deflections not invalidate the strength or working order of the floor and in any case the additional weight owing to accumulation of concrete is considered in the design of the floor and the support structure. Should deflection of the extrados lead to problems linked to functionality requirements of the structure, the deformation limits should be reduced
9.7.3(4)	Note 1	The recommended value γ_{VS} = 1.25 is adopted
9.7.3(8)	Note 1	The recommended value γ_{VS} = 1.25 is adopted
9.7.3(9)	Note	The recommended value μ = 0.5 is adopted
B.2.5(1)	Note	The recommended value γ_V = 1.25 is adopted
B.3.6(5)	Note	The recommended value γ_{VS} = 1.25 is adopted
	Use of Informative Annexes A, B and C	Annexes A, B and C retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN1994-1-2:2014	(includes update A1:2014 and corrigendum AC:2008) Design of composite steel and concrete structures Part 1-2: General rules -Structural fire design.
EN 1994-1-2:2005+A1:2014	(incorporating corrigenda July 2008) Design of composite steel and concrete structures – Part 1-2: General rules – Structural fire design

1. BASIS

This Annex contains the national determination parameters for UNI-EN1994-1-2:2014.

2. INTRODUCTION

2.1. Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the Paragraphs of UNI-EN1994-1-2:2014 below:

1.1 (16) Note	2.1.3 (2) Note	3.3.2 (9) Note 1	4.1 (1) P Note
	2.3 (1) P Note 1		4.3.5.1 (10) Note 1
	2.3 (2) P Note 1		
	2.4.2 (3) Note 1		

Paragraph 3 below also contains national indications on the use of the Informative Annexes A, B, C, D, E, F and G for buildings and other civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN1994-1-2:2014 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN 1994-1-2:2014 Eurocode 4: Design of composite steel and concrete structures – Part 1-2: General rules -Structural fire design.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN1994-1-2:2014.

Paragraph	Citation	National parameter – value or requirement
1.1 (16)	*Note*	*The use of concrete of a higher class than C50/60 and LC50/55 is permitted if advanced calculation models are used in the design and making reference to the properties of the materials indicated in Section 6 of EN 1992-1-2*
2.1.3 (2)	Note	The recommended values are adopted: - $\Delta_{\theta 1}$ = 200 K - $\Delta_{\theta 2}$ = 240 K
2.3 (1) P	Note 1	The recommended values are adopted: - $\gamma_{M,fi,a}$ = 1.0 - $\gamma_{M,fi,s}$ = 1.0 - $\gamma_{M,fi,c}$ = 1.0 - $\gamma_{M,fi,v}$ = 1.0
2.3 (2) P	Note 1	The recommended value $\gamma_{M,fi}$ = 1.0 is adopted
2.4.2 (3)	Note 1	The values of η must be calculated by reference to the partial factors set out in the National Annex to EN 1990 and EN 1991-1-2
3.3.2 (9)	Note 1	The value of λ_c is assumed to coincide with the upper limit referred to in expression 3.6a in Paragraph 3.3.2 (10)
4.1 (1) P	Note	No specific information is provided
4.3.5.1 (10)	Note 1	The recommended values are adopted: - $L_{ei} = 0.5 \cdot L$ - $L_{et} = 0.7 \cdot L$
	Use of Informative Annexes	Annexes A, B, C, D, E, F and G retain their informative character and may be used in so far as they are not contrary to the requirements set out in the implementing rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN-1994-2:2006	(includes corrigendum AC:2008) Design of composite steel and concrete structures Part 2: General rules and rules for bridges
EN-1994 – 2:2005	(incorporating Corrigendum July 2008) Design of composite steel and concrete structures Part 2 – General Rules and rules for bridges

1.PREMESSA

This Annex contains the national determination parameters for UNI-EN-1994-2: 2006.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1994-2:2006 below:

1.1.3(3)	2.4.1.1(1)	5.4.4(1)	6.2.1.5(9)	7.4.1(4)	8.4.3(3)
	2.4.1.2(5)P		6.2.2.5(3)	7.4.1(6)	
	2.4.1.2(6)P		6.3.1(1)		
			6.6.1.1(13)		
			6.6.3.1(1)		
			6.8.1(3)		
			6.8.2(1)		

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1994-2:2006 in Italy.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1994:2006 Design of composite steel and concrete structures – Part 2 – General rules and rules for bridges

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI EN 1994-2:2006.

Paragraph	Citation	National parameter - value or requirement
1.1.3(3)	Note	No additional information is provided
2.4.1.1(1)	Note	The recommended value γ_P =1.00 is adopted for both favourable and unfavourable effects
2.4.1.2(5)P	Note	The recommended value γ_V = 1.25 is adopted
2.4.1.2(6)P	Note	The recommended value $\gamma_{Mf,s}$ = 1.00 is adopted
5.4.4.1	Note	A unit combination coefficient is adopted
6.2.1.5(9)	Note	No specific information is given on choice of method
6.2.2.5(3)	Note	The recommended values $C_{Rd,c}$=0.15/γ_C and k_1=0.12 are adopted, with the limit value for the tension in the concrete, if tensile, being equal to $\sigma_{cp,0}$ = -1.85 n/mm^2
6.3.1(1)	Note	No additional information is provided
6.6.1.1(13)	Note	No additional information is provided
6.6.3.1(1)	Note	The recommended valueγ_V = 1.25 is adopted
6.8.1(3)	Note	The recommended value k_s=0.75 is adopted
6.8.2(1)	Note	The value $\gamma_{Mf,s}$=1.00 is adopted, recommended in UNI-EN 1993-2:2007, in Paragraph 9.3 (1)P in the note
7.4.1(4)	Note	See UNI-EN1992-2:2006 in Paragraph 7.3.1(105) for the application of which reference is made to point 7.3.1(5) of UNI-EN1992-1-1:2015, adopting the values in the Tables

Requirement groups	Environmental conditions	Combination of actions	Reinforcement: Sensitive: Limit state	Reinforcement: Sensitive: w_d	Reinforcement: Less sensitive: Limit state	Reinforcement: Less sensitive: w_d
a	Ordinary	frequent	crack openings	$\leq w_2$	crack openings	$\leq w_3$
		almost permanent	crack openings	$\leq w_1$	crack openings	$\leq w_2$
b	Aggressive	frequent	crack openings	$\leq w_1$	crack openings	$\leq w_2$
		almost permanent	decompression	-	crack openings	$\leq w_1$
c	Very aggressive	frequent almost permanent	crack formation decompression		crack openings	$\leq w_1$

w_1=0.2 mm; w_2=0.3 mm; w_3=0.4 mm.

The compressed area near the adhesive pre-stressed cables or their sheaths shall be extended by at least 100 mm (recommended value) from the edge of the adhesive reinforcement or sheath, respectively.

The relationship between environmental conditions and the exposure class is provided in the table below

<table>
<tr><td></td><td></td><td><table>
<tr><th>ENVIRONMENTAL CONDITIONS</th><th>EXPOSURE CLASS</th></tr>
<tr><td>Ordinary</td><td>X0, XC1, XC2, XC3, XF1</td></tr>
<tr><td>Aggressive</td><td>XC4, XD1, XS1, XA1, XA2, XF2, XF3</td></tr>
<tr><td>Very aggressive</td><td>XD2, XD3, XS2, XS3, XA3, XF4</td></tr>
</table></td></tr>
<tr><td>7.4.1(6)</td><td>Note</td><td>The recommended value 20 K is adopted</td></tr>
<tr><td>8.4.3(3)</td><td>Note</td><td>No additional information is provided</td></tr>
<tr><td></td><td>Use of Informative Annex C</td><td>Annex C retains its informative character and may be used insofar as it does not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction</td></tr>
</table>

NATIONAL ANNEX

UNI EN 1995-1-1:2014	(includes update A1:2008, update A2:2014 and corrigendum EC1:2016 and EC:2006) Design of timber structures Part 1-1: General - Common rules and rules for buildings
EN 1995-1-1:2004+A2:2014	(Incorporating corrigendum June 2006) Eurocode 5: Design of timber structures Part 1-1: General - Common rules and rules for buildings

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1995-1-1:2014.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1995-1-1:2014 below:

2.3.1.2(2)P	2.4.1(1)P	6.4.3(8)	7.3.3(2)	8.3.1.2(7)	9.2.5.3(1)	10.9.2(4)
2.3.1.3(1)P	6.1.7(2)	7.2(2)	8.3.1.2(4)	9.2.4.1(7)	10.9.2(3)	

This National Annex also contains additional, non-contradictory information (*NCCI*) referring to UNI-EN-1995-1-1:2014.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN-1995-1-1:2014 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1995-1-1:2014 Eurocode 5 - Design of timber structures – Part 1-1: General rules - Common rules and rules for buildings

3. NATIONAL DECISIONS

Paragraph	Citation	National parameter - value or requirement
2.3.1.2(2)P	Note - Table 2.2	The snow load on the ground for a specific site at a certain reference altitude a_s must be considered to be at least of medium duration for altitudes a_s greater than or equal to 1 000 m; for altitudes of less than 1 000 m the duration class must be chosen according to the characteristics of the site, and in any case at least of short duration.

<table>
<tr><td></td><td></td><td>The action of average wind belongs to the class of short duration.
The action of a surge of wind and exceptional actions in general belongs to the class of instant duration</td></tr>
<tr><td>2.3.1.3(1)P</td><td>Note 2</td><td>Examples of service classes (non-exhaustive):
1 elements in a closed and heated environment
2 elements in an unheated indoor environment, outdoor elements protected from direct exposure to atmospheric agents
3 elements in an outdoor environment exposed directly to atmospheric agents; elements placed in particularly humid environments, including indoor environments such as swimming pools, ice rinks, purifiers and the like</td></tr>
<tr><td>2.4.1(1)P</td><td>Note 2</td><td>The values of the coefficients γ_M of the following statement are adopted.
Partial coefficients γ_M for the properties and resistances of materials.
<table>
<tr><td>Basic combinations:</td><td></td></tr>
<tr><td>Solid wood</td><td>1.50 (1.45)</td></tr>
<tr><td>Glued laminated timber</td><td>1.45 (1.35)</td></tr>
<tr><td>LVL, OSB plywood</td><td>1.40 (1.30)</td></tr>
<tr><td>Chipboard</td><td>1.50 (1.40)</td></tr>
<tr><td>Fibre panels, high density</td><td>1.50 (1.40)</td></tr>
<tr><td>Fibre panels, medium density</td><td>1.50 (1.40)</td></tr>
<tr><td>Fibre panels, MDF</td><td>1.50 (1.40)</td></tr>
<tr><td>Fibre panels, low density</td><td>1.50 (1.40)</td></tr>
<tr><td>Connections</td><td>1.50 (1.40)</td></tr>
<tr><td>Means of joining with punched metal plates</td><td>1.50 (1.40)</td></tr>
<tr><td>Accidental combinations:</td><td>1.00</td></tr>
</table>
The values given in brackets can be assumed for continuous production of elements or structures, included in a quality system, which are subject to continuous material control resulting in a coefficient of variation (ratio of mean square deviation to mean value) of the strength not exceeding 15 %.
NCCI For panels of cross-laminated boards, the same partial coefficients γ_M are assumed as indicated for glued laminated timber</td></tr>
<tr><td>6.1.7(2)</td><td>Note</td><td>For k_{cr} the following values are adopted:
- $k_{cr} = 2,0/f_{v,k}$ for solid wood;
- $k_{cr} = 2.5/f_{v,k}$ for lamellar wood;
- $k_{cr} = 1.0$ for other wood-based products according to EN 13986 and EN 14374;
where $f_{v,k}$ is the relevant value of the characteristic shear</td></tr>
</table>

		strength (in MPa)
6.4.3(8)	Note	Formula 6.54 is adopted
7.2(2)	Note	The values set out in the following table are adopted, subject to accurate deformation checks in relation to the use of the structure, with particular reference to damage to non-structural elements and the functionality of the structure.
7.3.3(2)	Note	The following values are adopted: - a = 1.0 mm/kN - b = 120
8.3.1.2(4)	Note 2	The proposal in Paragraph 8.3.1.2(4) is adopted
8.3.1.2(7)	Note	For silver fir, spruce fir and Douglas fir Paragraph 8.3.1.2(7) is adopted
9.2.4.1(7)	Note	Method A is applied
9.2.5.3(1)	Note (Table 9.2)	The following values are adopted: - $k_s = 4$ - $k_{f,1} = 60$ - $k_{f,2} = 80$ - $k_{f,3} = 30$
10.9.2(3)	Note	$a_{bow,perm} \leq 20$ mm
10.9.2(4)	Note	$a_{dev,perm} \leq 30$ mm
	Use of Informative Annexes	Informative Annexes A, B (from B.1 to B.5) and C (from C.1 to C.4) retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction

Table within 7.2(2):

	w_{inst}	$w_{net,fin}$	w_{fin}
Simple support beam	l/300 ÷ l/500	l/250 ÷ l/350	l/200 ÷ l/300
Cantilever	l/150 ÷ l/250	l/125 ÷ l/175	l/100 ÷ l/150

NATIONAL ANNEX

UNI-EN1995-1-2:2005	(includes corrigendum AC:2009) Design of timber structures – Part 1-2: General rules -Structural fire design.
EN 1995-1-2:2004	(incorporating corrigendum June 2006, March 2009) Design of timber structures – Part 1-2: General rules Structural fire design

1. BASIS

This Annex contains the national determination parameters for UNI-EN1995-1-2:2005.

2. INTRODUCTION

2.1. Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1995-1-2:2005 below:

2.1.3 (2) Note
2.3 (1) P Note 2
2.3 (2) P Note 1
2.4.2 (3) Note 1
2.4.2 (3) Note 2
4.2.1 (1) Note

Paragraph 3 below also contains national indications on the use of Informative Annexes A, B, C, D, E and F for buildings and other civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN1995-1-2:2005 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN 1995-1-2:2005 Eurocode 5: Design of timber structures – Part 1-2: General rules -Structural fire design.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN1995-1-2:2005.

Paragraph	Citation	National parameter – value or requirement
2.1.3 (2)	Note	The recommended values are adopted: - $\Delta_{\theta 1}$ = 200 K - $\Delta_{\theta 2}$ = 240 K
2.3 (1) P	Note 2	The recommended value $\gamma_{M,fi}$ = 1.0 is adopted
2.3 (2) P	Note 1	The recommended value $\gamma_{M,fi}$ = 1.0 is adopted
2.4.2 (3)	Note 1	The values of η must be calculated by reference to the partial factors set out in the National Annex to EN 1990 and EN 1991-1-2
2.4.2 (3)	Note 2	No specific information is provided
4.2.1 (1)	Note	The recommended procedure of the reduced cross-section method is adopted
	Use of Informative Annexes	Annex A, B, C, D, E and F maintain the informative character and may be used in so far as they are not contrary to the requirements set out in the implementing rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN 1995-2:2005	(includes corrigendum EC1:2017) Design of timber structures – Part 2: Bridges
EN 1995-2:2004	Design of timber structures - Part 2: Bridges

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1995-2:2005.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1995-2:2005 below.

2.3.1.2(1)   2.4.1   7.2   7.3.1(2)

This Annex also contains national indications concerning the use of Annexes A and B for wooden bridges.
This National Annex also contains non-contradictory additional information (NCCI) referring to UNI-EN 1995-2:2005.
These national decisions relating to the Paragraphs mentioned above must be applied for the use in Italy of UNI-EN 1995-2:2005.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN 1995-2:2005 Eurocode 5 - Design of timber structures – Part 2: Bridges.

3. NATIONAL DECISIONS

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>2.3.1.2(1)</td><td>Note</td><td>The recommended values are adopted (see the note to Paragraph 2.3.1.2(1) and Table 2.2 of UNI-EN 1995-1-1). Actions during execution are assumed to be of short duration, as recommended</td></tr>
<tr><td>2.4.1</td><td>Note</td><td>The values of the coefficients γ_M in the following Table are adopted:
Partial coefficients γ_M for the properties and resistances of materials
<table>
<tr><td>1. Timber and wood-based materials</td><td></td></tr>
<tr><td>- normal verification</td><td></td></tr>
<tr><td>solid wood</td><td>γ_M=1.50 (1.45)</td></tr>
<tr><td>glued laminated timber</td><td>γ_M=1.45 (1.35)</td></tr>
<tr><td>LVL, OSB plywood</td><td>γ_M=1.40 (1.30)</td></tr>
<tr><td>- fatigue check</td><td>$\gamma_{M,fat}$=1.00</td></tr>
<tr><td>2. Connections</td><td></td></tr>
<tr><td>- normal verification</td><td>γ_M=1.50 (1.40)</td></tr>
<tr><td>- fatigue check</td><td>$\gamma_{M,fat}$=1.00</td></tr>
<tr><td>3. Steel used in composite elements</td><td>$\gamma_{M,s}$=1.15</td></tr>
<tr><td>4. Concrete used in composite elements</td><td>$\gamma_{M,c}$=1.50</td></tr>
<tr><td>5. Shear connectors between timber and concrete in composite elements</td><td></td></tr>
<tr><td>- normal verification</td><td>$\gamma_{M,v}$=1.25</td></tr>
<tr><td>- fatigue check</td><td>$\gamma_{M,v,fat}$=1.00</td></tr>
<tr><td>6. Pre-stressed steel elements</td><td>$\gamma_{M,s}$=1.15</td></tr>
</table>
For exceptional combinations the value γ_M=1.0 is adopted.
The values given in brackets can be assumed for continuous production of elements or structures, included in a quality system, which are subject to continuous material control resulting in a coefficient of variation (ratio of mean square deviation to mean value) of the strength not exceeding 15 %.
NCCI: For panels of cross-laminated boards, the same partial coefficients γ_M are assumed as indicated for glued laminated timber</td></tr>
<tr><td>7.2</td><td>Note</td><td>The limit inflection values recommended in Table 7.1 are adopted</td></tr>
<tr><td>7.3.1(2)</td><td>Note 1</td><td>Values of damping coefficients different to those indicated may be adopted for specific structures, following suitable justification on a trial bases</td></tr>
<tr><td></td><td>Use of Informative Annexes</td><td>Informative Annexes A (from A.1 to A.3) to B (from B.1 to B.3) retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules</td></tr>
</table>

		of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN-1996-1-1:2013	(includes A1:2012 and the corrigendum of July 2009) Design of masonry structures Part 1-1: General rules for reinforced and non-reinforced masonry structures
EN 1996-1-1:2005+A1:2012	(incorporating corrigenda July 2009) Design of masonry structures Part 1-1: General rules for unreinforced and reinforced masonry structures

1. FOREWORD

This Annex contains the national determination parameters for UNI-EN-1996-1-1:2013.

2. INTRODUCTION

2.1 Scope

The document contains, in point 3 below, the decisions on the national parameters to be laid down in UNI-EN-1996-1-1:2013 with regard to the following Paragraphs:

2.4.3(1) P	3.6.4(3)	6.2(2)
2.4.4(1)	3.7.2(2)	8.1.2(2)
3.2.2(1)	3.7.4(2)	8.5.2.2(2)
3.6.1.2(1)	4.3.3(3)	8.5.2.3(2)
3.6.2(3)	4.3.3(4)	8.6.2(1)
3.6.2(4)	5.5.1.3(3)	8.6.3(1)
3.6.2(6)	6.1.2.2(2)	

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1996-1-1:2013 in Italy.

2.2 Normative references

This Annex must be taken into account when using all regulatory documents explicitly referring to UNI-EN-1996-1-1:2013 – Design of masonry structures – Part 1-1: General rules for reinforced and non-reinforced masonry structures: general rules and rules for buildings.

3. NATIONAL DECISIONS

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>2.4.3(1)P</td><td>Note</td><td>
Partial factors γ_M for ultimate limit states.
The classes and values γ_M indicated in the following table are adopted:
<table>
<tr><td colspan="2" rowspan="3">Material</td><td colspan="2">γ_M</td></tr>
<tr><td colspan="2">Class</td></tr>
<tr><td>1</td><td>2</td></tr>
<tr><td></td><td>Masonry built with:</td><td></td><td></td></tr>
<tr><td>A</td><td>Category I elements, performance-guaranteed mortar;</td><td>2.0</td><td>2.5</td></tr>
<tr><td>B</td><td>Category I elements, mortar with a prescribed composition;</td><td>2.2</td><td>2.7</td></tr>
<tr><td>C</td><td>Category II elements, any type of mortar.</td><td>2.5</td><td>3.0</td></tr>
<tr><td>D</td><td>Anchorage of reinforced steel</td><td>2.2</td><td>2.7</td></tr>
<tr><td>E</td><td>Reinforced and pre-stressed steel</td><td>1.15</td><td>1.15</td></tr>
<tr><td>F</td><td>Completion elements</td><td>2.2</td><td>2.7</td></tr>
<tr><td>G</td><td>Lintels, according to EN845-2</td><td>2.0</td><td>2.5</td></tr>
</table>
Allocation to Classes 1 and 2 is made, in relation to what is indicated in Annex A ‘Considerations on partial factors relating to execution’, as specified below.
In any case, Class 2 requires:
- the availability of specific staff who are qualified and experienced, employed by the company carrying out the work, to supervise the work (site manager)
- the availability of specific staff who are qualified and experienced, employed by the company carrying out the work, for inspection verifications of the works (site engineer)
Class 1 is attributed if, in addition to the inspections referred to above, the following verification operations are provided:
- on-site inspection and evaluation of the properties of the mortar and concrete;
- dispensing components of mortar ‘in volume’ with the use of suitable containers and control of mixing operations or use of pre-mixed mortar certified by the producer
</td></tr>
<tr><td>2.4.4(1)</td><td>Note</td><td>The recommended value $\gamma M = 1$ is adopted</td></tr>
<tr><td>3.2.2(1)</td><td>Note</td><td>
In the following table, six mixes of prescribed composition (in volume) are indicated, with the relative M value.
To the three basic components of the mixtures (cement, hydraulic lime and sand), two additional components (aerial lime and pozzolana) are added in order to consider the use of pozzolanic mortar.
<table>
<tr><th>Mortar class</th><th>Type</th><th>Cement</th><th>Hydraulic lime</th><th>Sand</th><th>Aerial lime</th><th>Pozzolana</th></tr>
<tr><td>M2.5,0,1,3,0,0</td><td>Hydraulic</td><td>--</td><td>1</td><td>3</td><td>--</td><td>--</td></tr>
</table>
</td></tr>
</table>

M2.5,1,2,9,0,0	Rough	1	2	9	--	--
M5,1,1,5,0,0	Rough	1	1	5	--	--
M8,2,1,8,0,0	Cement	2	1	8	--	--
M12,1,0,3,0,0	Cement	1	--	3	--	--
M2.5,0,0,0,1,3	Pozzolanic	--	--	--	1	3

3.6.1.2(1)	Note	The method indicated as (*ii*) is adopted
3.6.2(3)	Note	$f_{vk} \leq f_{lmt} = 0.065\ f_b$ is adopted with the exception of autoclaved aerated concrete elements of Group 1 and all elements with a tensile strength (measured in a horizontal direction parallel to the installation surface) greater than or equal to $0.2 f_b$, for which $f_{vk} \leq f_{lmt} = 0.10\ f_b$
3.6.2(4)	Note	$f_{vk} \leq 0{,}045\ f_b$ is adopted
3.6.2(6)	Note	The values of $_{vk0}$ shown in the following table are adopted: *Characteristic shear strength in the absence of normal tensions f_{vk0} (N/mm^2)*

Masonry elements	f_{vk0} (N/mm^2)			
	Ordinary mortar of a given strength class		Thin layer mortar (horizontal joint ≥ 0.5 mm and ≤ 3 mm)	Lightened mortar
Brick	M10 - M20	0.30	0.30*	0.15
	M2.5 - M9	0.20		
	M1 - M2	0.10		
Calcium silicate	M10 - M20	0.20	0.20**	0.15
	M2.5 - M9	0.15		
	M1 - M2	0.10		
Aggregate concrete Autoclaved aerated concrete Artificial stone and solid natural stone	M10 - M20	0.20	0.20**	0.15
	M2.5 - M9	0.15		
	M1 - M2	0.10		

* the value applies to mortars of class M10 or higher and with a block strength $f_{bk} \geq 5.0$ N/mm^2

** the value applies to mortars of class M5 or higher and with a block strength $f_{bk} \geq 3.0$ N/mm^2

The values in the previous Table refer to the case of mortar-filled horizontal and vertical joints

3.6.4(3)	Note 1 Note 2 Note 3	For f_{xk1} and f_{xk2} the values provided in the Tables in Note 3 are adopted
3.7.2(2)		The recommended value k_E=1000 is adopted
3.7.4(2)	Note	The ranges of values provided in the Table are adopted
4.3.3(3)	Note	The recommended selections are adopted, as given in the appropriate Table
4.3.3(4)	Note	For c_{nom} the recommended values are adopted, given in the appropriate Table
5.5.1.3(3)	Note	The recommended value $k_{tef}=E_2/E_1 \leq 2$ is adopted
6.1.2.2(2)	Note	For each type of masonry, the recommended limit value λ_c=15 is adopted

6.2(2)	Note	The wording given by equation (6.13) is adopted
8.1.2(2)	Note	The minimum thickness of walls with structural function is equal to: - masonry with full artificial strength elements 150 mm - masonry with semi-full artificial strength elements 200 mm - masonry with perforated artificial strength elements 240 mm - squared stone masonry 240 mm - squared stone striped masonry 400 mm - non-squared stone masonry 500 mm For the definition of full, semi-full or perforated elements, please refer to the additional information given in point 4 below
8.5.2.2(2)	Note 3	n_{min} = 2.5 connectors/m^2 is adopted
8.5.2.3(2)	Note 2	j=2.5 connectors/m^2 is adopted
8.6.2(1)	Note	The recommended values in the Table are adopted
8.6.3 (1)	Note	The recommended values in the Table are adopted

4. NON-CONTRADICTORY ADDITIONAL INFORMATION

4.1 Properties of masonry elements

The additional classification for the elements according to the perforation percentage and the average area of the cross-section of each individual hole for brick and concrete elements, respectively.

Classification of brick elements

Elements	**Perforation percentage ϕ**	**Area f of the normal section of the hole**
Filled	ϕ ≤ 15 %	f ≤ 9 cm²
Semi-filled	15 % < ϕ ≤ 45 %	f ≤ 12 cm²
Perforated	45 % < ϕ ≤ 55 %	f ≤ 15 cm²

Elements may have cavities of limited depth intended to be filled by the mortar bed.
Brick elements of a gross area A greater than 300 cm² may be equipped with a gripping hole with a maximum area of 35 cm², to be counted in the overall perforation percentage, with the aim of facilitating manual gripping; for A greater than 580 cm² two holes, each with a maximum area of 35 cm², or a gripping hole or a hole for possible reinforcement whose area does not exceed 70 cm² shall be allowed.
In the case of extruded blocks of bricks the perforation percentage φ coincides with the percentage by volume of empty space as defined by UNI EN 772-9.

Classification of concrete elements

Elements	**Perforation percentage ϕ**	**Area f of the normal section of the hole**	
		***A* ≤ 900 cm²**	***A* > 900 cm²**
Filled	ϕ ≤ 15 %	f ≤ 0.10 A	f ≤ 0.15 A
Semi-filled	15 % < ϕ ≤ 45 %	f ≤ 0.10 A	f ≤ 0.15 A

Holes in brick and concrete elements intended to be filled with concrete or mortar are not subject to limitation.
The minimum thickness of internal walls (minimum distance between two holes) is the following:

- Elements made of brick or calcium silicate: 7 mm
- Concrete elements: 18 mm

The minimum thickness of the outer septa (minimum distance from the outer edge to the nearest hole net of any grooves) is as follows:

- Elements made of brick or calcium silicate 10 mm
- Concrete elements 18 mm

4.2 Use of thin mortar joints or vertical dry joints (without mortar)

The use of thin mortar joints (a thickness between 0.5 mm and 3 mm) and/or vertical dry joints shall be limited to buildings with a maximum interplanar height of 3.5 m and a number of floors above ground not exceeding what is specified in the National Annex to UNI EN 1998-1.

NATIONAL ANNEX

UNI-EN1996-1-2:2005	(includes corrigendum AC:2010) Design of masonry structures – Part 1-2: General rules -Structural fire design.
EN 1996-1-2:2005	(incorporating corrigendum October 2010) Design of masonry structures – Part 1-2: General rules Structural fire design

1. BASIS

This National Annex contains the national determination parameters for UNI-EN1996-1-2:2005.

2. INTRODUCTION

2.1. Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1996-1-2:2005 below:

2.1.3 (2) Note (see AC:2010)	3.3.3.1 (1) Note	4.5 (3) Note	Annex B Note 1
2.2 (2) Note	3.3.3.2 (1) Note 2		Annex B Note 4
2.3 (2) P Note	3.3.3.3 (1) Note 2		Annex C Note
2.4.2 (3) Note 1 (see AC:2010)			

Paragraph 3 below also contains national indications on the use of Informative Annexes A, B, C, D, E and F for buildings and other civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN1996-1-2:2005 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN1996-1-2:2005 Eurocode 6: Design of masonry structures – Part 1-2: General rules -Structural fire design.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN1996-1-2:2005.

Paragraph	Citation	National parameter – value or requirement
2.1.3 (2)	Note (from AC:2010)	The recommended values are adopted: - $\Delta_{\theta 1}$ = 200 K - $\Delta_{\theta 2}$ = 240 K
2.2 (2)	Note	The value ε_m = 0.7 is adopted
2.3 (2) P	Note	The recommended value $\gamma_{M,fi}$ = 1.0 is adopted
2.4.2 (3)	Note 1 (completed by AC:2010)	The values of η must be calculated by reference to the partial factors set out in the National Annex to EN 1990 and EN 1991-1-2
3.3.3.1 (1)	Note	Whatever the method of determining the thermal expansion to be used within an analytical method, it is still necessary to validate the model with suitable testing to be conducted through the execution of standard tests (EN 1364-1 for non-load-bearing masonry and EN 1365-1 for load-bearing masonry)
3.3.3.2 (1)	Note 2	Whatever the method of determining the specific heat to be used within an analytical method, it is still necessary to validate the model with suitable testing to be conducted through the execution of standard tests (EN 1364-1 for non-load-bearing masonry and EN 1365-1 for load-bearing masonry)
3.3.3.3 (1)	Note 2	Whatever the method of determining the thermal conductivity to be used within an analytical method, it is still necessary to validate the model with suitable testing to be conducted through the execution of standard tests (EN 1364-1 for non-load-bearing masonry and EN 1365-1 for load-bearing masonry)
4.5 (3)	Note	No specific information is provided
Annex B	Note 1	No specific information is provided
Annex B	Note 4 (completed by AC:2010)	The values in Tables N.B.1.1 to N.B.5.2 cannot be used. The fire resistance class to be assigned to a masonry wall is that which can be determined by applying the Decree of the Minister for the Interior of 16 February 2007 ‘Classification of the fire resistance of products and building elements of construction works’ and circular letter no 1968 of 15 February 2008 on ‘Fire resistant load-bearing masonry walls’ and further acts issued by the competent authority in this area, such as that of the Minister for the Interior of 3 August 2015

Annex C	Note	Useful indications are provided in the circular of the Fire Department of the Ministry of the Interior DCPREV No 4638 of 5 April 2013
	Use of Informative Annexes	Annex A, C, D, E and F maintain the informative character and may be used in so far as they are not contrary to the requirements set out in the implementing rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN-1996-2:2006	(includes corrigendum AC:2009) Design of masonry structures Part 2: Design considerations, selection of materials and execution of masonry
EN 1996-2:2006	(incorporating corrigendum September 2009) Design of masonry structures Part 2: Design considerations, selection of materials and execution of masonry

1. FOREWORD

This Annex contains the national determination parameters for UNI-EN-1996-2:2006.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1996-2:2006 below:

1.1.(2)P	2.3.4.2(2)	3.5.3.1(1)
2.3.1(1)	3.4.3	

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1996-2:2006 in Italy.

2.1 Normative references

This Annex must be taken into account when using all regulatory documents explicitly referring to UNI-EN-1996-2:2006 Design of masonry structures – Part 2: Design considerations, selection of materials and execution of masonry.

3. NATIONAL DECISIONS

Paragraph	**Citation**	**National parameter - value or requirement**
1.1.(2)P	Note	No additional information
2.3.1(1)	Note	No additional information
2.3.4.2(2)	Note	The recommended values are adopted
3.4 (3)	Note	In addition to the values shown in Table 3.1 and shown in Figure 3.1, the values given in point 4.2 of this National Annex are taken into account
3.5.3.1(1)	Note	The recommended value is adopted

4. NON-CONTRADICTORY ADDITIONAL INDICATIONS

4.1 Acceptance, generality (Paragraph 3.2.1)

The Director of Works is required to carry out acceptance tests on structural masonry elements and mortars, as well as on any reinforcement and concrete used in the construction of reinforced masonry or confined masonry for structural purposes, as indicated in Chapter 11 of the 2018 NTC.

4.2 Deviations permitted from the design specifications (Paragraph 3.4.(3))

In addition to the values indicated in Table 3.1 and in Figure 3.1, the deviations permitted in the specific designs must also respect the following limits.

Location	**Maximum deviation**
Uprightness	
in any storey (Figure 3.1a, 1)	$\pm h/200$ (h net height of the wall from floor to floor)
in the total height of buildings of 3 or more storeys (Figure 3.1a, 2)	± 35 mm
vertical alignment (Figure 3.1b)	the minor, in absolute value, between ±15 mm and $\pm t/15$ (t thickness of the underlying wall)
Flatness/straightness [(a)]	
over 10 m	± 35 mm

[(a)] the deviation from flatness/straightness is measured from an ideal straight line between two points

NATIONAL ANNEX

UNI-EN-1996-3:2006	(includes corrigendum AC:2009) Design of masonry structures Part 3: Simplified calculation methods for unreinforced masonry structures
EN 1996-3:2006	(incorporating corrigendum October 2009) Design of masonry structures Part 3: Simplified calculation methods for unreinforced masonry structures

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1996-3:2006.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1996-3:2006 below:

2.3 (2)P	4.1 (P)	D.1 (1)
	4.2.1.1 (1)P	D.2 (1)
	4.2.2.3 (1)	D.3 (1)

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1996-3:2006 in Italy.

2.2 Normative references

This Annex must be taken into account when using all regulatory documents explicitly referring to UNI-EN-1996-3:2006 Design of masonry structures – Part 3: Simplified calculation methods for unreinforced masonry structures

3. NATIONAL DECISIONS

Paragraph	**Citation**	**National parameter - value or requirement**
2.3 (2)P	Note	The values of γ_M set out in the National Annex to EN 1996-1-1 are adopted
4.1 (P)	Note	It is assumed that verification of the global stability of the building is satisfied if Equation 5.1 in Point 5.4 (2) of EN 1996-1-1 is satisfied
4.2.1.1 (1)P	Note	The maximum height h_m is equal to 12 m. (from the grade plane of the foundation of the masonry structure)
4.2.2.3 (1)	Note	The recommended value n_{min} is adopted
D.1 (1)	Note	The values recommended in the Tables are adopted, recalling that the requirements set out in point (4) 'Non-contradictory additional information' of the national annex to EN 1996-1-1 must be complied with. Group 3 and Group 4 elements are therefore excluded
D.2 (1)	Note	The recommended values in the Tables are adopted
D.3 (1)	Note	The recommended values in the Table are adopted

NATIONAL ANNEX

UNI-EN-1997-1:2013	(includes update A1:2013 and corrigendum AC:2009) Geotechnical design Part 1: General rules
EN 1997-1:2004 +A1:2013	(incorporating corrigendum February 2009) Geotechnical design Part 1: General rules

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1997-1:2013.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the Paragraphs of UNI-EN-1997-1:2013 below:

2.1(8)P	7.6.2.2(8)P	8.4(6)P	10.2(3)	11.5.1(1)P
2.4.6.1(4)P	7.6.2.2(14)P	8.4(7)P		
2.4.6.2(2)P	7.6.2.3(4)P	8.5.1(1)P		
2.4.7.1(2)P	7.6.2.3(5)P	8.5.2(2)P		
2.4.7.1(3)	7.6.2.3(8)	8.5.2(3)P		
2.4.7.1(4)	7.6.2.4(4)P	8.5.2(5)P		
2.4.7.1(5)	7.6.3.2(2)P	8.5.3(1)P		
2.4.7.1(6)	7.6.3.2(5)P	8.5.3(2)P		
2.4.7.2(2)P	7.6.3.3(3)P	8.5.3(3)P		
2.4.7.3.2(3)P	7.6.3.3(4)P	8.5.3(4)P		
2.4.7.3.3(2)P	7.6.3.3(6)	8.6.2(2)P		
2.4.7.3.4.1(1)P		8.6.2(3)P		
2.4.7.4(3)P				
2.4.7.5(2)P				
2.4.8(2)				
2.4.9(1)P				
2.5(1)				

and in the following clauses of Annex A:

A.2	A.3.3.2	A.3.3.6
A.3.1	A.3.3.3	A.4
A.3.2	A.3.3.4	A.5
A.3.3.1	A.3.3.5	A.6

2.2 Normative references

This Annex must be taken into account when using all regulatory documents explicitly referring to UNI-EN-1997-1:2013 Geotechnical design – Part 1 - General rules.

3. NATIONAL DECISIONS

Paragraph	Citation	National parameter - value or requirement
2.1(8)P	Note	Minimum requirements for surveys, calculation methods and geotechnical checks should not be introduced as the complexity of the works varies
2.4.6.1(4)P	Note 1	See Tables A.1, A.3 and A.15 in Paragraphs A.2, A.3.1 and A.4 respectively.
2.4.6.2(2)P	Note 1	See Tables A.2, A.4 and A.16 in Paragraphs A.2, A.3.2 and A.4 respectively.
2.4.7.1(2)P	Note	See the Tables in Paragraphs A.2, A.3.1, A.3.2, A.3.3.1, A.3.3.2, A.3.3.3, A.3.3.4, A.3.3.5, A.3.3.6 and A.4
2.4.7.1(3)	Note	The partial coefficients for exceptional actions are 1.00
2.4.7.1(4)	Note	Values of the partial coefficients that are more precautionary than those set out in Annex A are not to be indicated. More precautionary values may be requested by the developer or substantiated by the designer.
2.4.7.1(5)	Note	Less conservative partial coefficient values than those named in Annex A are not accepted.
2.4.7.1(6)	Note	Model coefficients are not indicated
2.4.7.2(2)P	Note 2	Please refer to Tables A.1 and A.2 set out in Paragraph A.2
2.4.7.3.2(3)P	Note	Please refer to Tables A.3 and A.4 set out in Paragraphs A.3.1 and A.3.2
2.4.7.3.3(2)P	Note	Please refer to Tables A.5, A.6, A.7, A.8, A.12, A.13 and A.14 set out respectively in Paragraphs A.3.31, A.3.3.2, A.3.3.4, A.3.3.5 and A.3.3.6
2.4.7.3.4.1(1) P	Note 1	Design Approach 1 applies only to the case of flexible support works (bulkheads, etc.) and underground works and, for combination 2 only, always in global stability checks. Design Approach 2 applies to the case of structures with direct foundations or foundations on piles and to retaining walls with direct foundations and foundations on piles, but without anchorage. Design Approach 3 cannot be applied
2.4.7.4(3)P	Note	Please refer to Tables A.15 and A16 set out in Paragraph A.4
2.4.7.5(2)P	Note 1	Expressions 2.9a and 2.9b and Table A.17 are not applicable. In mainly vertical flow conditions: a) in the case of an unrestricted outflow boundary, the siphoning check shall be carried out by checking that the hydraulic gradient i is not higher than the critical hydraulic gradient ic divided by a partial coefficient γ_R = 3, if the average hydraulic gradient is assumed as the effect of the actions, and for a partial coefficient γ_R = 2 in case the hydraulic outflow gradient is considered b) in the presence of a load imposed on the outflow boundary, the

<table>
<tr><td></td><td></td><td>check shall be carried out by checking that the interstitial pressure in excess of the hydrostatic condition is not higher than the effective vertical tension calculated in the absence of filtration, divided by a partial coefficient $\gamma_R = 2$
In all other cases, the designer must evaluate the effects of the filtration forces and guarantee adequate safety levels, to be explicitly preset and justified</td></tr>
<tr><td>2.4.8(2)</td><td>Note</td><td>The partial coefficients on the actions for checks at the service limit states are equal to 1.00</td></tr>
<tr><td>2.4.9(1)P</td><td>Note</td><td>The limit values for the movements of foundations must be set by the developer or chosen responsibly by the designer</td></tr>
<tr><td>2.5(1)</td><td>Note</td><td>No conventional and precautionary design rules are adopted</td></tr>
<tr><td>7.6.2.2(8)P</td><td>Note</td><td>Please refer to Table A.9 set out in Paragraph A.3.3.3</td></tr>
<tr><td>7.6.2.2(14)P</td><td>Note</td><td>Please refer to Tables A.6, A.7 and A.8 set out in Paragraph A.3.3.2</td></tr>
<tr><td>7.6.2.3(4)P</td><td>Note</td><td>Please refer to Tables A.6, A.7 and A.8 set out in Paragraph A.3.3.2</td></tr>
<tr><td>7.6.2.3(5)P</td><td>Note</td><td>Please refer to Table A.10 set out in Paragraph A.3.3.3</td></tr>
<tr><td>7.6.2.3(8)</td><td>Note</td><td>Model coefficients are not indicated</td></tr>
<tr><td>7.6.2.4(4)P</td><td>Note</td><td>Please refer to Table A.11 set out in Paragraph A.3.3.3</td></tr>
<tr><td>7.6.3.2(2)P</td><td>Note</td><td>Please refer to Tables A.6, A.7 and A.8 set out in Paragraph A.3.3.2</td></tr>
<tr><td>7.6.3.2(5)P</td><td>Note</td><td>Please refer to Table A.9 set out in Paragraph A.3.3.3</td></tr>
<tr><td>7.6.3.3(3)P</td><td>Note</td><td>Please refer to Tables A.6, A.7 and A.8 set out in Paragraph A.3.3.2</td></tr>
<tr><td>7.6.3.3(4)P</td><td>Note</td><td>Please refer to Table A.10 set out in Paragraph A.3.3.3</td></tr>
<tr><td>7.6.3.3(6)</td><td>Note</td><td>Model coefficients are not indicated</td></tr>
<tr><td>8.4(6)P</td><td>Note</td><td>No specific indication is given</td></tr>
<tr><td>8.4(7)P</td><td>Note</td><td>No specific indication is given</td></tr>
<tr><td>8.5.1(1)</td><td>Note</td><td>The proposed procedure is not adopted</td></tr>
<tr><td>8.5.1(2)</td><td>Note 1</td><td>No specific indication is given</td></tr>
<tr><td>8.5.1(2)</td><td>Note 2</td><td>No specific indication is given</td></tr>
<tr><td>8.5.2(1)P</td><td>Note</td><td>No specific indication is given. Recommendations on this can be found in (a)</td></tr>
<tr><td>8.5.2(2)P</td><td>Note</td><td>No specific indication is given. Recommendations on this can be found in (a)</td></tr>
<tr><td>8.5.2(3)</td><td>Note 1</td><td>Reference is made to the values of ξ_a shown in the table below depending on the number of design pull-out tests carried out.
Correlation coefficients for tests on anchorage
<table>
<tr><td>Number of tests</td><td>1</td><td>2</td><td>>2</td></tr>
<tr><td>ξ_{a1}</td><td>1.5</td><td>1.4</td><td>1.3</td></tr>
<tr><td>ξ_{a2}</td><td>1.5</td><td>1.3</td><td>1.2</td></tr>
</table>
The characteristic value of resistance $R_{a;k}$ will be determined as the minimum value amongst those obtained with the following formulas:</td></tr>
</table>

<table>
<tr><td></td><td></td><td>- $R_{ak1} = \frac{R_{am}}{\xi_{a1}}$
- $R_{ak2} = \frac{R_{a\,min}}{\xi_{a2}}$
where R_{am} and R_{amin} indicate respectively the average and minimum strengths obtained from the pull-out tests on pilot anchorages, which, due to the properties of the land concerned, and the geometric and technological characteristics, are similar to those that will be carried out during the construction of the work.
For tests based on theoretical formulae, please refer to point 4 below of this National Annex</td></tr>
<tr><td>8.5.2(3)</td><td>Note 2</td><td>Table A.20 is not adopted. The minimum number of design tests shall not be less than:
- 1 if the number of anchorages is lower than 30
- 2 if the number of anchorages is between 31 and 50
- 3 if the number of anchorages is between 51 and 100
- 7 if the number of anchorages is between 101 and 200
- 8 if the number of anchorages is between 201 and 500
- 10 if the number of anchorages exceeds 500</td></tr>
<tr><td>8.5.2(5)</td><td>Note</td><td>Table A.19 is not adopted. Reference is made to the values of γ_R set out in the following Table<table><tr><td></td><td>Symbol</td><td>Partial factor</td></tr><tr><td>Temporary</td><td>γ_R</td><td>1.1</td></tr><tr><td>Permanent</td><td>γ_R</td><td>1.2</td></tr></table></td></tr>
<tr><td>8.5.3(1)</td><td>Notes 1 and 2</td><td>No specific indication is given. Recommendations on this can be found in (a)</td></tr>
<tr><td>8.5.3(2) (3) (4)</td><td>Note</td><td>Tables A.20 and A.21 are not adopted. Recommendations on this can be found in (a)</td></tr>
<tr><td>8.6.2(2)</td><td>Notes 1 and 2</td><td>Formulations 8.13 and 8.14 are not adopted. The test load shall be 1.2 times the design action used for the SLS verifications, verifying that the measured elongations are within the prescribed limits and/or compatible with the measurements of the preliminary test anchorages</td></tr>
<tr><td>8.6.2(3)</td><td>Notes 1 and 2</td><td>No specific indication is given. Recommendations on this can be found in (a)</td></tr>
<tr><td>10.2.(3)</td><td>Note</td><td>It is not permitted to treat lifting strength due to shear strength and anchorage forces as permanent stabilizing actions. Therefore, partial safety coefficients are not provided</td></tr>
<tr><td>11.5.1(1)P</td><td>Note</td><td>Please refer to Tables A.3, A.4 and A.14 in paragraphs A.3.1, A.3.2 and A.3.3.6 respectively</td></tr>
<tr><td>A.2</td><td>Note</td><td>See Table A.1 and A.2 attached at the bottom</td></tr>
<tr><td>A.3.1</td><td>Note</td><td>See Table A.3 attached at the bottom</td></tr>
<tr><td>A.3.2</td><td>Note</td><td>See Table A.4 attached at the bottom</td></tr>
<tr><td>A.3.3.1</td><td>Note</td><td>See Table A.5 attached at the bottom</td></tr>
</table>

A.3.3.2	Note	See Tables A.6, A.7 and A.8 attached at the bottom
A.3.3.3	Note	See Tables A.9, A.10 and A.11 attached at the bottom
A.3.3.5	Note	See Table A.13 attached at the bottom
A.3.3.6	Note	See Table A.14 attached at the bottom
A.4	Note	See Tables A.15 and A.16 attached at the bottom
A.5	Note	Table A.17 is not applicable. The partial factors for HYD verifications shall be those indicated in point 2.4.7.5(2) P above
Annex B (informative)		The informative nature of this annex is confirmed
Annex C (informative)		The informative nature of this annex is confirmed Alternative methods may be used for the calculation of active and passive forces
Annex D (informative)		The informative nature of this annex is confirmed
Annex E (informative)		The use of this annex is not accepted.
Annex F (informative)		The informative nature of this annex is confirmed
Annex G (informative)		The informative nature of this annex is confirmed
Annex H (informative)		The informative nature of this annex is confirmed
Annex J (informative)		The informative nature of this annex is confirmed

Table A.*1*

Partial coefficients on actions for verifications regarding EQU limit states (1)

Action	Symbol	Value
Permanent unfavourable(2)	$\gamma_{G;dst1}$	1.1
	$\gamma_{G;dst2}$	1.5
Permanent favourable(2)	$\gamma_{G;stb1}$	0.9
	$\gamma_{G;stb2}$	0
Variable unfavourable	$\gamma_{Q;dst}$	1.5
Variable favourable	$\gamma_{Q;stb}$	0

(1) The coefficients are defined in the Annex to EN 1990. They are reported here only for the sake of ease of consultation.

(2) Two coefficients are distinguished, γ_G, γ_{G1} and γ_{G2}, for structural and non-structural permanent loads respectively.
In each verification of the ultimate limit state structural loads are considered as all those deriving from the presence of structures and materials which, in the modelling used, contribute to the behaviour of the work with characteristics of strength and rigidity. In particular, considered within the structural load shall be the weight of the soil in the verifications on slopes and embankments, the force on the support structures, etc.
Should the permanent non-structural loads (for example permanent carried loads) be fully defined, the same valid coefficients may be adopted for permanent actions.

Table A.*2*

Partial coefficients on soil parameters for verifications regarding the EQU limit state

Soil parameters	Symbol	Value
Angle of shear force (or of friction)	$\gamma_{\varphi'}$	1.25
Effective cohesion	$\gamma_{c'}$	1.25
Undrained strength (or cohesion)	γ_{cu}	1.4
Unit shear strength [(1)]	$\gamma_{\tau r}$	1.25
Weight of unit of volume	γ_{γ}	1.0

(1) The partial coefficient on the unit shear strength is introduced to replace the corresponding value on the simple compression strength

Table A.*3*
Partial coefficients on actions or effect of actions

Action	Symbol	Values	
		A1	A2
Permanent unfavourable[(1)]	γ_G	$\gamma_{G1} = 1.3$	$\gamma_{G1} = 1.0$
		$\gamma_{G2} = 1.5$	$\gamma_{G2} = 1.3$
Permanent favourable[(1)]		$\gamma_{G1} = 1.0$	$\gamma_{G1} = 1.0$
		$\gamma_{G2} = 0$	$\gamma_{G2} = 0$
Variable unfavourable	γ_Q	1.5	1.3
Variable favourable		0	0

(1) Two coefficients are distinguished, γ_G, γ_{G1} and γ_{G2}, for structural and non-structural permanent loads respectively. In each verification of the ultimate limit state structural loads are considered as all those which derive from the presence of structures and materials which, in the modelling used, contribute to the performance of the work with characteristics of strength and rigidity. In particular, considered within the structural load shall be the weight of the soil in the verifications on slopes and embankments, the force on the support structures, etc.
Should the permanent non-structural loads (for example permanent carried loads) be fully defined, the same valid coefficients may be adopted for permanent actions.

Table A.*4*
Partial coefficients on soil parameters for verifications regarding the STR and GEO limit states

Soil parameters	Symbol	Values	
		M1	M2[(1)]
Angle of shear force (or of friction)	$\gamma_{\varphi'}$	1.0	1.25
Effective cohesion	$\gamma_{c'}$	1.0	1.25
Undrained strength (or cohesion)	γ_{cu}	1.0	1.4
Unit shear strength [(1)]	$\gamma_{\tau r}$	1.0	1.25
Weight of unit of volume	γ_{γ}	1.0	1.0

(1) The partial coefficient on the unit shear strength is introduced to replace the corresponding value on the simple compression strength

Table A.*5*

Partial coefficients for resistance of surface foundations

Resistance	Symbol	
		R2
Limit load	$\gamma_{R;v}$	2.3
Sliding	$\gamma_{R;h}$	1.1

Table A.*6*
Partial coefficients for resistance of driven piles

Resistance	Symbol	
		R2
Point	γ_b	1.15
Lateral	γ_s	1.15
Total (compression)	γ_t	1.15
Lateral (traction)	$\gamma_{s;t}$	1.25

Table A.*7*
Partial coefficients for resistance of bored piles

Resistance	Symbol	
		R2
Point	γ_b	1.35
Lateral	γ_s	1.15
Total (compression)	γ_t	1.3
Lateral (traction)	$\gamma_{s;t}$	1.25

Table A.*8*
Partial coefficients for resistance of continuous helical piles

Resistance	Symbol	
		R2
Point	γ_b	1.3
Lateral	γ_s	1.15
Total (compression)	γ_t	1.25
Lateral (traction)	$\gamma_{s;t}$	1.25

Table A.9
Correlation coefficients for design static load tests on pilot piles

ξ per n =	1	2	3	4	≥5
ξ_1	1.40	1.30	1.20	1.10	1.00

ξ_2	1.40	1.20	1.05	1.00	1.00

Table A.10
Correlation coefficients for deriving characteristic values of pile strength from calculations carried out from the results of on-site and laboratory investigations on soil

ξ per n =	1	2	3	4	5	7	10
ξ_3	1.70	1.65	1.60	1.55	1.50	1.45	1.40
ξ_4	1.70	1.55	1.48	1.42	1.34	1.28	1.21

Table A.11

Correlation coefficients for dynamic load tests on piles

ξ per n	≥2	≥5	≥10	≥15	≥20
ξ_5	1.60	1.50	1.45	1.42	1.40
ξ_6	1.50	1.35	1.30	1.25	1.25

Table A.13
Partial coefficients for verifications of support works

Resistance	Symbol	
		R2
limit load	$\gamma_{R;v}$	1.4
sliding	$\gamma_{R;h}$	1.1
passive strength	$\gamma_{R;e}$	1.4

Table A.14
Safety coefficients for global stability verifications

Resistance	Symbol	Values
		R1
shear strength of land	$\gamma_{R;e}$	1.1

Table A.15
Partial coefficients on actions for verifications regarding the UPL state

Action	Symbol	Value
Structural permanent unfavourable(1)	$\gamma_{G;dst,1}$	1.1
Non-structural permanent unfavourable(1)	$\gamma_{G;dst,2}$	1.5

Structural permanent favourable	$\gamma_{G;stb, 1}$	0.9
Non-structural permanent favourable	$\gamma_{G;stb,2}$	0
Variable unfavourable	$\gamma_{Q;dst}$	1.5

(1) Two coefficients are distinguished, γ_G, γ_{G1} and γ_{G2}, for structural and non-structural permanent loads respectively. In each verification of the ultimate limit state structural loads are considered as all those which derive from the presence of structures and materials which, in the modelling used, contribute to the performance of the work with characteristics of strength and rigidity.
Should the permanent non-structural loads (for example permanent carried loads) be fully defined, the same valid coefficients may be adopted for permanent actions.

Table A.16
Partial coefficients on soil parameters for verifications regarding the UPL limit state

Soil parameters	Symbol	Value
Angle of shear force (or of friction)	$\gamma_{\varphi'}$	1.25
Effective cohesion	$\gamma_{c'}$	1.25
Undrained strength (or cohesion)	γ_{cu}	1.4
Unit shear strength (1)	$\gamma_{\tau r}$	1.25
Anchorage strength	γ_a	1.4

(1) The partial coefficient on the unit shear strength is introduced to replace the corresponding value on the simple compression strength

4. NON-CONTRADICTORY ADDITIONAL INFORMATION

For the design of piles under transversal actions and anchorages, reference must be made to the current Technical Standards for Construction.

(a) For the design of anchorages, reference can be made to the AICAP-AGI Recommendations '*Anchorages in Soils and Rocks*'. 2012. Edizioni AGI-Roma - ISBN 978-88-975-1708-5

NATIONAL ANNEX

UNI-EN-1997-2:2007	(includes corrigendum AC:2010) Geotechnical design Part 2: Ground investigation and testing
EN-1997-2:2007	(including corrigendum June 2010) Geotechnical Design Part 2: Ground investigation and testing

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1997-2:2007.

2. INTRODUCTION

The document includes a general part and 24 Informative Annexes but does not provide for the definition of any national parameter.

NATIONAL ANNEX

UNI-EN-1998-1:2013	(includes update A1:2013 and corrigendum AC:2009) – Design of structures for earthquake resistance Part 1- General rules, seismic actions and rules for buildings.
EN-1998-1:2004+A1:2013	(include corrigendum AC:2009 Design of structures for earthquake resistance- Part 1 - General Rules, seismic actions and rules for buildings.

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1998-1:2013.
The document also contains values and requirements for the definition of seismic actions (accelerations, response spectra and their stratigraphic classifications, relative terrain displacements, etc.) as for all NPD values of EN 1998-1:2013.
These parameters are consistent with the general and specific criteria on seismic actions defined for the national territory.

2. INTRODUCTION

2.1 Scope

This National Annex contains, in paragraph 3 below, the decisions on the national parameters to be laid down in UNI-EN-1998-1 with regard to the following Paragraphs:

1.1.2(7)	4.3.3.1 (4)	5.11.3.4(7)e	9.2.3(1)
2.1(1)P	4.3.3.1 (8)	6.1.2(1)P	9.2.4(1)
2.1(1)P	4.4.2.5 (2).	6.1.3(1)	9.3(2)
3.1.1(4)	4.4.3.2 (2)	6.2(3)	9.3(2)
3.1.2(1)	5.2.1(5)P	6.2 (7)	9.3(3)
3.2.1(1), (2),(3)	5.2.2.2(10)	6.5.5(7)	9.3(4), Table 9.1
3.2.1(4)	5.2.4, (3)	6.7.4(2)	9.3(4), Table 9.1
3.2.1(5)P	5.4.3.5.2(1)	7.1.2(1)P	9.5.1(5)
3.2.2.1(4), 3.2.2.2(1)P	5.8.2(3)	7.1.3(1), (3)	9.6(3)
3.2.2.3(2)	5.8.2(4)	7.1.3(4)	9.7.2(1)
3.2.2.5(4)P	5.8.2(5)	7.7.2(4)	9.7.2(2)b
4.2.3.2(8)	5.11.1.3.2(3)	8.3(1)P	9.7.2(2)c
4.2.4(2)P	5.11.1.4	9.2.1(1)	9.7.2(5)
4.2.5(5)P	5.11.1.5(2)	9.2.2(1)	10.3(2)P

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1998-1:2013 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1998-1:2013.

3. NATIONAL DECISIONS

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>1.1.2(7)</td><td>Note</td><td>Annex A, which remains informative, is fully transposed into the expression of the elastic displacement response spectrum set out in Paragraph 3.2.3.2.3 of the 2018 NTC. Annex B is informative. It shows how other criteria may be used to assess maximum displacement</td></tr>
<tr><td>2.1(1)P</td><td>Nota1</td><td>The nominal lifetimes of the various types of works are shown in the following Table and must be specified in the design documents.

Minimum values of the Nominal design lifetime VN for several types of constructions
<table>
<tr><th></th><th>TYPES OF CONSTRUCTIONS</th><th>Minimum values of VN (years)</th></tr>
<tr><td>1</td><td>Temporary and provisional constructions [1]</td><td>10</td></tr>
<tr><td>2</td><td>Buildings with ordinary performance levels</td><td>50</td></tr>
<tr><td>3</td><td>Buildings with high performance levels</td><td>100</td></tr>
</table>
Constructions or parts thereof that can be dismantled with the intention of being reused are not to be considered temporary.
For new construction works for which the design construction phase is anticipated to span a duration equal to P_N, the working life related to this phase of construction, for the purposes of the evaluation of seismic actions, should be assumed to be no less than P_N , and in any case no less than 5 years.
Seismic monitoring of constructions of type 1 or constructions at the construction stage may be omitted when the project anticipates that such condition will persist for less than 2 years.
Constructions are classified into four use classes, defined in the Note to Paragraph 4.2.5 (5)P.
Seismic actions are assessed in relation to a reference period V_R which is obtained, for each type of construction, by multiplying the nominal lifetime V_N for the use coefficient C_U, as defined in the Note to Paragraph 4.2.5(5)P.
$V_R = V_N \cdot C_U$
The Return Period T_R is a function of the probability of exceeding P_{VR} in the reference period V_R, according to the following expression:
$T_R = - V_R / \ln(1 - P_{VR}) = - C_U V_N / \ln(1 - P_{VR})$
The probability of exceedance over the reference period PVR, to be referred to in the identification of the seismic action acting in the Lifesaving Limit State, LLS, is 10 % in 50 years</td></tr>
<tr><td>2.1(1)P</td><td>Note 3</td><td>The probability of exceedance over the reference period PVR, to be referred to in the identification of the seismic action acting in the Damage Limit State is 63 % in 50 years.
The Return Period T_R is a function of the probability of exceeding P_{VR} in the reference period V_R, according to the following expression:
$T_R = - V_R / \ln(1 - P_{VR}) = - C_U V_N / \ln(1 - P_{VR})$
Where protection against operating limit states is of priority importance,</td></tr>
</table>

the value of P_{VR} must be reduced according to the degree of protection to be achieved.

To this end, as the use class and the coefficient C_U change, the value of C_U can be used not to increase V_N, taking it to V_R, but to reduce the value of P_{VR}.

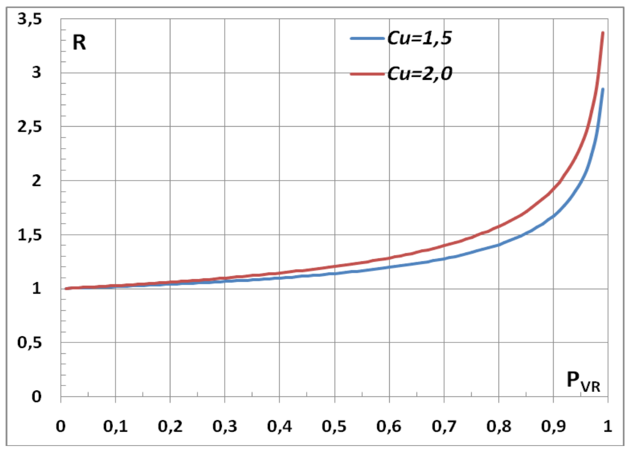
In such a case there shall be:

$T_R = - V_R / \ln (1- P_{VR}/C_U)$

Where $T_{R,a}$ is the return period obtained with the standard design strategy and $T_{R,b}$ is the return period obtained with the design strategy described above, the ratio R between the two return periods would be valid in this case:

[illegible]

it would have, depending on the CU and P_{V_R}, the developments shown in the following chart.



Variation of R with CU and P_{V_R}

Having noted that, with the proposed strategy, the conditions previously indicated as indispensable are respected (substantial constancy of TR, therefore substantially unchanged protection, for the values of P_{V_R} related to the ULS, i.e. for $P_{V_R} \leq 10$ %, and significant T_R growth, thus significantly increased protection, for the values of P_{V_R} related to the SLS, i.e. for $P_{V_R} \geq 60$ %), it then possible to assess how to apply the indication of the standard, i.e. how to modify the P_{V_R}.

To find how to change, as the C_U changes, the values of P_{V_R} in the VR reference period to obtain the same TR values as suggested by the proposed strategy, it is sufficient to impose R=1 in formula C.3.2.2 and indicate with $P^*_{V_R}$ the new values of P_{V_R}, thus obtaining:

[illegible]

It is thus possible to obtain, as the C_U changes, the values of $P^*_{V_R}$ starting from the values of P_{V_R}; these values are reported, together with the corresponding TR values, in Table C.3.2.II. Adopting the proposed strategy, as the C_U grows the values of $P^*_{V_R}$ corresponding to the Serviceability Limit States (SLS) are significantly reduced and the corresponding T_R grow, while the values of $P^*_{V_R}$ corresponding to the Ultimate Limit States (ULS) and the corresponding T_R do not substantially change.

Values of $P^*_{V_R}$ and TR as the CU changes

Limit States		Values of $P^*_{V_R}$			Corresponding TR values		
		CU = 1.0	CU = 1.5	CU = 2.0	CU = 1.0	CU = 1.5	CU = 2.0
SLS	OLS	81.00 %	68.80 %	64.60 %	$0,60 \cdot V_R$	$0,86 \cdot V_R$	$0,96 \cdot V_R$
	DLS	63.00 %	55.83 %	53.08 %	V_R	$1,22 \cdot V_R$	$1,32 \cdot V_R$
ULS	LLS	10.00 %	9.83 %	9.75 %	$9,50 \cdot V_R$	$9,66 \cdot V_R$	$9,75 \cdot V_R$
	CLS	5.00 %	4.96 %	4.94 %	$19,50 \cdot V_R$	$19,66 \cdot V_R$	$19,75 \cdot V_R$

Therefore, if protection against SLS is of priority importance, the values of P_{V_R} can be substituted with those of $P^*_{V_R}$, thus achieving better protection against SLS.

Having obtained the values of T_R corresponding to the four limit states considered (using, as the case may be, design strategy a or b), it is possible to obtain, by varying the site in which the construction is located and using the data given in Annexes A and B to the NTC 2008, the ground acceleration ag and the shapes of the design response spectrum for each site, construction, situation of use, and limit state

3.1.1(4)	Note	Where stratigraphic conditions and soil properties are clearly attributable to the categories defined in Table 3.2.II of the 2018 NTC, a simplified approach can be referred to, based on subsoil classification according to the values of the propagation rate of shear waves. Simplified methods may only be used if the seismic action at the surface is described by the maximum acceleration or the elastic response spectrum; they cannot be used if the seismic action on the surface is described by temporal histories of ground motion. (Paragraph 3.2.2 of the 2018 NTC, Paragraph C3.2.2 of Application Circular No 7 of 11 February 2019)
3.1.2(1)	Note	Please refer to Paragraph C3.2.2 of Application Circular No 7 of 11 February 2019
3.2.1(1), (2), (3)	Notes	The value of a_g (maximum horizontal acceleration at the site expected in free-field conditions on a rigid reference site with a horizontal topographical surface) for each point of the grid where the Italian territory is divided is given in Annexes A and B to the Decree of the Minister of Infrastructure of 14 January 2008, published in the O.S. to the Official Gazette of 4 February 2008 No 29, with reference to any subsequent updates

<table>
<tr><td>3.2.1(4)
3.2.1(5) P</td><td>Note</td><td>For $a_g \cdot S \leq 0.075$ g, the 2018 NTC provides in Paragraph 7.0 simplified guidance for design and verification against the Lifesaving Limit State.
Paragraph 7.8.1.2 of the NTC 2018, for masonry structures in sites characterised by $a_g \cdot S \leq 0.075$g, derogation from certain requirements to avoid brittle breakages is allowed</td></tr>
<tr><td>3.2.2.1(4),
3.2.2.2(2)P</td><td>Note(1)
Note(2)</td><td>The parameters defining spectral forms are defined in Paragraphs 3.2.3.2 and 3.2.3.3 of the 2018 NTC and in Paragraph C3.2.2 of Application Circular No 7 of 11 February 2019</td></tr>
<tr><td>3.2.2.3(1)P</td><td>Note</td><td>The accelerating elastic response spectrum of the vertical component is defined in Paragraph 3.2.3.2.2 of the 2018 NTC</td></tr>
<tr><td>3.2.2.5(4)P</td><td>Note</td><td>The recommended value $\beta = 0.2$ is accepted. For full expressions of the design spectra see Paragraphs 3.2.3.4 and 3.2.3.5 of the 2018 NTC</td></tr>
<tr><td>4.2.3.2(8)</td><td>Note</td><td>No definition of the centre of rigidity is given.
The torsional radius r is defined, for frame or wall structures, as the square root of the ratio between the torsional stiffness, K_θ, with respect to the lateral centre of stiffness and the greater of the lateral rigidities, K, taking into account only the primary structural elements (Paragraph C7.4.1 of Application Circular No 7 of 11 February 2019).
$$r = \sqrt{\frac{K_\theta}{K}}$$</td></tr>
<tr><td>4.2.4(2)P</td><td>Note</td><td>The value $\varphi = 1.00$ is adopted for each category and floor</td></tr>
<tr><td>4.2.5(5)P</td><td>Note</td><td>Importance coefficients as given in EN1998-1, where seismic action is multiplied, are assumed to be equal to 1.
In this National Annex, the importance of buildings is taken directly into account in the definition of seismic action by modifying the average return periods as set out in Notes 1 and 3 of Paragraph 2.1(1)P of this Annex, where the value of the use coefficient CU is defined, as the Use Class changes, as shown in the following Table.
Use coefficient CU values
<table><tr><th>USE CLASS</th><th>I</th><th>II</th><th>III</th><th>IV</th></tr><tr><td>CU COEFFICIENT</td><td>0.7</td><td>1.0</td><td>1.5</td><td>2.0</td></tr></table>
For buildings housing activities with a risk of accidents, CU values even higher than 2 should be adopted, in relation to the consequences for the environment and for public safety caused by the reaching of limit states</td></tr>
<tr><td>4.3.3.1 (4)</td><td>Note</td><td>Non-linear analysis methods may also be used in the case of buildings that are not isolated at the base</td></tr>
<tr><td>4.3.3.1 (8)</td><td>Note</td><td>The model of the structure must be three-dimensional and adequately represent the actual spatial distributions of mass, rigidity and resistance</td></tr>
<tr><td>4.4.2.5 (2).</td><td>Note</td><td>For horizontal diaphragms a unique value γ_d=1.3 is adopted regardless of the breaking manner</td></tr>
<tr><td>4.4.3.2 (2)</td><td>Note</td><td>For C_U I and II checks must be carried out at the DLS using the design response spectrum for the intended use class as defined in Paragraph 3.2.3.5 of the 2018 NTC</td></tr>
</table>

		The following values of ν are adopted: - for cladding rigidly connected to the structure that interferes with its deformability ν=1.0 - for cladding designed in such a way as not to suffer damage as a result of interplanar movements d_{rp}, because of its inherent deformability or links to the structure ν=1.0 The checks to be carried out are set out in Paragraph 7.3.6.1 of the 2018 NTC, in which, in the case of linear analyses, d_r has the meaning specified in Paragraph C7.3.6.1 of Application Circular No 7 of 11 February 2019. In addition, Paragraph 7.3.6.1 of the 2018 NTC contains additional limitations compared to those indicated in 4.4.3.2 of EN-1998-1:2004+A1:2013 (corrigendum AC:2009), relating to: - buildings with a load-bearing structure of ordinary masonry $q \cdot d_r < 0.0020 \cdot h$ - buildings with a supporting structure of reinforced masonry $q \cdot d_r < 0.0030 \cdot h$ - buildings with a load-bearing confined masonry structure $q \cdot d_r < 0.0025 \cdot h$ For C_U III and IV, checks must be carried out at the *OLS* (Table 7.3.III) using the response spectrum for the intended use class as defined in Paragraph 3.2.3.5 of the 2018 NTC. In this case, interplanar movements shall be less than 2/3 of the limits indicated for C_U I and II In the case of non-linear analyses, the value of q shall be 1. If different types of cladding or load-bearing structures exist on the same storey of the construction, the most restrictive displacement limit must be assumed If, in the case of cladding designed in such a way as not to suffer damage as a result of interplanar movements, interplanar movements exceed 0.005 h, checks of the displacement capacity of non-structural elements shall be extended to all cladding, internal partitions and installations
5.2.1(5)P	Note	There is no geographical limitation on the use of ductility classes M and H. There are however design and verification requirements in respect of the *LLS,* for buildings in sites where $a_g S \leq 0.075g$. These requirements are set out in Paragraph 7.0 of the 2018 NTC
5.2.2.2(10)	Note	No increase of *q* following quality control.
5.2.4(3)	Note	In the event that the reduction of the strength of materials due to degradation by cyclic deformations is justified on the basis of specific experimental tests, the values of the partial coefficients of safety on materials γ_M specified in Chapter 4 of the 2018 NTC may be adopted for the exceptional situations listed below: - Concrete constructions: γ_M=1.0 - Steel constructions: γ_M=1.0 - Composite constructions of steel and concrete: γ_M=1.0 - Wooden constructions: γ_M=1.0

		- Masonry constructions: γ_M equal to half of those assumed for ordinary situations
5.4.3.5.2(1)	Note	The suggested value is accepted: the minimum provided for walls in the non-seismic area in EN 1992-1-1
5.8.2(3)	Note	Horizontal links between foundations must be capable of absorbing the following axial forces: ± 0.2 Nsd a_{max} /g for type A stratigraphic profile ± 0.3 Nsd a_{max} /g for type B stratigraphic profile ± 0.4 Nsd a_{max} /g for type C stratigraphic profile ± 0.6 NSD a_{max} /g for type D stratigraphic profile where Nsd is the mean value of the vertical forces acting on the connected elements, and a_{max} is the maximum horizontal acceleration expected at the site. For the purpose of applying the preceding equations, the type E stratigraphic profile is combined with that of type C if the earth placed on the ground in consideration is medium dense (coarse-grained soils), or medium consistency (fine-grained soils) and with that of type D if the earth placed on the ground in consideration is loose density (coarse-grained soils) or loose consistency (fine-grained soils)
5.8.2(4)	Note	The suggested values are adopted
5.8.2(5)	Note	The suggested values are adopted
5.11.1.3.2(3)	Note	The ductility classes applicable to prefabricated constructions are those of other structural types
5.11.1.4	Note	The suggested value k_p=1 is adopted for structures which respect the terms given in Paragraphs 5.11.2.1.1, 5.11.2.1.2, 5.11.2.1.3. Should this condition not be satisfied it will be necessary to demonstrate the ductile behaviour of the connection and the entire structure with appropriate testing. Alternatively, a maximum structure factor q_P equal to 1.5 is assumed, as provided for in Paragraph 5.11.1.4(2). It corresponds to the value k_P=1.5/q
5.11.1.5(2)	Note	If it is necessary to verify the stability during the execution, the check at the ultimate limit state will be carried out with the action relating to the nominal lifetime of 10 years
5.11.3.4(7)e	Note	The suggested value is adopted
6.1.2(1)P	Note(1) Note(2)	The recommended value in Note (1) of the upper limit of the behaviour factor for non dissipative constructions q = 1.50 is adopted. There are no restrictions on the use of non dissipative or dissipative constructions with ductility classes M and H
6.1.3(1)	Note(1) Note(2)	For verifications of the ultimate limit states, the partial safety factor on steel resistance is equal to γ_s = 1.05
6.2(3)	Note(1) Note(2)	The material excess strength factor γ_{ov} is 1.25 for steels of type S235, S275 and S355 and 1.15 for steels of type S420 and S460
6.2 (7)	Note	The tenacity of the steel and the input material in the welding must meet the requirements of the quasi-permanent temperature value (see EN 1993-1-10:2004)
6.5.5(7)	Note	No additional rules

6.7.4(2)	Note(1) Note(2)	The suggested value γ_{pb} = 0.30 is adopted
7.1.2(1)P	Note(1) Note(2)	The recommended value in Note (1) of the upper limit of the behaviour factor for non dissipative constructions q = 1.50 is adopted There are no restrictions on the use of non dissipative or dissipative constructions with ductility classes M and H
7.1.3(1), (3)	Note(1) Note(2)	For checks at the ultimate limit states, the values of γ_M are equal to: - γ_C (concrete) = 1.5 - γ_A (carpentry steel) = 1.05 - γ_S (reinforced steel) = 1.15 - γ_V (connections) = 1.25 In serviceability limit states, it is assumed γ_M = 1. In exceptional design situations, it is assumed γ_M = 1. In the event that the reduction of the strength of materials due to degradation by cyclic deformations is justified on the basis of specific experimental tests, reference may be made to the indications set out in Paragraph 5.2.4 (3) of this Annex
7.1.3(4)	Note(1) Note(2)	Reference is made to Paragraph 6.2(3) of this Annex
7.7.2(4)	Note	The suggested value r= 0.50 is adopted
8.3(1)P	Note	There are no geographical limitations on the use of ductility classes M and H
9.2.1(1)	Note	Reference is made to the requirements set out in Paragraphs 4.5.2.2 and 7.8.1.2 of the 2018 NTC
9.2.2(1)	Note	With the exception of buildings located in sites characterised, at the LLS, by $a_gS \leq 0.075g$, the elements must comply with the following indications: - characteristic failure strength perpendicular to the load-bearing direction (f_{bk}), calculated on the gross area of the holes, no less than 5 MPa or, alternatively, mean normalised resistance in the load-bearing direction (f_b) no less than 6 MPa - characteristic failure strength perpendicular to the load-bearing direction or in the development plan of the wall($\bar{f}_{bk}$), calculated in the same way, may not be less than 1.5 MPa
9.2.3(1)	Note	The suggested value is adopted: • $f_{m,min}$=5 N/mm^2 for non-reinforced and confined masonry • $f_{m,min}$=10 N/mm^2 for reinforced masonry The minimum resistance class of the conglomerate must be C12/15. As regards the adhesiveness of the reinforcement, reference must be made to experimental test results and references of recognised validity
9.2.4(1)	Note	With reference to Paragraph 7.8.1.2 of the 2018 NTC, vertical joints must be filled with mortar (type a joints). If using elements for masonry which rely on pockets for filling of mortar, the vertical joint may be considered as entirely filled according to the indications in UNI EN 1996-1-1, Paragraph 8.1.5 (3). The use of thin joints (thickness between 0.5 mm and 3 mm) is permitted exclusively for buildings with characteristics of LLS, of

		$a_gS \leq 0.15$ g, with the following limitations: • maximum height, measured in axis to the thickness of the masonry: - 10.5 m if agS ≤ 0.075 g - 7 m if 0.075 g < agS ≤ 0.15 g • number of floors (n_P) in masonry from ground level: - $n_p \leq 3$ for $a_gS \leq 0.075$g; - $n_p \leq 2$ for 0.075g $< a_gS \leq 0.15$g
9.3(2)	Note(1) Note(2)	Only non-reinforced masonry designed in accordance with the provisions of EN 1996 may be used in the case of $a_gS \leq 0.075$g, with the additional requirements of Paragraph 3.2.1(5) of this Annex The minimum effective thicknesses for non-reinforced masonry designed solely according to the provisions of EN 1996 are shown in Table 9.2 of this Annex.
9.3(3)	Note	No limitation on the use of non-reinforced masonry in relation to the value of a_gS
9.3(4) Table 9.1	Note(1)	The indication in Note (1) is accepted assuming, for the masonry, the minimum values of q_0 in Table 9.1
9.3(4) Table 9.1	Note(2)	Buildings with increased ductility may be considered as those which, in addition to the provisions of Chapter 9 of EN 1998-1, also comply with: - the design criteria and geometric requirements set out in Paragraph 7.8.1.4 of the 2018 NTC - the detailed rules set out in Paragraphs 7.8.6.2 and 7.8.6.3 of the 2018 NTC and Paragraph C7.8.6.3 of Circular No 7 of 11 February 2019 In this case, the maximum values of the base value q_0 of the behaviour factor is shown in Table 7.3.II of the 2018 NTC. In the case of reinforced masonry, values between 2.0 αu/α1 and 2.5 αu/α1 can be applied in function of the construction system selection, without verifying what the collapse mechanism of the construction is. The value 3.0 αu/α1 can only be used by applying the capacity design principles described in Paragraph 7.8.1.7 of the 2018 NTC. $q = q0 \cdot K_R$ is always assumed, attributing to K_R the values indicated in Paragraph 7.3.1 of the 2018 NTC. Factors α_1 and α_u are defined as follows: - α1 is the multiplier of the horizontal seismic force through which, other actions remaining constant, the first wall panel reaches its ultimate resistance (through shear or buckling) - αu is 90 % of the multiplier of the horizontal seismic force through which, other actions remaining constant, the construction reaches its maximum resistance force The value of α_u/α_1 can be calculated by means of a non-linear static analysis (Paragraph 7.3.4.2) and cannot in any case be taken more than 2.5. If non-linear analysis is not carried out, the following values of α_u/α_1 may be adopted: - constructions using ordinary masonry $\alpha_u/\alpha_1 = 1.7$

<table>
<tr><td></td><td></td><td>- constructions using reinforced masonry $\alpha_u/\alpha_1 = 1.5$
- reinforced masonry constructions with a capacity design $\alpha_u/\alpha_1 = 1.3$
- constructions using confined masonry $\alpha_u/\alpha_1 = 1.6$</td></tr>
<tr><td>9.5.1(5)</td><td>Note</td><td>The geometry of the earthquake-resistant walls shall comply with the requirements set out in Table 9.2 below, where t is the thickness of the wall net of the plaster, h_o is the free inflexion height of the wall as defined in Paragraph 4.5.6.2 of the 2018 NTC, h’ is the maximum height of the openings adjacent to the wall, and l the length of the wall.

Table 9.2 Geometric requirements for earthquake-resistant walls (Table 7.8.I of the 2018 NTC)
<table>
<tr><th>Construction types</th><th>t_{min}</th><th>$(\lambda=h_o/t)_{max}$</th><th>$(l/h')_{min}$</th></tr>
<tr><td>Ordinary masonry, made with square stone elements</td><td>300 mm</td><td>10</td><td>0.5</td></tr>
<tr><td>Ordinary masonry, made with artificial elements</td><td>240 mm</td><td>12</td><td>0.4</td></tr>
<tr><td>Reinforced masonry, made with artificial elements</td><td>240 mm</td><td>15</td><td>Any</td></tr>
<tr><td>Confined masonry</td><td>240 mm</td><td>15</td><td>0.3</td></tr>
<tr><td>Ordinary masonry, made with square stone elements, in sites characterised, at LLS, of $a_g S \leq 0.15$ g</td><td>240 mm</td><td>12</td><td>0.3</td></tr>
<tr><td>Masonry, made with artificial semi-filled elements, in sites characterised, at the LLS, by $a_g S \leq 0.075$ g</td><td>200 mm</td><td>20</td><td>0.3</td></tr>
<tr><td>Masonry made with artificial filled elements, in sites characterised, at the LLS, by $a_g S \leq 0.075$ g</td><td>150 mm</td><td>20</td><td>0.3</td></tr>
</table></td></tr>
<tr><td>9.6(3)</td><td>Note</td><td>The partial safety coefficients for the strength of the material provided in Table 4.5.II of the 2018 NTC may be reduced by 20 % and in any case up to a value of not less than 2 (Paragraph 7.8.1.1 of the 2018 NTC).
The values of γ_M for the conglomerate and steel reinforcement used in reinforced and confined masonry are those adopted for the fundamental loading conditions contained in EN-1992-1-1 for the verification of the ULS:
- $\gamma_c = 1.50$
- $\gamma_s = 1.15$</td></tr>
</table>

<table>
<tr><td>9.7.2(1)</td><td>Note</td><td>
In the case of simple constructions, as defined in Paragraph 7.8.1.9 of the 2018 NTC and according to the indications of Paragraphs C7.8.1.9 of Circular No 7 of 11 February 2019, for each storey the ratio between the area of the resistant section of the walls and the gross surface area of the storey shall not be less than the values given in Table 7.8.II of the 2018 NTC, depending on the number of building storeys and the seismicity of the site, for each of the two orthogonal directions:

Table 9.3 Area of resistant walls in each orthogonal direction for simple constructions (Table 7.8.II of the 2018 NTC).
<table>
<tr><td colspan="2">$a_g S$ peak soil acceleration</td><td>≤0.075 g</td><td>≤0.10 g</td><td>≤0.15 g</td><td>≤0.20 g</td><td>≤0.25 g</td><td>≤0.30 g</td><td>≤0.35 g</td></tr>
<tr><td>Type of structure</td><td>Number of storeys</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="3">Ordinary masonry</td><td>1</td><td>3.5 %</td><td>3.5 %</td><td>4.0 %</td><td>4.5 %</td><td>5.5 %</td><td>6.0 %</td><td>6.0 %</td></tr>
<tr><td>2</td><td>4.0 %</td><td>4.0 %</td><td>4.5 %</td><td>5.0 %</td><td>6.0 %</td><td>6.5 %</td><td>6.5 %</td></tr>
<tr><td>3</td><td>4.5 %</td><td>4.5 %</td><td>5.0 %</td><td>6.0 %</td><td>6.5 %</td><td>7.0 %</td><td>7.0 %</td></tr>
<tr><td rowspan="3">Confined masonry</td><td>1</td><td>3.2 %</td><td>3.2 %</td><td>3.6 %</td><td>4.0 %</td><td>5.0 %</td><td>5.5 %</td><td>5.5 %</td></tr>
<tr><td>2</td><td>3.6 %</td><td>3.6 %</td><td>4.0 %</td><td>4.5 %</td><td>5.5 %</td><td>6.0 %</td><td>6.0 %</td></tr>
<tr><td>3</td><td>4.0 %</td><td>4.0 %</td><td>4.5 %</td><td>5.5 %</td><td>6.0 %</td><td>6.5 %</td><td>6.5 %</td></tr>
<tr><td rowspan="4">Reinforced masonry</td><td>1</td><td>2.5 %</td><td>3.0 %</td><td>3.0 %</td><td>3.0 %</td><td>3.5 %</td><td>3.5 %</td><td>4.0 %</td></tr>
<tr><td>2</td><td>3.0 %</td><td>3.5 %</td><td>3.5 %</td><td>3.5 %</td><td>4.0 %</td><td>4.0 %</td><td>4.5 %</td></tr>
<tr><td>3</td><td>3.5 %</td><td>4.0 %</td><td>4.0 %</td><td>4.0 %</td><td>4.5 %</td><td>5.0 %</td><td>5.5 %</td></tr>
<tr><td>4</td><td>4.0 %</td><td>4.5 %</td><td>4.5 %</td><td>5.0 %</td><td>5.5 %</td><td>5.5 %</td><td>5.5 %</td></tr>
</table>

For simple constructions, the number of storeys may not exceed 3 for ordinary masonry and confined masonry constructions, and 4 for reinforced masonry constructions.
The following must also be true for each storey:
$$\sigma = \frac{N}{A} \leq 0{,}25 \frac{f_k}{\gamma_M}$$
where N is the total vertical load at the base of each storey of the building corresponding to the sum of the permanent and variable loads (assessed by assuming $\gamma_G = \gamma_Q = 1$), A is the total area of the load-bearing walls on the same storey and f_k the characteristic compression strength in the vertical direction of the masonry.

The foundations can be sized in a simple manner, taking into account

the mean normal tensions and global seismic stresses determined by

linear static analysis
</td></tr>
<tr><td>9.7.2(2)b</td><td>Note</td><td>The value λ_{min} = 1/3 is adopted</td></tr>
<tr><td>9.7.2(2)c</td><td>Note</td><td>With regard to the plant regularity criteria, for each recess, the area between the perimeter of the horizontal and the convex line circumscribing the horizontal shall not exceed 5 % of the horizontal area</td></tr>
<tr><td>9.7.2(5)</td><td>Note</td><td>With regard to the criteria of regularity in height, the mass and stiffness must remain constant or vary gradually, without abrupt changes, from the base to the top of the construction (changes in mass from one</td></tr>
</table>

		horizontal line to the other must not exceed 25 %, the rigidity should not be reduced from one horizontal line to one above it by more than 30 % and must not increase by more than 10 %); for the purposes of rigidity, structures with walls or cores of reinforced concrete or masonry walls and cores of a constant cross-section over the height or frames braced with steel, to which at least 50% of the seismic action at the base is entrusted, may be considered structures regular in height
10.3(2)P	Note	Checks of devices must be conducted with reference to actions for CLS rather than LLS For this reason, a higher coefficient of movements is adopted, equal to γ_x=1.2

NATIONAL ANNEX

UNI-EN-1998 – 2:2011	(includes update A1:2009, update A2:2011 and corrigendum AC:2010) Design of structures for earthquake resistance. Part 2: Bridges
EN-1998 – 2:2005+A2:2011	(incorporating A1:2009 e corrigenda February AC:2010) Design of structures for earthquake resistance Part 2 – Bridges

1.PREMESSA

This Annex contains the national determination parameters for UNI-EN-1998-2:2011.

2. INTRODUCTION

2.1 Scope

The document contains, in point 3 below, the decisions on the national parameters to be laid down in UNI-EN1998:2 with regard to the following Paragraphs

1.1.1(8)	2.1(3)P	3.2.2.3(1)P	4.1.2(4)P	5.3(4)	6.2.1.4(1)P	7.4.1(1)P	J.1(2)
	2.1(4)P	3.3(1)P	4.1.8(2)	5.4(1)	6.5.1(1)P	7.6.2(1)P	J.2.(1)
	2.1(6)	3.3(6) (2 positions)		5.6.2(2)P b	6.6.2.3(3)	7.6.2(5)	
	2.2.2(5)			5.6.3.3(1)P b	6.6.3.2(1)P	7.7.1(2)	
	2.3.5.3(1)				6.7.3(7)	7.7.1(4)	
	2.3.6.3(5)						
	2.3.7(1) (2 positions)						

and to national information regarding use of Informative Annexes A, B, C, D, E, F, H, JJ and K and in Regulatory Annexes G and J for bridges in seismic zones.
These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1998-2:2011 in Italy.

2.2 Normative references

This Annex must be considered when using all normative documents which make explicit reference to UNI-EN-1998-2:2011 – Eurocode 8 – Design of structures for seismic resistance – Part 2 – Bridges.

3. NATIONAL DECISIONS

Paragraph	**Citation**	**National parameter - value or requirement**
1.1.1(8)	Use of Informative Annexes	Annexes A, J, JJ and K may not be used, except paragraph J.1. Informative Annexes B, C, D, E, F and H retain their informative nature
2.1 (3)P	Note 1	The average return periods of the action for the usual structures are defined on the basis of the probability of exceedance of the reference

limit states, as defined in Paragraph 3.2.1 of the 2018 NTC

The nominal lifetimes of the various types of works are shown in the following Table and must be specified in the design documents (Paragraph 2.4.1 of the 2018 NTC, Paragraph C2.4.1 of Circular No 7 of 11 February 2019).

Table 2.4.I Minimum values of the Nominal design lifetime VN *for several types of constructions*

	TYPES OF CONSTRUCTIONS	**Minimum values of VN** (years)
1	Temporary and provisional constructions[1]	10
2	Buildings with ordinary performance levels	50
3	Buildings with high performance levels	100

Constructions or parts thereof that can be dismantled with the intention of being reused are not to be considered temporary.

For new construction works for which the design construction phase is anticipated to span a duration equal to P_N, the working life related to this phase of construction, for the purposes of the evaluation of seismic actions, should be assumed to be no less than P_N , and in any case no less than 5 years.

Seismic monitoring of constructions of type 1 or constructions at the construction stage may be omitted when the project anticipates that such condition will persist for less than 2 years.

Bridges are classified in four classes of importance, defined in the Note to the following point 2.1.(4) P.

Seismic actions are assessed in relation to a reference period V_R which is obtained, for each type of construction, by multiplying the nominal lifetime V_N for the use coefficient C_U, as defined in the Note to the following point 4.2.5(5)P.

$$V_R = V_N \cdot C_U$$

The Return Period T_R is a function of the probability of exceeding P_{VR} in the reference period V_R, according to the following expression:

$$T_R = - V_R / \ln (1- P_{VR}) = - C_U V_N / \ln (1- P_{VR})$$

The value of the use coefficient C_U is defined, as the use class changes, as shown in Table 2.4.II of the 2018 NTC.

Table 2.4.II – Use coefficient C_U values

USE CLASS	II	III	IV
COEFFICIENT C_U	1.0	1.5	2.0

For buildings housing activities with a risk of accidents, C_U values even higher than 2 should be adopted, in relation to the consequences for the environment and for public safety caused by the reaching of limit states.

The probability of exceedance in the reference lifetime P_{VR}, to be referred to when identifying the seismic action in each of the limit states considered, is given in Table 3.2.I of the 2018 NTC.

<table>
<tr><td></td><td></td><td>Table 3.2.I – Probability of exceedance P_{VR} as the limit state considered changes
<table>
<tr><th colspan="2">Limit states</th><th>P_{VR}: Probability of exceedance in reference period V_R</th></tr>
<tr><td rowspan="2">Serviceability limit states</td><td>OLS</td><td>81 %</td></tr>
<tr><td>DLS</td><td>63 %</td></tr>
<tr><td rowspan="2">Ultimate limit states</td><td>LLS</td><td>10 %</td></tr>
<tr><td>CLS</td><td>5 %</td></tr>
</table></td></tr>
<tr><td>2.1(4)P</td><td>Note</td><td>The bridges are classified in classes of use II, III and IV, defined as follows:
- Class II: Bridges and structural works and road networks not in Class of use III or Class of use IV, rail networks whose interruption would not create an emergency situation. Dams the collapse of which would not have significant consequences
- Class III: Extra-urban road networks not falling within use class IV. Bridges and rail networks, the interruption of which may result in emergency situations. Dams, the collapse of which would have significant consequences.
- Class IV: Type A or B road networks as stated in Ministerial Decree No 6792 of 5 November 2001, ‘Functional and geometric standards for road construction,’ and type C networks, when belonging to connecting routes between regional towns also not served by type “A” or “B” roads. Bridges and railway networks of critical importance for maintenance of communication channels, particularly after a seismic event. Dams connected to the functioning of aqueducts and electrical plants</td></tr>
<tr><td>2.1(6)</td><td>Note</td><td>Importance coefficients as given in EN-1998-2, where seismic action is multiplied, are assumed to be equal to 1. In this National Annex, the significance of bridges is taken into account directly in the definition of seismic action by modifying the periods of return of the action itself</td></tr>
<tr><td>2.2.2(5)</td><td>Note</td><td>(5) cannot be applied</td></tr>
<tr><td>2.3.5.3(1)</td><td>Note 2</td><td>For the determination of the length of the plastic hinge $L_P$in the absence of more precise determinations, it may be assumed equal to: L_P=0.1L_S provided in Paragraph C8.8.5.4 of Circular No 7 of 11 February 2019, or the recommended expression given in Annex E may be adopted.</td></tr>
<tr><td>2.3.6.3(5)</td><td>Note 1</td><td>The value of the permitted limits for <u>non-critical structural components</u> must be greater than the sum of displacement determined by the seismic action relative to the damage limit state and displacement due to 50 % of the design thermal variation. The values adopted are therefore p_E=1.0 and p_T=0.5.
In Class III and IV bridges, the viability of the bridge must be guaranteed</td></tr>
<tr><td>2.3.7(1)</td><td>Note 1</td><td>Very low seismicity zone means sites for which the value of $a_g \cdot S$ rated at LLS is less than 0.075 g</td></tr>
<tr><td>2.3.7(1)</td><td>Note 2</td><td>No specific simplified methods for bridges are provided. However, the verification can be carried out in the elastic field for bridges of any</td></tr>
</table>

		category and in all zones using a behaviour factor q=1 for verifications of the OLS and $q \leq 1.5$ for verifications of the DLS, LLS and CLS
3.2.2.3(1)P	Note	The recommended procedure is not adopted. For the definition of active fault please refer, when necessary, to specific evaluations
3.3(1)P	Note	The spatial variability of motion must be considered in accordance with Paragraphs 3.2.4 and 7.3.5 of the 2018 NTC and Paragraph C7.3.5 of Circular No 7 of 11 February 2019 Therefore information is not provided on the value of L_{lim}, which does not interfere with the analysis
3.3(3)		The simplified method as stated in Points 3.3(4) and 3.3(7) may not be applied. However, the provisions set out in the National Annex of EN-1998-1 in relation to paragraph 3.3(1)P above apply
3.3(4) 3.3(5) 3.3.(6) 3.3.(7)P	All the text	The method described does not apply
4.1.2(4)P	Note	For road bridges, the coefficient ψ_{21} is assumed as a rule for the loads due to the transit of the vehicles equal to $\psi_{2j} = 0.0$. Where necessary, for example for bridges in urban areas of intense traffic, for the loads due to the transit of the vehicles $\psi_{2j} = 0.2$ is assumed, when relevant, both in the combination of actions and for the definition of the effect of seismic action (Paragraph 5.1.3.12 of the 2018 NTC). Railway bridges always adopt $\psi_{2,j} = 0.0$ (Table 5.2.VII of the 2018 NTC)
4.1.8(2)P	Note	The recommended value $\rho_0 = 2.0$ is adopted
5.3(4)	Note	For excess strength factors γ_0 the expression $\gamma_0 = 0.7 + 0.2 \cdot q \geq 1.0$ is adopted, according to Paragraph 7.9.5 of the 2018 NTC, where q is the value of the behaviour factor used in the calculation. In the case of reinforced concrete sections, where the ratio ν_k between the axial force and the compressive strength of the concrete section exceeds 0,1, the excess strength factor shall be multiplied by $1 + 2\,(\nu_k - 0.1)^2$. To the seismic actions, which the shoulder or stack must withstand as a standalone structure, the parasitic forces transmitted by friction from the mobile or elastomeric supports that do not perform the isolation function pursuant to Paragraph 7.10 of the 2018 NTC must be added, which must be increased by a factor of 1.30
5.4(1)	Note	The increase in the bending moment of the plastic hinge due to the effects of the II order is given by: - $\Delta M = q \cdot d_{Ed} \cdot N_{Ed}$ if $T_1 \geq T_C$ - $\Delta M = [1+(q-1) \cdot T_C/T_1] \cdot d_{Ed} \cdot N_{Ed}$ if $T_1 < T_C$ pursuant to Paragraph 7.9.4 of the 2018 NTC
5.6.2(2)P b	Note	For the partial coefficient γ_{Bd1} the recommended value $\gamma_{Bd1}=1.25$ is adopted.
5.6.3.3(1)P	Note	For the calculation of the partial coefficient γ_{Bd} procedure no 1 is

<table>
<tr><td>b</td><td></td><td>adopted, so that the recommended value is:
$1 \leq \gamma_{Bd} = \gamma_{Bd1}+1-(qV_{Ed}/V_{C,0}) \leq \gamma_{Bd1}$
where the value of γ_{Bd1} is specified in Paragraph 5.6.2(2)P of this Annex</td></tr>
<tr><td>6.2.1.4(1)P</td><td>Note</td><td>As recommended, the use of all types of confinement reinforcement is accepted</td></tr>
<tr><td>6.5.1(1)P</td><td>Note</td><td>In the case of non-dissipative structural behaviour, in any seismic zone, the capacity of the members and connections shall be assessed in accordance with the rules of Chapter 4 of the 2018 NTC, without any additional requirements, provided that:
- for reinforced concrete structures, no section exceeds the conventional curvature of first plasticisation, as defined in Paragraph 7.4.4.1.2 of the 2018 NTC
- for pre-stressed reinforced concrete structures and metal carpentry structures, no section exceeds the design yield curvature (Paragraph 7.9.2 of the 2018 NTC)</td></tr>
<tr><td>6.6.2.3(3)</td><td>Note</td><td>No specific rules are provided</td></tr>
<tr><td>6.6.3.2(1)P</td><td>Note</td><td>In order to prevent the detachment of the deck from the supports, vertical anti-lift restraints shall be adopted when the design seismic action exceeds a percentage p_H of the compression reaction of the support, due to permanent loads, equal to:
- p_H = 90 % in bridges with ductile behaviour
- p_H = 65 % in bridges with limited ductile behaviour</td></tr>
<tr><td>6.7.3(7)</td><td>Note</td><td>The recommended limit displacement values d_{lim} given in the table are adopted, limited to importance Classes II, III and IV.
<table>
<tr><th>Use class</th><th>d_{lim} [mm]</th></tr>
<tr><td>II</td><td>60</td></tr>
<tr><td>III</td><td>45</td></tr>
<tr><td>IV</td><td>30</td></tr>
</table></td></tr>
<tr><td>7.4.1(1)P</td><td>Note</td><td>The design spectrum must be considered in compliance with the terms provided in National Annex EN-1998-1</td></tr>
<tr><td>7.6.2(1)P</td><td>Note</td><td>Checks of devices must be conducted with reference to actions for CLS rather than LLS. =For this reason, a higher coefficient of movements is adopted, equal to γ_x=1.2</td></tr>
<tr><td>7.6.2(5)</td><td>Note</td><td>For the partial coefficient γ_m the value γ_m=1.00 is always adopted</td></tr>
<tr><td>7.7.1(2)</td><td>Note</td><td>The recommended value δ = 0.5 is adopted</td></tr>
<tr><td>J.1(2)</td><td>Note</td><td>The temperature values $T_{min,b}$ must be defined case by case according to the type of deck and location of the site.
In any case, the above Paragraph 1.1.1(8) of this National Annex applies</td></tr>
<tr><td>J.2(1)</td><td>Note 2</td><td>The recommended values of factors λ are adopted as are the guidelines in Informative Annex JJ.
In any case, the above Paragraph 1.1.1(8) of this National Annex applies</td></tr>
</table>

NATIONAL ANNEX

UNI-EN-1998-3:2005	(includes corrigenda AC:2010 and AC:2013) Design of structures for earthquake resistance. Part 3: Assessment and retrofitting of buildings
EN-1998-3:2005	(incorporating corrigenda March 2010 and August 2013) - Design of structures for earthquake resistance Part 3: Assessment and retrofitting of buildings

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1998-3:2005.
Interventions on existing structures are classified as adaptation, improvement, repair or local intervention as defined in Paragraph 8.4 *Classification of interventions* of the 2018 NTC. The application of UNI-EN-1998-3:2005 cannot disregard, for each category of intervention, the provisions of the 2018 NTC.
Adaptation and improvement interventions must undergo static tests.
For interventions aimed at reducing the vulnerability to earthquakes of cultural heritage assets, the regulatory reference is the Prime Ministerial Directive of 9 February 2011 'Assessment and reduction of the earthquake risk of cultural heritage with reference to the technical standards for construction referred to in the Ministerial Decree of 14 January 2008', published in Official Gazette No 47 of 26 February 2011 – suppl. ord. no 54. In view of the specificity and articulation of the content, as well as the characteristics of Italy's historical building heritage, this directive can be adopted as a reference for buildings which in any case have a historical, artistic or urban-environmental value, even if not explicitly bound by it.

2. INTRODUCTION

2.1 Scope

This Annex contains, in paragraph 3 below, the decisions on the national parameters to be laid down in UNI-EN-1998-3 with regard to the following Paragraphs:

1.1(4)	2.1(2)P	3.3.1(4)	4.4.2(1)P
	2.1(3)P	3.4.4(1)	4.4.4.5(2)
	2.2.1(7)P		A.4.4.2(5)
			A.4.4.2(9)

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1998-3:2005 in Italy.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1998-3:2005

3. NATIONAL DECISIONS

Paragraph	Citation	National parameter - value or requirement
1.1(4)		ANNEX A REINFORCED CONCRETE STRUCTURES (informative) Informative Annex A for reinforced concrete structures is replaced, with regard to the data necessary for the assessment of the level of static security and earthquake vulnerability, with reference to the indications in Paragraphs C8.5 *Definition of the reference model for analyses*, C8.5.1 *Historical and critical analysis*, C8.5.2*Relief*, in particular C8.5.2.2 *Reinforced concrete or steel constructions*, C8.5.3*Mechanical characterisation of materials*, in particular C8.5.3.2 *Reinforced concrete or steel constructions*, and C8.5.4 *Knowledge levels and confidence factors* in particular C8.5.4.2 *Reinforced concrete or steel constructions*, of Circular No 7 of 11 February 2019. As regards the design of interventions in the presence of seismic actions, Informative Annex A is replaced by the indications in Paragraphs C8.7.2 *Reinforced concrete or steel constructions*, in particular C8.7.2.1 *Safety requirements*, C8.7.2.2 *Methods of analysis and verification criteria* and C8.7.2.3 *Capacity models for the evaluation of reinforced concrete buildings* and in C8.7.4 *Criteria and types of intervention*, in particular C8.7.4.2 *Criteria for consolidation interventions in concrete buildings* of the aforementioned Circular. For the design of FRP reinforcement operations reference shall be made to the CNR-DT 200/2004 Instruction as amended as indicated in Paragraph C8.7.4 *Criteria and types of intervention* of Circular No 7 of 11 February 2019. ANNEX B STEEL AND COMPOSITE STRUCTURES (informative) Annex B remains informative and is integrated, with regard to the data necessary for the assessment of the level of static security and earthquake vulnerability, with reference to the indications in points C8.5 *Definition of the reference model for analyses*, C8.5.1 *Historical and critical analysis*, C8.5.2*Relief*, in particular C8.5.2.2 *Reinforced concrete or steel constructions*, C8.5.3*Mechanical characterisation of materials*, in particular C8.5.3.2 *Reinforced concrete or steel constructions*, and C8.5.4 *Knowledge levels and confidence factors* in particular C8.5.4.2 *Reinforced concrete or steel constructions*, of Circular No 7 of 11 February 2019. As regards the design of interventions in the presence of seismic actions, Informative Annex B is supplemented by the indications in points C8.7.2 *Reinforced concrete or steel constructions*, in particular in C8.7.2.1 *Safety requirements*, C8.7.2.2 *Methods of analysis and verification criteria* and C8.7.2.4 *Criteria and types of intervention* of the aforementioned Circular. ANNEX C MASONRY BUILDINGS (informative) Informative Annex C for masonry constructions is replaced, with regard to the data necessary for the assessment of the level of static security and earthquake vulnerability, with reference to the indications in Paragraphs

		C8.5 *Definition of the reference model for analyses*, C8.5.1 *Historical and critical analysis*, C8.5.2*Relief*, in particular C8.5.2.1 *Masonry constructions*, C8.5.3 *Mechanical characterisation of materials*. in particular C8.5.3.1 *Masonry constructions*C8.5.4*Knowledge levels and confidence factors*, in particular C8.5.4.1 *Masonry constructions*. As regards the design of interventions in the presence of seismic actions, it is replaced by the indications in Paragraph C8.7.1 *Masonry constructions* and C8.7.4 *Criteria and types of intervention*, in particular C8.7.4.1 *Criteria for consolidation interventions on masonry buildings*, of Circular No 7 of 11 February 2019
2.1(2)P		The Ultimate Limit States (ULS) and Serviceability Limit States (SLS) with the relevant probability of exceedance are defined in Paragraph 3.2.1 of the 2018 NTC. With regard to seismic actions, both serviceability limit states (SLS), and ultimate limit states (ULS) are identified by referring to the performance of the structure as a whole, including structural and non-structural elements and equipment. Serviceability limit states (SLS) are comprised of: - *Operating Limit State* (OLS): as a result of the earthquake, the construction as a whole, including the structural elements, non-structural elements and equipment relevant to its function, must not suffer significant damage and interruptions of use - *Damage Limit State* (DLS): following an earthquake, the construction in its entirety, including structural and non-structural elements and equipment related to its function, should suffer only damage that does not put its users at risk and does not significantly compromise its resistance and stiffness capacity towards vertical and horizontal actions, remaining immediately usable even if use of part of the equipment is interrupted Ultimate limit states (ULS) are comprised of: - *Lifesaving Limit State* (LLS): as a result of the earthquake, the construction suffers breakages and collapses of the non-structural and plant components and significant damage to the structural components associated with a significant loss of rigidity towards horizontal actions; the construction retains a part of the resistance and rigidity for vertical actions and a safety margin against collapse for horizontal seismic actions; - *Collapse Prevention Limit State* (CLS): as a result of the earthquake, the construction suffers severe breakages and collapses of the non-structural and plant components and very serious damage to the structural components; the construction still retains a safety margin for vertical actions and a small safety margin against collapse for horizontal actions. Paragraph 8.3 of the 2018 NTC specifies that the safety assessment and the design of interventions on existing constructions may be carried out with reference only to ULS, except for constructions in use class IV, for which verifications against the SLS specified in Paragraph 7.3.6 of the

2018 NTC are also required; in the latter case, reduced performance levels may be adopted.

The use class for a construction is defined in Paragraph 2.4.2 of the 2018 NTC, with reference to the consequences of an interruption in the operation or of a possible collapse.

For the seismic combination, ULS verifications of existing constructions can be performed against the condition of safeguarding human life (LLS) or, alternatively, the collapse condition (CLS), pursuant to Paragraph 7.3.6 of the 2018 NTC.

2.1(3)P

Seismic actions are assessed in relation to a reference period V_R which, for each type of construction, is obtained by multiplying the nominal lifetime V_N for the use coefficient C_U, in relation to the use class, as defined in Paragraph 2.4.2 of the 2018 NTC.

$$V_R = V_N \cdot C_U$$

Cu is defined for each use class, as per Table 2.4.II of 2018 NTC.

Table 2.4.II – *Use coefficient C_U values*

USE CLASS	I	II	III	IV
COEFFICIENT C_U	0.7	1.0	1.5	2.0

V_N is conventionally defined in Paragraph 2.4.1 of the 2018 NTC as the number of years in which the work is expected, provided that the maintenance planned in the design stage is carried out, to maintain the performance levels for which it was designed. The minimum values of V_N to be adopted for the different types of constructions are shown in Table 2.4.I. of the 2018 NTC. These values can also be used to define time-dependent performance.

Table 2.4.I - *Minimum nominal design lifetime values* V_N *for different types of constructions*

	TYPES OF CONSTRUCTIONS	**Minimum V_N values** (years)
1	Temporary and provisional constructions (1)	10
2	Buildings with ordinary performance levels	50
3	Buildings with high performance levels	100

The probability of exceedance P_{VR} in the period of reference V_R, to be referred to when identifying the seismic action in each of the limit states considered, is given in the following Table 3.2.I of the 2018 NTC.

Table 3.2.1 - *Probability of exceedance* P_{VR} *depending on the limit state considered*

Limit states		**P_{VR} : Probability of exceedance in reference period V_R**
Serviceability limit states	OLS	81 %
	DLS	63 %
Ultimate limit states	LLS	10 %
	CLS	5 %

Should protection against serviceability limit states be of primary importance the values of P_{VR} provided in the table must be reduced in

		relation to the protection rating you wish to reach. The return period T_R of the seismic action to be taken into account in the checks for each limit state and the relative probability of exceedance P_{VR} in the reference period V_R is derived from the expression [3.2.0] of the 2018 NTC as follows: $T_R = - V_R / \ln (1- P_{VR}) = - C_U V_N / \ln (1- P_{VR})$ Given the currently available reference range, only T_R values within the range of 30 years ≤ T_R ≤ 2475 years will be considered; if T_R < 30 years, T_R = 30 years is taken, if T_R > 2475 years, T_R = 2475 years is taken. Seismic actions referring to a higher T_R may be considered as special works
2.2.1(7)P		When calculating the design strength of the primary fragile elements, the indications given in Paragraph 1.1(4) concerning the characterisation of the materials and the calculation values of the strength of the material shall be taken into account. The 2018 NTC assumes, in Paragraph 4.3.3, for checks of the Ultimate Limit States, values of γ_M equal to: - γ_C (concrete) = 1.5 - γ_A (carpentry steel) = 1.05 - γ_S (reinforced steel) = 1.15 - γ_V (connections) = 1.25 The values of γ_M for checks of the Ultimate Limit States of timber elements are shown in Table 4.4.III in Paragraph 4.4.6 of the 2018 NTC. In Serviceability Limit States, γ_M = 1 is assumed. In exceptional design situations, it is assumed γ_M = 1. In the case of masonry buildings, in paragraph C8.5 *Definition of the reference model for analyses* of Circular No 7 of 11 February 2019, it is stated that checks regarding all seismic and non-seismic actions may be carried out using, when provided, a coefficient γ_M not less than 2 (Table 4.5.II in Paragraph 4.5.6.1 of the 2018 NTC). In this regard, it should be considered that in an existing building the mechanical characteristics of the masonry are directly found in the construction. In the event that the reduction of the strength of materials due to degradation by cyclic deformations is justified on the basis of specific experimental tests, reference may be made to the indications set out in Paragraph 7.3.6.1 of the 2018 NTC. In this case, the values of the partial safety coefficients of the materials γ_M are: - Concrete constructions γ_M=1.0 [Paragraph 4.1.4] - Steel constructions γ_M=1.0 [Paragraph 4.2.6] - Composite constructions of steel and concrete γ_M=1.0 [Paragraph 4.3.8] - Timber constructions γ_M=1.0 [Paragraph 4.4.17] - Masonry constructions: γ_M equal to half of those assumed for ordinary situations [Paragraph 4.5.10]
3.3.1(4)		The values are defined by the designer. Reference values are given in Circular No 7 of 11/02/2019 where they are called Confidence Factors (CF) (Paragraph C8.5.4). They are indices of the level of depth achieved

		and serve to reduce the values of the mechanical parameters of the materials. They are estimated with reference to three *knowledge levels* decreasing as follows. - The level of knowledge LC3 is considered to have been reached when the historical and critical analysis commensurate with the level under consideration, as described in Paragraph C8.5.1, the geometric survey, complete and accurate in all its parts, and *comprehensive investigations* of the construction details, as described in Paragraph C8.5.2, and *comprehensive tests* of the mechanical characteristics of the materials, as indicated in Paragraph C8.5.3, have been carried out; the corresponding confidence factor is CF=1 (to be applied only to the values of those parameters for which the above tests and investigations have been carried out, while for the other mechanical parameters the value of CF is defined consistently with the corresponding limited or extensive tests performed) - The level of knowledge LC2 is considered to have been reached when, as a minimum, the historical and critical analysis commensurate with the level under consideration, with reference to Paragraph C8.5.1, the complete geometric survey and *extended investigations* of the construction details, with reference to Paragraph C8.5.2, and *extended tests* of the mechanical characteristics of the materials, with reference to Paragraph C8.5.3, have been carried out; the corresponding confidence factor is CF=1.2 (in the case of steel constructions, if the level of knowledge is not LC3 only because of a non-exhaustive knowledge of the properties of the materials, the confidence factor can be reduced, justifying it with appropriate considerations also on the basis of the time of construction) - The level of knowledge LC1 is considered to have been reached when, as a minimum, the historical and critical analysis commensurate with the level under consideration, with reference to Paragraph C8.5.1, the complete geometric survey and ***limited investigations*** of the construction details, with reference to Paragraph C8.5.2, and ***limited tests*** of the mechanical characteristics of the materials, with reference to Paragraph C8.5.3, have been carried out; the corresponding confidence factor is CF=1.35 (in the case of steel constructions, if the level of knowledge is not LC2 only because of a non-extended knowledge of the properties of the materials, the confidence factor can be reduced, justifying it with appropriate considerations also on the basis of the time of construction) Only in the case of checks under non-seismic conditions of individual components (e.g. floors on which particularly accurate investigations have been carried out) or seismic checks against local mechanisms, is it possible to adopt levels of knowledge differentiated from those used in global seismic checks. To reach the level of knowledge LC3, the availability of a complete geometric survey and the acquisition of an exhaustive knowledge of the construction details are to be considered equivalent to the availability of

		original design documents, however to be properly verified in their completeness and correspondence to the real situation. In the case of existing constructions for which the obligations of Law No 1086/71 or Law 64/74 as amended have been fulfilled, reference may be made to the documentation on file, after adequate justification, also by means of on-site investigations. In particular, for the strengths of materials, the characteristic values assumed as the basis of the original design or the reduced values resulting from the available documentation on the materials in place may be adopted with justification. In this case, the confidence factors are assumed to be unitary. For constructions of historical and artistic value the confidence factors contained in the Prime Ministerial Directive of 9 February 2011 '*Assessment and reduction of the earthquake risk of cultural heritage with reference to the technical standards for construction referred to in the Ministerial Decree of 14 January 2008*', published in Official Gazette No 47 of 26 February 2011 – suppl. ord. no 54, may be adopted
3.4.4(1)		The criteria, methods and quantities must be defined by the designer. Indications in this regard are provided by Circular No 7 of 11 February 2019 which defines different degrees of depth of investigation in surveying and characterisation of materials. For masonry constructions there are three levels of depth of investigation in surveying (Paragraph C8.5.2.1): - *Limited investigations:* these are generally based on visual investigations that, together with the geometric survey of the external surfaces of the construction elements, combine possible tests that allow to examine, at least locally, the characteristics of the masonry under plaster and in the thickness, thus characterising the masonry section, the degree of bonding between orthogonal walls and the support areas of the floors, the connections and the elimination of pressures - *Extended investigations:* the surveys and in-situ investigations indicated in the previous point are accompanied by more extensive and widespread tests in order to obtain typifications of the material and construction characteristics and a faithful adherence of the indications to the real variety of the construction - *Comprehensive investigations:* in addition to the above, the investigations are extended systematically with the use of tests that allow the technician to form a clear opinion on the morphology and quality of the masonry, on compliance with the state of the art in the arrangement of materials, both on the surface and in the thickness of the masonry, on the effectiveness of the bonding between the walls and the connections and elimination of pressures, as well as on the characteristics of the supports of horizontal elements For masonry constructions, the quantity and type of investigations to be carried out are not prescribed, and must result from considerations based on a historical and critical analysis and on appropriate preliminary visual inspections, possibly accompanied by tests for the identification of homogeneous areas and degradation phenomena and for a first analysis of

possible failures.

Also with regard to the characterisation of materials, there are three types of in-depth analysis:

- ***Limited tests:*** these are non-detailed and non-extensive investigations, mainly based on visual examinations of surfaces, with limited checks on the elements forming the masonry. Local plaster removals are planned to identify the materials which the building is made from; in particular, using a historical and critical analysis, it is possible to subdivide the masonry walls into areas that can be regarded as homogeneous. The purpose of the investigations is to allow the identification of the types of masonry to which to refer for the purposes of determining the mechanical properties; this involves the surveying of the masonry texture of the walls and an estimate of the masonry section
- ***Extended tests****:* these are visual, widespread and systematic investigations, accompanied by local in-depth studies. Extensive tests are planned, both on the surface and in the thickness of the masonry (also using endoscopies), aimed at understanding the materials and internal morphology of the masonry, identifying homogeneous areas in terms of materials and masonry texture, cross-sectional connections, as well as degradation phenomena. Analyses of the mortars and, if significant, of the constituent elements, accompanied by non-destructive diagnostic techniques (penetrometric, sclerometric, sonic, thermographic, radar, etc.) and possibly supplemented by moderately destructive techniques (e.g. flat jacks), are also planned, aimed at classifying the type of masonry and its quality more accurately.
- ***Comprehensive tests****:* In addition to the requirements of the previous category, direct tests on materials are planned in order to determine their mechanical parameters. The designer determines the type and quantity according to the needs of knowledge of the structure. The tests shall be carried out either *in situ* or in the laboratory on undisturbed elements sampled *in situ*; they may include, if significant:
    - compression tests (e.g.: on panels or via double flat jacks)
    - shear tests (e.g.: compression and shear, diagonal compression, direct shear on the joint), selected according to the type of masonry and the strength criterion adopted for the analysis.

Tests shall be carried out on all types of masonry or in any case on elements which, from the sensitivity analysis based on preliminary data (Paragraph C8.5), have been found to be significant for the safety assessment. The values for verification will be obtained, starting from the average values in Table C8.5.I, using direct experimental measurements on the building, taking into account the reliability of the test method. As a substitute, the results of tests carried out on other buildings in the same area, in the presence of a clear and proven typological correspondence in terms of materials and morphology, may be considered.

Further information is given in Paragraph C8.5.3.1 in Circular No 7 of 11 February 2019.

With regard to the timbers elements present in buildings with a masonry

		structure, such as roofs or floors, a series of investigations are planned to get to know the material, particularly with regard to the species, the state of conservation and the mechanical characteristics. With regard to the characterisation of the material, for the identification of the species of wood, reference can be made to UNI 11118 and, for the assessment of the state of conservation and the strength profile of the elements in operation, to UNI 11119. Given the uncertainties of knowledge, where indirect test methods are used, it is appropriate to compare the measurements obtained by different methods, bearing in mind that the variability of individual parameters is generally broad. Possible biotic material degradation should be identified, including in relation to environmental conservation conditions. Particular attention must therefore be paid to the analysis of the microclimate around a wooden element or part of it that has been established under particular installation conditions (e.g. beam heads and trusses inserted in the masonry or elements concealed by false ceilings). With regard to the degree of depth of the investigation, three levels can be distinguished. Three levels of testing can be distinguished in relation to their degree of depth. • ***Limited tests****:* these are investigations based primarily on visual examinations of surfaces, including at least three faces and one head of each element of the primary and secondary warp, and involving limited checks on construction elements and connections; local removals of the protection layer are planned to carry out an assessment of the conservation status, for example in accordance with UNI 11119. • ***Extended tests:*** these are visual investigations on the surfaces of the elements, accompanied by some supporting instrumental checks, as well as the conditions of the connections. Local removals of the protection layer are planned to carry out an assessment of the conservation status, for example in accordance with UNI 11119. As instrumental controls, at least some checks of the moisture of the material are planned in areas specifically identified as particularly sensitive. • ***Comprehensive tests:*** these are widespread and systematic visual investigations, accompanied by instrumental insights, possibly resistographic. Analyses for the identification of the species, the measurement of moisture in the material and interface areas with different materials and the analysis of the connections, with an evaluation of the degradation phenomena of the connections, are planned. Such analyses may also require laboratory activities. Non-destructive or partially invasive techniques should be used to assess the mechanical characteristics of the material or to detect degraded areas below the surface. For reinforced concrete or steel constructions (Paragraph C8.5.2.2), there are three levels of depth of the investigation. Information on construction details can be derived from the original

		designs, a simulated design or *in situ* investigations. Whether the original designs are available or a simulated design has been produced, in order to verify its compliance with the reality of the building in terms of construction details, it is necessary to carry out in-situ surveys. In the surveys, three levels of investigation can be identified, in relation to their degree of study. - ***Limited investigations*****:** these allow the assessment, by means of sample tests, the correspondence between the characteristics of the connections reported in the original design drawings or obtained through the simulated design, and those actually present. - ***Extended investigations***: these are carried out when the original design drawings are not available, or as an alternative to the simulated design followed by limited investigations, or when the original design drawings are incomplete. - ***Comprehensive investigations*****:** these are carried out when an accurate level of knowledge is desired and the original design drawings are not available. In-situ investigations based on tests are carried out on an appropriate percentage of the structural elements, favouring, among the types of structural elements (beams, pillars, walls...), those that play a primary role in the structure. The amount of in-situ investigations based on tests depends on the desired level of knowledge in relation to the current degree of safety and must be carefully assessed, also in view of the significant consequences it entails on the design of interventions. Tests on materials, by analogy to what is defined for the investigations of construction details, can be performed on a different number of elements, depending on the level of knowledge desired. Three levels of testing can be distinguished in relation to their degree of depth: - ***Limited tests*****:** these provide for a limited number of in-situ or sample tests, used to supplement the information on the properties of the materials, whether they are obtained from the regulations in force at the time of construction, or from the nominal characteristics shown on the construction drawings or in the original test certificates. - ***Extended tests*****:** these provide for in-situ or sample tests more numerous than those of the previous case aimed at providing information in the absence of both the construction drawings and the original test certificates or when the values obtained with the ***limited tests*** are inferior to those shown in the original drawings or certificates. - ***Comprehensive tests*****:** these provide for in-situ or sample tests more numerous than those of the previous case aimed at obtaining information in the absence of both the construction drawings and the original test certificates or when the values obtained with the ***tests, whether limited or extended***, are inferior to those shown in the original drawings or certificates, or in cases where particularly accurate knowledge is desired.

In order to determine appropriately the number and location of tests on materials, it is useful to:

- carry out a limited number of preliminary investigations of the elements identified as representative following the historical and critical analysis, the documentation available and the geometric survey, in order to define a preliminary model of the structure
- perform an analysis for the preliminary verification of static security and earthquake vulnerability, using the construction details assessed during the preliminary investigation campaign (Paragraph C8.5.3.3).

On the basis of the outcome of the preliminary analysis, the need for further investigation is assessed in terms of the number and location of the investigation campaign, in relation to the static commitment of the various members, their role with respect to the safety of the structure and the degree of homogeneity of the results of the preliminary tests, also in relation to the original documents; the design of the tests provides the measure, thus allowing a quantitative grading of the level of depth.

For guidance purposes only, Tables C8.5.V and C8.5.VI link the level (limited, extended, comprehensive) of the investigations to the quantity of surveys of the construction details and tests for the assessment of the mechanical characteristics of the materials. It is understood that the investigation plan must be appropriately calibrated according to the preliminary analysis (see Paragraphs C8.5.3.2 and C8.5.3.3) and therefore, in relation to the level of knowledge to be achieved, oriented to the necessary insights in the construction sites where appropriate, both in relation to the static commitment of the different members and their role with regard to the safety of the structure, and in relation to the degree of homogeneity of the results of the preliminary tests and their agreement with the provisions of the original documents.

Table C8.5.V – Guidance definition of survey and test levels for reinforced concrete buildings

Level of Investigation and Testing	Survey (of construction details)[a]	Testing (on materials) [b][c][d]
	For each ‘primary’ element (beam, pillar)	
limited	The quantity and arrangement of the reinforcement shall be verified for at least 15 % of the elements	1 sample of concrete per 300 m^2 of the floor of the building, 1 sample of reinforcement per storey of the building
extended	The quantity and arrangement of the reinforcement shall be verified for at least 35 % of the elements	2 samples of concrete per 300 m^2 of the floor of the building, 2 samples of reinforcement per storey of the building
comprehensive	The quantity and arrangement of the reinforcement shall be	3 samples of concrete per 300 m^2 of the floor of the building, 3 samples of

	verified for at least 50 % of the elements	reinforcement per storey of the building

Table C8.5.VI – Guidance definition of survey and test levels for steel buildings

Level of Investigation and Testing	Survey (of joints)(a)	Testing (on materials) (b)(c)(d)
	For each ‘primary’ element (beam, pillar, etc.)	
limited	The characteristics of the joints are checked for at least 15 % of the elements	1 sample of steel per storey of the building, 1 sample of bolts or nails per storey of the building
extended	The characteristics of the joints are checked for at least 35 % of the elements	2 samples of steel per storey of the building, 2 samples of bolts or nails per storey of the building
comprehensive	The characteristics of the joints are checked for at least 50 % of the elements	3 samples of steel per storey of the building, 3 samples of bolts or nails per storey of the building

EXPLANATORY NOTES TO TABLES C8.5.V AND C8.5.VI

The percentages of elements to be investigated and the number of samples to be extracted and subjected to strength tests given in Tables C8.5.V and C8.5.VI are indicative and should be adapted to individual cases, taking into account the following aspects:

(a) In checking the achievement of the percentages of elements investigated for the purpose of determining the construction details, account shall be taken of any repetitive situations, which would make it possible to extend to a larger percentage the checks carried out on certain structural elements forming part of a series with evident characteristics of repeatability, in terms of geometry and an equal role in the structural scheme

(b) The tests on steel are aimed at the identification of the class of steel used with reference to the existing law at the time of construction. In order to reach the number of tests on steel necessary to acquire the desired level of knowledge, it is appropriate to take into account the diameters (in reinforced concrete structures) or the profiles (in steel structures) most commonly used in the main elements, with the exception of brackets

(c) For the purposes of testing materials, it is permitted to replace certain destructive tests, not more than 50 %, by at least three times as many non-destructive tests, either single or combined, calibrated on destructive tests.

(d) The number of samples given in Tables C8.5.V and C8.5.VI may vary, increasing or decreasing in relation to the characteristics of homogeneity of the material. In the case of concrete works these characteristics are often linked to the typical construction method of the time of construction and the type of component, which should be taken into account when planning the investigation. To this effect, it will be appropriate to provide a second run of supplementary tests, should the results of the first be very patchy.

4.4.2(1)P		In Paragraph C8.7.2.2.1 *Linear static analysis* of the Circular No 7 of 11 February 2019 it is stated that the linear static analysis may be carried out where the conditions set out in Paragraph 7.3.3.2 of the 2018 NTC are met, with the following additional indications:

		- considering all the primary elements of the structure and indicated, for the *i*-th of these elements, with $\rho_i = D_i / C_i$ the ratio between the flexion moment D_i provided by the analysis of the structure subjected to the seismic load combination and the corresponding resistant moment C_i (assessed in the presence of the normal stress relative to the gravitational load conditions), the coefficient of variation of all the $\rho_i \geq 1$ must not exceed the value of 0.5 - the capacity C_i of fragile elements/mechanisms is greater than the corresponding demand D_i, the latter being calculated on the basis of the strength of the adjacent ductile elements, if the ρ_i of fragile elements/mechanisms is greater than 1, or based on the results of the analysis, if the ρ_i of fragile elements/mechanisms is less than 1
4.4.4.5(2)		The National Annex does not provide references to additional non-contradictory information
A.4.4.2(5)		For the partial coefficient $\gamma_{f,d}$ relating to delamination for FRP, as indicated in Paragraph C8.7.4 *Criteria and types of intervention* of Circular No 7 of 11 February 2019, documents of proven validity are adopted
A.4.4.2(9)	37	No additional information is to be provided

NATIONAL ANNEX

UNI-EN-1998-4:2006	Design of structures for earthquake resistance. Part 4 - Silos, tanks and pipelines.
EN-1998-4:2006	Design of structures for earthquake resistance. Part 4: Silos, tanks and pipelines.

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1998-4:2006.

2. INTRODUCTION

2.1 Scope

The document contains, in point 3 below, the decisions on the national parameters to be laid down in UNI-EN-1998-4:2006 with regard to the following Paragraphs:

1.1(4)	2.1.2(4)P	3.1(2)P	4.5.1.3(3)
	2.1.3(5)P		4.5.2.3(2)P
	2.1.4(8)		
	2.2(3)		
	2.3.3.3(2)P		
	2.5.2(3)P		

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1998-4:2006 in Italy.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1998-4:2006.

3. NATIONAL DECISIONS

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>1.1(4)</td><td>Note</td><td>The constructions are divided into four use classes, defined in Paragraph 2.1.4(8) below, with reference to the consequences of an interruption of activity or a collapse. In particular, Class III and Class IV include industries with hazardous and particularly environmentally hazardous activities, respectively.
In any event, in relation to environmental and public risks, the competent authorities may give additional requirements to those set out in this standard</td></tr>
<tr><td>2.1.2(4)P</td><td>Note</td><td>The nominal lifetimes of the various types of works are shown in Table 2.4.I of the 2018 NTC and must be specified in the design documents.
Table 2.4.I - Minimum values of the Nominal design lifetime V_N for several types of constructions
<table>
<tr><th></th><th>TYPES OF CONSTRUCTIONS</th><th>Minimum values of V_N (years)</th></tr>
<tr><td>1</td><td>Temporary and provisional constructions [(1)]</td><td>10</td></tr>
<tr><td>2</td><td>Buildings with ordinary performance levels</td><td>50</td></tr>
<tr><td>3</td><td>Buildings with high performance levels</td><td>100</td></tr>
</table>
[1] Constructions or parts thereof that can be dismantled with the intention of being reused are not to be considered temporary.
For new construction works for which the design construction phase is anticipated to span a duration equal to P_N, the working life related to this phase of construction, for the purposes of the evaluation of seismic actions, should be assumed to be no less than P_N , and in any case no less than 5 years.
Seismic monitoring of constructions of type 1 or constructions at the construction stage may be omitted when the project anticipates that such condition will persist for less than 2 years.
Constructions are classified into four use classes, defined in Paragraph 2.1.4(8) below.
Seismic actions are assessed in relation to a reference period V_R which is obtained, for each type of construction, by multiplying the nominal lifetime V_N for the use coefficient C_U, as defined in Paragraph 2.1.4(8) below of this Annex:
$$V_R=V_N \cdot C_U$$
For structures with V_R=50 years, for the Lifesaving Limit State, the recommended value T_{NCR} = 475 years, P_{NCR} = 10% in 50 years is adopted.
For structures with V_R = 75 years, T_{NCR} = 712.5 years.
For structures with V_R = 100 years, T_{NCR} = 950 years.
The return period T_R is a function of the probability of exceedance P_{VR} in the reference period V_R, according to expression [3.2.0] of the 2018 NTC given below:
$$T_R = - V_R / \ln (1- P_{VR}) = - C_U V_N / \ln (1- P_{VR})$$</td></tr>
<tr><td>2.1.3(5)P</td><td>Note</td><td>For structures with V_R=50 years, for the Damage Limit State, the following value is adopted
T_{DLR} = 50 years, P_{DLR} = 63 % in 50 years.
For structures with V_R = 75 years, T_{DLR} = 75 years.
For structures with V_R = 100 years, T_{DLR} = 101 years.</td></tr>
</table>

For constructions falling in C_U III and IV, reference should be made to the *OLS*. too

Where protection against operating limit states is of priority importance, the value of P_{VR} must be reduced according to the degree of protection to be achieved.

To this end, as the use class and the coefficient C_U change, the C_U can be used not to increase V_N, taking it to V_R, but to reduce P_{VR}.

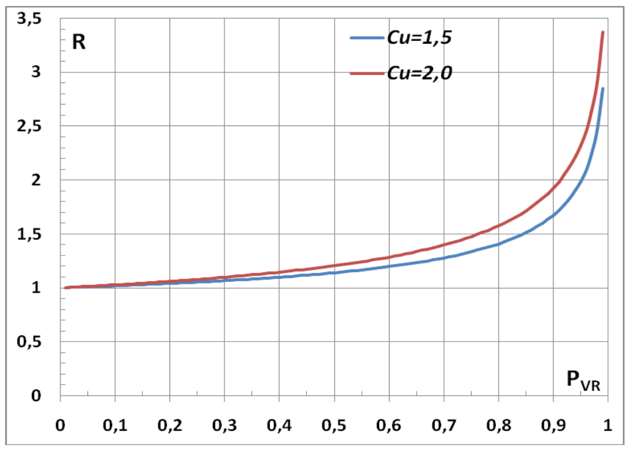
In such a case there shall be:

$$TR = -VR / \ln (1- PVR/C)_U)$$

Where $T_{R,a}$ is the return period obtained with the standard design strategy and $T_{R,b}$ is the return period obtained with the design strategy described above, the ratio R between the two return periods holds:

[illegible]

it has, depending on the CU and P_{V_R}, the developments shown in the following chart.



Variation of R with CU and P_{V_R}

Having noted that, with the proposed strategy, the conditions previously indicated as indispensable are respected (substantial constancy of TR, therefore substantially unchanged protection, for the values of P_{V_R} related to the ULS, i.e. for $P_{V_R} \leq 10\,\%$, and significant T_R growth, thus significantly increased protection, for the values of P_{V_R} related to the SLS, i.e. for $P_{V_R} \geq 60\,\%$), it then possible to proceed to assess how to apply the indication of the standard, i.e. how to modify the P_{V_R}.

To find how to change, as the C_U changes, the values of P_{V_R} in the V_R reference period to obtain the same T_R values as suggested by the proposed strategy, it is sufficient to impose R=1 in formula C.3.2.2 of Circular No 7 of 11/02/2019 and to indicate with $P^*_{V_R}$ the new values of P_{V_R}, thus obtaining:

[illegible]

It is thus possible to obtain, as the C_U changes, the values of $P^*_{V_R}$ starting from the values of P_{V_R}; these values are reported, together with the corresponding values of T_R, in Table C.3.2.II of Circular No 7 of 11 February 2019.

<table>
<tr><td></td><td></td><td>
Adopting the proposed strategy, as the C_U grows the values of $P^*_{V_R}$ corresponding to the Serviceability Limit States (SLS) are significantly reduced and the corresponding T_R grow, while the values of $P^*_{V_R}$ corresponding to the Ultimate Limit States (ULS) and the corresponding T_R do not substantially change.
Table C.3.2.II - Values of $P^*_{V_R}$ and T_R as the C_U changes
<table>
<tr><th colspan="2" rowspan="2">Limit States</th><th colspan="3">Values of $P^*_{V_R}$</th><th colspan="3">Corresponding values of T_R</th></tr>
<tr><th>C_U = 1.0</th><th>C_U = 1.5</th><th>C_U = 2.0</th><th>C_U = 1.0</th><th>C_U = 1.5</th><th>C_U = 2.0</th></tr>
<tr><td rowspan="2">SLS</td><td>OLS</td><td>81.00 %</td><td>68.80 %</td><td>64.60 %</td><td>$0,60 \cdot V_R$</td><td>$0,86 \cdot V_R$</td><td>$0,96 \cdot V_R$</td></tr>
<tr><td>DLS</td><td>63.00 %</td><td>55.83 %</td><td>53.08 %</td><td>V_R</td><td>$1,22 \cdot V_R$</td><td>$1,32 \cdot V_R$</td></tr>
<tr><td rowspan="2">ULS</td><td>LLS</td><td>10.00 %</td><td>9.83 %</td><td>9.75 %</td><td>$9,50 \cdot V_R$</td><td>$9,66 \cdot V_R$</td><td>$9,75 \cdot V_R$</td></tr>
<tr><td>CLS</td><td>5.00 %</td><td>4.96 %</td><td>4.94 %</td><td>$19,50 \cdot V_R$</td><td>$19,66 \cdot V_R$</td><td>$19,75 \cdot V_R$</td></tr>
</table>
Therefore, if protection against SLS is of priority importance, the values of P_{V_R} can be substituted with those of $P^*_{V_R}$, thus achieving better protection against SLS.
Having obtained the values of T_R corresponding to the four limit states considered (using, as the case may be, design strategy a or b), it is possible to obtain, by varying the site in which the construction is located and using the data given in Annexes A and B to the Decree of the Minister for Infrastructure of 14 January 2008, published in the O.S. of the Official Gazette of 4 February 2008, No 29, the ground acceleration a_g and the shapes of the design response spectrum for each site, construction, situation of use, and limit state
</td></tr>
<tr><td>2.1.4(8)</td><td>Note</td><td>
Importance coefficients as given in EN-1998-1, where seismic action is multiplied, are assumed to be equal to 1.
In this National Annex the significance of the structures treated is taken into account directly in the definition of the seismic action by modifying the return periods or dividing the associated probability of exceeding by the Coefficients of Use, C_U, shown in Table 2.4.II of the 2018 NTC:
Table 2.4.II – Use coefficient C_U values
<table>
<tr><th>USE CLASS</th><th>I</th><th>II</th><th>III</th><th>IV</th></tr>
<tr><td>COEFFICIENT C_U</td><td>0.7</td><td>1.0</td><td>1.5</td><td>2.0</td></tr>
</table>
For buildings housing activities with a risk of accidents, C_U values even higher than 2 should be adopted, in relation to the consequences for the environment and for public safety caused by the reaching of limit states.
The Use Coefficients C_u modify, by amplifying it, the average return period defined for C_u = 1. It therefore decreases for use class I and increases for classes III and IV
</td></tr>
<tr><td>2.2(3)</td><td>Note</td><td>The assessment of the displacement for the damage limit state shall be carried out using the corresponding response spectrum, assuming ν=1.
For Class III and IV structures, the verification shall also be carried out using the action relating to the operational limit state (OLS) and assuming ν=1.5</td></tr>
<tr><td>2.3.3.3(2)P</td><td>Note</td><td>The recommended value is maintained</td></tr>
<tr><td>2.5.2(3)P</td><td>Note</td><td>The recommended values are maintained</td></tr>
<tr><td>3.1(2)P</td><td>Note</td><td>The values set out in Table 3.1.I of the 2018 NTC are adopted. For materials not included in the previous Table, reference may be made to Table E1 EN-</td></tr>
</table>

		1991-4:2006 or to specific experimental investigations using nominal values as characteristic values
4.5.1.3(3)	Note	The recommended value is maintained
4.5.2.3(2)P	Note	The recommended value is maintained

NATIONAL ANNEX

UNI-EN-1998-5:2005	Design of structures for earthquake resistance Part 5: Foundations, retaining structures and geotechnical aspects
EN 1998-5:2004	Design of structures for earthquake resistance Part 5: Foundations, retaining structures and geotechnical aspects

1. BASIS

This Annex contains the national determination parameters for UNI EN-1998-5:2005.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN-1998-5:2005 below:

1.1(4) 3.1(3) 4.1.4(11) 5.2(2)c

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1998-5:2005 in Italy.
In the application of this standard, reference should also be made to the indications given in paragraph 4 of this Annex below. Some of these indications are aimed at determining the seismic coefficients for the verification of slopes and retaining structures with pseudostatic approaches. Other indications clarify some of the concepts set out in EN 1998-5:2005.

2.2 Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1998-5:2005 Design of structures for earthquake resistance – Part 5: Foundations, retaining structures and geotechnical aspects.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of UNI-EN-1998-5:2004.

Paragraph	Citation	National parameter - value or requirement
1.1(4)	Note 1-4	The informative nature of Annexes A, C and D is confirmed. The use of Annex F is not allowed
3.1(3)	Note	Checks of the ultimate limit states in the presence of seismic actions must be carried out using the same approach as set out in EN 1997-1 in the corresponding tests for the static case, taking as equal to 1 the partial coefficients on the actions and geotechnical parameters and evaluating the design strengths with the partial coefficients γ_R set out in the Tables annexed to the National Annex to EN 1997-1, except in the following cases: • Excavation and detection fronts (Paragraph 7.11.4 of the

		2018 NTC): - $\gamma_R = 1.2$ • Surface foundations (Paragraph 7.11.5.3.1 of the 2018 NTC): - Limit load $\gamma_R = 2.3$ (if the effect of inertial actions on the foundation ground is not taken into account) - Limit load $\gamma_R = 1.8$ (if the effect of inertial actions on the foundation ground is taken into account) - Sliding $\gamma_R = 1.1$ - Resistance on lateral surfaces $\gamma_R = 1.3$ • Support walls (Paragraph 7.11.6.2 of the 2018 NTC): - Limit load $\gamma R = 1.2$ - Sliding $\gamma R = 1.0$ - Tilting $\gamma R = 1.0$ - Soil resistance downstream $\gamma R = 1.2$ In the event that verification at the limit state of slopes and support walls is carried out using dynamic rigid block methods (Newmark method), the partial safety coefficients on all soil resistance parameters shall be set at 1.0. The use of these methods is explicitly provided for in EN 1998-5 in Paragraph 4.1.3.3(1)P for slopes, and implicitly for walls in Paragraph 7.3.1(1)P. In verifications at the ultimate limit of slopes and retaining structures with pseudostatic approaches, the seismic coefficients shall be determined by reference to the indications set out in point 4 below of this Annex
4.1.4(11)	Note	The choice of safety margin with regard to liquefaction must be assessed and justified by the designer.
5.2(2)c	Note	The suggested value is accepted
Annex A		The informative nature of this Annex is confirmed
Annex C		The informative nature of this Annex is confirmed
Annex D		The informative nature of this Annex is confirmed
Annex F		The use of this Annex is not accepted.

4. NON-CONTRADICTORY ADDITIONAL INFORMATION

4.1. Limitations of the scope of the document

EN 1998-5 applies only for the verification of the following situations and works: slopes in the ground (explicitly excluding rocky ridges), embankments, direct foundations and foundations on piles, support walls and bulkheads. Use is excluded for other works (tunnels, embankments, dams, etc.).

4.2. Soil resistance parameters

For coarse-grained soil the use of strength parameters in terms of effective stresses is advised, as indicated in Paragraph 3.1.(2), bearing in mind, in the case of saturated soil, the interstitial overstrengths generated by cyclical loads.

4.3. Analysis of stability of slopes

Reference should be made to the requirements of the 2018 NTC, Paragraph 7.11.3.5 Stabilisation of slopes, in particular for the assessment of seismic action in pseudostatic analyses.
Further information is provided by Circular No 7 of 11 February 2019 in Paragraph C7.11.3.5.

4.4. Excavation faces and embankments

The behaviour of excavation faces and embankments can be analysed using the same methods as for natural slopes, following the requirements of the 2018 NTC in Paragraph 7.11.4.
Further information is provided by Circular No 7 of 11 February 2019 in Paragraph C7.11.4.

4.5. Evaluation of design actions on foundations

The design actions are defined in the National Annex EN 1998-1.

4.6. Verification of sliding onto the laying plan of direct foundations

In the event that the passive resistance of the soil near the foundation is to be taken into account in the sliding verification (in equation 5.2 of EN 1998-5), in addition to the requirements of Paragraph 5.4.1.1(5), it shall be verified that the movements necessary to mobilise the passive resistance are not higher than those which could lead to an ultimate limit state condition on the structure.

4.7. Load limit of direct foundations

In the calculation of the load limit of direct foundations the inclination and the eccentricity of design forces transmitted onto the superstructure must be kept in mind, as affirmed in Paragraph 5.4.1.1(8)P. The use of methodologies given in Annex F is not permitted.

4.8. Partial safety coefficients for verification of pile foundations on seismic actions

In the verification of foundations on piles under the actions resulting from seismic combinations, reference is made to the partial safety coefficients R3, as set out in EN 1997-1, as amended by the relevant National Annex.

4.9. Flexion moments due to kinematic interaction between piles and the soil

Kinematic interaction between piles and soil must be taken into account only in the case of piles immersed in type D subsoil or worse, in zones of medium or high seismicity ($a_g > 0.25g$) and in the presence of raised rigidity contrasts on contact between contiguous soil layers.

4.10. Verifications on the ultimate limit state of retaining walls

Reference should be made to the provisions of the 2018 NTC in Paragraph 7.11.6 Retaining structures and in particular to Paragraph 7.11.6.2 referring to the design of support walls. Further information is provided by Circular No 7 of 11 February 2019 in Paragraph C7.11.6.2.

4.11. Verifications on the ultimate limit state of bulkheads

Reference should be made to the provisions of the 2018 NTC in Paragraph 7.11.6 Retaining structures and in particular to Paragraph 7.11.6.3 referring to the design of walls. Further information is provided by Circular No 7 of 11 February 2019 in Paragraph C7.11.6.3.

NATIONAL ANNEX

UNI-EN-1998-6:2005	Design of structures for earthquake resistance Part 6 - Towers, masts and chimneys
EN-1998-6:2005	Design of structures for earthquake resistance Part 6: Towers, masts and chimneys

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1998-6:2005.

2. INTRODUCTION

2.1. Scope

The document contains, in point 3 below, the decisions on the national parameters to be laid down in UNI-EN-1998-6 with regard to the following Paragraphs:

1.1(2)	3.1(1)	4.1(5)
	3.5(2)	4.3.2.1(2)
		4.7.2(1)P
		4.9(4)

These national decisions, relating to the Paragraphs mentioned above, must be applied for the use of UNI-EN-1998-6:2005 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1998-6:2005

3. NATIONAL DECISIONS

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>1.1(2)</td><td>Note</td><td>The informative value of the Annexes is maintained</td></tr>
<tr><td>3.1(1)</td><td>Note</td><td>Note 1: the recommended conditions are adopted
Note 2: Annex A is informative</td></tr>
<tr><td>3.5(2)</td><td>Note</td><td>In accordance with the National Annex EN-1998-1 (3.2.2.5 (4)P) the recommended value β = 0.2 is accepted</td></tr>
<tr><td>4.1(5)P</td><td>Note</td><td>

Importance coefficients as given in EN-1998-1, where seismic action is multiplied, are assumed to be equal to 1.
In this National Annex the significance of the buildings is taken into account directly in the definition of the seismic action by modifying the return periods or dividing the associated probability of exceeding by the coefficients C_u, so-called Use Coefficients.
The nominal lifetimes of the various types of works are shown in Table 2.4.I of the 2018 NTC and must be specified in the design documents.

[1] *Table 2.4.I - Minimum values of the Nominal design lifetime* V_N *for several types of constructions*

<table>
<tr><th></th><th>TYPES OF CONSTRUCTIONS</th><th>Minimum values of V_N (years)</th></tr>
<tr><td>1</td><td>Temporary and provisional constructions (1)</td><td>10</td></tr>
<tr><td>2</td><td>Buildings with ordinary performance levels</td><td>50</td></tr>
<tr><td>3</td><td>Buildings with high performance levels</td><td>100</td></tr>
</table>

() Constructions or parts thereof that can be dismantled with the intention of being reused are not to be considered temporary.

For new construction works for which the design construction phase is anticipated to span a duration equal to P_N, the working life related to this phase of construction, for the purposes of the evaluation of seismic actions, should be assumed to be no less than P_N , and in any case no less than 5 years.
Seismic monitoring of constructions of type 1 or constructions at the construction stage may be omitted when the project anticipates that such condition will persist for less than 2 years.
Seismic actions are assessed in relation to a reference period V_R which is obtained, for each type of construction, by multiplying the nominal lifetime V_N for the use coefficient C_U:

$$V_R = V_N \cdot C_U$$

The value of the use coefficient C_U is defined, in paragraph 2.4.3 of the 2018 NTC, as the use class changes, as shown in Table 2.4.II.

[2] *Table 2.4.II – Use coefficient* C_U *values*

<table>
<tr><th>USE CLASS</th><th>I</th><th>II</th><th>III</th><th>IV</th></tr>
<tr><td>COEFFICIENT C_U</td><td>0.7</td><td>1.0</td><td>1.5</td><td>2.0</td></tr>
</table>

For buildings housing activities with a risk of accidents, C_U values even higher than 2 should be adopted, in relation to the consequences for the environment and for public safety caused by the reaching of limit states.
The Use Coefficients C_u modify, by amplifying it, the average return period defined for C_u = 1. It therefore decreases for use class I and increases for

</td></tr>
</table>

classes III and IV.

The Return Period T_R is a function of the probability of exceeding P_{VR} in the reference period V_R, according to the following expression:

$$T_R = - V_R / \ln (1- P_{VR}) = - C_U V_N / \ln (1- P_{VR})$$

The probability of exceedance over the reference period P_{VR}, to be referred to in the identification of the seismic action acting in the Lifesaving Limit State, SLV, is 10 % in 50 years

Where protection against operating limit states is of priority importance, the value of P_{VR} must be reduced according to the degree of protection to be achieved.

To this end, as the use class and the coefficient C_U change, the C_U can be used not to increase V_N, taking it to V_R, but to reduce P_{VR}.

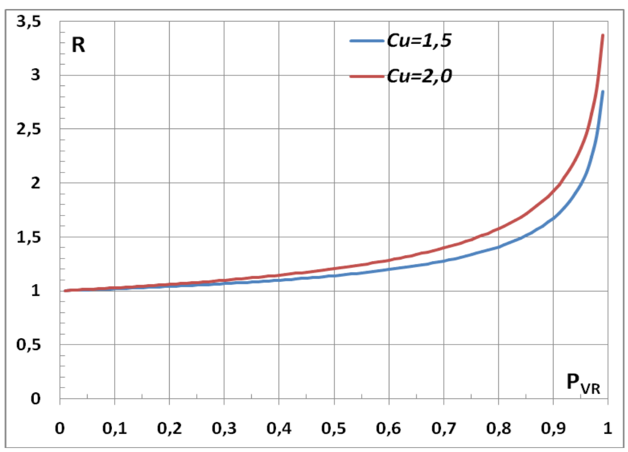
In such a case there shall be:

$$T_R = - V_R / \ln (1- P_{VR}/C_U)$$

Where $T_{R,a}$ is the return period obtained with the standard design strategy and $T_{R,b}$ is the return period obtained with the design strategy described above, the ratio R between the two return periods holds:

[illegible]

it has, depending on the C_U and P_{V_R}, the developments shown in the following chart.



Variation of R with CU and P_{V_R}

Having noted that, with the proposed strategy, the conditions previously indicated as indispensable are respected (substantial constancy of T_R, therefore substantially unchanged protection, for the values of P_{V_R} related to the ULS, i.e. for $P_{V_R} \leq 10$ %, and significant T_R growth, thus significantly increased protection, for the values of P_{V_R} related to the SLS, i.e. for $P_{V_R} \geq 60$ %), it then possible to proceed to assess how to apply the indication of the standard, i.e. how to modify the P_{V_R}.

To find how to change, as the C_U changes, the values of P_{V_R} in the V_R reference period to obtain the same T_R values as suggested by the proposed strategy, it is sufficient to impose R=1 in formula C.3.2.2 and indicate with $P^*_{V_R}$ the new values of P_{V_R}, thus obtaining:

<table>
<tr>
<td></td>
<td></td>
<td>
[illegible]

It is thus possible to obtain, as the C_U changes, the values of $P^*_{V_R}$ starting from the values of P_{V_R}; these values are reported, together with the corresponding values of T_R, in Table C.3.2.II of Circular No 7 of 11 February 2019. Adopting the proposed strategy, as the C_U grows the values of $P^*_{V_R}$ corresponding to the Serviceability Limit States (SLS) are significantly reduced and the corresponding T_R grow, while the values of $P^*_{V_R}$ corresponding to the Ultimate Limit States (ULS) and the corresponding T_R do not substantially change.

Table C.3.2.II - Values of $P^*_{V_R}$ *and* T_R *as the* C_U *changes*

<table>
<tr><th colspan="2" rowspan="2">Limit States</th><th colspan="3">Values of $P^*_{V_R}$</th><th colspan="3">Corresponding values of T_R</th></tr>
<tr><th>C_U =</th><th>C_U =</th><th>C_U =</th><th>$C_U = 1.0$</th><th>$C_U = 1.5$</th><th>$C_U = 2.0$</th></tr>
<tr><td rowspan="2">SLS</td><td>OLS</td><td>81.00 %</td><td>68.80 %</td><td>64.60 %</td><td>$0,60 \cdot V_R$</td><td>$0,86 \cdot V_R$</td><td>$0,96 \cdot V_R$</td></tr>
<tr><td>DLS</td><td>63.00 %</td><td>55.83 %</td><td>53.08 %</td><td>V_R</td><td>$1,22 \cdot V_R$</td><td>$1,32 \cdot V_R$</td></tr>
<tr><td rowspan="2">ULS</td><td>LLS</td><td>10.00 %</td><td>9.83 %</td><td>9.75 %</td><td>$9,50 \cdot V_R$</td><td>$9,66 \cdot V_R$</td><td>$9,75 \cdot V_R$</td></tr>
<tr><td>CLS</td><td>5.00 %</td><td>4.96 %</td><td>4.94 %</td><td>$19,50 \cdot V_R$</td><td>$19,66 \cdot V_R$</td><td>$19,75 \cdot V_R$</td></tr>
</table>

Therefore, if protection against SLS is of priority importance, the values of P_{V_R} can be substituted with those of $P^*_{V_R}$, thus achieving better protection against SLS.
Having obtained the values of T_R corresponding to the four limit states considered (using, as the case may be, design strategy a or b), it is possible to obtain, by varying the site in which the construction is located and using the data given in Annexes A and B to the Decree of the Minister for Infrastructure of 14 January 2008, published in the O.S. of the Official Gazette of 4 February 2008, No 29, the ground acceleration a_g and the shapes of the design response spectrum for each site, construction, situation of use, and limit state
</td>
</tr>
<tr><td>4.3.2.1(2)</td><td>Note</td><td>the recommended conditions are adopted</td></tr>
<tr><td>4.7.2(1)P</td><td>Note</td><td>For checks at the ultimate limit states, the values of γ_M are equal to:
- γ_C (concrete) = 1.5
- γ_A (carpentry steel) = 1.05
- γ_S (reinforced steel) = 1.15
- γ_V (connections) = 1.25
In serviceability limit states, it is assumed $\gamma_M = 1$.
In exceptional design situations, it is assumed $\gamma_M = 1$.
In the event that the reduction of the strength of materials due to degradation by cyclic deformations is justified on the basis of specific experimental tests, reference may be made to the indications set out in Paragraph 5.2.4 (3) of the Annex to EC8-1-1</td></tr>
<tr><td>4.9(4)</td><td>Note</td><td>The assessment of the displacement for the damage limit state must be carried out with the corresponding response spectrum assuming ν=1.
For Class III and IV structures, the verification shall also be carried out at the Operating Limit State (OLS), assuming ν=1.5</td></tr>
</table>

NATIONAL ANNEX

UNI-EN1999-1-1:2014	(includes update A1:2009 and update A2:2013) Design of aluminium structures Part 1-1: General structural rules
EN 1999-1-1:2007+A2:2013	(Incorporating A1:2009) Design of aluminium structures Part 1-1: General structural rules

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1999-1-1:2014.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1999-1-1:2014 below:

1.1.2 (1) Note	3.2.3.1 (1) Note	6.1.3 (1) Note 1	7.2.3 (1) Note	C.3.4.1 (4) Note
2.1.2 (3) Note	2 3.3.2.1 (3) Note	6.1.3 (1) Note 2	8.1.1 (2) Note	K.1(1) Note
2.3.1 (1) Note	1	6.2.1 (5) Note	8.9 (3) Note	K.3 (1) Note 1
3.2.1 (1) Note 1	3.3.2.2 (1) Note 1	2 7.1 (4) Note	A.2 (1) Note	K.3 (1) Note 2
3.2.2 (1) Note	5.2.1 (3) Note	7.2.1 (1) Note	C.3.4.1 (2) Note	
3.2.2 (2) Note 1	5.3.2 (3) Note	7.2.2 (1) Note	C.3.4.1 (3) Note	
	5.3.4 (3) Note			

Paragraph 3 below also contains national information on the use of Informative Annexes C, D, E, F, G, H, I, J, K, L and M for civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN-1999-1-1:2014 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to EN-1999-1-1:2014 Design of aluminium structures – Part 1-1: General structural rules.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI EN 1999-1-1:2014.

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>1.1.2 (1)</td><td>Note</td><td>The following limits are adopted, except in cases otherwise specified by the regulation:
• components with a thickness of material not less than 0.6 mm
• welded components with a thickness of material not less than 1.5 mm
• connections:
- steel bolts and pins with a diameter not less than 5 mm;
- aluminium bolts and pins with a diameter not less than 8 mm;
- rivets and self-tapping screws with a diameter not less than 4.2 mm
(recommended values)</td></tr>
<tr><td>2.1.2 (3)</td><td>Note</td><td>No additional clarification</td></tr>
<tr><td>2.3.1 (1)</td><td>Note</td><td>Specific actions for particular regional, climatic or exceptional situations are not provided</td></tr>
<tr><td>3.2.1 (1)</td><td>Note 1</td><td>No additional information</td></tr>
<tr><td>3.2.2 (1)</td><td>Note</td><td>No additional information</td></tr>
<tr><td>3.2.2 (2)</td><td>Note 1</td><td>No additional requirements</td></tr>
<tr><td>3.2.3.1 (1)</td><td>Note 2</td><td>No additional requirements</td></tr>
<tr><td>3.3.2.1 (3)</td><td>Note 1</td><td>No additional requirement, provided that reference to a harmonised product standard or, failing that, to the requirements of point C of Chapter 11.1 of the 2018 NTC is necessary for the use of aluminium bolts</td></tr>
<tr><td>3.3.2.2 (1)</td><td>Note 1</td><td>No additional information</td></tr>
<tr><td>5.2.1 (3)</td><td>Note</td><td>No additional information</td></tr>
<tr><td>5.3.2 (3)</td><td>Note</td><td>The values recommended in Table 5.1 of UNI-EN-1999-1-1 are adopted:
Table 5.1
<table>
<tr><td rowspan="2">Class instability</td><td>Elastic analysis</td><td>Plastic analysis</td></tr>
<tr><td>e_0/L</td><td>e_0/L</td></tr>
<tr><td>A</td><td>1/300</td><td>1/250</td></tr>
<tr><td>B</td><td>1/200</td><td>1/150</td></tr>
</table></td></tr>
<tr><td>5.3.4 (3)</td><td>Note</td><td>k = 0.5 is adopted
(recommended value)</td></tr>
<tr><td>6.1.3 (1)</td><td>Note 1</td><td>The following values are adopted:
- γ_{M1} = 1.15
- γ_{M2} = 1.25</td></tr>
<tr><td>6.1.3 (1)</td><td>Note 2</td><td>No additional information</td></tr>
<tr><td>6.2.1 (5)</td><td>Note 2</td><td>C = 1.20 is adopted
(recommended value)</td></tr>
<tr><td>7.1 (4)</td><td>Note</td><td>No additional information</td></tr>
</table>

7.2.1 (1)	Note	Vertical displacements must be consistent with the required performance of the structure also in relation to the intended use, with reference to static, functional and aesthetic requirements. As regards the limit values, these must be appropriate to the specific requirements and may be inferred from technical documentation of proven validity. For buildings, the following limits are adopted for vertical movements (δ_{max} arrow in the final state, cleared of the initial mount; δ_2 variation due to the application of variable loads): - roofing in general: $\delta_{max}/L \leq 1/200$, $\delta_2/L \leq 1/250$ - practical roofing: $\delta_{max}/L \leq 1/250$, $\delta_2/L \leq 1/300$ - floors in general: $\delta_{max}/L \leq 1/250$, $\delta_2/L \leq 1/300$ - floors or roofs bearing plaster or other fragile finishing materials or inflexible partitions: $\delta_{max}/L \leq 1/250$, $\delta_2/L \leq 1/350$ - floors that support columns: $\delta_{max}/L \leq 1/400$, $\delta_2/L \leq 1/500$ floors or roofs bearing plaster or other fragile finishing materials or inflexible partitions $\delta_{max}/L \leq 1/250$. In case of specific technical and/or functional requirements the limits of which should be suitably reduced
7.2.2 (1)	Note	Horizontal displacements must be consistent with the required performance of the structure also in relation to the intended use, with reference to static, functional and aesthetic requirements. As regards the limit values, these must be appropriate to the specific requirements and may be inferred from technical documentation of proven validity. For buildings, the following values are adopted for horizontal movements (Δ horizontal movement at the top; δ relative movement of the plane): - single-storey industrial buildings without overhead travelling crane: $\delta/h \leq 1/150$ - other single-story buildings: $\delta/h \leq 1/300$ - multi-storey buildings $\delta/h \leq 1/300$; $\Delta/H \leq 1/500$ In case of specific technical and/or functional requirements the limits of which should be suitably reduced
7.2.3 (1)	Note	As regards vibration limits, these must be congruent with performance required of the structure in relation to the intended use, with reference to static, functional and aesthetic requirements. As regards the limit values, these must be appropriate to the specific requirements and may be inferred from technical documentation of proven validity. For buildings, the following limits relating to the vibration of decks shall be adopted: - floors subject to a load of persons: the lowest natural frequency of the structure shall generally not be less than 3 Hz - floors subject to cycling excitations: the lowest natural frequency of the structure shall generally not be less than 5 Hz As an alternative to such restrictions, an acceptability check may be conducted on the perception of vibrations
8.1.1 (2)	Note	The values recommended in Table 8.1 UNI-EN-1999-1-1 are adopted
8.9 (3)	Note	Other types of unions are not permitted

A.2 (1)	Note	No additional requirements
C.3.4.1(2)	Note	The following shall be adopted: - $\gamma_{Mo,c}$ = 1.15 - $\gamma_{Mu,c}$ = 2.1
C.3.4.1(3)	Note	The following shall be adopted: - $\gamma_{M2,cu} = \gamma_{Mu,c}$ = 2.1 - $\gamma_{M2,co} = \gamma_{Mo,c}$ = 1.15
C.3.4.1(4)	Note	The following shall be adopted: - $\gamma_{Mp,co} = \gamma_{Mp}$ = 1.3 - $\gamma_{Mp,cu} = \gamma_{Mu,c}$ = 2.1
K.1 (1)	Note	The effects of 'shear lag' in the wings of the members may be overlooked if $b_0 < L_e / 50$, where b_0 is the width of the free wing or the half-width of the inner part, and L_e is the distance between the zero moment points. For verifications on the ultimate limit state the recommended values are adopted
K.3 (1)	Note 1	The effects of the 'shear lag' for verifications on the ultimate limit state may be determined by evaluating them in elastic conditions, as defined for the serviceability and fatigue limit states .
K.3 (1)	Note 3	No additional requirements
	Use of Informative Annexes C, D, E, F, G, H, I, J, K, L and M	Annexes C, D, E, F, G, H, I, J, K, L and M retain their informative character and may be used in so far as they are not contrary to the requirements set out in the implementing rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI EN 1999-1-2:2007	(includes corrigendum EC1:2010) Design of aluminium structures Part 1-2: General rules -Structural fire design
EN 1999-1-2:2007	(incorporating corrigendum, October 2009) Design of aluminium structures Part 1-2: General rules Structural fire design

1. BASIS

This Annex contains the national determination parameters for UNI-EN1999-1-2:2007.

2. INTRODUCTION

2.1. Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1999-1-2:2007 below:

2.3 (1) Note	4.2.2.1 (1) Note
2.3 (2) Note	4.2.2.3 (5) Note 1 (see AC 2009)
2.4.2 (3) Note 1	4.2.2.4 (5) Note (see AC 2009)

Paragraph 3 also contains national indications on the use of the Informative Annexes A and B for buildings and other civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN1999-1-2:2007 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN1999-1-2:2007 Eurocode 9: Design of aluminium structures – Part 1-2: General rules - Structural fire design.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI-EN1999-1-2:2007.

Paragraph	Citation	National parameter – value or requirement
2.3 (1)	Note	The recommended value $\gamma_{M,fi}$ = 1.0 is adopted
2.3 (2)	Note	The recommended value $\gamma_{M,fi}$ = 1.0 is adopted
2.4.2 (3)	Note 1	The values of η must be calculated by reference to the partial factors set out in the National Annex to EN 1990 and EN 1991-1-2
4.2.2.1 (1)	Note	No specific information is provided
4.2.2.4 (5)	Note 1 (see AC 2009)	No specific information is provided
4.2.2.3 (5)	Note 1 (see AC 2009)	No specific information is provided
	Use of Informative Annexes	Annexes A and B retain their informative character and may be used insofar as they do not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN1999-1-3:2011	(includes update A1:2011) Design of aluminium structures Part 1-3: Structures susceptible to fatigue
EN 1999-1-3: 2007 + A1:2011	Design of aluminium structures Part 1-3: Structures susceptible to fatigue

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1999-1-3:2011.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1999-1-3:2011 below:

2.1.1 (1) Note	3 (1) Note 1	6.2.1 (2) Note 2	I.2.2 (1) Note	L.4 (3) Note 2
2.2.1 (4) Note	4 (2) Note	6.2.1 (7) Note	I.2.3.2 (1) Note 2	L.4 (4) Note
2.3.1 (2) Note 2	5.8.1 (1) Note	6.2.1 (11) Note	I.2.4 (1) Note	L.4 (5) Note
2.3.2 (6) Note	5.8.2 (1) Note 1	E (5) Note	L.3(2) Note	L.5.1 (1) Note
2.4 (1) Note 1	6.1.3 (1) Note 1	E (7) Note	L.4(3) Note 1	
2.4 (1) Note 2	6.1.3 (1) Note 2			

Paragraph 3 below also contains national information on the use of Information Appendices B, C, D, E, F, G, H, I, J, K and L for civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN-1999-1-3:2011 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1999-1-3:2011 Design of aluminium structures – Part 1-3: Structures susceptible to fatigue.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI EN 1999-1-3:2011.

<table>
<tr><th>Paragraph</th><th>Citation</th><th>National parameter - value or requirement</th></tr>
<tr><td>2.1.1 (1)</td><td>Note</td><td>The damage tolerant design method is not accepted. Also for structures where damage is acceptable the verification regarding the duration of rated life must be carried out.</td></tr>
<tr><td>2.2.1 (4)</td><td>Note</td><td>The recommended value D_{lim} = 1.0 is adopted</td></tr>
<tr><td>2.3.1 (2)</td><td>Note 2</td><td>No additional requirements</td></tr>
<tr><td>2.3.2 (6)</td><td>Note</td><td>The recommended values are adopted:
- $k_F = 2$
- $k_N = 2$</td></tr>
<tr><td>2.4 (1)</td><td>Note 1</td><td>The recommended value $\gamma_{Ff} = 1$ is adopted</td></tr>
<tr><td>2.4 (1)</td><td>Note 2</td><td>The recommended values in Table 2.1 are adopted.</td></tr>
<tr><td>3 (1)</td><td>Note 1</td><td>No additional information</td></tr>
<tr><td>4 (2)</td><td>Note</td><td>No additional information</td></tr>
<tr><td>5.8.1 (1)</td><td>Note</td><td>The $\Delta\sigma$ to be considered in the checks must be consistent with those considered for the determination of the S-N curves. However, different assumptions must be precautionary: therefore, it is not allowed to consider nominal tension deltas if the S-N curves refer to peak tensions</td></tr>
<tr><td>5.8.2 (1)</td><td>Note 1</td><td>The equivalent damage coefficients shall be derived from appropriate calibrations, considering the gradient values m of the S-N curve consistent with those of the S-N curves of the details to be verified</td></tr>
<tr><td>6.1.3 (1)</td><td>Note 1</td><td>The recommended values given in Annex J are adopted</td></tr>
<tr><td>6.1.3 (1)</td><td>Note 2</td><td>No additional information</td></tr>
<tr><td>6.2.1(2)</td><td>Note 2</td><td>For partial coefficients γ_{Mf} the values of the following Table are adopted
<table>
<tr><td rowspan="2">Assessment criteria</td><td colspan="2">Consequences of breaking</td></tr>
<tr><td>Moderate consequences</td><td>Significant consequences</td></tr>
<tr><td>Acceptable damage</td><td>$\gamma_{Mf} = 1.00$</td><td>$\gamma_{Mf} = 1.15$</td></tr>
<tr><td>Useful fatigue life</td><td>$\gamma_{Mf} = 1.15$</td><td>$\gamma_{Mf} = 1.35$</td></tr>
</table></td></tr>
<tr><td>6.2.1 (7)</td><td>Note</td><td>No additional information</td></tr>
<tr><td>6.2.1 (11)</td><td>Note</td><td>No increases in classes of fatigue strength are accepted</td></tr>
<tr><td>E (5)</td><td>Note</td><td>For partial coefficients γ_{Mf} the values of the Table in note 2 to paragraph 6.2.1(2) are adopted, multiplied by 3.0</td></tr>
<tr><td>E (7)</td><td>Note</td><td>No additional information</td></tr>
<tr><td>I.2.2 (1)</td><td>Note</td><td>No additional information</td></tr>
<tr><td>I.2.3.2 (1)</td><td>Note 2</td><td>No additional information</td></tr>
<tr><td>I.2.4 (1)</td><td>Note</td><td>No additional information</td></tr>
<tr><td>L.3 (2)</td><td>Note</td><td>The indications recommended in Table L.1 are adopted</td></tr>
</table>

<table>
<tr><td>L.4 (3)</td><td>Note 1</td><td>The recommended values of γ_{Mf} are shown in Table L.2 below.

Table L.2
<table>
<tr><td rowspan="3">Design method</td><td rowspan="3">Design procedure</td><td colspan="3">Consequence class</td></tr>
<tr><td>CC1</td><td>CC2</td><td>CC3</td></tr>
<tr><td>$\gamma_M^{a\ b\ c\ d}$</td><td>$\gamma_M^{a\ b\ c\ d}$</td><td>$\gamma_M^{a\ b\ c\ d}$</td></tr>
<tr><td rowspan="2">DLS-I</td><td>Cumulation of damage</td><td>1.15</td><td>1.25</td><td>1.35</td></tr>
<tr><td>Constant amplitude fatigue
(e.g. max $\Delta\sigma_{E,d} < \Delta\sigma_{D,d}$</td><td>1.15</td><td>1.25</td><td>1.35</td></tr>
<tr><td rowspan="2">DLS-II</td><td>Cumulation of damage</td><td>1.0</td><td>1.15</td><td>1.25</td></tr>
<tr><td>Constant amplitude fatigue
(e.g. max $\Delta\sigma_{E,d} < \Delta\sigma_{D,d}$</td><td>1.0</td><td>1.15</td><td>1.25</td></tr>
</table>
</td></tr>
<tr><td>L.4 (3)</td><td>Note 2</td><td>The values of γ_{Mf} in Table L.2 are specified with reference to the consequence class and not with reference to the execution class</td></tr>
<tr><td>L.4 (4)</td><td>Note</td><td>The damage tolerant design method is not accepted</td></tr>
<tr><td>L.4 (5)</td><td>Note</td><td>The damage tolerant design method is not accepted</td></tr>
<tr><td>L.5.1 (1)</td><td>Note</td><td>No additional criteria are specified</td></tr>
<tr><td></td><td>Use of Informative Annexes B, C, D, E, F, G, H, I, J, K and L</td><td>Annexes B, C, D, E, F, G, H, I, J, K and L retain their informative character and may be used in so far as they are not contrary to the requirements set out in the implementing rules of the various structural types and the current Technical Standards for Construction</td></tr>
</table>

Non-contradictory additional information (ICNC): since the use of the Damage tolerant design is not permitted, Paragraph 2.2.2, Paragraph A.3 of Annex A, Paragraph L.2 and all parts of the text referring to the DTD are not applicable

NATIONAL ANNEX

UNI EN 1999-1-4:2011	(includes update A1:2011 and corrigendum AC:2009) Design of aluminium structures Part 1-4: Cold formed structural sheeting
EN 1999-1-4:2007+A1:2011	(Incorporating corrigendum November 2009) Design of aluminium structures Part 1-4: Cold-formed structural sheeting

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1999-1-4:2011.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the paragraphs of UNI-EN1999-1-4:2011 below:

2 (3) Note
2.(4) Note
2 (5) Note 1
3.1 (3) Note 1
7.3 (3) Note
A.1 (1) Note 2
A.1 (1) Note 3
A.3.4 (3) Note

Paragraph 3 below also contains national information on the use of Informative Annex B for civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN-1999-1-4:2011 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1999-1-4:2011 Design of aluminium structures – Part 1-4: Cold-formed structural sheeting.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI EN 1999-1-4:2007.

Paragraph	Citation	National parameter - value or requirement
2(3)	Note	The recommended values are adopted: - $\gamma_{M1} = 1.15$ - $\gamma_{M2} = 1.25$ - $\gamma_{M3} = 1.25$
2(4)	Note	The recommended value $\gamma_{M,ser} = 1.0$ is adopted

2(5)	Note 1	No additional information
3.1(3)	Note 1	No additional information
7.3(3)	Note	Vertical displacements must be consistent with the required performance of the structure also in relation to the intended use, with reference to static, functional and aesthetic requirements. As regards the limit values, these must be appropriate to the specific requirements and may be inferred from technical documentation of proven validity. For buildings, the following limits are adopted for vertical movements (δ_{max} arrow in the final state, cleared of the initial mount; δ_2 variation due to the application of variable loads): - roofing in general: $\delta_{max}/L \leq 1/200$, $\delta_2/L \leq 1/250$ - practical roofing: $\delta_{max}/L \leq 1/250$, $\delta_2/L \leq 1/300$ - floors in general: $\delta_{max}/L \leq 1/250$, $\delta_2/L \leq 1/300$ - floors or roofs bearing plaster or other fragile finishing materials or inflexible partitions: $\delta_{max}/L \leq 1/250$, $\delta_2/L \leq 1/350$ - floors that support columns: $\delta_{max}/L \leq 1/400$, $\delta_2/L \leq 1/500$ floors or roofs bearing plaster or other fragile finishing materials or inflexible partitions $\delta_{max}/L \leq 1/250$. In case of specific technical and/or functional requirements the limits of which should be suitably reduced
A.1(1)	Note 2	No additional information
A.1(1)	Note 3	No additional information
A.3.4(3)	Note	The partial factors γ_M must be determined in accordance with EN 1990, but will not be less than: - $\gamma_{M1} \geq 1.15$ - $\gamma_{M2} \geq 1.25$ - $\gamma_{M3} \geq 1.25$ For γ_{sys} the recommended value $\gamma_{sys} = 1,0$ is adopted
	Use of Informative Annex B	Annex B retains its informative character and may be used insofar as it does not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction

NATIONAL ANNEX

UNI-EN-1999-1-5:2007	(corrigendum AC:2009) Design of aluminium structures Part 1-5: Shells
EN 1999-1-5:2007	(Incorporating corrigendum November 2009) Design of aluminium structures Part 1-5: Shell structures

1. BASIS

This Annex contains the national determination parameters for UNI-EN-1999-1-5:2007.

2. INTRODUCTION

2.1 Scope

The document indicates, in point 3 below, which national parameters are to be adopted in the Paragraphs of UNI-EN1999-1-5:2007 below

2.1 (3) Note
2.1 (4) Note

Paragraph 3 below also contains national information on the use of Informative Annex B for civil engineering works.
These national decisions relating to the paragraphs mentioned above must be applied for the use of UNI-EN-1999-1-5:2007 in Italy.

2.2. Normative references

This Annex should be taken into account when using all regulatory documents explicitly referring to UNI-EN-1999-1-5:2007 Design of aluminium structures – Part 1-5: Shell structures.

3. NATIONAL DECISIONS

The following are the national parameters to be adopted for the use of the Eurocode UNI EN 1999-1-5:2007.

Paragraph	Citation	National parameter - value or requirement
2.1 (3)	Note	The following shall be adopted: - $\gamma_{M1} = 1.15$ - $\gamma_{M2} = 1.25$ (recommended values)
2.1 (4)	Note	$\gamma_{M,ser} = 1.0$ is adopted (recommended value)

	Use of Informative Annex B	Annex B retains its informative character and may be used insofar as it does not conflict with the requirements set out in the execution rules of the various structural types and the current Technical Standards for Construction