



BSI Standards Publication

**Statistical verification of partial factors for buildings  
according to Eurocode EN 1993-1-1 Annex E**

---

## National foreword

This Published Document is the UK implementation of CEN/TS 17991:2023.

The UK participation in its preparation was entrusted to Technical Committee ISE/103, Structural Steels Other Than Reinforcements.

A list of organizations represented on this committee can be obtained on request to its committee manager.

### Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

This publication is not to be regarded as a British Standard.

© The British Standards Institution 2023  
Published by BSI Standards Limited 2023

ISBN 978 0 55 28227 6

ICS 91.010.30; 91.080.13

**Compliance with a Published Document cannot confer immunity from legal obligations.**

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 30 November 2023.

### Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

---

TECHNICAL SPECIFICATION  
SPÉCIFICATION TECHNIQUE  
TECHNISCHE SPEZIFIKATION

**CEN/TS 17991**

November 2023

ICS 91.010.30; 91.080.13

English Version

**Statistical verification of partial factors for buildings  
according to Eurocode EN 1993-1-1 Annex E**

Vérification statistique des coefficients partiels de  
sécurité pour la construction de bâtiments selon  
Eurocode 1993-1-1 Annexe E

Statistischer Nachweis von Sicherheitsfaktoren für den  
Hochbau nach Eurocode EN 1993-1-1 Anhang E

This Technical Specification (CEN/TS) was approved by CEN on 22 October 2023 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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



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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

<b>Contents</b>	<b>Page</b>
European foreword .....	3
<b>1 Scope</b> .....	<b>4</b>
<b>2 Normative references</b> .....	<b>4</b>
<b>3 Terms and definitions</b> .....	<b>4</b>
<b>4 Statistical verification of partial factors for buildings - Requirements on the statistical distribution of mechanical properties and products dimensions</b> .....	<b>4</b>
4.1 General.....	5
4.2 Practical procedure and permissible deviations .....	6
4.3 Methodology of statistical verification .....	6
<b>5 Other methods for the verification of partial factors for buildings</b> .....	<b>6</b>
<b>6 Procedures for the different steel products</b> .....	<b>6</b>
6.1 General.....	6
6.2 Hot-rolled sections .....	7
6.2.1 General.....	7
6.2.2 Mechanical and geometrical requirements for statistical verification.....	7
6.2.3 Non-statistical verification .....	8
6.3 Hot rolled plates rolled on a reversing mill .....	8
6.3.1 General.....	8
6.3.2 Mechanical requirements for statistical verification for fixed thickness tolerance classes according to EN 10029 and non-statistical verification for hot rolled plates rolled on a reversing mill.....	8
6.4 Sheets/plates cut from hot-rolled wide strip .....	9
6.4.1 General.....	9
6.4.2 Mechanical and geometrical requirements for statistical verification.....	9
6.4.3 Non-statistical verification for sheets/plates cut from hot-rolled wide strip .....	10
6.5 Hot finished and cold formed welded hollow sections .....	10
<b>7 Sampling and testing</b> .....	<b>11</b>
7.1 Location of samples and orientation of test pieces for mechanical tests .....	11
7.2 Sampling period and population.....	11
7.3 Tensile test.....	11
<b>Annex A (informative) Matrix of possible combinations of <math>X_{5\%}</math> and <math>X_{0,12\%}</math> criteria for sections</b> .....	<b>12</b>
<b>Bibliography</b> .....	<b>14</b>

## European foreword

This document (CEN/TS 17991:2023) has been prepared by Technical Committee CEN/TC 459/SC 3 “Structural steels other than reinforcements”, the secretariat of which is held by DIN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users’ national standards bodies. A complete listing of these bodies can be found on the CEN website.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

## 1 Scope

This document provides requirements for the statistical distribution of material properties and dimensional parameters of structural steel products, allowing the proof of consistency of the safety approach of the properties of the product standards compared to those of the design standards for the design of steel buildings. It also describes the evaluation procedures for the verification of the compliance of structural steels with these requirements.

This document applies for the following structural steel products intended for buildings: hot rolled and welded I- and H-sections, hot rolled plates rolled on a reversing mill, sheets/plates cut from hot-rolled wide strip and hot finished and cold formed welded structural hollow sections.

It is intended to be used as a background document to support the assessment of the partial factors for steel constructions (as detailed in EN 1993-1-1).

This document can be used for neither product ordering nor certification.

NOTE The background of statistical requirements on mechanical properties and geometrical parameters is detailed in EN 1993-1-1:2022, Annex E.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 10024, *Hot rolled taper flange I sections — Tolerances on shape and dimensions*

EN 10029, *Hot-rolled steel plates 3 mm thick or above — Tolerances on dimensions and shape*

EN 10034, *Structural steel I and H sections — Tolerances on shape and dimensions*

EN 10025 (all parts), *Hot rolled products of structural steels*

EN 10051, *Continuously hot-rolled strip and plate/sheet cut from wide strip of non-alloy and alloy steels — Tolerances on dimensions and shape*

EN 10149 (all parts), *Hot rolled flat products made of high yield strength steels for cold forming*

EN 10210 (all parts), *Hot finished structural hollow sections of non-alloy and fine grain steels*

EN 10219 (all parts), *Cold formed welded structural hollow sections of non-alloy and fine grain steels*

EN 10365, *Hot rolled steel channels, I and H sections — Dimensions and masses*

## 3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— IEC Electropedia: available at <https://www.electropedia.org/>

— ISO Online browsing platform: available at <https://www.iso.org/obp>