

Tensile testing of metallic materials —

Part 1: Method of test at ambient temperature

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National foreword

This British Standard has been prepared under the direction of the Iron and Steel and Non-ferrous Metals Standards Policy Committees and is the English language version of EN 10 002-1 “*Metallic materials — Tensile testing — Part 1: Method of test*”, ratified by CEN/BT on 27 November 1989. It supersedes BS 18:1987 which is withdrawn.

Other Parts of EN 10 002, in course of preparation, are listed in the foreword to EN 10 002-1.

Cross-references. Where there are British Standards corresponding to Euronorms, European Standards and international standards quoted in this standard the relationship is given in National appendix B.

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température ambiante)

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Teil 1: Prüfverfahren (bei Raumtemperatur)

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Brief history

This European Standard was prepared by the Technical Committee ECISS/TC1A “Mechanical and physical tests”, the Secretariat of which has been allocated to the Association Française de Normalisation (AFNOR).

It represents the first part of the general standard: Metallic materials — Tensile testing.

This European Standard replaces the Euronorms:

EU 2-80: Tensile testing for steel

EU 11-80: Tensile test for steel sheet and strip less than 3 mm thick

This European Standard was adopted by CEN on 27 November 1989.

According to the Common CEN/CENELEC Rules, being part of the Internal Regulations of CEN, the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and United Kingdom.

Foreword

The Standard EN 10 002 will comprise the following parts:

— *Part 1: Metallic materials; Tensile test; Method of test (at ambient temperature);*

— *Part 2: Verification of the force measuring system of the tensile testing machines;*

— *Part 3: Metallic materials; Tensile test; Calibration of proving devices used for the verification of uniaxial testing machines;*

— *Part 4: Metallic materials; Tensile test; Verification of extensometers used in uniaxial testing;*

— *Part 5: Metallic materials; Tensile test; Method of test at elevated temperatures.*

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1 Object and field of application

This European Standard specifies the method for tensile testing of metallic materials and defines the mechanical properties which can be determined thereby at ambient temperature.

For certain particular metallic materials and applications, the tensile test may be the subject of specific standards or particular requirements.

2 References

EN 10 002-2¹⁾, *Metallic materials; Tensile testing; — Part 2: Verification of tensile testing machines.*

ISO 2566-1-1984, *Steel — Conversion of elongation values — Part 1: Carbon and low alloy steels.*

ISO 2566-2-1984, *Steel — Conversion of elongation values — Part 2: Austenitic steels.*

ISO/DIS 9513²⁾, *Metallic materials — Verification of extensometers used in uniaxial testing.*

EU 18-1979³⁾, *Selection and preparation of samples and test pieces for steel and iron and steel products.*

3 Principle

The test involves straining a test piece by tensile force, generally to fracture, for the purpose of determining one or more of the mechanical properties defined in clause 4.

The test is carried out at ambient temperature between 10 °C and 35 °C, unless otherwise specified. Tests carried out under controlled conditions shall be made at a temperature of 23 ± 5 °C.

4 Definitions

For the purposes of this European Standard, the following definitions apply.

4.1 gauge length (L)

Length of the cylindrical or prismatic portion of the test piece on which elongation is measured at any moment during the test. In particular, a distinction is made between:

4.1.1

original gauge length (L_0)

gauge length before application of force

4.1.2

final gauge length (L_u)

gauge length after rupture of the test piece (see 11.1)

4.2

parallel length (L_c)

length of the reduced section parallel portion of the test piece

NOTE The concept of parallel length is replaced by the concept of distance between grips for non-machined test pieces.

4.3

elongation

increase in the original gauge length (L_0) at the end of the test

4.4 percentage elongation

Elongation expressed as a percentage of the original gauge length (L_0).

4.4.1

percentage permanent elongation

increase in the original gauge length of a test piece after removal of a specified stress (see 4.9), expressed as a percentage of the original gauge length (L_0)

4.4.2

percentage elongation after fracture (A)

permanent elongation of the gauge length after fracture ($L_u - L_0$), expressed as a percentage of the original length (L_0)

NOTE In the case of proportional test pieces, only if the original gauge length is other than $5,65 \sqrt{S_0}$ ⁴⁾, where S_0 is the original cross-sectional area of the parallel length, the symbol A shall be supplemented by an index indicating the coefficient of proportionality used, for example:

$A_{11,3}$ = percentage elongation on a gauge length (L_0) of $11,3 \sqrt{S_0}$

In the case of non-proportional test pieces, the symbol A shall be supplemented by an index indicating the original gauge length used, expressed in millimetres, for example:

A_{80} mm = percentage elongation on a gauge length (L_0) of 80 mm.

4.4.3

percentage total elongation at fracture (A_t)

total elongation (elastic elongation plus plastic elongation) of the gauge length at the moment of fracture expressed as a percentage of the original gauge length (L_0)

¹⁾ In preparation.

²⁾ Pending the preparation of Part 4 of this European Standard.

³⁾ Until this Euronorm is transformed into a European Standard it can either be used or reference made to the corresponding national standards, a list of which is given in Annex F of this European Standard.

⁴⁾ $5,65 \sqrt{S_0} = 5 \sqrt{(4S_0/\pi)}$