

Steel for the reinforcement of concrete — Weldable ribbed reinforcing steel B500 — Technical delivery conditions for bars, coils and welded fabric

ICS 77.140.60; 91.080.40

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Committees responsible for this Draft for Development

The preparation of this Draft for Development was entrusted to Technical Committee ISE/9, Steel for concrete reinforcement, upon which the following bodies were represented:

- British Cement Association
- British Iron and Steel Producers' Association
- British Precast Concrete Federation Ltd.
- Concrete Society
- County Surveyors' Society
- Department of Transport
- Federation of Civil Engineering Contractors
- Institution of Structural Engineers
- UK Certification Authority Reinforcing Steels

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National foreword

This Draft for Development has been prepared by Technical Committee ISE/9 and is the English language version of European Prestandard ENV 10080 *Steel for the reinforcement of concrete — Weldable ribbed reinforcing steel B500 — Technical delivery conditions for bars, coils and welded fabric* published by the European Committee for Standardization (CEN).

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

It is being issued in the Draft for Development series of publications and is of a provisional nature. It should be applied on this provisional basis so that information and experience of its practical application may be obtained.

Comments arising from the use of this Draft for Development are requested so that UK experience can be reported to the European organization responsible for its conversion to a European Standard. A review of this publication will be initiated 2 years after its publication by the European organization so that a decision can be taken on its status at the end of its 3 year life. The commencement of the review period will be notified by an announcement in *BSI News*.

According to the replies received by the end of the review period, the responsible BSI Committee will decide whether to support the conversion into a European Standard, to extend the life of the prestandard or to withdraw it. Comments should be sent in writing to the Secretary of BSI Technical Committee ISE/9 at 389 Chiswick High Road, London W4 4AL giving the document reference and clause number and proposing, where possible, an appropriate revision of the text. This Draft for Development has been published to enable ENV 10080 to be used in the design of steel reinforced concrete structures conforming to ENV 1992-1-1 and to develop data on the properties available from reinforced steels.

The UK has consistently objected to aspects of this ENV, particularly items 2), 3), 5) and 7) of the foreword of ENV 10080.

It is unlikely that the UK will vote positively on any proposed European Standard on this subject until these points are satisfactorily resolved.

Cross-references

Publication referred to	Corresponding British Standard
EN 10002-1	BS EN 10002 <i>Tensile testing of metallic materials</i> Part 1:1990 <i>Method of test at ambient temperature</i>
EN 10002-2	Part 2:1992 <i>Verification of the force measuring system of the tensile testing machine</i>
EN 10002-4	Part 4:1995 <i>Verification of extensometers used in uniaxial testing</i>
EN 10020	BS EN 10020:1991 <i>Definition and classification of grades of steel</i>
EN 10027-1	BS EN 10027 <i>Designation systems for steel</i> Part 1:1992 <i>Steel names, principal symbols</i>
EN 10027-2	Part 2:1992 <i>Steel numbers</i>
EN 10079	BS EN 10079:1993 <i>Definition of steel products</i>
EN 29002	BS EN ISO 9002:1994 <i>Quality systems. Model for quality assurance in production, installation and servicing</i>
EN 45011	BS 7511:1989 <i>General criteria for certification bodies operating product certification</i>
EN 45012	7512:1989 <i>General criteria for certification bodies operating quality system certification</i>

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the ENV title page, pages 2 to 24, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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Descriptors: Reinforced concrete, reinforcement structures, prestressing steels, reinforcing steels, metal bars, welded wire lattice, designations, classifications, chemical composition, grades: quality, mechanical properties, dimensions, tests, weldability, delivery

English version

Steel for the reinforcement of concrete — Weldable ribbed reinforcing steel B 500 — Technical delivery conditions for bars, coils and welded fabric

Acier pour l'armature du béton — Armatures pour béton armé soudables à verrous B 500 — Conditions techniques de livraison pour les barres, les couronnes et les treillis soudés

Betonbewehrungsstahl — Schweißgeeigneter gerippter Betonstahl B 500 — Technische Lieferbedingungen für Stäbe, Ringe und geschweißte Matten

This European Prestandard (ENV) was approved by CEN on 1995-01-26 as a prospective standard for provisional application. The period of validity of this ENV 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 ENV can be converted into a European Standard (EN).

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

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

a) History

This European Prestandard has been prepared by SC 1, Reinforcing steels not for prestressing, of the Technical Committee ECISS/TC 19, Concrete reinforcing steel — Qualities, dimensions, and tolerances, of which the Secretariat is held by DIN.

The work of ECISS/TC 19/SC 1 started in 1988 with the aim to transform

EURONORM 80-85 *Reinforcing Steel (not for prestressing); technical delivery conditions,*

EURONORM 82-1:79 *Steel for the reinforcement of concrete with an improved bonding action; dimensions, mass, tolerances. General requirements, and*

EURONORM 82-2:79 *Steel for the reinforcement of concrete with an improved bonding action; dimensions, mass, tolerances. Supplementary specifications for ribbed steels*

into a European Standard (EN) with unified specifications for the mechanical and dimensional properties of bars, coils and welded fabric of reinforcing steels suitable to meet the requirements for the design of concrete structures.

There were nine plenary meetings of ECISS/TC 19/SC 1 with the participation of in total 17 member countries and of representatives of the organizations to which liaison had been established such as CEN/TC 250/SC 2 (Structural Eurocodes; Eurocode 2: Design of concrete structures), ISO/TC 17/SC 16 (Steels for the reinforcement and prestressing of concrete), and the European Fabric Reinforcement Association (EFRA). Although some fundamental agreements could be achieved (e.g. with regard to the number of strength levels, weldability, size ranges etc.) it was not possible, even after a 5 year period of debate, to get the approval of a qualified majority of the member countries to the publication of a genuine European Standard. Thus a proposal was adopted in the meeting of ECISS/TC 19/SC 1 in May 1993 and confirmed by the results of a written enquiry in November 1993 to give the present document containing the delivery conditions for the weldable ribbed reinforcing steels B500A and B500B the status of a European Prestandard (ENV) for the reasons mentioned below.

b) Reasons for the publication of a Prestandard ENV 10080

In the existing national standards the specifications for reinforcing steels differ to a considerable extent as a result of the differences of traditions and material requirements. Hence it was often difficult to obtain the compromises necessary to get unified European delivery conditions. Some of the specifications laid down in the present document were only supported by a slight majority of votes [see also item c)]. One of the main questions was how to attain a close alignment of the material specifications with the rules for the design of concrete structures covered by the Eurocodes 2, 4 and 8. The decision to publish Eurocode 2 as a European Prestandard (ENV 1992-1-1 *Design of concrete structures — Part 1.1: General rules and rules for buildings*) open for modification and completion within a reasonable space of time promoted the decision of ECISS/TC 19/SC 1 to publish the present document as a European Prestandard too. The lifetime of ENV 10080 should be harmonized with that of ENV 1992-1-1. This period is necessary to carry out thorough investigations and to collect sufficient experience about the correlation and compatibility between the material properties to be specified and the criteria for the design and execution of the concrete structures.

c) Main items to be rediscussed

All interested parties are requested to draw their special attention to the following items which have been controversially discussed during the previous meetings of ECISS/TC 19/SC 1 and shall be reconsidered when transforming ENV 10080 and ENV 1992-1-1 into European Standards:

- 1) whether the rules for the design of concrete structures according to Eurocodes 2, 4 and 8 require the standardization of two or of more than two categories of steel grade B500 with different ductility values;

NOTE ECISS/TC 19/SC 1 is in favour of standardizing (eventually in a separate EN) a B500 category with ductility values higher than those specified for B500B if such a category is considered to be necessary in view of the requirements of Eurocode 8 (building in seismic regions) or to other applications (e.g. nuclear power stations, marine structures etc.).

- 2) whether the total elongation at maximum force (A_{gt}) may be regarded as a more significant characteristic for the evaluation of the service behaviour of reinforcing steels than the elongation at fracture (A_5 or A_{10}),

- 3) whether in addition to characteristic values (in the sense of the definition in **3.8**) minimum values should be specified for A_{gt} and R_m/R_e (see Table 1);
- 4) whether fatigue strength values should be specified for welded fabric (see Table 1);
- 5) whether the details of testing the fatigue properties are acceptable (see **6.3.4**);
- 6) whether the permissible deviation from nominal mass should be increased (e.g. to $\pm 6\%$) for small product diameters (e.g. up to 10 mm) (see Table 1 and **6.4.2**);
- 7) whether the certification procedures as described in clause **7** and Annex A should be maintained as the sole possible system for the verification of the conformity of the steels with the specifications of the standard.

NOTE The requirements laid down in Annex A are the recommendations of ECIS/TC 19/SC 1. It is recognized that the Commission of the European Union has the ultimate responsibility for setting the level of the attestation of conformity for the products covered by ENV 10080.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Prestandard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

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1 Scope

1.1 This European Prestandard specifies requirements for the chemical composition and the mechanical and geometrical properties of weldable ribbed reinforcing steel in Grade B500, categories A and B (designated as steels B500A and B500B, see Table 1) used for the reinforcement of concrete structures in the form of

- bars and coils or as elements for the manufacture of welded fabric,
- sheets of factory-made machine-welded fabric in the diameter ranges given in Table 1.

1.2 This European Prestandard does not apply to

- non-weldable reinforcing steel;
- plain round or indented reinforcing steel;
- lattice girders;
- prestressing steels (see EN 10138).

2 Normative references

This European Prestandard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Prestandard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 10002-1, *Metallic materials — Tensile testing; Part 1: Method of test (at ambient temperature)*.

EN 10002-2, *Metallic materials — Tensile testing; Part 2: Verification of the force measuring system of the tensile testing machine*.

EN 10002-4, *Metallic materials — Tensile testing; Part 4: Verification of extensometers used in uniaxial testing*.

EN 10020, *Definition and classification of grades of steel*.

EN 10027-1, *Designation system for steels; Part 1: Steel names; principal symbols*.

EN 10027-2, *Designation system for steels; Part 2: Numerical system*.

EN 10079, *Definition of steel products*.

EN 29002, *Quality systems; Model for quality assurance in production and installation*.

EN 45011, *General criteria for certification bodies operating product certification*.

EN 45012, *General criteria for certification bodies operating quality system certification*.

ECISS Information Circular IC 10, *Designation systems for steel; Additional symbols for steel names*.

EURONORM 18, *Selection and preparation of samples and test pieces for steel products*¹⁾.

ISO 10065, *Steel bars for the reinforcement of concrete — Bend and rebend tests*.

ISO 10287, *Steel for the reinforcement of concrete — Determination of the strength of joints in welded fabric*.

ISO 10606, *Steel for the reinforcement of concrete — Determination of total elongation at maximum force*²⁾.

3 Definitions

For the purposes of this European Prestandard the following definitions apply.

3.1 reinforcing steel

steel with a circular or practically circular cross section which is suitable for the reinforcement of concrete

3.2 ribbed reinforcing steel

steel with at least two rows of transverse ribs which are uniformly distributed over the entire length

3.3 non-alloyed steel; quality steel

definitions, see EN 10020

3.4 bar, rod, wire

definitions, see EN 10079

3.5 decoiled material

reinforcing steel manufactured in coils and subsequently straightened. After straightening, it may be delivered in straight lengths or as cut and bent pieces

3.6 nominal cross-sectional area

the cross-sectional area equivalent to the area of a circular plain bar of the nominal diameter

¹⁾ Until it is transformed into a European Standard either this EURONORM or the corresponding national standard may be applied.

²⁾ At present at the stage of draft.