
Varivo rebrasto betonsko jeklo B 500 - Tehnični dobavni pogoji za palice, svitke in varjene mreže

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

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

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

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77.140.15	Jekla za armiranje betona	Steels for reinforcement of concrete
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EUROPEAN PRESTANDARD

ENV 10080

PRÉNORME EUROPÉENNE

EUROPÄISCHE VORNORM

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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**

iTeh STANDARD PREVIEW

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

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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 SC1 "Reinforcing steel 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/TC19/SC1 started in 1988 with the aim to transform

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

EURONORM82-1:79 - 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 requi-
rements for the design of concrete structures.

There were nine plenary meetings of ECISS/TC19/SC1 with the participation of in total 17 member countries and of representatives of the organizations to which liaison had been established such as CEN/TC250/SC2-Structural Eurocodes; Eurocode 2: Design of concrete structures -, ISO/TC17/SC16 - Steels for the reinforcement and prestressing of concrete - and the European Fabric Reinforcement Association (E.F.R.A.). 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 five years period of debates to get the approval of the qualified majority of the member countries to the publication of a genuine European Standard. Thus a proposal was adopted in the meeting of ECISS/TC19/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 an 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 clause 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/ TC19/SC1 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.

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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/TC19/SC1 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 B 500 with different ductility values.

NOTE: ECISS/TC19/SC1 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 to the requirements of Eurocode 8 (buildings 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 evalua-

tion of the service behaviour of reinforcing steels than the elongation after 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_s (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.

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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.

According to 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.

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 manufacturing 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 systems 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 18¹⁾ Selection and preparation of samples and test pieces for steel products
- ISO 10065 Steel bars for reinforcement of concrete - Bend and rebend tests
- ISO 10287 Steel for the reinforcement of concrete - Determination of strength of joints in welded fabric
- ISO 10606²⁾ Steel for the reinforcement of concrete - Determination of percentage total elongation at maximum force

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.

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.

3.6 Nominal cross-sectional area: The cross-sectional area equivalent to the area of a circular plain bar of the nominal diameter.

3.7 Welded fabric: Arrangement of longitudinal and transverse bars or wires of the same or different diameter and length that are arranged substantially at right angles to each other and factory electrical resistance welded together by automatic machines at points of intersection.

3.8 Characteristic value: Value having a prescribed probability of not being attained in a hypothetical unlimited test series. In the context of this European Prestandard the characteristic value is (unless otherwise indicated) the lower limit of the one sided statistical tolerance interval at which there is a 90 % probability ($1-\alpha = 0,90$) that 95 % ($p = 0,95$) or 90 % ($p = 0,90$) of the values are at or above this lower limit. This definition refers to the long-term quality level of production.

NOTE: The p-values specified for the properties of the steels covered by this European Prestandard are given in table 1.

3.9 Longitudinal rib: Uniform continuous protrusion parallel to the axis of the bar. In the case of cold twisted bars the ribs are parallel before cold twisting.

3.10 Transverse rib: Any rib on the surface of the product other than a longitudinal rib.

3.11 Rib height h: Distance from the highest point of the rib (transverse or longitudinal) to the surface of the core.

3.12 Rib spacing c: Distance between the centres of two consecutive transverse ribs measured parallel to the axis of the bar (see figure 2).

3.13 Transverse rib inclination β : Angle between the centre line of the transverse rib and the longitudinal axis of the bar (see figure 2).

3.14 Pitch of twist: Distance between two consecutive corresponding points of a longitudinal rib on the same generatrix of a twisted bar.

3.15 Standard fabric: Fabric manufactured according to national or producer's delivery conditions and available from stock.

3.16 **Purpose made fabric:** Fabric manufactured according to user's specific requirements.

3.17 **Longitudinal wire:** Reinforcing element in the manufacturing direction of the fabric.

3.18 **Transverse wire:** Reinforcing element perpendicular to the manufacturing direction of the fabric.

3.19 **Twin wires:** Two wires of the same steel and size placed adjacently and in contact with each other as a pair.

3.20 **Pitch of fabric:** Centre-to-centre distance of wires in a sheet of fabric. For twin wire fabric the pitch is measured between the tangent of the adjacent wires (see figures 4 and 5).

3.21 **Overhang:** Length of longitudinal or transverse wires projecting beyond the centre of the outer crossing wire in a sheet of fabric. For twin wire fabric the overhang is measured from the tangent line of the adjacent wires (see figures 4 and 5).

3.22 **Length of sheet:** Longest side of the sheet of fabric, irrespective of the manufacturing direction.

3.23 **Width of sheet:** Shortest side of the sheet of fabric, irrespective of the manufacturing direction.

NOTE: Further definitions concerning attestation of conformity and certification are given in annex A of this European Prestandard.

4 Classification and designation

4.1 Classification

The steels B500A and B500B are classified as non-alloyed quality steels according to EN 10020.

NOTE: The reference to EN 10020 is used for the purpose of classification of the steels covered by the present European Prestandard and shall not be regarded as a binding requirement for the chemical composition.

4.2 Designation

4.2.1 The steel names are allocated in accordance with EN 10027-1 and ECISS Information Circular IC 10; the steel numbers are allocated in accordance with EN 10027-2.

4.2.2 The products covered by this European Prestandard shall be designated in the following sequence:

- a) description of the product form (e.g. bar, coil, fabric),
- b) the number of this European Prestandard (ENV 10080),
- c) the nominal dimensions of the product (see 4.2.3 and 4.2.4),
- d) the name or the number of the steel (see table 1).

4.2.3 In the case of bars and coils the indications for the nominal dimensions shall include

- the nominal diameter of the product in millimetres,
- the nominal length (for bars only) in millimetres.

EXAMPLE: Bar according to this European Prestandard with a nominal diameter of 20 mm and a nominal length of 12000 mm of steel B500A (steel number 1.0438).

Bar ENV 10080-20x12000-B500A
or
Bar ENV 10080-20x12000-1.0438

4.2.4 In the case of welded fabric the designation shall include the necessary information about the wire sizes and the geometry (dimensions, pitch, overhang etc.) of the sheet.

NOTE: Brief designations are widely used to describe standard fabric (see 3.15). The relevant mesh arrangement can be seen from the tabulated data issued by the manufacturer.

Purpose made fabric (see 3.16) can be described using the indications given in figure 1 or by a fully dimensioned drawing and should be identified by the user's reference.

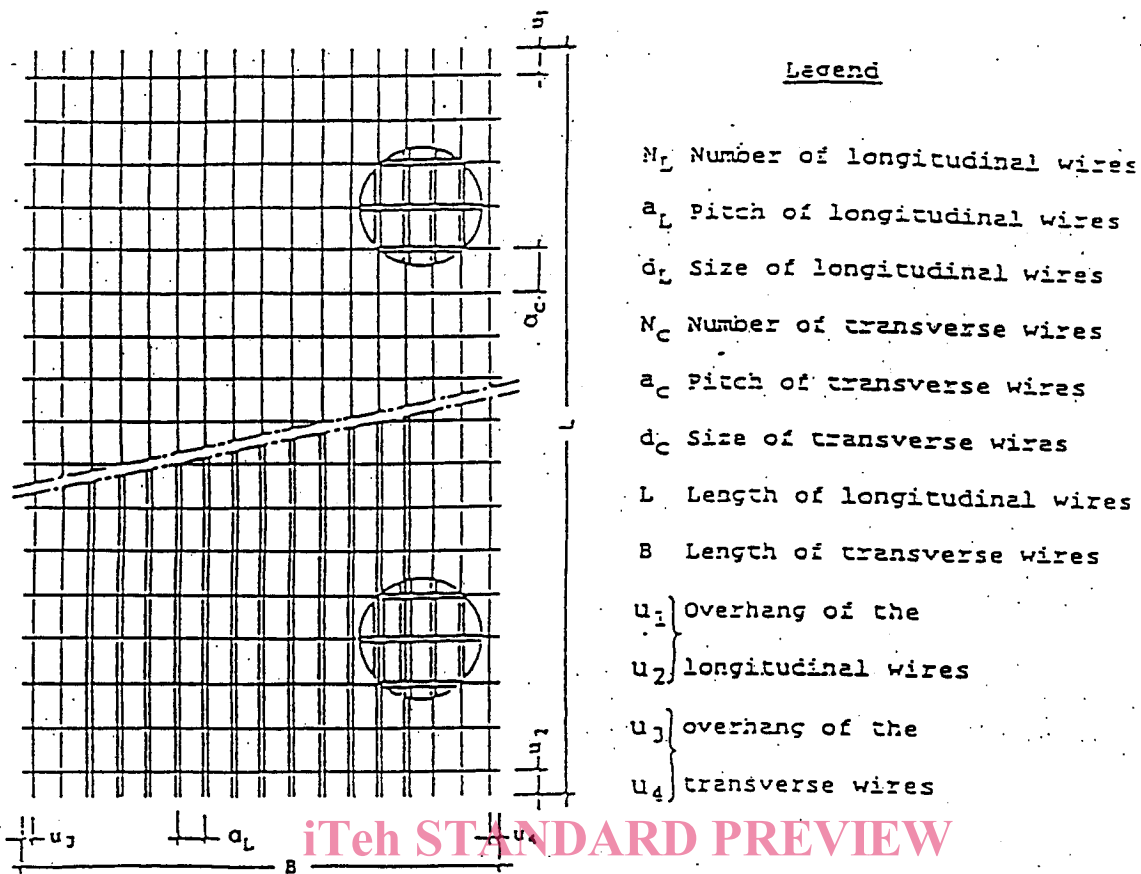


Figure 1: Characteristics of purpose made fabric

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5 Manufacturing processes

5.1 Melting process and type of deoxidation

The melting process and the type of deoxidation of the steel shall be at the discretion of the manufacturer.

5.2 Manufacturing process of the product

5.2.1 Bars and coils

5.2.1.1 The manufacturing process shall be at the discretion of the producer. It shall be reported to the purchaser if requested.

NOTE: Examples of manufacturing methods are

- hot rolling without further treatment or hot rolling and immediately heat treating in line or cold working (by twisting or stretching the initial hot rolled product without significant reduction of the cross-sectional area),
- cold rolling or cold drawing from rod with a significant reduction of the cross-sectional area.