SLOVENSKI STANDARD
SIST EN 1653:2000

01-november-2000

Baker in bakrove zlitine - Plogļ e, ploļ evina in diski za grelnike vode, tlaļ ne posode ter hranilnike vroļ e vode

Copper and copper alloys - Plate, sheet and circles for boilers, pressure vessels and hot water storage units

Kupfer und Kupferlegierungen - Platten, Bleche und Ronden für Kessel, Druckbehälter und Warmwasserspeicheranlagen

Cuivre et alliages de cuivre - Plaques, tôles et disques pour chaudieres, réservoirs a pression et unités de stockage d'eau chaude

Ta slovenski standard je istoveten z: **EN 1653:1997**

ICS:

77.150.30	Bakreni izdelki	Copper products

SIST EN 1653:2000 **en**

EUROPEAN STANDARD

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EN 1653

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ICS 77.150.30

Descriptors: copper, copper alloys, rolled products, metal plates, blank, boilers, pressure equipment, storage, hot water, designation, chemical composition, mechanical properties, dimensional tolerances, sampling, tests

English version

Copper and copper alloys - Plate, sheet and circles for boilers, pressure vessels and hot water storage units

Cuivre et alliages de cuivre - Plaques, tôles et disques pour chaudières, réservoirs à pression et unités de stockage d'eau chaude

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This European Standard was approved by CEN on 6 November 1997.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 133 "Copper and copper alloys", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 1998, and conflicting national standards shall be withdrawn at the latest by June 1998.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 2 "Rolled flat products" to prepare the following standard:

EN 1653
Copper and copper alloys – Plate, sheet and circles for boilers, pressure vessels and hot water storage units

This is one of a series of European Standards for copper and copper alloy rolled flat products. Other products are, or will be, specified as follows:

EN 1172
Copper and copper alloys – Sheet and strip for building purposes

EN 1652
Copper and copper alloys – Plate, sheet, strip and circles for general purposes

EN 1654
Copper and copper alloys – Strip for springs and connectors

EN 1758
Copper and copper alloys – Strip for lead frames

Copper and copper alloys – Copper plate, sheet and strip for electrical purposes (WI: 00133022)

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the composition, property requirements and tolerances on dimensions and form for copper and copper alloy plate, sheet and circles for boilers, pressure vessels, heat exchangers and hot water storage units.

The sampling procedures, the methods of test for verification of conformity to the requirements of this standard, and the delivery conditions are also specified.

2 Normative references

This European Standard 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 Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 1655
Copper and copper alloys – Declarations of conformity

EN 10002-1
Metallic materials – Tensile testing – Part 1: Method of test (at ambient temperature)

EN 10204
Metallic products – Types of inspection documents

ISO 1811-2
Copper and copper alloys – Selection and preparation of samples for chemical analysis – Part 2: Sampling of wrought products and castings

ISO 6507-1
Metallic materials – Hardness test – Vickers test – Part 1: HV 5 to HV 100

ISO 6507-2
Metallic materials – Hardness test – Vickers test – Part 2: HV 0,2 to less than HV 5

ISO 7438
Metallic materials – Bend test

NOTE: Informative references to documents used in the preparation of this standard, and cited at the appropriate places in the text, are listed in a bibliography, see annex A.

3 Definitions

For the purposes of this standard, the following definitions, based on ISO 197-3, apply:

3.1 plate

Flat rolled product of rectangular cross-section with uniform thickness greater than 10 mm, usually with sheared, sawn or machined edges.

3.2 sheet

Flat rolled product of rectangular cross-section with uniform thickness from 0,2 mm up to and including 10 mm, supplied in straight lengths, usually with sheared or sawn edges. The thickness does not exceed one tenth of the width.

3.3 circle

Circular blank.

4 Designations

4.1 Material

4.1.1 General

The material is designated either by symbol or number (see tables 1 and 2).

4.1.2 Symbol

The material symbol designation is based on the designation system given in ISO 1190-1.

NOTE: Although material symbol designations used in this standard might be the same as those in other standards using the designation system given in ISO 1190-1, the detailed composition requirements are not necessarily the same.

4.1.3 Number

The material number designation is in accordance with the system given in EN 1412.

4.2 Material condition

For the purposes of this standard, the following designations, which are in accordance with the system given in EN 1173, apply for the material condition:

R... Material condition designated by the minimum value of tensile strength requirement for the product with mandatory tensile strength, 0,2 % proof strength and elongation requirements;

H... Material condition designated by the minimum value of hardness requirement for the product with mandatory hardness requirements.

Exact conversion between material conditions designated R... and H... is not possible.

Material condition is designated by only one of the above designations.

4.3 Product

The product designation provides a standardized pattern of designation from which a rapid and unequivocal description of a product is conveyed in communication. It provides mutual comprehension at the international level with regard to products which meet the requirements of the relevant European Standard.

The product designation is no substitute for the full content of the standard.

The product designation for products to this standard shall consist of:

- denomination (Plate, Sheet or Circle);
- number of this European Standard (EN 1653);
- material designation, either symbol or number (see tables 1 and 2);

- material condition designation (see tables 3 and 9);
- nominal dimensions:

  plate, sheet and circles for boilers, pressure vessels and heat exchangers

  - plate: thickness × width × length and tolerance classes for thickness (if applicable, P), width and length (see example 1);
  - sheet: thickness × width × length and tolerance classes for thickness (if applicable, P), width and length;
  - circles: thickness × diameter and tolerance classes for thickness (if applicable, P), and diameter;

  sheet and circles for hot water storage units
  - sheet: thickness × width × length;

– circles: thickness × diameter (see example 2);

– tolerance class for cutting to width and length and diameter of plate, sheet or circles for boilers, pressure vessels and heat exchangers. (The following designations shall be used as appropriate: S for sheared, B for band sawn and M for machined, see tables 5 and 7).

The derivation of a product designation is shown for plate in example 1 and another typical product designation is shown in example 2.

EXAMPLE 1:
Plate conforming to this standard, in material designated either CuNi10Fe1Mn or CW352H, in material condition R320, nominal thickness 15,05 mm with plus tolerance, nominal width 800 mm, nominal length 1 500 mm, bandsawn, shall be designated as follows:

Plate EN 1653 – CuNi10Fe1Mn – R320 – 15,05P × 800 × 1 500 – B

or

Plate EN 1653 – CW352H – R320 – 15,05P × 800 × 1 500 – B

- Denomination: Plate
- Number of this European Standard: EN 1653
- Material designation: CW352H
- Material condition designation: R320
- Nominal dimensions in millimetres: 15,05P × 800 × 1 500
- Tolerance class for cutting to width and length: B

EXAMPLE 2:
Circles for boilers conforming to this standard, in material designated either Cu-DHP or CW024A, in material condition R200, nominal thickness 3,55 mm, nominal diameter 1 150 mm, sheared, shall be designated as follows:

Circle EN 1653 – Cu-DHP – R200 – 3,55 × 1 150 – S

or

Circle EN 1653 – CW024A – R200 – 3,55 × 1 150 – S

5 Ordering information

In order to facilitate the enquiry, order and confirmation of order procedures between the purchaser and the supplier, the purchaser shall state on his enquiry and order the following information:

a) quantity of product required (number of pieces or mass);

b) denomination (Plate, Sheet or Circle);

c) number of this European Standard (EN 1653);

d) material designation (see tables 1 and 2);

e) material condition designation (see 4.2 and tables 3 and 9) if the choice is not to be left to the discretion of the supplier;

f) nominal dimensions:

- plate, sheet: thickness × width × length;
- circles: thickness × diameter;

g) for plate, sheet and circles for boilers, pressure vessels and heat exchangers, if plus tolerances only are required, instead of standard tolerances on thickness (see table 4);

h) for plate and sheet for boilers, pressure vessels and heat exchangers, tolerance class for cutting to width and length (see table 5);

i) for circles for boilers, pressure vessels and heat exchangers, tolerance class for cutting to diameter (see table 7);

j) for pressure vessel applications, the type of inspection document required if other than inspection certificate 3.1.B of EN 10204 (see 9.2).

NOTE: It is recommended that the product designation as described in 4.3, is used for items b) to i).

In addition, the purchaser shall also state on the enquiry and order any of the following, if required:

k) whether mechanical properties at elevated temperatures are to be determined and if so the test method to be used and the minimum property levels to be achieved (see 6.1.3);

l) whether the product is intended for subsequent welding applications (see table 2);

m) whether there are any special requirements for surface condition (see 6.1.4);

n) whether there are any special requirements for internal soundness and if so, the test method and acceptance criteria required (see 6.1.5);

o) thickness tolerance required for plate or sheet or circles with width or diameter over 1 500 mm (see table 4);

p) width and length tolerances required for plate or sheet with width and/or length over 3 000 mm (see table 5);

q) squareness requirement for plate or sheet with width over 1 500 mm (see table 6);

r) tolerance on diameter required for circles with diameter over 1 500 mm (see table 7);

s) tolerance on flatness required for plate with length and/or width over 3 000 mm and a circle cut from a plate with diameter over 3 000 mm (see table 8);

t) whether a declaration of conformity is required (see 9.1);

u) whether an inspection document is required, and if so, which type (see 9.2);

v) whether there are any special requirements for marking, packaging or labelling (see clause 10).

EXAMPLE:
Ordering details for 10 plates conforming to EN 1653, in material designated either CuNi10Fe1Mn or CW352H in material condition R320, nominal thickness 15,05 mm, nominal width 800 mm, nominal length 1 500 mm, bandsawn, with inspection certificate 3.1.B:

10 pieces Plate EN 1653 – CuNi10Fe1Mn – R320 – 15,05 × 800 × 1 500 – B
– inspection certificate 3.1.B

or

10 pieces Plate EN 1653 – CW352H – R320 – 15,05 × 800 × 1 500 – B
– inspection certificate 3.1.B

6 Requirements

6.1 Plate, sheet and circles for boilers, pressure vessels and heat exchangers

6.1.1 Composition

The composition shall conform to the requirements for the appropriate material given in tables 1 and 2.

6.1.2 Mechanical properties

The tensile properties (tensile strength, 0,2 % proof strength and elongation) shall conform to the appropriate requirements given in table 3. The tests shall be carried out in accordance with 8.2.

Dimensional limitations which can have an effect on the properties are indicated.

6.1.3 Mechanical properties at elevated temperatures

If requested by the purchaser at the time of enquiry and order, and confirmed by agreement with the supplier, the property levels to be achieved and test method to be used shall be requirements of the order.

NOTE: Minimum proof strength and creep properties at elevated temperatures are given in annex B for design and calculation purposes. The values given in annex B have been derived statistically and need not be confirmed by testing.

6.1.4 Surface condition

Plate, sheet and circles shall be clean and free from injurious defects which shall be specified by agreement between the purchaser and the supplier at the time of enquiry and order. A superficial film of residual lubricant is normally present on cold rolled products and is permissible unless otherwise specified.

6.1.5 Internal soundness

Plate shall be free from injurious internal defects. If requested by the purchaser at the time of enquiry and order, and confirmed by agreement with the supplier, a test method to be used and the acceptance criteria shall be requirements of the order.

6.1.6 Tolerances

Plate, sheet and circles shall conform to the appropriate tolerances on dimensions and form given in tables 4 to 8.

6.2 Sheet and circles for hot water storage units

6.2.1 Materials

Sheet and circles shall be made from one of the following copper grades: Cu-DLP (CW023A) or Cu-DHP (CW024A).

6.2.2 Composition

The composition shall conform to the requirements for the appropriate material given in table 1.

6.2.3 Hardness

The Vickers hardness shall conform to the appropriate requirements given in table 9. The test shall be carried out in accordance with 8.3.

6.2.4 Bending characteristics

A bend test shall be carried out in accordance with 8.4. In order to pass the test, the test piece shall not crack when bent once through 180°.

6.2.5 Tolerances

Sheet and circles shall conform to the appropriate tolerances given in table 10.

7 Sampling

7.1 General

When required (for pressure vessel applications or, for example, if necessary in accordance with specified procedures of a supplier's quality system, or when the purchaser requests inspection documents with test results, or for use in cases of dispute), an inspection lot shall be sampled in accordance with 7.2 and 7.3.

7.2 Analysis

The sampling rate shall be in accordance with ISO 1811-2. A test sample, depending on the analytical technique to be employed, shall be prepared from each sampling unit and used for the determination of the composition.

NOTE 1: When preparing the test sample, care should be taken to avoid contaminating or overheating the test sample. Carbide tipped tools are recommended; steel tools, if used, should be made of magnetic material to assist in the subsequent removal of extraneous iron. If the test samples are in finely divided form (e.g. drillings, millings), they should be treated carefully with a strong magnet to remove any particles of iron introduced during preparation.

NOTE 2: In cases of dispute concerning the results of analysis, the full procedure given in ISO 1811-2 should be followed.

Results may be used from analyses carried out at an earlier stage of manufacturing the product, e.g. at the casting or master coil stage, if the material identity is maintained and if the quality system of the manufacturer is certified as conforming to EN ISO 9001 or EN ISO 9002.

7.3 Tensile, hardness and bend tests

The sampling rate shall be:

- for plate or sheet up to and including 20 mm thickness, sampling units representing 10 % of the products;
- for plate over 20 mm thickness, sampling units from each plate.

Sampling units shall be selected from the finished products. The test samples shall be cut from the sampling units. Test samples, and test pieces prepared from them, shall not be subjected to any further treatment, other than any machining operations necessary in the preparation of the test pieces.