SLOVENSKI STANDARD
SIST EN 723:1998

01-april-1998

Baker in bakrove zlitine - Seģigna metoda za doloļevanje ogljika na notranji povrģini bakrenih cevi in fitingov

Copper and copper alloys - Combustion method for determination of carbon on the inner surface of copper tubes or fittings

Kupfer und Kupferlegierungen - Verfahren zur Bestimmung des Kohlenstoffs auf der Innenoberfläche von Kupferrohren oder Fittings durch Verbrennen

Cuivre et alliages de cuivre - Méthode de détermination par combustion de la teneur en carbone a la surface interne des tubes ou des raccords en cuivre

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English version

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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.

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CEN

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

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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of an identical text or by endorsement, at the latest by February 1997, and conflicting national standards shall be withdrawn at the latest by February 1997.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 3 "Copper tubes" to prepare the following standard:

EN 723
Copper and copper alloys – Combustion method for determination of carbon on the inner surface of copper tubes or fittings

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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 a combustion method for determining the carbon content, if any, on the inner surface of copper tubes or copper fittings.

This standard applies only to round copper tubes as specified in EN 1057 or copper fittings as specified in prEN 1254-1 and prEN 1254-5.

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 1057
Copper and copper alloys – Seamless, round copper tubes for water and gas in sanitary and heating applications

prEN 1254-1
Copper and copper alloys – Plumbing fittings – Part 1: Fittings with ends for capillary soldering or capillary brazing to copper tubes

prEN 1254-5
Copper and copper alloys – Plumbing fittings – Part 5: Fittings with short ends for capillary brazing to copper tubes

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1 residual carbon

Amount of carbon present in the form of elemental carbon.

3.2 potential carbon

Amount of carbon present in the form of organic compounds (oils, greases, acids, alcohols, etc.).

3.3 total carbon

Sum of residual carbon and potential carbon.

4 General principle

Combustion of the carbon present on the inner surface of a tube or fitting sample is carried out at a given temperature in an oxygen flow. Carbon content is expressed in terms of total, residual or potential carbon.

The standard describes a combustion method and three methods of measurement of the carbon dioxide generated.

The residual carbon content, the total carbon content, or both residual and total carbon content are determined. The potential carbon content is derived by calculation (total carbon minus residual carbon).

5 Preparation of samples

5.1 General

Perform one or both of the sequences of operations in 5.1.1 (alternative A or alternative B) and/or 5.1.2 according to the carbon to be determined.

5.1.1 Residual carbon content

Alternative A

a) select samples (see 5.2);

b) clean inner surface of sample (see 5.3);

c) clean outer surface of sample (see 5.4);

d) cut test pieces (see 5.5);

or

Alternative B

a) select samples (see 5.2);

b) clean outer surface of sample (see 5.4);

c) clean inner surface of sample (see 5.3);

d) cut test pieces (see 5.5).

5.1.2 Total carbon content

a) select samples (see 5.2);

b) clean outer surface of sample (see 5.4);

c) cut test pieces (see 5.5).

5.2 Selection of samples

5.2.1 Tubes

Cut a 30 cm long sample from a tube, using a metal-cutting saw or a pipe cutter. Ensure that the saw blade and pipe cutter are free from paint, grease or other carbon-containing contaminants.

Trim the ends of samples using a smooth file or a trimming blade.

5.2.2 Fittings

Select sufficient fittings from the batch in order to be able to cut test pieces from them having a minimum total internal surface area of 10 cm^2. If necessary, use several fittings of the same batch to make up the required minimum area.

5.3 Cleaning of inner surface of sample

Immerse the sample, for 5 min at room temperature or 2 min if boiling, in a bath of agitated chlorinated solvent, for example analytical grade of trichlorethylene or trichloroethane that shall be used as reference in case of dispute.

Immerse the sample in a second solvent bath for at least 30 s.

Remove the sample from the bath and place it vertically under a fume hood or in an oven until the solvent has totally evaporated.

Refresh both baths periodically as appropriate, in accordance with written internal procedures.

5.4 Cleaning of outer surface of sample

5.4.1 General

A method for chemical cleaning the outer surface is given in 5.4.2 and for mechanical cleaning in 5.4.3. For cleaning fittings, use the method in 5.4.2. For cleaning tubes use either of the methods.

For the determination of the blank value (see 7.5) and for use in cases of dispute, use only the chemical cleaning method given in 5.4.2.

5.4.2 Chemical cleaning

Seal one end of a tube sample and all ends of a fittings sample, using silicone plugs.

Immerse the sample, in the case of tubes, with the plugged end downwards, for at least 30 s in a glass test vessel containing 50 % v/v nitric acid solution. Take care to ensure that the cleaned sample does not subsequently come into contact with hands, or with a carbon-containing substance. Rinse the sample firstly under running water, then with demineralized water and finally immerse it for 2 min to 3 min in a demineralized water bath at a temperature not less than 80 °C. Withdraw the sample and allow it to dry in free air.

Refresh the nitric acid solution periodically as appropriate, in accordance with written internal procedures.

5.4.3 Mechanical cleaning

Remove a thin layer from the surface of the sample by turning on a clean lathe, used only for such purposes.

Samples obtained from coiled tube, if preferred, may be mechanically cleaned by filing, using a clean file used only for this purpose.

5.5 Cutting of test pieces

5.5.1 Tubes

5.5.1.1 General

Prepare test pieces by one of the procedures given in 5.5.1.2 or 5.5.1.3 and afterwards keep the test pieces in a non-contaminating environment, such as in a desiccator containing sodium hydroxide pellets, until the time of measurement.

5.5.1.2 Tubes with diameters not exceeding the furnace diameter

Using the cleaned sample, cut and discard a 2,5 cm length, from one end which, in the case of a chemically cleaned outer surface, shall be from the plugged end of the tube. Cut from the remainder of the sample a test piece of such a length that its internal surface area is at least 20 cm^2.

NOTE: To achieve a clean cut, normal to the tube axis, the use of a circular cross-cut saw is recommended.

Determine the internal surface area of the test piece from its mean internal diameter and mean length, measured to an accuracy of 0,1 mm.

If the test piece is longer than the zone of incandescence of the combustion device described in 6 c), cross-cut the test piece into two, in order that both pieces may be fed simultaneously into the zone of incandescence.

5.5.1.3 Tubes with diameters exceeding the furnace diameter

If the furnace diameter is not large enough to accommodate tube sections, proceed in accordance with a) or b), as follows:

a) longitudinal cutting method

Cut a length sufficient to give a section having an internal surface area of at least 20 cm^2.

Weigh the section to the nearest 0,01 g : P_0.

Calculate the internal surface area S_0 of this section, from its mean internal diameter and mean length measured to an accuracy of 0,1 mm.

Using a degreased saw blade, cut the section longitudinally into two halves which together constitute the test piece. Fold each half so as to allow its longitudinal introduction into the furnace. This folding may be done between the jaws of a vice equipped with aluminium or alternative material clamps previously degreased using trichlorethylene or trichloroethane. The alternative material for the clamps shall not be detrimental to their cleanliness.

Weigh the test piece (i.e. the two halves) to the nearest 0,01 g : P_1.

Calculate the internal surface area S_1 of the test piece, which shall be at least 20 cm^2, as follows:

$$S_1 = S_0 \frac{P_1}{P_0}$$

b) flattening method

If a test piece of internal surface area of at least 20 cm^2 can be obtained by flattening, carry out the flattening operation between the jaws of a vice equipped with aluminium or alternative material clamps previously degreased using trichlorethylene or trichloroethane. The alternative material for the clamps shall not be detrimental to their cleanliness.

5.5.2 Fittings

5.5.2.1 General

Prepare test pieces by one of the following procedures and afterwards keep the test pieces in a non-contaminating environment, such as in a desiccator containing sodium hydroxide pellets, until the time of measurement.

Depending on size, a test piece might be:

- one complete fitting;
- part of one fitting;
- several fittings.