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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Copper and copper alloys — Selection and preparation of samples for chemical analysis —

Part 2 :
Sampling of wrought products and castings

Cuivre et alliages de cuivre — Sélection et préparation des échantillons pour l'analyse chimique —

Partie 2 : Échantillonnage des produits corroyés et des produits moulés

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 1811-2 was prepared by Technical Committee ISO/TC 26, *Copper and copper alloys.*

Together with ISO 1811-1 and 1811-3, it cancels and replaces ISO Recommendation R 1811 : 1971, of which it constitutes a technical revision.

ISO 1811 consists of the following parts, under the general title *Copper and copper alloys — Selection and preparation of samples for chemical analysis:*

— *Part 1 : Sampling of cast unwrought products*

— *Part 2 : Sampling of wrought products and castings*

— *Part 3 : Sampling of cathodes*

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Copper and copper alloys — Selection and preparation of samples for chemical analysis —

Part 2 : Sampling of wrought products and castings

1 Scope

This part of ISO 1811 specifies methods for the selection and preparation of samples for chemical analysis of copper and copper alloys in the form of wrought products and castings.[1)]

The methods specified in this part of ISO 1811 apply to copper and copper alloys in the following forms, and are intended to determine compliance with the requirements for their chemical composition:

a) wrought products, including plate, sheet, strip, rod, bar, tube, profile, forgings, etc.;

b) castings, including sand castings, chill castings, die castings, continuous castings, centrifugal castings.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 1811. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 1811 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 197-1 : 1983, *Copper and copper alloys — Terms and definitions — Part 1: Materials.*

ISO 197-3 : 1983, *Copper and copper alloys — Terms and definitions — Part 3: Wrought products.*

ISO 197-4 : 1983, *Copper and copper alloys — Terms and definitions — Part 4: Castings.*

ISO 1811-1 : 1988, *Copper and copper alloys — Selection and preparation of samples for chemical analysis — Part 1: Sampling of unwrought products.*

3 Definitions

For the purposes of this part of ISO 1811, the definitions for copper and copper alloys in ISO 197-1, for wrought products in ISO 197-3 and for castings in ISO 197-4 apply.

In addition, the following definitions apply.

3.1 lot: Unless otherwise agreed between supplier and purchaser, for the purpose of sampling, a lot shall be defined as follows:

3.1.1 lot of wrought products: Material of the same alloy and of a particular form, such as plate, sheet, strip, rod, bar, tube, profile, wire or forgings, made during the same production sequence under uniform conditions.

Materials processed under different conditions shall be considered as separate lots.

3.1.2 lot of castings: Material of a particular form produced by, for instance, sand casting, chill casting, die casting or centrifugal casting from a single melting furnace charge or from a particular cycle of a continuous melting furnace.

3.2 sampling unit: An individual wrought product or casting selected from a lot.

3.3 gross sample: The total amount of all sampling units taken from a lot.

3.4 test sample: A sample prepared from the gross sample and from which the test portions will be taken.

3.5 test portion: The quantity of material taken from the test sample and on which the analysis is actually carried out.

1) Sampling theory is explained in annex A of ISO 1811-1.

4 Selection of sampling units

Unless otherwise agreed between supplier and purchaser, the following number of sampling units shall be selected from a single lot.

4.1 General procedure

Sampling units shall be selected randomly from a lot. When sampling units are to be taken from final products, arrangements shall be made for the necessary excess length or amount of material to be provided.

By agreement between supplier and purchaser, sampling units taken at the time of casting, or broken tensile test pieces or other physical test pieces may be used as sampling units instead of taking sampling units from the product.

4.2 Wrought products

4.2.1 Rods, bars, shapes, sheet, strip, plate and wire

The sampling units shall be taken from four individual lengths of finished product. If the lot consists of less than four lengths, one sampling unit shall be taken from each individual length.

4.2.2 Tubes

The sampling units shall be taken from each lot according to the schedule in table 1.

Table 1 — Sampling frequency — Tubes

Number of tubes in lot	Number of sampling units to be taken[1)]
1 to 50	1
51 to 200	2
201 to 1 500	3
over 1 500	0,2 % of the number of tubes, to a maximum of 10 pieces

1) Each sampling unit shall be taken from a different tube.

4.3 Castings

At least one sampling unit shall be selected from each furnace charge of molten metal, or during a two-hour period of continuous melting and casting, or at the beginning, middle and end of each shift. When sampling units are cast, the liquid metal shall be poured at a temperature above that of the liquidus, so that it is homogeneous, into a small chill mould.

In cases in which several furnace charges are mixed in a ladle prior to pouring, one sampling unit shall be taken from the combined melts prior to pouring the castings.

5 Sample preparation

5.1 Wrought products and castings shall be sampled either by sawing and milling the entire cross-section, or by drilling entirely through the sampling unit at several points along its length. Products too thin to be handled conveniently for machining shall be sampled by clipping.

5.2 Before sampling, the sampling units shall be clean and free from scale, dirt, oil, grease and other contaminants. If necessary, the sampling units may be cleaned in ethyl ether or acetone, rinsed in ethanol, and dried. Scale and dirt may be removed by suitable mechanical or chemical treatment. If chemical methods of cleaning are used, such operations shall not alter the metal surface in any way.

5.3 The saw, drill, cutter or other tool used for sampling shall be thoroughly cleaned prior to use. The speed of sampling shall be so regulated that excessive heating and consequent oxidation of the sample is avoided. Lubricants shall not be used. Carbide-tipped tools are recommended; steel tools, if used, shall be made of magnetic material to assist in the subsequent removal of extraneous iron.

5.4 For alloys with magnetic phases, carbide-tipped tools shall be used; magnetic cleaning shall not be used. Drillings, millings, sawings or clippings of alloys with no magnetic phases shall be treated carefully with a strong magnet to remove any particles of iron introduced during sampling. The drillings, millings, sawings or clippings shall be carefully examined, and any foreign material introduced in taking the sample shall be removed.

5.5 In certain cases a complete cross-section from a sampling unit may be required for spectrometric examination. Each cross-section shall be taken and properly marked before using the remainder of the sampling unit in other sampling operations.

5.6 The gross sample shall be prepared by thoroughly mixing equal masses of drillings, millings, sawings or clippings taken from each sampling unit. The chips obtained by milling, drilling, etc., shall be uniformly small in size.

5.7 The gross sample shall weigh at least four times the amount required for the analysis, and shall be divided into four test samples of equal mass, each of which shall be placed in a container and sealed: one for the supplier, one for the purchaser, one for reference purposes, if necessary, and one as reserve.

5.8 In the event of the oxygen content of Cu-OFE (and Cu-HCP if necessary) being determined, an additional group of test samples shall be taken from the selected sampling units. Each test sample for oxygen determination shall consist of a single piece of adequate size, cut from the sampling unit by a method agreeable to both producer and purchaser at a mutually agreeable location in the sampling unit. Each test sample shall be cut into three test portions of approximately equal mass: one for the producer, one for the purchaser, and one for reference purposes, if necessary. Each party shall determine oxygen on his test portion using an agreed procedure.

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Descriptors : copper, copper alloys, copper products, wrought products, castings, chemical analysis, sampling, specimen preparation.

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