

Copper and copper alloys — Determination of impurities in pure copper — ET AAS method

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National foreword

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 19 and a back cover.

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Kupfer und Kupferlegierungen - Bestimmung der Verunreinigungen in reinem Kupfer - Elektrothermales Atomabsorptionsspektrometrie-Verfahren (ET-AAS)

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (EN 14935:2006) 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of an identical text or by endorsement, at the latest by December 2006, and conflicting national standards shall be withdrawn at the latest by December 2006.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 10 "Methods of analysis" to prepare the following standard:

EN 14935:2006, *Copper and copper alloys — Determination of impurities in pure copper — ET AAS method*

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

1 Scope

This European Standard specifies two different electrothermal atomization atomic absorption spectrometric methods (ET AAS) for the determination of silver, arsenic, bismuth, cadmium, cobalt, chromium, iron, manganese, nickel, lead, antimony, selenium, tin, tellurium and zinc in copper (greater than 99,85 %) in the form of unwrought, wrought and cast products.

The standard specifies two methods depending on range of impurity concentrations, see Table 1.

Table 1

Concentration range in µg/g

Element	Method A		Method B	
	from	up to and including	from	up to and including
Ag	1	30	0,02	1,0
As	1	20	0,04	1,0
Bi	1	5	0,09	1,0
Cd	1	5	0,001	1,0
Co	1	10	0,04	1,0
Cr	1	10	0,04	1,0
Fe	1	10	0,01	1,0
Mn	1	10	0,02	1,0
Ni	1	30	0,01	1,0
Pb	1	10	0,01	1,0
Sb	1	10	0,2	1,0
Se	1	10	0,05	1,0
Sn	1	10	0,02	1,0
Te	1	10	0,05	1,0
Zn	1	10	0,01	1,0

Method B (method of additions) is applicable to products containing impurity elements at concentrations below 1,0 µg/g. This method uses special ET AAS equipment fitted with background correction by means of the Zeemann effect.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

NOTE Informative references to documents used in the preparation of this standard, and cited at the appropriate places in the text, are listed in the Bibliography.

3 Principle

Dissolution of a test portion in nitric acid followed, after suitable dilution, by injection into electrothermal atomization equipment of an atomic absorption spectrometer with a suitable background corrector. Measurement of the absorption of the following lines emitted by the relevant hollow-cathode or electrodeless discharge lamps, see Table 2.

Table 2

Element	Wave length nm
Ag	328,1
As	193,7
Bi	223,1
Cd	228,8
Co	240,7
Cr	357,9
Fe	248,3
Mn	279,5
Ni	232,0
Pb	283,3
Sb	217,6
Se	196,0
Sn	224,6
Te	214,3
Zn	213,9

4 Reagents and materials

4.1 General

During the analysis, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

4.2 Hydrochloric acid, HCl ($\rho = 1,19$ g/ml).

4.3 Nitric acid, HNO₃ ($\rho = 1,40$ g/ml).

4.4 Nitric acid solution, 1 + 1

Dilute 500 ml of nitric acid (4.3) in 500 ml of water.

4.5 Nitric acid solution, 1 + 3

Dilute 250 ml of nitric acid (4.3) in 750 ml of water.

4.6 Pure sodium hydroxide, NaOH 1 mol/l.