Designation: E 478 – 03

Standard Test Methods for Chemical Analysis of Copper Alloys[1]

This standard is issued under the fixed designation E 478; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 These test methods cover the chemical analysis of copper alloys having chemical compositions within the following limits:[2]

Element	Concentration, %
Aluminum	12.0 max
Antimony	1.0 max
Arsenic	1.0 max
Cadmium	1.5 max
Cobalt	1.0 max
Copper	40.0 min
Iron	6.0 max
Lead	27.0 max
Manganese	6.0 max
Nickel	50.0 max
Phosphorus	1.0 max
Silicon	5.0 max
Sulfur	0.1 max
Tin	20.0 max
Zinc	50.0 max

1.2 The test methods appear in the following order:

	Sections
Aluminum by the Carbamate Extraction-(Ethylenedinitrilo) Tetraacetate Titrimetric Test Method [2 to 12 %]	70-77
Copper by the Combined Electrodeposition Gravimetric and Oxalyldihydrazide Photometric Test Method [50 %, minimum]	9-17
Iron by the 1,10-Phenanthroline Photometric Test Method [0.003 to 1.25 %]	18-27
Lead by the Atomic Absorption Test Method [0.002 to 15 %]	89-99
Lead by the (Ethylenedinitrilo)tetraacetic Acid (EDTA) Titrimetric Test Method [2.0 to 30.0 %]	28-35
Nickel by the Dimethylglyoxime Extraction Photometric Test Method [0.03 to 5.0 %]	36-45
Nickel by the Dimethylglyoxime Gravimetric Test Method [4 to 50 %]	54-61
Silver in Silver-Bearing Copper by the Atomic Absorption Test Method [0.01 to 0.12 %]	100-111
Tin by the Iodatimetric Titration Test Method [0.5 to 20 %]	62-69
Tin by the Phenylfluorone Photometric Test Method [0.01 to 1.0 %]	112-122
Zinc by Atomic Spectrometry [0.2 to 2 %]	78-88
Zinc by the (Ethylenedinitrilo)tetraacetic Acid (EDTA) Titrimetric Test Method [2 to 40 %]	46-53

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications[3]

E 50 Practices for Apparatus, Reagents, and Safety Precautions for Chemical Analysis of Metals[4]

E 60 Practice for Photometric and Spectrophotometric Methods for Chemical Analysis of Metals[4]

E 173 Practice for Conducting Interlaboratory Studies of Methods for Chemical Analysis of Metals[4]

E 255 Practice for Sampling Copper and Copper Alloys for Determination of Chemical Composition[4]

E 1024 Guide for Chemical Analysis of Metals and Metal Bearing Ores by Flame Atomic Absorption Spectrophotometry[4]

E 1601 Practice for Conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method[4]

3. Significance and Use

3.1 These test methods for the chemical analysis of metals and alloys are primarily intended as referee methods to test such materials for compliance with compositional specifications. It is assumed that all who use these methods will be trained analysts capable of performing common laboratory procedures skillfully and safely. It is expected that work will be performed in a properly equipped laboratory.

4. Apparatus, Reagents, and Photometric Practice

4.1 Apparatus and reagents required for each determination are listed in separate sections preceding the procedure. The

[1] These test methods are under the jurisdiction of ASTM Committee E01 on Analytical Chemistry for Metals, Ores, and Related Materials and are the direct responsibility of Subcommittee E01.05 on Cu, Pb, Zn, Cd, Sn, Be, their Alloys and Related Metals.

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[2] The actual limits of application of each test method are presented in 1.2.

[3] *Annual Book of ASTM Standards,* Vol 14.02.

[4] *Annual Book of ASTM Standards,* Vol 03.05.

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