



Designation: B115 – 10 (Reapproved 2021)

Standard Specification for Electrolytic Copper Cathode¹

This standard is issued under the fixed designation B115; 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 This specification establishes the requirements for electrolytic copper cathode; electrorefined and electrowon.

1.2 *Units*—The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

NOTE 1—Cathode produced to this specification corresponds to the designation “Cath” as defined in Classification B224 and may be used to produce all other coppers listed in Classification B224 that are normally produced from “Cath” copper.

NOTE 2—Grade 1 cathode conforms to the chemical compositional requirements of Copper UNS No. C11040, except for oxygen, and is suitable for the manufacture of wire rod as designated in Specification B49.

1.3 The following hazard caveat applies to the test methods described in Annex A2 of this specification: *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

B49 Specification for Copper Rod for Electrical Purposes
B193 Test Method for Resistivity of Electrical Conductor Materials
B224 Classification of Coppers

¹ This specification is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.07 on Refined Copper.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

B846 Terminology for Copper and Copper Alloys
E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
E50 Practices for Apparatus, Reagents, and Safety Considerations for Chemical Analysis of Metals, Ores, and Related Materials
E53 Test Method for Determination of Copper in Unalloyed Copper by Gravimetry

3. Terminology

3.1 For definition of general terms related to copper and copper alloys, refer to the current editions of Classification B224 and Terminology B846.

4. Ordering Information

4.1 Orders for product shall include the following information, as applicable:

- 4.1.1 ASTM designation and year of issue (for example, B115 – XX),
- 4.1.2 Cathode grade (Table 1),
- 4.1.3 Size; full cathode or cut,
- 4.1.4 Total weight of each size.

5. Chemical Composition

5.1 The cathode furnished shall conform to the requirements of Table 1 for the grade specified in the contract or purchase order.

5.2 These composition limits do not preclude the presence of other elements. Limits may be established and analysis required for unnamed elements by agreement between the supplier and the purchaser and such agreement shall be part of the contract or purchase order.

6. Physical Property Requirements

6.1 Electrical Resistivity:

6.1.1 The maximum electrical resistivity for product produced from Grade 2 cathode shall be $0.153\ 28\ \Omega\cdot\text{g}/\text{m}^2$ (conductivity 100.0 % minimum IACS) at 20 °C (68 °F) annealed³ when tested in accordance with Test Method B193. Measurement error is not included in the maximum/minimum limit.

³ *NBS Notebook 100* available from National Technical Information Service (NTIS), 5301 Shawnee Rd, Alexandria, VA 22312, <http://www.ntis.gov>.

*A Summary of Changes section appears at the end of this standard



TABLE 1 Chemical Composition

Element	Grade 1 ^A	Grade 2 ^A
	Percent, %	
	99.95, min ^B	
	ppm ^C	
Copper		
Selenium, max	2	10
Tellurium, max	2	5
Bismuth, max	1.0	3
Group total, max	3	...
Antimony, max	4	15
Lead, max	5	40
Arsenic, max	5	15
Iron, max	10	25
Nickel, max	10	20
Tin, max	5	10
Sulfur, max	15	25
Silver, max	25	70
Maximum allowable total	65	...

^A Measurement error is not incorporated in the maximum limits, refer to 10.1.1.

^B Including silver.

^C Determined from a melted sample.

7. Dimensions, Mass, and Permissible Variations

7.1 Full-size cathodes or cathodes cut to size may be supplied as agreed upon between supplier and purchaser.

8. Workmanship, Finish, and Appearance

8.1 Cathodes shall withstand ordinary handling without breakage or excessive separation of nodules. They shall be substantially free of all foreign material; for example, copper sulfate, dirt, grease, and oil.

9. Sampling

9.1 For routine sampling of cathodes for analysis, the method of sampling shall be at the discretion of the sampler.

9.2 In case of dispute concerning sampling for chemical composition, or electrical resistivity, or both, the method of sampling shall be in accordance with Annex A1.

9.3 In case of special requirements specified in the purchase order or contract, the method of sampling shall be as agreed between the supplier and the purchaser.

10. Number of Tests and Retests

10.1 Tests:

10.1.1 Chemical composition shall be determined as the per element mean of at least two replicate analyses of each sample.

10.1.2 Electrical resistivity shall be determined as the mean of results from four specimens.

10.2 Retests:

10.2.1 In the case of compositional or resistivity dispute, retests may be made under the conditions of 9.2.

10.3 Umpire Test:

10.3.1 In the case in which retest does not settle the dispute, further retest may be made by a qualified third-party laboratory agreeable to both parties. This provision does not preclude other contractual agreements.

11. Specimen Preparation

11.1 For routine testing, specimen preparation shall be at the discretion of the preparer.

11.2 In the case of special requirements specified in the purchaser order or contract, specimen preparation shall be as agreed between the supplier and the purchaser.

11.3 In the case of dispute concerning specimen preparation for chemical composition specified in Table 1 or electrical resistivity, specimen preparation shall be in accordance with Annex A1.

12. Test Methods

12.1 Chemical Composition:

12.1.1 For routine analysis of Grade 1 and Grade 2 cathode, the methods of analysis used shall be at the discretion of the analyst.

12.1.2 In the case of dispute concerning the chemical composition, the methods of analysis shall be in accordance with Annex A2, except for copper in Grade 2 cathode.

12.1.3 In the case of dispute concerning copper content of Grade 2 cathode, the method of analysis shall be in accordance with Test Method E53.

12.1.4 In the case of dispute concerning special requirements stated in the purchase order or contract, the methods of analysis used shall be as agreed between the supplier and the purchaser.

12.2 Electrical Resistivity:

12.2.1 In the case of dispute concerning electrical resistivity, the method of testing shall be in accordance with Test Method B193.

13. Significance of Numerical Limits

13.1 Calculated values shall be rounded to the desired number of places as directed in Practice E29.

14. Inspection

14.1 The producer shall inspect the product and conduct such tests as are necessary to verify that the requirements of this specification are met.

15. Rejection and Rehearing

15.1 Rejection:

15.1.1 Product that fails to conform to the requirements of this specification may be rejected.

15.1.2 Rejection shall be reported to the producer or supplier promptly and in writing.

15.1.3 In the case of disagreement or dissatisfaction with the results of the test upon which rejection was based, the producer or supplier may make claim for a rehearing.

15.2 Rehearing:

15.2.1 As a result of product rejection, the supplier may make claim for retest to be conducted by the producer or supplier and the purchaser. Samples of the rejected product shall be taken in accordance with this specification and tested by both parties as directed in this specification, or, alternatively, upon agreement between both parties, an independent laboratory may be selected for the tests using the test methods prescribed in this specification.