



Designation: B 224 – 98

## Standard Classification of Coppers<sup>1</sup>

This standard is issued under the fixed designation B 224; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope \*

1.1 This is a classification of the various types of copper currently available in refinery shapes and wrought products in commercial quantities. It is not a specification for the various types of copper.

1.2 In this classification, use is made of the standard copper designations in use by the copper industry.

1.3 Although this classification includes certain UNS designations as described in Practice E 527, these designations are for cross-reference only and are not requirements. Therefore, in case of conflict, this ASTM classification shall govern.

1.4 This classification does not attempt to differentiate between all compositions that could be termed either coppers or copper-base alloys, but in conformance with general usage in the trade, includes those coppers in which the copper is specified as 99.85 % or more, silver being counted as copper.

NOTE 1—Coppers may contain small amounts of certain elements intentionally permitted to impart specific properties, without excessively lowering electrical conductivity. The total copper plus specific permitted elements is usually specified as 99.85 % or more. These intentionally permitted elements normally include, but are not limited to, arsenic, cadmium, chromium, lead, magnesium, silver, sulfur, tellurium, tin, zinc, and zirconium, plus deoxidizers, up to specific levels adopted by the International Standards Organization.

1.5 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

B 5 Specification for High Conductivity Tough Pitch Copper Refinery Shapes<sup>2</sup>

B 30 Specification for Copper-Base Alloys in Ingot Form<sup>2</sup>

B 115 Specification for Electrolytic Cathode Copper<sup>2</sup>

B 170 Specification for Oxygen-Free Electrolytic Copper—Refinery Shapes<sup>2</sup>

B 216 Specification for Tough-Pitch Fire-Refined Copper for Wrought Products and Alloys-Refinery Shapes<sup>2</sup>

B 379 Specification for Phosphorized Coppers—Refinery Shapes<sup>2</sup>

B 584 Specification for Copper Alloy Sand Castings for General Applications<sup>2</sup>

E 527 Practice for Numbering Metals and Alloys (UNS)<sup>3</sup>

F 68 Specification for Oxygen-Free Copper in Wrought Forms for Electron Devices<sup>2</sup>

### 3. Terminology

3.1 Appendix X2 describes the terms used in designating the various coppers listed.

3.2 Appendix X3 describes the refinery shapes.

3.3 Appendix X4 describes the fabricators' forms.

NOTE 2—Copper, as applied to castings other than refinery cast shapes, cakes, billets, wire bars, ingots, and ingot bars, is described in Specifications B 30 and B 584.

### 4. Significance and Use

4.1 This classification lists the types of copper available from refineries and/or fabricators, defines the common terms used, and gives the characteristics of many of the coppers available. It is useful to the neophyte looking for the appropriate copper for a particular application.

### 5. Basis of Classification

5.1 Table X1.1 lists the standard designations, and the refinery shapes and fabricators' products currently produced. The listed coppers are not necessarily available in the complete range of sizes in the form shown, nor from any one supplier in all forms.

5.2 Existing ASTM specifications for refinery copper and for wrought copper products may cover more than one of the coppers listed in Table X1.1 or may include only part of the range covered by any one of the coppers shown in this classification.

### 6. Keywords

6.1 classification, coppers

<sup>1</sup> This classification 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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<sup>2</sup> Annual Book of ASTM Standards, Vol 02.01.

<sup>3</sup> Annual Book of ASTM Standards, Vol 01.01.

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

**APPENDIXES**
**(Nonmandatory Information)**
**X1. CLASSIFICATION OF COPPERS**

X1.1 Table X1.1 lists the standard designations, refinery shapes, and fabricator's products.

**TABLE X1.1 Classification of Coppers**

Designations	Type of Copper <sup>A</sup>	UNS Nos. <sup>B</sup>	Form in which Copper is Available <sup>C</sup>							
			From Refiners <sup>D</sup>			From Fabricators <sup>E</sup>				
			Wire Bars	Billets	Cakes	Ingots and Ingot Bars	Flat Products	Pipe and Tube	Rod and Wire	Shapes
CATH	Electrolytic cathode		Cathodes only							
Tough-Pitch Coppers										
ETP	Electrolytic tough-pitch	C11000	X	X	X	X	X	X	X	X
RHC	Remelted, high-conductivity tough pitch	C11010	X	X	X	X	X	X	X	X
ETP	Electrolytic tough-pitch (anneal resist)	C11100	X	X	X		X	X	X	X
CRTP	Chemically refined tough-pitch	C11030				X				
FRHC	Fire-refined, high-conductivity tough-pitch	C11020	X	X	X	X	X	X	X	X
STP	Silver-bearing, tough-pitch	C11300, C11400, C11500, C11600	X	X	X	X	X	X	X	X
FRTP	Fire-refined, tough-pitch	C12500		X	X	X	X	X	X	X
FRSTP	Fire-refined tough-pitch with silver	C12700, C12800, C12900, C1300		X	X	X	X			X
Oxygen-Free Coppers (Without use of Deoxidants)										
OFE	Oxygen-free, electronic	C10100	X	X	X		X	X	X	X
OF	Oxygen-free	C10200	X	X	X		X	X	X	X
OFS	Oxygen-free, silver-bearing	C10400, C10500, C10700	X	X	X		X	X	X	X
OFXLP	Oxygen-free, extra low phosphorus	C10300	X	X	X		X	X	X	X
OFLP	Oxygen-free, low-phosphorus	C10800	X	X	X		X	X	X	X
Deoxidized Coppers										
DLP	Phosphorized, low-residual phosphorus	C12000		X			X	X	X	X
DLPS <sup>F</sup>	Phosphorized, low-residual phosphorus silver-bearing	C12100		X			X	X	X	X
DHP <sup>G</sup>	Phosphorized, high-residual phosphorus	C12200		X	X		X	X	X	X
DHPS <sup>F</sup>	Phosphorized, high-residual phosphorus silver-bearing	C12300					X	X	X	X
DPTE <sup>H</sup>	Phosphorized, tellurium-bearing	C14520		X					X	
Other Coppers										
	Sulfur-bearing	C14700		X					X	
	Zirconium-bearing	C15000		X	X		X		X	
PTE	Tellurium-bearing	C14500		X					X	

<sup>A</sup> See Appendix X2.

<sup>B</sup> The chemical compositions associated with these numbers are listed in the product specifications and in the Standard Designations for Copper and Copper Alloys that appear in this publication under "Related Material".

<sup>C</sup> The "X" in the table indicates commercial availability.

<sup>D</sup> See Appendix X3.

<sup>E</sup> See Appendix X4.

<sup>F</sup> This includes oxygen-free copper to which phosphorus and silver have been added in amounts agreed upon.

<sup>G</sup> This includes oxygen-free copper to which phosphorus has been added.

<sup>H</sup> This includes oxygen-free tellurium-bearing copper to which phosphorus has been added in amounts agreed upon.