Designation: B224 – 04

Standard Classification of Coppers[1]

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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 E527, 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 *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, which are provided for information only and are not considered standard.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

B5 Specification for High Conductivity Tough-Pitch Copper Refinery Shapes
B115 Specification for Electrolytic Copper Cathode
B170 Specification for Oxygen-Free Electrolytic Copper—Refinery Shapes
B216 Specification for Tough-Pitch Fire-Refined Copper—Refinery Shapes
B379 Specification for Phosphorized Coppers—Refinery Shapes
E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)
F68 Specification for Oxygen-Free Copper in Wrought Forms for Electron Devices

3. Terminology

3.1 Appendix X1 describes the terms used in designating the various coppers listed.

3.2 Appendix X2 describes the refinery shapes.

3.3 Appendix X3 describes the fabricators' forms.

4. Significance and Use

4.1 This classification lists the types of copper available from refineries or fabricators, or both, 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 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 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

[1] 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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[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.

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

TABLE 1 Classification of Coppers

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

Designations	Type of Copper[A]	UNS Nos.[B]	Form in which Copper is Available[C]							
			From Refiners[D]				From Fabricators[E]			
			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
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	C12900		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[F]	Phosphorized, low-residual phosphorus silver-bearing	C12100		X			X	X	X	X
DHP[G]	Phosphorized, high-residual phosphorus	C12200		X	X		X	X	X	X
DHPS[F]	Phosphorized, high-residual phosphorus silver-bearing	C12300					X	X	X	X
DPTE[H]	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	

[A] See Appendix X1.
[B] 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".
[C] The "X" in the table indicates commercial availability.
[D] See Appendix X2.
[E] See Appendix X3.
[F] This includes oxygen-free copper to which phosphorus and silver have been added in amounts agreed upon.
[G] This includes oxygen-free copper to which phosphorus has been added.
[H] This includes oxygen-free tellurium-bearing copper to which phosphorus has been added in amounts agreed upon.