Designation: B224 – 16 (Reapproved 2022)

Standard Classification of Coppers[1]

This standard is issued under the fixed designation B224; 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 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 plus specific permitted elements is specified as 99.85 % or more, silver being counted as copper except in the case of UNS C10100 and C11040 where silver is not 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 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 *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]

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

B846 Terminology for Copper and Copper Alloys

3. Terminology

3.1 This classification covers definitions specific to this document and in conjunction with Terminology B846.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *sulfur-bearing copper*—copper alloy containing a specified amount of sulfur (C14700).

3.2.2 *tellurium-bearing copper*—copper alloy containing a specified amount of tellurium (C14500).

3.2.3 *wire*—a solid section, including rectangular flat wire but excluding other flat products, furnished in coils or on spools, reels, or bucks.

3.2.4 *zirconium-bearing copper*—copper alloy containing a specified amount of zirconium (C15000).

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.

[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				From Fabricators[A]			
			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
		C11040	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
STP	Silver-bearing, tough-pitch	C11300,	X	X	X	X	X	X	X	X
		C11400,	X	X	X	X	X	X	X	X
		C11500,	X	X	X	X	X	X	X	X
		C11600	X	X	X	X	X	X	X	X
	Fire-Refined Copper									
		Reclaimed Copper								
FRTP	Fire-refined, tough-pitch	C12500		X	X	X	X	X	X	X
FRHC	Fire-refined, high-conductivity tough-pitch	C11020,	X	X	X	X	X	X	X	X
		C11025	X	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,	X	X	X		X	X	X	X
		C10500,	X	X	X		X	X	X	X
		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	Phosphorized, low-residual phosphorus silver-bearing	C12100		X			X	X	X	X
DHP	Phosphorized, high-residual phosphorus	C12200		X	X		X	X	X	X
DHPS	Phosphorized, high-residual phosphorus silver-bearing	C12300					X	X	X	X
DPTE	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 3.1.
[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.

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