



# Standard Specification for Sintered Copper Structural Parts for Electrical Conductivity Applications<sup>1</sup>

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## 1. Scope

1.1 This specification covers sintered Powder Metal (P/M) structural parts of substantially pure copper of two types depending on density. It is anticipated that the parts will be used in applications where high electrical conductivity is required.

1.2 The values stated in inch-pound units are the standard. The SI values in parentheses are for information only and may be approximate.

## 2. Referenced Documents

2.1 *ASTM Standards:*

B 243 Terminology of Powder Metallurgy<sup>2</sup>

B 328 Test Method for Density, Oil Content, and Interconnected Porosity of Sintered Powder Metal Structural Parts and Oil-Impregnated Bearings<sup>2</sup>

E 8 Test Methods of Tension Testing of Metallic Materials<sup>3</sup>

## 3. Terminology

3.1 *Definitions*—Definitions of powder metallurgy terms can be found in Terminology B 243. Additional descriptive information is available in the Related Materials section of Vol 02.05 of the *Annual Book of ASTM Standards*.

## 4. Ordering Information

4.1 Orders for parts under this specification shall include the following information:

- 4.1.1 Dimensions (see Section 9),
- 4.1.2 Chemical composition (see 6.1 and Table 1),
- 4.1.3 Density (see 7.1 and Table 2),
- 4.1.4 Mechanical properties (see Section 8),
- 4.1.5 Electrical properties (see 7.2),
- 4.1.6 Certification (see Section 13), and
- 4.1.7 Metallography (see Section 14).

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee B09 on Metal Powders and Metal Powder Products and is the direct responsibility of Subcommittee B09.05 on Structural Parts.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 02.05.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 03.01.

TABLE 1 Chemical Requirements

Element	Composition, %
Copper, min	99.80
Other, max	0.20

## 5. Materials and Manufacture

5.1 Structural parts shall be made by molding and sintering metal powders followed by repressing and resintering, if necessary, to produce finished parts conforming to the requirements of this specification.

## 6. Chemical Composition

6.1 The material shall conform to the requirements in Table 1.

6.2 The chemical analysis shall be made in accordance with the methods prescribed in Vol 03.05 of the *Annual Book of ASTM Standards*, or by any other approved method agreed upon between the manufacturer and the purchaser.

NOTE 1—Iron contamination should be avoided. Iron in solid solution in copper has a deleterious effect on both electrical and thermal conductivity. Iron not in solid solution (admixed) has a much lesser effect on conductivity. An example of the effect of iron on conductivity is shown in Fig. X1.1 appended.

## 7. Physical Properties

### 7.1 Density:

7.1.1 The density shall be determined by Test Method B 328. If the density does not vary more than 0.3 g/cm<sup>3</sup> from one section of the structural part to any other section, the overall density shall fall within the limits prescribed in Table 2. If the density varies more than 0.3 g/cm<sup>3</sup> from one section of the part to another, the manufacturer and the purchaser shall agree upon a critical section of the part where the stresses are highest. The density of this critical section, rather than the average density, shall fall within the limits prescribed in Table 2.

TABLE 2 Density Requirements

Type	Dry Density, g/cm <sup>3</sup>
I	7.8 to 8.3
II	8.3 min