



# AEROSPACE MATERIAL SPECIFICATION

AMS2223™

REV. J

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Superseding AMS2223H

## Tolerances Copper and Copper Alloy Seamless Tubing

### RATIONALE

AMS2223J results from a Five-Year Review and update of this specification with changes to update Applicable Documents (see Section 2), diameter tolerance usage (see 3.1), and wall thickness tolerances (see Tables 3 and 4, and 4.1.2), to relocate Definitions (see 2.2), and to add a note regarding usage of non-refractory and refractory tables in this specification (see 9.2).

#### 1. SCOPE

This specification covers established inch/pound manufacturing tolerances applicable to copper and copper alloy seamless tubing ordered to inch/pound dimensions. These tolerances apply to all conditions, unless otherwise noted. The term "exclusive" is used to apply only to the higher figure of a specified range.

#### 2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

##### 2.1 SAE Publications

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AS7766 Terms Used in Aerospace Metals Specifications

##### 2.2 Definitions

Terms used in AMS are defined in AS7766.

#### 3. DIAMETER

See Table 1 and 3.1.

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**Table 1 - Average diameter tolerance**

| Specified Diameter<br>Inches | Average Diameter Tolerance<br>Inches, Plus and Minus |
|------------------------------|------------------------------------------------------|
| Up to 0.125, incl            | 0.002                                                |
| Over 0.125 to 0.625, incl    | 0.002                                                |
| Over 0.625 to 1, incl        | 0.0025                                               |
| Over 1 to 2, incl            | 0.003                                                |
| Over 2 to 3, incl            | 0.004                                                |
| Over 3 to 4, incl            | 0.005                                                |
| Over 4 to 5, incl            | 0.006                                                |
| Over 5 to 6, incl            | 0.007                                                |
| Over 6 to 8, incl            | 0.008                                                |
| Over 8 to 10, incl           | 0.010                                                |

- 3.1 Applicable to inside or outside diameter. Table 1 is applicable to all copper and copper alloy seamless tubing, and both refractory and non-refractory alloys (see 9.2).
- 3.2 Out-of-roundness (difference between the major and minor diameters at any one cross-section) of unannealed tubing in straight lengths shall be not greater than specified in Table 2; if the tolerance is expressed as a percentage of a specified dimension, the tolerance so calculated shall be rounded to the nearest 0.001 inch to obtain the permissible tolerance.

**Table 2 - Roundness tolerance**

| Ratio of Specified<br>Nominal Wall Thickness<br>to Specified Diameter | Roundness Tolerance<br>% of Specified Diameter |
|-----------------------------------------------------------------------|------------------------------------------------|
| 0.01 to 0.03, incl                                                    | 1.5                                            |
| Over 0.03 to 0.05, incl                                               | 1.0                                            |
| Over 0.05 to 0.10, incl                                               | 0.8; 0.002 inch, minimum                       |
| Over 0.10                                                             | 0.7; 0.002 inch, minimum                       |

#### 4. WALL THICKNESS

When the tolerance is expressed as a percentage of a dimension, the tolerance so calculated shall be rounded to the nearest 0.001 inch to obtain the permissible tolerance.

##### 4.1 Round, Nonrefractory (see 9.2)

See Table 3.