SAE Aerospace
An SAE International Group

# AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4701F

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Reaffirmed APR 2007

Superseding AMS 4701E

## Copper Wire, Oxygen-Free 99.95(Cu+Ag) Annealed

(Composition similar to UNS C10200)



RATIONALE

This document has been reaffirmed to comply with the SAE 5-year Review policy.

1. SCOPE:

1.1 Form:

This specification covers one type of copper in the form of wire.

1.2 Application:

This wire has been used typically for copper brazing, high-conductivity bonding, and emergency lockwiring, but usage is not limited to such applications.

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 canceled and no superseding document has been specified, the last published issue of that document shall apply.



**TO PLACE A DOCUMENT ORDER:** **Tel: 877-606-7323 (inside USA and Canada)**
**Tel: 724-776-4970 (outside USA)**
**Fax: 724-776-0790**
**Email: custsvc@sae.org**
**SAE WEB ADDRESS:** **http://www.sae.org**

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org

| | |
|---|---|
| AMS 2224 | Tolerances, Copper and Copper Alloy Wire |
| MAM 2224 | Tolerances, Metric, Copper and Copper Alloy Wire |

2.2 ASTM Specifications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.

| | |
|---|---|
| ASTM B 250 | General Requirements for Wrought Copper-Alloy Wire |
| ASTM B 250M | General Requirements for Wrought Copper-Alloy Wire (Metric) |
| ASTM B 577 | Hydrogen Embrittlement of Copper |
| ASTM E 8 | Tension Testing of Metallic Materials |
| ASTM E 8M | Tension Testing of Metallic Materials (Metric) |
| ASTM E 53 | Chemical Analysis of Copper |

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall be oxygen-free copper containing not less than 99.95% by weight copper, including silver, and not more than 0.0010% oxygen, determined by wet chemical methods in accordance with ASTM E 53, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

3.2 Condition:

Cold drawn or cold rolled, and annealed (061) (see 8.2).

3.3 Properties:

Wire shall conform to the following requirements:

3.3.1 Tensile Elongation: Shall be as specified in Tables 1 and Table 2, determined in accordance with ASTM E 8 or ASTM E 8M.

3.3.1.1 Rounds, Hexagons, Octagons: See Table 1.

TABLE 1 - Minimum Elongation

| Nominal Diameter or Least Distance Between Parallel Sides Inch | Nominal Diameter or Least Distance Between Parallel Sides Millimeters | Elongation in 10 Inches (254 mm) % |
|---|---|---|
| Up to 0.0113, excl | Up to 0.287, excl | 15 |
| 0.0113 to 0.0226, excl | 0.287 to 0.574, excl | 20 |
| 0.0226 to 0.1144, excl | 0.574 to 2.906, excl | 25 |
| 0.1144 to 0.2893, incl | 2.906 to 7.348, incl | 30 |
| Over 0.2893 | Over 7.348 | 35 |

3.3.1.2 Squares, Rectangles: See Table 2.

TABLE 2 - Minimum Elongation

| Thickness or Nominal Distance Between Parallel Sides Inch | Thickness or Nominal Distance Between Parallel Sides Millimeters | Elongation in 10 Inches (254 mm) % |
|---|---|---|
| Up to 0.011, excl | Up to 0.28, excl | 20 |
| 0.011 to 0.021, excl | 0.28 to 0.53, excl | 25 |
| 0.021 to 0.051, excl | 0.53 to 1.30, excl | 30 |
| 0.051 to 0.290, excl | 1.30 to 7.37, excl | 32 |
| 0.290 and over | 7.37 and over | 35 |



3.3.2 Hydrogen Embrittlement: Wire, after exposure to hydrogen, shall withstand, without cracking, eight bends determined in accordance with ASTM B 577, Method D.

3.4 Quality:

Wire, as received by purchaser, shall be uniform in quality and condition, sound, smooth, and free from foreign materials and from imperfections detrimental to usage of the wire.

3.5 Tolerances:

Shall conform to AMS 2224 or MAM 2224 as applicable to copper and nonrefractory alloys.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of wire shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the wire conforms to the specified requirements.

4.2 Classification of Tests:

All technical requirements are acceptance tests and shall be performed on each lot.

4.3 Sampling and Testing:

Shall be in accordance with ASTM B 250 or ASTM B 250M.

4.4 Reports:

The vendor of wire shall furnish with each shipment a report showing the results of tests on each lot to determine conformance to the technical requirements. This report shall include the purchase order number, lot number, AMS 4701F, nominal size, and quantity.

4.5 Resampling and Retesting:

If any specimen used in the above tests fails to meet the specified requirements, disposition of the wire may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the wire represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Wire shall be supplied on spools or in coils except when straight lengths are ordered.

5.2 Identification:

5.2.1 Spools and Coils: Shall be legibly marked, by a durable tag or label, with not less than the manufacturer's identification, purchase order number, AMS 4701F, nominal size, and quantity; boxes or drums shall be marked with the same information.

5.2.2 Straight Lengths: Shall have attached to each bundle or enclosed in each box a durable tag or label legibly marked with the information of 5.2.1; when boxed, the box shall be legibly marked with the same information.