



AEROSPACE MATERIAL SPECIFICATION

AMS3411™**REV. E**

Issued 1958-08
Revised 2016-06
Reaffirmed 2021-08

Superseding AMS3411D

Flux, Silver Brazing
High Temperature

RATIONALE

AMS3411E revises 3.2.7 to specify braze fillers for flow testing that do not contain Cd and is a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

This specification covers a silver brazing flux in the form of paste.

1.2 Application

This flux has been used typically for silver brazing nonferrous metals, excluding aluminum, magnesium, and zinc alloys, and ferrous metals including austenitic steels, at temperatures in the range 1100 to 1800 °F (593 to 982 °C), but usage is not limited to such applications. Flux may also be used for critical applications involving long heating cycles for high temperature brazing or for uneven heating cycles such as quick induction heating applications.

1.3 Safety - Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

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.

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For more information on this standard, visit
<https://www.sae.org/standards/content/AMS3411E/>

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS4763	Silver Alloy, Brazing Filler Metal 56Ag - 22Cu - 17Zn - 5.0Sn 1145 to 1205 °F (618 to 652 °C) Solidus-Liquidus Range
AMS4788	Silver Alloy Brazing Filler Metal 50Ag - 28Zn - 20Cu - 2.0Ni 1220 to 1305 °F (660 to 707 °C) Solidus-Liquidus Range
AMS5510	Steel, Corrosion and Heat-Resistant, Sheet, Strip and Plate 18Cr - 10.5Ni - 0.40Ti (SAE 30321) Solution Heat Treated

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM E11 Woven Wire Test Sieve Cloth and Test Sieves

2.3 U.S. Government Publications

Copies of these documents are available online at <http://quicksearch.dla.mil>.

FED-STD-313 Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

3. TECHNICAL REQUIREMENTS

3.1 Material

The flux shall be a blended mixture of uniform consistency and shall be an acid fluoride base containing 0.5 to 1.5% powdered metallic boron and not more than 35% water by weight. It shall not separate in the container to an extent that it cannot be restored to uniform consistency by stirring.

3.2 Properties

The flux shall conform to the following requirements:

- 3.2.1 The flux, diluted with water as required, shall have acceptable fusibility and acceptable application and fluxing characteristics, and shall produce satisfactory brazed joints, of any type on copper alloys, nickel alloys, all types of steel including corrosion resistant alloys and tungsten and chromium carbides, when used in conjunction with silver brazing filler metal.
- 3.2.2 During heating to 1650 °F (899 °C), flux shall fuse at 1100 °F (593 °C) or lower; on cooling from 1650 °F (899 °C), flux shall remain in the liquid state until temperature drops to 1150 °F (621 °C) or lower.
- 3.2.3 Flux, placed on a U.S. Standard 30-mesh (600 µm) sieve conforming to ASTM E11 and worked lightly with a brush, shall pass completely through the sieve. If the flux has partially agglomerated in the container, the flux may, before conducting the test, be warmed over a water bath until it has returned to its normal consistency.
- 3.2.4 Flux shall not produce, during use, a flame or smoke of sufficient intensity to obscure the work; however, the dark opaque nature of the flux is a distinctive feature when it initially fuses or melts.
- 3.2.5 Flux shall be soluble in water at 175 °F (79 °C) or lower after being subjected to normal brazing operations.
- 3.2.6 Flux shall have a shelf life of not less than six months; not more than thorough mixing shall be required to restore flux for use during that time.

3.2.7 When applied to AMS5510 corrosion-resistant steel, using AMS4763 or AMS4788 filler metal and heated in air to 1350 to 1400 °F (732 to 760 °C), flux shall cause braze filler metal to flow with no evidence of balling or dewetting.

3.3 Quality

Flux, as received by purchaser, shall be uniformly blended, free from contaminants and from foreign materials detrimental to the usage of the flux.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of flux 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 flux conforms to the specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

All technical requirements, except shelf life (3.2.6), are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests

Shelf life (3.2.6) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing

At least one randomly selected sample of flux shall be randomly selected from each lot. A lot shall be all flux in an identifiable quantity produced in a single run from the same batches of raw materials and presented for vendor's inspection at one time.

4.4 Reports

The vendor of flux shall furnish with each shipment a report stating that the flux conforms to all technical requirements. This report shall include the purchase order number, lot number, AMS3411E, date of manufacture, identification and quantity.

4.4.1 A material safety data sheet in accordance with FED-STD-313, or equivalent, shall be supplied to each purchaser with the first shipment of flux for production use. Each request for modification of flux formulation shall be accompanied by a revised data sheet for the proposed formulation.

4.5 Resampling and Retesting

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

5. PREPARATION FOR DELIVERY

5.1 Identification

5.1.1 Flux shall be assigned a name unique to this product, a code consisting of letters and/or numbers, or other identification traceable to a specific set of raw materials, ingredients, manufacturing processes, procedures and sequences, and methods of inspection. If necessary to make any changes in the raw materials, ingredients, manufacturing processes, procedures or sequences, or methods of inspection, the identifying name or code shall also be changed.

5.1.2 Each package of flux shall permanently and legibly marked with not less than the following information:

FLUX, SILVER BRAZING, HIGH TEMPERATURE

AMS3411E

PURCHASE ORDER NUMBER _____

MANUFACTURER'S NAME _____

MANUFACTURER'S DESIGNATION (see 5.1.1) _____

LOT NUMBER _____

DATE OF MANUFACTURE _____

DIRECTIONS FOR MIXING AND APPLICATION _____

WEIGHT OF CONTENTS _____

5.2 Packaging

5.2.1 A lot of flux may be packaged in small quantities and delivered under the basic lot acceptance provided lot identification is maintained.

5.2.2 Containers of flux shall be packaged to ensure that the flux, during shipment and storage, will be protected against exposure to moisture, weather, or any other normal hazard.

5.2.3 Packages of flux shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the flux to ensure carrier acceptance and safe delivery.

6. ACKNOWLEDGMENT

A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS

Flux not conforming to this specification, or to modifications authorized by purchaser, will be subject to rejection.

8. NOTES

8.1 Revision Indicator

A change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. Change bars and (R) are not used in original publications, nor in documents that contain editorial changes only.