SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3411D

Issued 1958-08
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Reaffirmed 2010-11

Superseding AMS 3411C

(R)

Flux, Silver Brazing
High Temperature

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 copper alloys, nickel alloys, ferrous metal including austenitic stainless steels, and tungsten and chromium carbides, 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 following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS3411D

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 4769 Silver Alloy Brazing Filler Metal, 45Ag - 24Cd - 16Zn - 15Cu, 1125 to 1145 °F (607 to 618 °C) Solidus-Liquidus Range
AMS 4770 Silver Alloy Brazing Filler Metal, 50Ag - 18Cd - 16.5Zn - 15.5Cu, 1160 to 1175 °F (627 to 635 °C) Solidus-Liquidus Range
AMS 5510 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, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM E 11 Wire-Cloth Sieves for Testing Purposes

2.3 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

FED-STD-313 Material Safety Data Sheets, Preparation and Submission of

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 E 11 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 AMS 5510 corrosion-resistant steel, using AMS 4769 or AMS 4770 filler metal and heated in air to 1300 to 1350 °F (704 to 732 °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 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: Tests for all technical requirements, except shelf life (3.2.6), are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests for 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, AMS 3411D, 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
AMS 3411D
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_____