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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3417A

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Superseding AMS 3417

Submitted for recognition as an American National Standard

FLUX, BRAZING
High Temperature

1. SCOPE:

1.1 Form:

This specification covers a high temperature brazing flux in the form of paste or powder.

1.2 Application:

This flux has been used typically with copper alloy and gold-nickel filler metals for torch brazing of nickel alloys, ferrous metals including austenitic steels, and tungsten and chromium carbides, at temperatures in the range 1700 to 2200 °F (927 to 1204 °C). Flux may also be used for critical heating applications involving long heating cycles for high temperature brazing, or for intense, localized heating cycles such as fast induction heating applications, but usage is not limited to such 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.

QUESTIONS REGARDING THIS DOCUMENT: (412) 772-7154 FAX (412) 776-0243
TO PLACE A DOCUMENT ORDER: (412) 776-4970 FAX (412) 776-0790

2.1 SAE Publications:

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

AMS 4764 Copper Alloy, Brazing Filler Metal, 52.5Cu - 38Mn - 9.5Ni, 1615 - 1700 °F (879 - 927 °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

3. TECHNICAL REQUIREMENTS:

3.1 Material:

Shall be an intimately blended mixture of uniform consistency and shall consist of a borate, boric acid, fluoride base which may contain up to 1.5% powdered metallic boron, up to 15% powdered silica, and not more than 35% water by weight. It shall not separate in the container to such an extent that it cannot be restored to uniform consistency by stirring.

3.2 Properties:

Flux shall conform to the following requirements:

3.2.1 Useability: The flux, diluted with water as required, shall have acceptable fusibility and acceptable application and fluxing characteristics, and shall produce satisfactory brazed joints on nickel alloys containing up to 0.6% aluminum plus 0.4% titanium, steels including corrosion-resistant types, and tungsten and chromium carbides, when used in conjunction with gold-nickel or copper alloy brazing filler metals.

3.2.1.1 (R) A "T" joint test brazement consisting of two 1/16 x 1 x 1 inch (1.6 x 25 x 25 mm) coupons of AMS 5510 steel shall be torch brazed with AMS 4764 brazing filler metal wire as follows: The coupon shall be degreased and cleaned to remove surface oxides. The coupons and filler metal shall be coated with the flux. Test coupons shall then be fixtured to form a "T" joint and preheated with the torch to approximately 1800 to 1850 °F (982 to 1010 °C) (light orange color). The filler metal shall then be face fed to one end of the joint, and the joint area "wiped" with the torch to promote flow throughout the entire length of the joint. Heating shall be discontinued as soon as flow is visibly completed. The brazement shall be water cooled, placed in a vise, and the leg bent 45 degrees. Visual examination of the test coupon shall reveal a ductile joint with not less than 90% sound bond.

3.2.2 (R) Fusion Temperature: On heating, flux shall fuse at 1700 °F (927 °C) or lower; on cooling from 1925 °F (1052 °C), flux shall remain in the liquid state until temperature drops to 1750 °F (954 °C) or lower.

3.2.3 Smoothness: Flux, placed on a U.S. Standard 20-mesh (850 µm) sieve conforming to ASTM E 11 and worked lightly with a brush, shall pass completely through the sieve. If the flux has partially coagulated in the container, the flux may, before conducting the test, be diluted with water and/or warmed by immersion of the flux container in a water bath, and stirred until it has returned to a paste consistency.

3.2.4 Flame or Smoke Emission: Flux shall not produce, during use, a flame or smoke of sufficient intensity to obscure the work. However, the dark opaque nature of a boron-containing flux is a distinctive feature when it initially fuses or melts.

3.2.5 Solubility: Flux shall be soluble in water at 175 °F (79 °C) or higher after being subjected to normal brazing operations.

3.2.6 Shelf Life: Flux shall have shelf life of not less than 6 months, not more than thorough mixing shall be required to restore flux for use during that time.

3.3 (R) Quality:

Flux, as received by purchaser, shall be free from foreign materials and contaminants detrimental to 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 specified requirements.

4.2 Classification of Tests:

4.2.1 (R) Acceptance Tests: Useability (3.2.1) is an acceptance test and shall be performed on each lot of flux.

4.2.2 (R) Periodic Tests: Fusion temperature (3.2.2), smoothness (3.2.3) flame or smoke emission (3.2.4) solubility (3.2.5), and 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.

4.2.3 (R) Preproduction Tests: All technical requirements are preproduction tests and shall be performed on the initial shipment of flux to a purchaser, when a change in material and/or processing is made, and when purchaser deems confirmatory testing to be required.

4.3 Sampling and Testing:

(R) At least one randomly selected sample of flux from each lot. A lot shall be all flux produced in a single production 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 the technical requirements. This report shall include the purchase order number, lot number, AMS 3417A, date of manufacture, and quantity.

4.5 Resampling and Retesting:

If any sample used in the above tests fails to meet 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 specified requirements shall be cause for rejection of the flux represented.

5. PREPARATION FOR DELIVERY:

5.1 Identification:

Each package shall be permanently and legibly marked with not less than the following information:

FLUX, BRAZING, HIGH TEMPERATURE
AMS 3417A _____
PURCHASE ORDER NUMBER _____
MANUFACTURER'S IDENTIFICATION (See 5.1.1) _____
LOT NUMBER _____
DATE OF MANUFACTURE _____
DIRECTIONS FOR USE _____
WEIGHT OF CONTENTS _____

5.1.1 (R) Flux shall be assigned a unique name, 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 change in raw materials, ingredients, manufacturing processes, procedures or sequences, or methods of inspection, the identifying name or code shall also be changed.