



AEROSPACE MATERIAL SPECIFICATION	AMS3412™	REV. F
	Issued 1948-05 Revised 2009-07 Reaffirmed 2021-08	
Superseding AMS3412E		
Flux, Aluminum Brazing for Torch or Furnace Brazing		

RATIONALE

AMS3412F has been reaffirmed to comply with the SAE five year review policy.

1. SCOPE

1.1 Form

This specification covers the requirements for an aluminum brazing flux in the form of powder or paste.

1.2 Application

This flux has been used typically for brazing aluminum and aluminum alloys in accordance with AMS2672 at 1050 °F (566 °C) and above, but usage is not limited to such applications.

1.3 Classification

Flux covered by this specification is classified as follows:

- Type 1 - Torch Brazing
- Type 2 - Furnace Brazing

Where a type is not specified, Type 1 shall be supplied.

1.3.1 Form

- Form 1 – Powder
- Form 2 – Paste

If no form is specified, Form 1 shall be used.

1.4 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.

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<https://www.sae.org/standards/content/AMS3412F/>

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

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

AMS2672	Brazing, Aluminum, Torch or Furnace
AMS4184	Filler Metal, Aluminum Brazing, 10Si - 4Cu, (4145)
AMS4185	Filler Metal, Aluminum Brazing, 12Si, (4047)

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 E 11 Wire Cloth and Sieves for Testing Purposes

2.3 AWS Publications

Available from American Welding Society, 550 NW LeJeune Road, Miami, FL 33126, Tel: 1-800-443-9353, www.aws.org.

AWS A5.31 Specification for Fluxes for Brazing and Braze Welding

3. TECHNICAL REQUIREMENTS

3.1 Composition and Form

3.1.1 Form 1 powder flux shall be a finely ground and uniformly blended mixture of ingredients, containing not more than 5% water by weight as determined by the water content test in AWS A5.31.

3.1.1.1 Flux shall not harden in the container. A slight amount of agglomeration is permissible provided the lumps can be readily broken into a powder not coarser than the remainder of the material.

3.1.2 Form 2 flux shall be in paste form, premixed with suitable moisturizing agents and ready for use with no further additions.

3.1.2.1 Flux shall not harden in the container. A slight amount of agglomeration is permissible provided the lumps will pass through a number 40 sieve in accordance with ASTM E 11 with no more than a slight brushing required.

3.2 Properties

Flux shall conform to the following requirements:

3.2.1 Fluxing Ability

Flux shall permit production of satisfactory brazed joints of any type on applicable aluminum alloys, determined in accordance with 3.2.1.2.

3.2.1.1 Form 1 powder flux, mixed with water in the proportions of 3 parts flux to 1 part water by weight, with or without a suitable wetting agent, shall form a smooth paste, free from coarse particles, having acceptable fusibility and application and fluxing characteristics.

- 3.2.1.2 The test sample shall consist of two pieces of suitably cleaned and prepared alloy of 1100 or 3003 aluminum, each approximately 1 x 4 inches (25 x 102 mm), held by tack welding, wiring, or fixturing to create a "T" configuration with a suitable gap between the two parts. Material thickness may vary from 0.02 to 0.07 inches (0.5 to 1.8 mm). Filler metal shall conform to AMS4184 or AMS4185.
- 3.2.1.2.1 For Type 1 flux, the specimen and the filler metal shall be liberally coated with flux. It may be necessary to preheat the filler metal to facilitate adhesion of the flux. The filler metal shall be fed into the joint while the specimen is heated with an oxyacetylene torch flame or equivalent.
- 3.2.1.2.2 For Type 2 flux, the filler metal shall be preplaced on one side of the 4 inch (102 mm) long joint. Both the specimen and the filler metal shall be liberally coated with flux. The fluxed assembly shall be placed in a preheated air furnace and held at 1100 °F ± 10 (593 °C ± 6) for sufficient time to permit the specimen to achieve braze temperature, but not longer than 3 minutes at temperature. The specimen may be furnace or air cooled.
- 3.2.1.2.3 After cooling, flux shall be removed in accordance with 3.2.4. The resultant joint shall exhibit a uniform fillet of braze filler metal on both sides of the joint.

3.2.2 Fusion Temperature

On heating, flux shall fuse at 1050 °F (566 °C) or lower; on cooling from 1100 °F (593 °C) or higher, flux shall remain in the liquid state until the temperature drops to 1050 °F (566 °C) or lower.

3.2.3 Flame or Smoke Emission

3.2.3.1 Flux shall not produce, during use, a flame or smoke of sufficient intensity to obscure the work.

3.2.3.2 Flux shall not produce toxic or suffocating fumes under normal conditions of use.

3.2.4 After being subjected to brazing operations, flux should be readily removable by water at 190 °F (88 °C) or hotter. If the flux is not completely removed by the hot water, but is removed by immersion for not more than 15 minutes in a 10% solution of nitric acid, to which 0.25% hydrofluoric acid is added, at a temperature not higher than 100 °F (38 °C), followed by a final hot water rinse, flux is acceptable.

3.3 Quality

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

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The supplier of flux shall supply all samples for supplier's tests and shall be responsible for the performance of all required tests. The cognizant engineering organization 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 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 the cognizant engineering organization deems confirmatory testing to be required.

4.3 Sampling for Testing

Sample quantity shall be at the discretion of the supplier, unless otherwise specified by the cognizant engineering organization.

4.4 Reports

The supplier 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, AMS3412F, date of manufacture, identification, and quantity.

5. PREPARATION FOR DELIVERY

5.1 Identification

5.1.1 Flux shall be assigned a unique name, 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 change 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 be permanently and legibly marked with not less than the following information:

FLUX, ALUMINUM BRAZING, FOR TORCH OR FURNACE BRAZING
AMS3412F

CLASSIFICATION TYPE NUMBER _____

FORM, IF OTHER THAN POWDER _____

PURCHASE ORDER NUMBER _____

MANUFACTURER'S IDENTIFICATION (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 approval provided lot identification is maintained.

5.2.2 Containers of flux shall be suitably wrapped, sealed, and boxed or otherwise packaged for protection against injury and contamination during shipment and under normal dry storage conditions.

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. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

6. ACKNOWLEDGMENT

The supplier 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 the cognizant engineering organization, will be subject to rejection.