

METRIC

MIL-F-14256F  
Amendment 1  
18 May 1994

MILITARY SPECIFICATION

FLUX, SOLDERING, LIQUID, PASTE FLUX,  
SOLDER PASTE AND SOLDER-PASTE FLUX,  
(FOR ELECTRONIC/ELECTRICAL USE)  
GENERAL SPECIFICATION FOR

This amendment forms a part of MIL-F-14256F, dated 26 April 1993,  
and is approved for use by all Departments and Agencies of the  
Department of Defense.

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3.2.1.3, delete and substitute:

"3.2.1.3 Type LR. Flux manufacturers may classify certain formulations of nonrosin-based, rosin-based or water soluble fluxes as low residue (LR) fluxes for use in manufacturing processes which minimize or eliminate cleaning operations. Type LR fluxes shall be free of ionic and non-ionic halide(s) and/or halogen(s). During qualification, fluxes classified as low residue shall be tested for surface insulation resistance, both after cleaning and without cleaning. The results of both tests shall be reported separately in the qualification report. In the material data sheet, manufacturers of low residue fluxes shall provide recommendations on whether the flux should be cleaned. In addition, the material data sheet should describe known material incompatibility with commonly used solvents, saponifiers, and other cleaning materials."

3.2.3, delete and substitute title as follows:

"3.2.3 Resistivity of water extract (applicable to Types R, RMA, RA, WSF-0 and WSF-1)."

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AMSC N/A

FSC 3439

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3.3.2, delete and substitute:

"3.3.2 Surface insulation resistance (SIR). The test specimens shall be made from glass epoxy resin substrates per MIL-P-13949/4. When tested as specified in 4.7.4 under conditions of  $85 \pm 2^\circ\text{C}$  and 85% relative humidity (RH), nominal, for a duration of 7 days (168 hours), test specimens shall have a minimum of 50 megohms resistance at T = 96 and 168 hours and a minimum of 500 megohms two hours after the final temperature and humidity conditions have stabilized at  $25^\circ\text{C}$  and 50% RH. Resistance readings shall be actual values rather than an average of the tested coupons."

3.3.2.1, delete and substitute:

"3.3.2.1 Inspection for visual defects. Upon completion of surface insulation resistance testing, each coupon shall be examined using 10X to 30X magnification with back lighting. Dendritic growth, dark spots, blue-green discoloration (corrosion) or other conditions demonstrating electrochemical migration shall be considered a failure when inspected per 4.7.4."

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3.3.3, delete and substitute:

"3.3.3 Solder spread. When tested as specified in 4.7.5, the solder spread test results shall be expressed in square millimeters ( $\text{mm}^2$ ). The following minimum requirements shall apply: Type LR, no requirement, but shall be reported; all other types,  $90 \text{ mm}^2$ ."

3.3.4, delete and substitute:

"3.3.4 Corrosion test. When tested as specified in 4.7.3.6, there shall be no evidence of corrosion for flux Types R, RMA, RA. Failure of this test by flux Types WSF-0 and WSF-1 shall not be cause for rejection. Evidence of a light blue, green, or blue-green discoloration at the interface of the solder and copper coupon for Type LR fluxes consisting of up to 2% ACS reagent grade adipic acid in isopropyl alcohol with no additional activators, resins, wetting agents, or other additives, shall not be cause for rejection. Type LR flux must pass the copper mirror and silver chromate paper tests to be accepted. The results of corrosion testing for all flux types shall be reported."

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4.5, delete and substitute:

"4.5 Qualification inspection (see 6.4). Qualification inspections shall be performed at a laboratory acceptable to the Government on samples produced with equipment and procedures normally used in production. A report which meets the requirements of 4.5.4 shall be submitted for initial qualification."

## PAGE 12

4.6.1.4, Table IV, delete requirement for group B Corrosion Test from Table IV and substitute changed table as follows:

TABLE IV. Group B inspection.

| TEST                         | REQUIREMENT<br>PARAGRAPH | METHOD<br>PARAGRAPH(S) |
|------------------------------|--------------------------|------------------------|
| Flux activity classification | 3.2.2                    | 4.7.3.7                |
| Resistivity of water extract | 3.2.3                    | 4.7.2                  |
| Halide content               | 3.2.4                    | 4.7.3 through 4.7.3.4  |
| Effect on copper mirror      | 3.3.1                    | 4.7.3.5                |
| Solder spread                | 3.3.3                    | 4.7.5                  |

## PAGE 13

4.6.2.1, Table V, add requirement for group C Corrosion Test to Table V and substitute changed table as follows:

TABLE V. Group C inspection.

| EXAMINATION OR TEST           | REQUIREMENT<br>PARAGRAPH | METHOD<br>PARAGRAPH(S) |
|-------------------------------|--------------------------|------------------------|
| Flux reliability              |                          |                        |
| Surface insulation resistance | 3.3.2 and 3.3.2.1        | 4.7.4                  |
| Packaging and marking         | 5.1 and 5.2              | 4.7.1 and 4.8.2        |
| Corrosion                     | 3.3.4                    | 4.7.3.6                |

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## PAGE 14

4.7.2, delete and substitute:

"4.7.2 Resistivity of water extract (see 3.2.3). This test will require dissolving paste flux or solder-paste flux in isopropyl alcohol (IPA) (see 3.2.6) for rosin based fluxes. Five watch glasses and five acid/alkali resistant graduated beakers shall be thoroughly cleaned by washing in hot water and detergent solution and rinsing several times with tap water followed by at least five distilled water rinses."

## PAGE 17

4.7.3.7, line 3: delete "accomplished" and substitute "performed."

## PAGE 18

4.7.4, change as follows:

last paragraph, line 2: delete "control" and substitute "all test patterns (including the control boards)."

last paragraph, line 4: change 7X to 10X

last paragraph, line 5: change 10X to 30X

## PAGE 19

4.7.4.1, line 2: delete "specimen" and substitute "test pattern."

## PAGE 22

6.1.5, delete and substitute:

"6.1.5 Type LR. These types of fluxes are often designed to be left on the assembly, without the requirement of cleaning. If Type LR flux is not cleaned, then the manufacturing process must be such that contamination that can jeopardize the product's reliability is not introduced to the assembly. That is, all of the starting materials shall be clean of any conductive, corrosive, contaminant, and the process flow shall be controlled so that mishandling does not contaminate the assembly. The material data sheet should be referred to for compatibility information. When low residue fluxes are used to reduce or eliminate cleaning processes during hardware manufacture, assemblers must perform tests to verify the flux is compatible with the assembly process, process materials, and conformal coating. In addition, performance tests should be used to verify that post-production residues do not adversely affect hardware electrical performance."

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6.2, change as follows:

subparagraph c., add "plus package size and quantity."

subparagraph h., move LR (Low Residue) from column heading XX to X as follows:

| <u>M</u> | <u>14256</u> | <u>X</u>  | <u>XX</u>  |
|----------|--------------|---|--|
| Mil Spec | No.          | Type  | Form   |
|          |              | (i.e. R, RA, RMA, WSF-0, WSF-1, LR (Low Residue)) | (i.e. L(Liquid) FP (Paste Flux) SP (Solder-Paste Flux))" |

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6.3, delete and substitute:

"6.3 Polyglycol. Materials containing polyethylene glycol or primary derivatives of polyethylene glycol, or a material generally derived by the reaction of organic acids, amines, alcohols, phenols, or water with ethylene or propylene oxides, or their derivatives. This family of materials includes, but is not limited to polyethylene glycol, polypropylene glycol and a wide range of polyglycol surfactants. This family of materials does not include glycols (e.g. ethylene glycol), polyols (e.g. glycerine), or mono-, di-, or triglycol ethers."

CONCLUDING MATERIAL

Custodian:

Army - ER  
Navy - EC  
Air Force - 99

Preparing activity:

Army - ER

Review Activities:

Army - MI, CR  
Navy - SH, AS, OS, MC, YD  
Air Force - 84, 99, 80  
DLA - GS

Project: 3439-0844