ENGINEERING PRACTICE STUDY

PROJECT NUMBER: 5961-2012-058

TITLE: REVIEW OF REQUIREMENTS FOR MIL-STD-750 TEST METHOD 2026

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FINAL REPORT

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I. OBJECTIVES: An engineering practice study was conducted to review and evaluate the requirements of MIL-STD-750, Test Method 2026 (Solderability) to determine if an allowance for the use of ROM1 type flux should be permitted for gold leaded Leadless Chip Carrier (LCC) packages.

II. BACKGROUND: MIL-STD-750, Test Method 2026, Solderability references J-STD-002, Solderability Tests for Component Leads, Terminations, Lugs, Terminals and Wires, which requires the use of flux type ROL1 (standard activated rosin flux #1 having a composition of 25% +/-0.5% by weight of colophony and o.15% +/-0.01% by weight diethylammonium hydrochloride, in 74.85% +/- 0.5% by weight of isopropyl alcohol for tin/lead solderability testing.

J-STD-004B, Requirements for Soldering Fluxes classifies flux type ROL1 as a low activity rosin flux.

Recent comments received by DLA have suggested that the use of ROM1 type flux should be permitted for gold leaded LCC packages. The manufacturing of LCC packages involves a breaking/singulation process after the gold plating process. This breaking/singulation process results in exposed metal (nickel and tungsten) at the package castellation. After steam aging, nickel hydrate oozes onto the gold surface through the exposed nickel/tungsten surface which results in non-wetting of the castellations.

International Rectifier initiated a design of experiment to evaluate and compare the results of three different solder fluxes: Kester 182 (ROL1), Kester 1544 (ROM1) and Superior 43(ORH1). The results of this experiment found that the solderability yield for devices using the ROM1 or ORH1 type fluxes were nearly double those of the ROL1 type flux.

J-STD-004 classifies flux type ORH1 as a high activity organic flux, therefore, it will not be considered for allowance in MIL-STD-750, Test Method 2026.

III. RESULTS: The comments received by DLA Land and Maritime have been compiled and reviewed. Comments were issued by two other 19500 suppliers who are qualified to supply gold leaded LCC packages. They have reported that they are not having any difficulty passing solderability testing using ROL1 type flux (per the current requirements). Further comments received from multiple parties were critical of the proposed change because it fails to address the root cause of the problem, which is the porosity/unevenness of the gold plating.

IV. CONCLUSIONS: Based on the negative comments received and the fact that this issue appears to be isolated to a single 19500 qualified supplier, MIL-STD-750, Test Method 2026 will not be revised to allow the use of ROM1 type fluxes for gold leaded LCC packages.

V. RECOMMENDATIONS: J-STD-002 does allow for the use of a different flux per paragraph 1.8 AABUS (as agreed by user and supplier). This could be pursued as a possible solution. Also, the J-STD-002 committee recently reported that in the next revision of J-STD-002 (revision D), steam conditioning will be replaced with dry bake conditioning. This could potentially eliminate the issue International Rectifier is experiencing all together.