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BSI Standards Publication

Process management for avionics – Aerospace and defence electronic systems containing lead-free solder

Part 4: Ball grid array (BGA) re-balling

National foreword

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The UK participation in its preparation was entrusted to Technical Committee GEL/107, Process management for avionics.

A list of organizations represented on this committee can be obtained on request to its secretary.

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FOREWORD

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Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 62647-4, which is a Technical Specification, has been prepared by IEC technical committee 107: Process management for avionics.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
107/314/DTS	107/331/RVDTS

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the IEC 62647 series, published under the general title *Process management for avionics – Aerospace and defence electronic systems containing lead-free solder*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

As the result of RoHS directives, soldering assembly processes have migrated predominantly from tin-lead to Pb-free, and a majority of BGA components manufacturers have converted from tin-lead solder balls to Pb-free solder balls. This has introduced well documented reliability concerns. In the case of a leaded soldering process, a solution can be to replace the Pb-free solder balls on the BGA components with tin-lead solder balls. This will prevent mixing solder alloys.

This document was prepared to standardize the requirements and guidelines for replacing the solder balls on applicable BGA components. The requirements within this document are derived from existing industry standards and a collaboration of service providers and customers, typically avionics original equipment manufacturers (OEMs).

This document is intended to be used by de-balling/re-balling providers and customers to incorporate these requirements into their operations to provide a consistent and well-controlled process, or to create a de-balling/re-balling plan that augments their existing processes.

There are two major reasons to de-ball/re-ball BGA components: alloy compatibility and replacement of damaged balls.

The customer should understand the potential risks of the BGA de-balling/re-balling process for a specific package.

To avoid reliability problems, the BGA de-balling/re-balling process should be qualified and carefully controlled to prevent the possibility of BGA failure after re-balling. Generally, automated processes contribute positively to this objective and are encouraged in the electronic industry.

This document does not guarantee a particular yield or reliability of BGA components going through the de-balling/re-balling process. BGA component construction and materials used should be evaluated for compatibility with the solder re-balling process to ensure that BGA component reliability and integrity are maintained.

Because of the dynamic nature of the transition to lead-free (Pb-free) electronics, this and other similar documents are based on the best information and expertise available; its update will be considered as future knowledge and data are obtained.

PROCESS MANAGEMENT FOR AVIONICS – AEROSPACE AND DEFENCE ELECTRONIC SYSTEMS CONTAINING LEAD-FREE SOLDER –

Part 4: Ball grid array (BGA) re-balling

1 Scope

This part of IEC 62647, which is a Technical Specification, defines the requirements for replacing solder balls on ball grid array (BGA) component packages in the context of an electronic components management plan (ECMP) for aerospace, defence and high reliability products.

NOTE 1 IEC TS 62239-1 and EIA-STD-4899 describe the electronic components management program (ECMP).

It does not apply to column grid array (CGA) components or chip scale components.

This re-balling document addresses two types of configurations. For other configuration types, see Annex A for tailoring.

- Configuration 1: A BGA package that will be de-balled and then re-balled with tin-lead balls compatible with a tin-lead soldering assembly process.
- Configuration 2: A BGA package that will be de-balled and then re-balled with Pb-free balls compatible with a Pb-free soldering assembly process.

The intent of this document is to provide re-balling companies (hereinafter referred to as the re-balling provider) with the administrative and technical requirements to be incorporated within existing processes or for establishing, implementing and maintaining a new set of processes or the creation of a stand-alone re-balling process.

This document is intended to be used by de-balling/re-balling providers and customers, typically avionics original equipment manufacturers (OEM); it defines the requirements for re-balling providers who are providing services to the aerospace, defence, high performance and high reliability electronics industry.

Requirements for new BGA component part number qualification are also included. This document identifies the need for the creation of new part numbers for re-balled BGA components, covers process and testing requirements for the de-balling/re-balling process and encourages the automated processes due to the ability to control the process.

Companies engaged in re-balling are supposed to have the necessary knowledge, experience and tools, and to customize if needed their own methods for defining a de-balling/re-balling process that meets the requirements in this document.

Each customer determines the applicability of this document and the need for full replacement of the existing solder balls. Some applications can have unique requirements that exceed the scope of this document and are therefore specified separately.

This document is not intended to address all procedures and processes associated with a de-balling/re-balling facility; it is assumed there are management, quality, manufacturing, safety, calibration and training processes/procedures in place as well as all the necessary tools and equipment to accomplish the work.

NOTE 2 For the purposes of this document, if the term “BGA” is used alone, it is stated as “BGA component".