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Surface mounting technology -
Part 1: Standard method for the specification of surface mounting components (SMDs)

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Surface mounting technology - Part 1: Standard method for the specification of surface mounting components (SMDs)

FOREWORD

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This commented version (CMV) of the official standard IEC 61760-1:2026 edition 4.0 allows the user to identify the changes made to the previous IEC 61760-1:2020 edition 3.0. Furthermore, comments from IEC TC 91 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

IEC 61760-1 has been prepared by IEC technical committee 91: Electronics assembly technology. It is an International Standard.

This fourth edition cancels and replaces the third published in 2020. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) added new subclause 4.2 – Classification of electronic assemblies;
b) added new subclause 4.4.8 – Creepage and clearance distances - Insulation coordination;
c) added new subclause 4.9 – Thermal and electrical performance;
d) updated Clause 6 – Soldering: now including requirements related to application of low temperature solders;
e) added new subclause 6.2.2 – Commonly used solder alloys;
f) updated subclause 6.3.6 – Resistance to vacuum during soldering;
g) updated subclause 6.3.7 – Resistance to cleaning media and processes - now includes the tests in IEC 60068-2-88, *Tests – Test XD: Resistance of components and assemblies to liquid cleaning media*;
h) added new subclause 6.3.9 – Rework of soldered components;
i) added new Annex B – Sustainability.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
91/2103/FDIS	91/2113/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 61760 series, published under the general title *Surface mounting technology*, can be found on the IEC website.

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

– reconfirmed,
– withdrawn, or
– replaced.

INTRODUCTION

Specifications for electronic components have in the past been formulated for each component family. The regulations for environmental tests have been selected from IEC 60068 and other IEC and ISO publications. The intention for this procedure was that all components, once installed in a piece of equipment, had to satisfy certain criteria.

The introduction and increasing use of different mounting processes on one assembly make it ~~necessary~~ essential to extend the existing requirements to include those arising from processing during assembly.

Nevertheless, there existed no harmonized standard that prescribes the content of a component specification before the publication of this document. It is the purpose of this document to define the general requirements for component specifications derived from the assembly processes. This is done in three steps.

In the first step, general requirements for component specifications and component design related to the handling and placement of the component on the substrate are given (Clause 4). In the second step, the requirements related to assembly processes are given (Clause 5). In the third step, additional requirements resulting from specific mounting methods are given (from Clause 6 to Clause 9).

Additional consideration with respect to the through-hole components are crucial to mixed technology boards, i.e. boards containing through-hole components and SMDs~~, require additional consideration with respect to the through-hole components~~. These ~~may~~ can be subject to the same requirements as the SMDs. Persons responsible for drafting specifications for "non-surface mounting components" wishing to include a statement on their ability to withstand surface mounting conditions should use the classifications and tests set out in the present document.

1 Scope

This part of IEC 61760 defines requirements for component specifications of electronic components that are intended for usage in surface mounting technology. To this end, it specifies a reference set of process conditions and related test conditions to be considered when compiling component specifications.

The objective of this document is to ensure that a wide variety of SMDs can be subjected to the same placement, mounting and subsequent processes (e.g. cleaning, inspection) during assembly. This document defines tests and requirements that ~~need to be part of~~ are included in any SMD component's general, sectional or detail specification. In addition, this document provides component users and manufacturers with a reference set of typical process conditions used in surface mounting technology.

Some of the requirements for component specifications in this document are also applicable to components with leads intended for mounting on a circuit board, including solderless interconnection technology. Cases for which this is appropriate are indicated in the relevant subclauses.

NOTE Solderless interconnection technology refers to a mounting method which is not part of the surface-mounting process and the components do not undergo a soldering operation. Such components are included in this document because the mounting of components for solderless interconnection commonly occurs after the mounting of SMDs.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

~~IEC 60068 (all parts), *Environmental testing*~~

IEC 60068–2–2, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068–2–21, *Environmental testing – Part 2-21: Tests – Test U: Robustness of terminations and integral mounting devices*

~~IEC 60068-2-45:1980, *Basic environmental testing procedures – Part 2-45: Tests – Test XA and guidance: Immersion in cleaning solvents*~~
~~IEC 60068-2-45:1980/AMD1:1993~~

IEC 60068–2–58, *Environmental testing – Part 2-58: Tests – Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMDs)*

IEC 60068-2-88, *Environmental testing - Part 2-88: Tests – Test XD: Resistance of components and assemblies to liquid cleaning media*

IEC 60191–6, *Mechanical standardization of semiconductor devices – Part 6: General rules for the preparation of outline drawings of surface mounted semiconductor device packages*

IEC 60194–2, *Printed boards design, manufacture and assembly – Vocabulary – Part 2: Common usage in electronic technologies as well as printed board and electronic assembly technologies*

IEC 60286-3, *Packaging of components for automatic handling - Part 3: Packaging of surface mount components on continuous tapes*

IEC 60286-4, *Packaging of components for automatic handling - Part 4: Stick magazines for electronic components encapsulated in packages of different forms*

IEC 60286–5, *Packaging of components for automatic handling – Part 5: Matrix trays*

IEC 60286–6, *Packaging of components for automatic handling – Part 6: Bulk case packaging for surface mounting components*

IEC 60664-1, *Insulation coordination for equipment within low-voltage supply systems - Part 1: Principles, requirements and tests*

IEC 60749-20~~:2008~~, *Semiconductor devices - Mechanical and climatic test methods - Part 20: Resistance of plastic encapsulated SMDs to the combined effect of moisture and soldering heat*

IEC 61188–6–4, *Printed boards and printed board assemblies – Design and use – Part 6-4: Land pattern design – Generic requirements for dimensional drawings of surface mounted components (SMD) from the viewpoint of land pattern design*

IEC 61340–5–1, *Electrostatics – Part 5-1: Protection of electronic devices from electrostatic phenomena – General requirements*

IEC 61340–5–3, *Electrostatics – Part 5-3: Protection of electronic devices from electrostatic phenomena – Properties and requirements classification for packaging intended for electrostatic discharge sensitive devices*

IEC 61760–2, *Surface mounting technology – Part 2: Transportation and storage conditions of surface mounting devices (SMD) – Application guide*

IEC 61760–4, *Surface mounting technology – Part 4: Classification, packaging, labelling and handling of moisture sensitive devices*

IEC 62090, *Product package labels for electronic components using bar code and two-dimensional symbologies*

IPC/JEDEC J-STD-020, *Moisture/Reflow Sensitivity Classification for ~~Nonhermetic Solid State~~ Non-hermetic Surface Mount Devices (SMDs)*

IPC/JEDEC J-STD-033, *Handling, ~~Packaging~~Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices*

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IEC 60062, *Marking codes for resistors and capacitors*

IEC 60068-1, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-20, *Environmental testing – Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices with leads*

IEC 60068-2-69, *Environmental testing – Part 2-69: Tests – Test Te/Tc: Solderability testing of electronic components and printed boards by the wetting balance (force measurement) method*

IEC 60191-6-19, *Mechanical standardization of semiconductor devices – Part 6-19: Measurement methods of the package warpage at elevated temperature and the maximum permissible warpage*

IEC 60352-5, *Solderless connections – Part 5: Press-in connections – General requirements, test methods and practical guidance*

IEC 60749 (all parts), *Semiconductor devices – Mechanical and climatic test methods*

IEC 61188-5-1, *Printed boards and printed board assemblies – Design and use – Part 5-1: Attachment (land/joint) considerations – Generic requirements*

IEC 61189-5-504, *Test methods for electrical materials, interconnection structures and assemblies – Part 5-504: General test methods for materials and assemblies – Process ionic contamination testing (PICT)*

IEC TR 61191-7, *Printed board assemblies – Part 7: Technical cleanliness of components and printed board assemblies*

IEC 62474, *Material declaration for products of and for the electrotechnical industry*

IEC TR 62474-1, *Material declaration for products of and for the electrotechnical industry – Part 1: Guidance for the implementation of IEC 62474*

ISO 8601, *Data elements and interchange formats – Information interchange – Representation of dates and times*

ISO 25178, *Geometrical product specifications (GPS) – Surface texture: Areal*

IPC-9797, *Press-fit standard for automotive requirements and other high-reliability applications*

JEDEC Publication SPP-024, *Reflow Flatness Requirements for Ball Grid Array Packages*

JEDEC Standard JESD22-B112, *Package Warpage Measurement of Surface-Mount Integrated Circuits at Elevated Temperature*

[1] J-STD-609, *Marking, symbols, and labels of leaded and lead-free terminal finished materials used in electronic assembly*

[2] IPC-2221, *Generic Standard on Printed Board Design*

[3] IEC 60664-4, *Insulation coordination for equipment within low-voltage systems - Part 4: Consideration of high-frequency voltage stress*

[4] IEC 61188-6-2, *Circuit boards and circuit board assemblies - Design and use - Part 6-2: Land pattern design - Description of land pattern for the most common surface mounted components (SMD)*

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[14] IPC/JEDEC J-STD-020, *Moisture/Reflow Sensitivity Classification for Non-hermetic Surface Mount Devices (SMDs)*

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[16] IEC TR 60068-3-12, *Environmental testing - Part 3-12: Supporting documentation and guidance - Method to evaluate a possible lead-free solder reflow temperature profile*

[17] IPC-7530, *Guidelines for Temperature Profiling for Mass Soldering Processes (Reflow and Wave)*

[18] IEC 61760-4, *Surface mounting technology - Part 4: Classification, packaging, labelling and handling of moisture sensitive devices*

[19] EIA/IPC/JEDEC-J-STD-075, *Classification of Passive and Solid State Devices for Assembly Processes*

[20] ECA/IPC/JEDEC J-STD-075, Non-IC Electronic Component Assembly

[21] IEC TR 60068-3-15, *Environmental testing - Part 3-15: Supporting documentation and guidance - Vacuum-assisted reflow soldering*

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