IEC 61191-1

Edition 3.0 2018-09
REDLINE VERSION

INTERNATIONAL STANDARD

Printed board assemblies –
Part 1: Generic specification – Requirements for soldered electrical and electronic assemblies using surface mount and related assembly technologies

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IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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PRINTED BOARD ASSEMBLIES –

Part 1: Generic specification – Requirements for soldered electrical and electronic assemblies using surface mount and related assembly technologies

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 61191-1 has been prepared by IEC technical committee 91: Electronics assembly technology.

This third edition cancels and replaces the second edition published in 2013. This edition constitutes a technical revision.

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

a) the requirements have been updated to be compliant with the acceptance criteria in IPC-A-610F;
b) the term "assembly drawing" has been changed to "assembly documentation" throughout;
c) references to IEC standards have been corrected;
d) Clause 9 was completely rewritten;
e) Annex B was removed because there are already procedures for circuit board assemblies.

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

CDV	Report on voting
91/1481/CDV	91/1510/RVC

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

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

A list of all parts of IEC 61191 series, published under the general title *Printed board assemblies*, can be found in the IEC website.

IEC 61191-1:2018

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,
- replaced by a revised edition, or
- amended.

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PRINTED BOARD ASSEMBLIES –

**Part 1: Generic specification –
Requirements for soldered electrical and electronic assemblies
using surface mount and related assembly technologies**

1 Scope

This part of IEC 61191 prescribes requirements for materials, methods and verification criteria for producing quality soldered interconnections and assemblies using surface mount and related assembly technologies. This part of IEC 61191 also includes recommendations for good manufacturing processes.

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.

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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 60068-2-58, *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 (SMD)*

IEC 61191-1:2018

IEC 60194, *Printed board design, manufacture and assembly – Terms and definitions*

https://standards.iteh.ai/catalog/standards/iec/15a921dc-c586-4259-97ed-56b60e065075/iec-61191-1-2018

IEC 60721-3-1, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities –~~Section 1:~~ Storage*

~~IEC 61188-1-1, *Printed boards and printed board assemblies – Design and use – Part 1-1: Generic requirements – Flatness considerations for electronic assemblies*~~

IEC 61189-1, *Test methods for electrical materials, interconnection structures and assemblies – Part 1: General test methods and methodology*

IEC 61189-3, *Test methods for electrical materials, printed boards and other interconnection structures and assemblies – Part 3: Test methods for interconnection structures (printed boards)*

IEC 61190-1-1, *Attachment materials for electronic assembly – Part 1-1: Requirements for soldering fluxes for high-quality interconnections in electronics assembly*

~~IEC 61190-1-2, *Attachment materials for electronic assembly – Part 1-2: Requirements for soldering pastes for high-quality interconnects in electronics assembly*~~

IEC 61190-1-3, *Attachment materials for electronic assembly – Part 1-3: Requirements for electronic grade solder alloys and fluxed and non-fluxed solid solders for electronic soldering applications*

IEC 61191-2, *Printed board assemblies – Part 2: Sectional specification – Requirements for surface mount soldered assemblies*

IEC 61191-3, *Printed board assemblies – Part 3: Sectional specification – Requirements for through-hole mount soldered assemblies*

IEC 61191-4, *Printed board assemblies – Part 4: Sectional specification – Requirements for terminal soldered assemblies*

IEC 61249-8-8, *Materials for interconnection structures – Part 8: Sectional specification set for non-conductive films and coatings – Section 8: Temporary polymer coatings*

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

IEC/TR 61340-5-2, *Electrostatics – Part 5-2: Protection of electronic devices from electrostatic phenomena – User guide*

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

ISO 9001:2008, *Quality management systems – Requirements*

IPC-A-610~~E:2010~~, *Acceptability of Electronic Assemblies*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60194 and the following apply.

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ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
bow
deviation from flatness of a board characterized by a roughly cylindrical or spherical curvature so that, if the product is rectangular, its four corners are in the same plane

3.2
manufacturer
assembler
individual or company responsible for the procurement of materials and components, as well as all assembly process and verification operations necessary to ensure full compliance of assemblies with this document

3.3
objective evidence
documentation agreed to between the user and the manufacturer

Note 1 to entry: The documentation can be in the form of a hard copy, computer data, computer algorithms, video or other media.

3.4
process indicator
detectable anomaly, other than a defect, that is reflective of material, equipment, personnel, process and/or workmanship variation

3.5
proficiency
capability to perform tasks in accordance with the requirements and verification procedures detailed in this document

3.6
shadowing
phenomenon where parts create a shadow of leads, lands, or other parts, which obstruct heating at reflow soldering or spreading solder at flow soldering

3.7
supplier
individual or company responsible for assuring, to the manufacturer (assembler), full compliance of components and base materials with the requirements and verification procedures of this document

Note 1 to entry: Components include electronic, electromechanical, mechanical components, printed boards, etc.

Note 2 to entry: Base materials include solder, flux, cleaning agents, etc.

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3.8
twist
deviation of a rectangular sheet, panel or printed board that occurs parallel to a diagonal across its surface, so that one of the corners of the sheet is not in the plane that contains the other three corners

3.9
user
procuring authority
individual, company or agency responsible for the procurement of electrical/electronic hardware, and having the authority to define the class of equipment and any variation or restrictions to the requirements of this document

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EXAMPLE The originator/custodian of the contract detailing these requirements.

4 General requirements

4.1 Order of precedence

4.1.1 General remark

In the event of a conflict between the text of this standard and the applicable standard cited herein, the text of this document shall take precedence. However, nothing in this document supersedes applicable laws and regulations.

4.1.2 Conflict

In the event of conflict between the requirements of this document and the applicable assembly ~~drawing(s)~~ documentation, the applicable user approved assembly ~~drawing(s)~~ documentation shall govern. In the event of conflict between the requirements of this document and assembly ~~drawing(s)~~ documentation that has not been approved, the differences shall be referred to the designated user activity for approval. Upon such approval, the provisions shall be documented (by official revision notice or equivalent) on the assembly ~~drawings~~ documentation, which shall then govern.

4.1.3 Conformance documentation

Where this document requires documentary evidence to support conformance claims, each record shall be retained and be available for inspection for a minimum of two years from the date of the recorded occurrence (see ISO 9001).

4.2 Interpretation of requirements

The introduction of product classification according to the levels and their end use (see 4.3) permits the user to differentiate the performance requirements. When the user elects to specify compliance with the mandatory requirements of this document, the following conditions apply:

- unless otherwise specified by the user, the word "shall" signifies that the requirements are mandatory,
- deviations from any "shall" requirement requires written acceptance by the user, for example via assembly ~~drawing~~ documentation, specification or contract provision. The word “should” is used to indicate a recommendation or guidance statement. The word “may” indicates an optional situation. Both “should” and “may” express non-mandatory situations. “Will” is used to express a declaration of purpose.

4.3 Classification

This document recognizes that electrical and electronic assemblies are subject to classifications by intended end-item use. Three general end-product levels have been established to reflect differences in producibility, functional performance requirements, and verification (inspection/test) frequency.

It should be recognized that there may be overlaps of equipment between levels. The user (see 3.5) of the assemblies is responsible for determining the level to which the product belongs. The contract shall specify the level required and indicate any exceptions or additional requirements to the parameters, where appropriate.

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Level A: General electronics products

Includes consumer products, some computer and computer peripherals, and hardware suitable for applications where the major requirement is function of the completed assembly.

Level B: Dedicated service electronics products

Includes communications equipment, sophisticated business machines, and instruments where high performance and extended life is required, and for which uninterrupted service is desired but not mandatory. Typically, the end-use environment would not cause failures.

Level C: High-performance electronics products

Includes all equipment where continued performance or performance-on-demand is mandatory. Equipment downtime cannot be tolerated, end-use environment may be uncommonly harsh, and the equipment shall function when required, such as life support systems and other critical systems.

IPC-A-610 shall be used as workmanship standard.

NOTE Level A corresponds to class 1 in IPC-A-610

Level B corresponds to class 2 in IPC-A-610

Level C corresponds to class 3 in IPC-A-610