INTERNATIONAL STANDARD

IEC 61192-5

First edition
2007-05

Workmanship requirements for soldered electronic assemblies –

Part 5:
Rework, modification and repair of soldered electronic assemblies

Reference number
IEC 61192-5:2007(E)

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE W

For price, see current catalogue

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

WORKMANSHIP REQUIREMENTS FOR SOLDERED ELECTRONIC ASSEMBLIES –

Part 5: Rework, modification and repair of soldered electronic assemblies

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

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International Standard IEC 61192-5 has been prepared by IEC technical committee 91: Electronics assembly technology.

The text of this standard is based on the following documents:

FDIS	Report on voting
91/652/FDIS	91/686/RVD

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

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

A list of all parts in the IEC 61192 series, under the general title *Workmanship requirements for soldered electronic assemblies,* can be found on the IEC website.

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

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

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

WORKMANSHIP REQUIREMENTS FOR SOLDERED ELECTRONIC ASSEMBLIES –

Part 5: Rework, modification and repair of soldered electronic assemblies

1 Scope

This part of IEC 61192 provides information and requirements that are applicable to modification, rework and repair procedures for soldered electronic assemblies. It is applicable to specific processes used to manufacture soldered electronic assemblies where components are attached to printed boards and to the relevant parts of resulting products. The standard is also applicable to activities that can form part of the work in assembling mixed technology products.

This part of IEC 61192 also contains guidance on design matters where they have relevance to rework.

NOTE Typical in-process surface-mount rework activities to which this standard applies are shown in Figure 1.

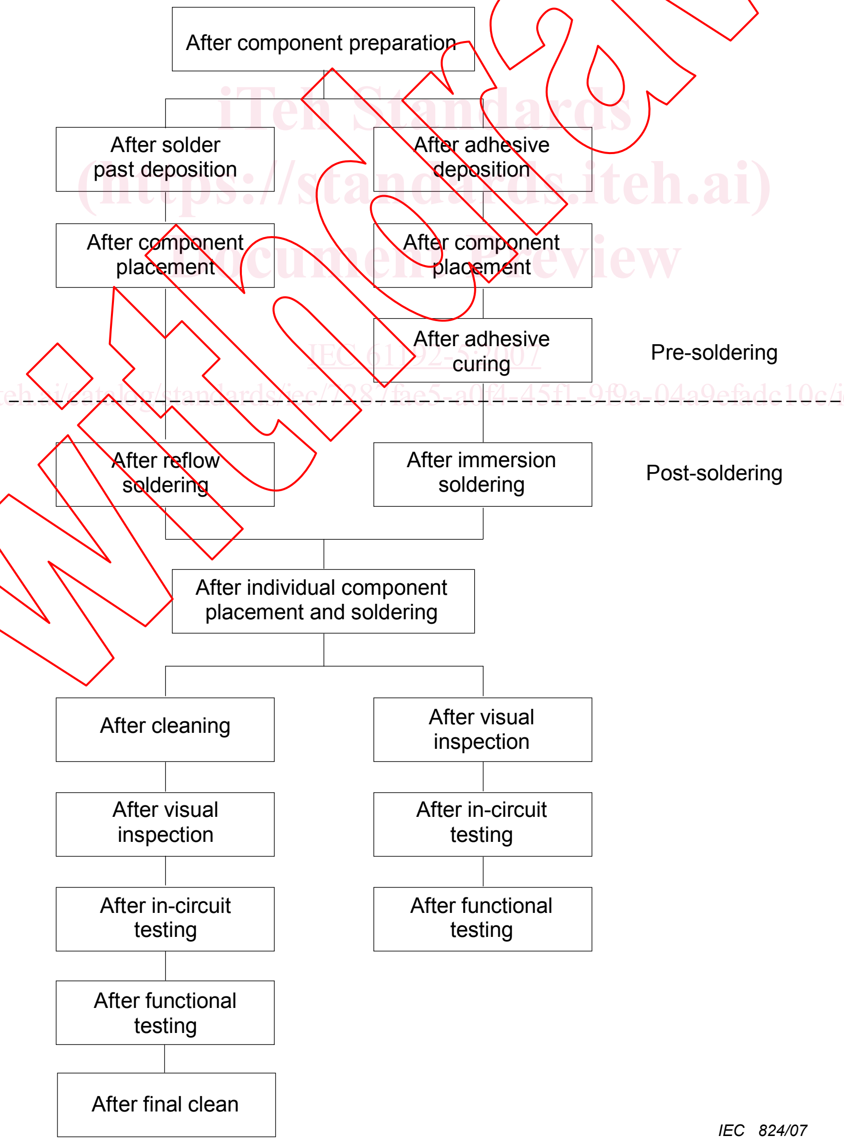

Figure 1 – Typical in-process modification, rework or repair activities

2 Normative references

The following referenced documents are indispensable for the application 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 60194, *Printed board design, manufacture and assembly – Terms and definitions*

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 solder paste for high-quality interconnections in electronics assembly*

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

IEC 61191-1:1998, *Printed board assemblies – Part 1: Generic specification – Requirements for soldered electrical and electronic assemblies using surface mount and related assembly technologies*

IEC 61191-2:1998, *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 61192-1, *Workmanship requirements for soldered electronic assemblies – Part 1: General*

IEC 61192-2, *Workmanship requirements for soldered electronic assemblies – Part 2: Surface-mount assemblies*

IEC 61192-3, *Workmanship requirements for soldered electronic assemblies – Part 3: Through-hole mount assemblies*

IEC 61192-4, *Workmanship requirements for soldered electronic assemblies – Part 4: Terminal assemblies*

IEC 61193-1, *Quality assessment systems – Part 1: Registration and analysis of defects on printed board assemblies*

IEC 61249 (all parts), *Materials for printed boards and other interconnecting structures*

3 Terminology

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60194, some of which (marked with an asterisk) are repeated below for convenience, as well as the following, apply.

3.1.1

rework*

act of reprocessing non-complying articles, through the use of original or alternate equivalent processing, in a manner that assures compliance of the article with applicable drawings or specifications

3.1.2

repair*

act of restoring the functional capability of a defective article in a manner that precludes compliance of the article with applicable drawings or specifications

3.1.3

modification*

revision of the functional capability of a product in order to satisfy new acceptance criteria

3.1.4

anomaly chart

copy of an assembly drawing (or of an actual printed board assembly) that is used to record the location of faults or process indicators used for process improvement analysis

3.1.5

added component

electronic component that is mounted on a printed board by soldering or other attachment methods

3.1.6

embedded component

electronic component that is an integral part of a printed board, for example, embedded resistors, capacitive layers, printed inductors

3.2 Abbreviations

The following abbreviations are commonly used in relation to printed board assemblies. Not all of them are used in the text. Some are included for information only.

ASIC	application-specific integrated circuit
BGA	ball grid array
CLCC	ceramic leaded chip carrier
CLLCC	ceramic leadless chip carrier
LCCC	leadless ceramic chip carrier
LED	light-emitting diode
MELF	metal electrode face-bonded component
PLCC	plastic leaded chip carrier
PTFE	polytetrafluoroethylene
QFP	plastic quad flat package

RMA	rosin, mildly active
SMD	surface-mounted device
SMT	surface-mount technology
SO	small outline
SOD	small outline diode
SOIC	small outline integrated circuit
SOT	small outline transistor
TSOP	plastic thin small outline package

4 Classification of rework activities

4.1 Pre-soldering rework

This includes rework following:

a) component preparation;
b) deposition of solder (e.g. paste, preform, tinning);
c) deposition of adhesive;
d) component placement;
e) curing of adhesive.

NOTE In the context of this standard, the word “component” includes all added components, printed boards and any components that are manufactured integrally with the printed board.

4.2 Post-soldering rework

Post-soldering rework activities, not necessarily occurring in the order given, include:

a) preparation prior to rework or repair, for example, removal of conformal coating, preheating, baking, cleaning, removal of adjacent components and parts to enable access;
b) component realignment;
c) component removal;
d) addition of flux and solder to a joint;
e) removal of excess solder from a joint;
f) removal of excess solder or adhesive from the printed board prior to remounting a component;
g) placement and soldering of a replacement component;
h) post-rework cleaning (if required);
i) visual, thermal, mechanical and dimensional inspection and electrical test of reworked items.

4.3 Essential prerequisites for successful and reliable rework

The essential prerequisites for successful and reliable rework include the following:

a) suitable printed-board layout design to allow the preferred tool to be used for each component type;
b) confirmation of the type of solder used for the interconnection and selection of the appropriate process (tin/lead, lead free, other), and replacement material;
c) availability of the most efficient tool or equipment for the task plus antistatic protection;