BS EN IEC 61760-3:2021

BSI Standards Publication

# Surface mounting technology

Part 3: Standard method for the specification of components for through-hole reflow (THR) soldering

bsi.

# National foreword

This British Standard is the UK implementation of EN IEC 61760-3:2021. It is identical to IEC 61760-3:2021. It supersedes BS EN 61760-3:2010, which will be withdrawn on 1 October 2021.

The UK participation in its preparation was entrusted to Technical Committee EPL/501, Electronic Assembly Technology.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2021
Published by BSI Standards Limited 2021

ISBN 978 0 539 04585 7

ICS 31.190

**Compliance with a British Standard cannot confer immunity from legal obligations.**

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 March 2021.

**Amendments/corrigenda issued since publication**

| Date | Text affected |
|---|---|

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN IEC 61760-3

March 2021

ICS 31.190

Supersedes EN 61760-3:2010 and all of its amendments and corrigenda (if any)

English Version

# Surface mounting technology - Part 3: Standard method for the specification of components for through-hole reflow (THR) soldering (IEC 61760-3:2021)

Technique du montage en surface - Partie 3: Méthode normalisée relative à la spécification des composants pour le brasage par refusion à trous traversants (THR, Through Hole Reflow)
(IEC 61760-3:2021)

Oberflächenmontagetechnik - Teil 3: Genormtes Verfahren zur Spezifizierung von Durchsteckmontage-Bauelementen für das Aufschmelzlöten (THR)
(IEC 61760-3:2021)

This European Standard was approved by CENELEC on 2021-03-10. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

© 2021 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

Ref. No. EN IEC 61760-3:2021 E

# European foreword

The text of document 91/1684/FDIS, future edition 2 of IEC 61760-3, prepared by IEC/TC 91 "Electronics assembly technology" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61760-3:2021.

The following dates are fixed:

| | | |
|---|---|---|
| • latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2021-12-10 |
| • latest date by which the national standards conflicting with the document have to be withdrawn | (dow) | 2024-03-10 |

This document supersedes EN 61760-3:2010 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

## Endorsement notice

The text of the International Standard IEC 61760-3:2021 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

| | | |
|---|---|---|
| IEC 60068-2-82:2019 | NOTE | Harmonized as EN IEC 60068-2-82:2019 (not modified) |
| IEC 62090 | NOTE | Harmonized as EN 62090 |

# Annex ZA
(normative)

## Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60068 | series | Environmental testing | - | - |
| IEC 60068-2-20 | 2008 | Environmental testing - Part 2-20: Tests - Test T: Test methods for solderability and resistance to soldering heat of devices with leads | EN 60068-2-20 | 2008 |
| IEC 60068-2-21 | - | Environmental testing - Part 2-21: Tests - Test U: Robustness of terminations and integral mounting devices | EN 60068-2-21 | - |
| IEC 60068-2-45 | 1980 | Basic environmental testing procedures - Part 2-45: Tests - Test XA and guidance: Immersion in cleaning solvents | EN 60068-2-45 | 1992 |
| + A1 | 1993 | | + A1 | 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 (SMD) | EN 60068-2-58 | - |
| IEC 60068-2-77[1] | - | Environmental testing - Part 2-77: Tests - Test 77: Body strength and impact shock | EN 60068-2-77 | - |
| IEC 60194-1 | - | Printed boards design, manufacture and assembly - Vocabulary - Part 1: Common usage in printed board and electronic assembly technologies | - | - |

[1] To be integrated into the seventh edition of IEC 60068-2-21. Stage at the time of publication: IEC/AFDIS 60068-2-21:2021.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60286 | series | Packaging of components for automatic handling | EN 60286 | series |
| IEC 60286-3 | - | Packaging of components for automatic handling - Part 3: Packaging of surface mount components on continuous tapes | EN IEC 60286-3 | - |
| IEC 60286-4 | - | Packaging of components for automatic handling - Part 4: Stick magazines for electronic components encapsulated in packages of different forms | EN 60286-4 | - |
| IEC 60286-5 | - | Packaging of components for automatic handling - Part 5: Matrix trays | EN IEC 60286-5 | - |
| IEC 60749-20 | - | Semiconductor devices - Mechanical and climatic test methods - Part 20: Resistance of plastic encapsulated SMDs to the combined effect of moisture and soldering heat | EN IEC 60749-20 | - |
| 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 | EN IEC 61188-6-4 | - |
| IEC 61191-3 | - | Printed board assemblies - Part 3: Sectional specification - Requirements for through-hole mount soldered assemblies | EN 61191-3 | - |
| IEC 61760-1 | 2020 | Surface mounting technology - Part 1: Standard method for the specification of surface mounting components (SMDs) | EN IEC 61760-1 | 2020 |
| IEC 61760-2 | - | Surface mounting technology - Part 2: Transportation and storage conditions of surface mounting devices (SMD) - Application guide | EN 61760-2 | - |
| IEC 61760-4 | 2015 | Surface mounting technology - Part 4: Classification, packaging, labelling and handling of moisture sensitive devices | EN 61760-4 | 2015 |
| IPC/JEDEC J-STD-020 | - | Moisture/Reflow Sensitivity Classification for Non-hermetic Solid State Surface Mount Devices | - | - |
| IPC-A-610 | - | Acceptability of Electronics Assemblies | - | - |

CONTENTS

FOREWORD ... 4
1 Scope ... 6
2 Normative references ... 6
3 Terms and definitions ... 7
4 Requirements to component design and component specifications ... 9
4.1 General requirement ... 9
4.2 Packaging ... 9
4.3 Labelling of component packaging ... 10
4.4 Component marking ... 10
4.5 Storage and transportation ... 10
4.6 Component outline and design ... 10
4.6.1 Drawing and specification ... 10
4.6.2 Requirement of pick-up area ... 11
4.6.3 Component tilt ... 13
4.6.4 Bottom surface requirements ... 13
4.6.5 Terminal requirements ... 14
4.6.6 Optical recognition ... 19
4.6.7 Component height ... 19
4.6.8 Component mass ... 20
4.7 Mechanical stress ... 20
4.8 Component reliability ... 20
4.9 Additional requirements for compatibility with lead-free soldering ... 20
5 Typical process conditions for THR soldering process ... 20
5.1 Mounting by through-hole reflow soldering ... 20
5.2 Solder paste supply ... 21
5.3 Component insertion ... 22
5.4 Reflow soldering methods (recommended) ... 22
5.5 Cleaning ... 23
5.5.1 General ... 23
5.5.2 Cleaning medium and cleaning method ... 23
5.5.3 Cleaning process conditions ... 23
5.6 Removal and/or replacement of soldered components ... 24
6 Relevant tests and requirements for components and component specifications for THR soldering process ... 24
6.1 General ... 24
6.2 Wettability ... 25
6.3 Dewetting ... 25
6.4 Resistance to soldering heat ... 25
6.5 Resistance to cleaning solvent ... 25
6.5.1 General ... 25
6.5.2 Solvent resistance of component ... 26
6.5.3 Solvent resistance of marking ... 26
6.6 Soldering profile ... 26
6.7 Moisture sensitivity level ... 26
7 Quality criteria for THR soldering ... 26
Annex A (informative) Flux creeping-up and solder wicking ... 27

Bibliography ........ 28

Figure 1 – Example of a component with marked specific orientation put in tape and tray ........ 9
Figure 2 – Example of components in a tape ........ 10
Figure 3 – Pick-up area ........ 12
Figure 4 – Chuck jaw ........ 12
Figure 5 – Component side flat surface ........ 13
Figure 6 – Component top flat surface ........ 13
Figure 7 – Clearance ........ 14
Figure 8 – Stand-off height ........ 14
Figure 9 – Terminal length and protrusion length ........ 15
Figure 10 – Terminal position tolerance 0,2 mm ........ 16
Figure 11 – Terminal position tolerance 0,4 mm ........ 17
Figure 12 – Terminal shape ........ 18
Figure 13 – Solder wetting ........ 19
Figure 14 – Typical soldering process steps ........ 21
Figure 15 – Solder paste supply ........ 22
Figure A.1 – Example of the flux creeping-up ........ 27
Figure A.2 – Example of the solder wicking ........ 27

Table 1 – Typical cleaning conditions ........ 24

INTERNATIONAL ELECTROTECHNICAL COMMISSION

___________

**SURFACE MOUNTING TECHNOLOGY –**

**Part 3: Standard method for the specification of components for through-hole reflow (THR) soldering**

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.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 61760-3 has been prepared by IEC technical committee 91: Electronics assembly technology. It is an International Standard.

This second edition cancels and replaces the first edition published in 2010. This edition constitutes a technical revision.

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

a) change position tolerance requirement (0,4 mm maximum to between 0,2 mm and 0,4 mm);
b) introduce through-hole vacant method as a solder paste supply method.

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

| Draft | Report on voting |
|---|---|
| 91/1684/FDIS | 91/1702/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/standardsdev/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 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.

**SURFACE MOUNTING TECHNOLOGY –**

**Part 3: Standard method for the specification of components for through-hole reflow (THR) soldering**

## 1 Scope

This part of IEC 61760 gives a reference set of requirements, process conditions and related test conditions to be used when compiling specifications of electronic components that are intended for usage in through-hole reflow soldering technology.

The object of this document is to ensure that components with leads intended for through-hole reflow and surface mounting components can be subjected to the same placement and mounting processes. Hereto, this document defines test and requirements that need to be part of any component generic, sectional or detail specification, when through-hole reflow soldering is intended.

Furthermore, this document provides component users and manufacturers with a reference set of typical process conditions used in through-hole reflow soldering technology.

## 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 60068-2-20:2008, *Environmental testing – Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices with leads*

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 (SMD)*

IEC 60068-2-77[1], *Environmental testing – Part 2-77: Tests – Test 77: Body strength and impact shock*

IEC 60194-1, *Printed boards design, manufacture and assembly – Vocabulary – Part 1: Common usage in printed board and electronic assembly technologies*

---

[1] To be integrated into the seventh edition of IEC 60068-2-21.
Stage at the time of publication: IEC/AFDIS 60068-2-21:2021.

IEC 60286 (all parts), *Packaging of components for automatic handling*

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 60749-20, *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 61191-3, *Printed board assemblies – Part 3: Sectional specification – Requirements for through-hole mount soldered assemblies*

IEC 61760-1:2020, *Surface mounting technology – Part 1: Standard method for the specification of surface mounting components (SMDs)*

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

IEC 61760-4:2015, *Surface mounting technology – Part 4: Classification, packaging, labelling and handling of moisture sensitive devices*

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

IPC-A-610G, *Acceptability of Electronic Assemblies*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60194-1 and the following apply.

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 https://www.iso.org/obp

**3.1**
**through-hole reflow**
**THR**
reflow soldering process for electronic component terminals inserted into the through-hole of the circuit board

**3.2**
**THR components**
**through-hole reflow components**
electronic components with leads which are intended to be subject to through-hole reflow soldering

**3.3**
**vacuum nozzle**
pipette
type of tooling for component to pick-up and place the component with vacuum

**3.4**
**chuck**
gripper
type of tooling for component transfer

**3.5**
**chucking**
gripping
motion of the *chuck* (3.4) to hold the components

**3.6**
**pick-up area**
component surface area for vacuum suction or chucking to transfer within pick and place machine

**3.7**
**cavity of packaging**
depression area to place component in taping or tray

**3.8**
**stand-off**
protrusion(s) from the component body which are used to make a space between the component body and the seating plane

Note 1 to entry: Stand-off prevents the component touching the solder paste.

**3.9**
**clearance**
space to avoid contact between component body and solder paste and to ensure sufficient heat transfer to soldering regions

**3.10**
**auxiliary terminal**
protrusion which has no electrical function inserted into a circuit board

**3.11**
**stencil**
stencil foil
thin sheet of material containing openings to reflect a specific pattern, designed to transfer solder paste like material to a circuit board for the purpose of component attachment

[SOURCE: IEC 60194-1:2021, 3.19.187, modified – The words " paste-like material " have been replaced by "solder paste like material" and “substrate” has been replaced by “circuit board”.]

**3.12**
**A side**
circuit board surface to which THR components (3.2) are to be mounted

**3.13**
**B side**
reverse surface of A side (3.12)

**3.14**
**solder wicking**
capillary movement of solder between metal surfaces, such as strands of wire

[SOURCE: IEC 60194-1:2021, 3.19.125]

## 4 Requirements to component design and component specifications

### 4.1 General requirement

The component specification for THR components (hereinafter, referred to as component specification) shall specify the requirements specified in 4.2 through 4.9 and Clause 6.

### 4.2 Packaging

Packaging for THR components shall be in accordance with IEC 60286-3, IEC 60286-4 and IEC 60286-5.

The component specification shall specify the following:

– Protection of THR components during transportation and storage;
– Moisture absorption control; if needed, follow the moisture sensitivity level (MSL) according to IEC 61760-4, IEC 60749-20 or IPC/JEDEC J-STD-020 (see 6.7);
– Polarity or pin 1 indication (see Figure 1);
– Orientation of the component in the packaging (see Figure 2).

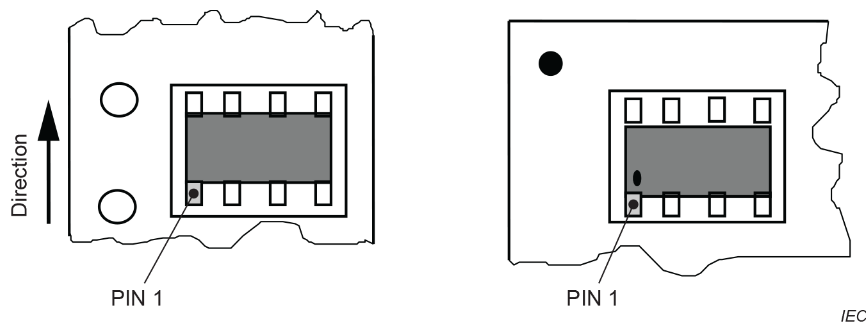



**Figure 1 – Example of a component with marked specific orientation put in tape and tray**

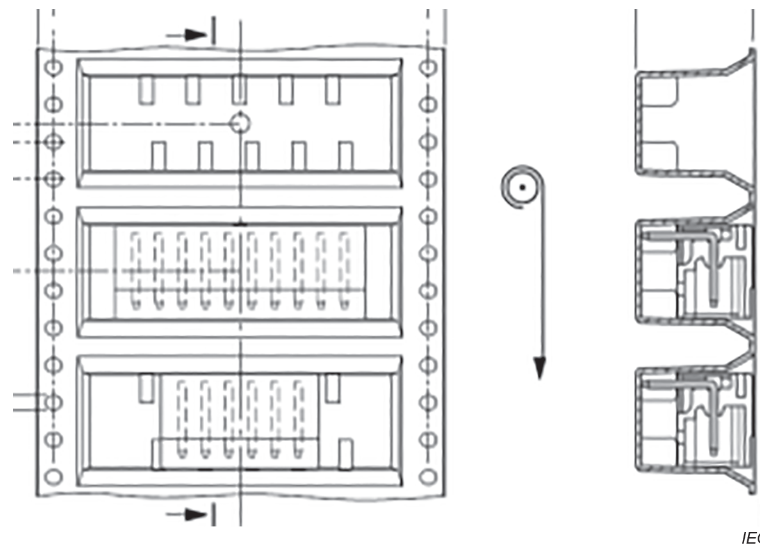



**Figure 2 – Example of components in a tape**

### 4.3 Labelling of component packaging

Labelling of the component packaging should comply with IEC 62090.

NOTE The following items are particularly important.

- item identification (e.g. customer part number or manufacturer part number or both);
- quantity;
- traceability identification (e.g. batch number or serial number).

### 4.4 Component marking

The marking on the component shall be specified in the component specification.

### 4.5 Storage and transportation

Component specification shall refer to storage and transportation conditions of IEC 61760-2.

### 4.6 Component outline and design

#### 4.6.1 Drawing and specification

Drawings, including bottom-view, top-view and side-view drawings, of the component showing all dimensions and tolerances of its body and terminals shall be part of the component specification. The drawing shall include reference to the positioning of the component body and terminals on the mounting land pattern. If conductive surfaces are not planar, their three-dimensional geometry shall be clearly specified with the relevant tolerances.

In any 2D drawing or 3D data, conductive parts/surfaces and insulating parts/surfaces shall be clearly distinguished, at least for bottom and sides of components, as well as for movable parts. This requirement applies both to the disassembled and the assembled condition for parts requiring a final assembly step after mounting on a substrate (e.g. if a connector contains spring-loaded retainers, which change their position/angle upon mating). The locations and dimensions of conductive parts/surfaces shall be specified even if they are not intended for establishing a contact with the mounting surface, e.g. punched or sawn surfaces consisting of unplated leadframe resulting from component singulation for molded semiconductor packages.

Component drawing and component specification shall specify in particular the following information:

– Dimensions and tolerances according to 4.6.4, 4.6.5.1 and 4.6.5.2;
– Dimensional drawings of footprint design. The generic requirements for dimensional drawings of SMDs from viewpoint of land-pattern design as specified in IEC 61188-6-4 shall be adopted for surface-mount devices;
– Locations of metal parts which contact to the circuit board surface.

The manufacturer of a THR component shall consider that the design and material selection can lead to a possible expansion or deformation of the component in the reflow process. The manufacturer shall provide an appropriate recommendation for mounting including a footprint recommendation.

### 4.6.2 Requirement of pick-up area

#### 4.6.2.1 General requirement

Design of the component shall be in such a way, that it is possible to hold the component by vacuum nozzle or mechanical chuck and transfer it to the exact placement position on the circuit board. It shall be possible to create a vacuum or mechanical force strong enough to hold the component in its position under the vacuum nozzle or chuck. During the total transfer process, which may include optical inspection, the component shall remain exactly in its position under the vacuum nozzle or chuck, until the component is placed.

The centre of the suction area shall match the centre of gravity (major requirement) and the geometrical centre (minor requirement).

NOTE Assembly manufacturer considers mounting by vacuum nozzle first. If a vacuum nozzle is not available, then chuck will be selected.

#### 4.6.2.2 Vacuum nozzle mounting

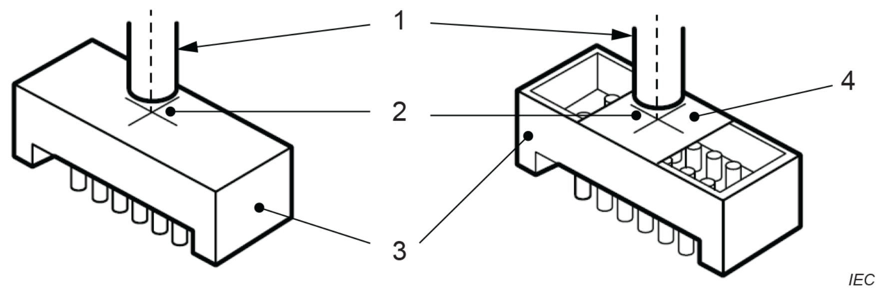
Vacuum nozzle mounting shall be in accordance with IEC 61760-1.

In the case of mounting or inserting the component by using vacuum nozzle, the following matters shall be considered and, when necessary, clarified between the manufacturer and the user of the component:

– The pick-up area shall be on top of the component;
– The pick-up area shall be appropriately secured depending on the mass of the component;

  NOTE See 4.6.8 for the relation between area of vacuum nozzles and mass of components.

– If a suitable pick-up area is not ensured, then sticky tape or caps (see Figure 3) shall be used;
– Sticky tape or caps shall not fall off during and after reflow soldering;
– The centre of the pick-up area should match the component centre of gravity. Unless the component dose not tilt, the geometrical centre may be used.




**Key**

1 vacuum nozzle

2 pick-up area

3 component body

4 sticky tape

**Figure 3 – Pick-up area**

#### 4.6.2.3 Chuck mounting

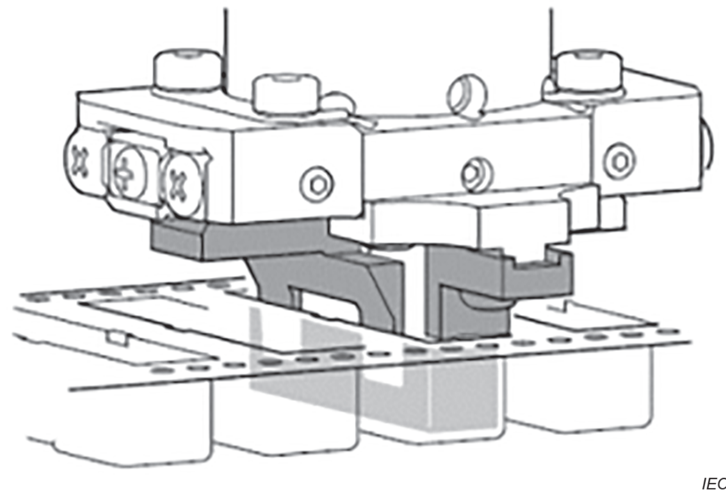
In the case of mounting or inserting the component using a chuck, an agreement between manufacturer and user is necessary considering the following matters:

– There shall be enough gap between the component and the cavity of packaging (see Figure 4);

– Components shall have flat surface on sides for chucking (see Figure 5);

– Components shall have flat surface on top which make the component fixed while chucking (see Figure 6);

– It is desirable to reduce rattling between the component and the cavity.




Chuck jaws are shown in hatched.

**Figure 4 – Chuck jaw**

以上内容仅为本文档的试下载部分，为可阅读页数的一半内容。如要下载或阅读全文，请访问：https://d.book118.com/257003045040006101