

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**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)**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2021 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

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

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

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC online collection - oc.iec.ch

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 18 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC - webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC online collection - oc.iec.ch

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**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)**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 31.190

ISBN 978-2-8322-9294-5

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

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 test 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. For 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 Publications”). 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 60068-2-77¹, *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.