



NSAI
Standards

Irish Standard
I.S. EN 62739-3:2017

Test method for erosion of wave soldering equipment using molten lead-free solder alloy - Part 3: Selection guidance of erosion test methods

I.S. EN 62739-3:2017

Incorporating amendments/corrigenda/National Annexes issued since publication:

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):

NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.

This document is based on:

EN 62739-3:2017

Published:

2017-03-31

This document was published under the authority of the NSAI and comes into effect on:

2017-04-18

ICS number:

NOTE: If blank see CEN/CENELEC cover page

NSAI
1 Swift Square,
Northwood, Santry
Dublin 9

T +353 1 807 3800
F +353 1 807 3838
E standards@nsai.ie
W NSAI.ie

Sales:
T +353 1 857 6730
F +353 1 857 6729
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

National Foreword

I.S. EN 62739-3:2017 is the adopted Irish version of the European Document EN 62739-3:2017, Test method for erosion of wave soldering equipment using molten lead-free solder alloy - Part 3: Selection guidance of erosion test methods

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

For relationships with other publications refer to the NSAI web store.

Compliance with this document does not of itself confer immunity from legal obligations.

In line with international standards practice the decimal point is shown as a comma (,) throughout this document.

This page is intentionally left blank

EUROPEAN STANDARD

EN 62739-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2017

ICS 31.190; 31.240

English Version

Test method for erosion of wave soldering equipment using molten lead-free solder alloy - Part 3: Selection guidance of erosion test methods (IEC 62739-3:2017)

Méthode d'essai de l'érosion de l'équipement de brasage à la vague utilisant un alliage à braser sans plomb fondu -
Partie 3: Document d'orientation pour le choix des méthodes d'essai d'érosion
(IEC 62739-3:2017)

Verfahren zur Erosionsprüfung für Wellenlöttausrüstungen bei Verwendung von geschmolzener, bleifreier Lotlegierung - Teil 3: Leitfaden für die Auswahl von Verfahren zur Erosionsprüfung
(IEC 62739-3:2017)

This European Standard was approved by CENELEC on 2017-02-10. 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, 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: Avenue Marnix 17, B-1000 Brussels

EN 62739-3:2017

European foreword

The text of document 91/1368/CDV, future edition 1 of IEC 62739-3, prepared by IEC/TC 91 "Electronics assembly technology" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62739-3:2017.

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) 2017-11-10
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2020-02-10

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

Endorsement notice

The text of the International Standard IEC 62739-3:2017 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When 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

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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 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	EN 61190-1-3	-
IEC 62739-1	2013	Test method for erosion of wave soldering equipment using molten lead-free solder alloy - Part 1: Erosion test method for metal materials without surface processing	EN 62739-1	2013
IEC 62739-2	-	Test method for erosion of wave soldering equipment using molten lead-free solder alloy - Part 2: Erosion test method for metal materials with surface processing	EN 62739-2	-

This page is intentionally left blank



IEC 62739-3

Edition 1.0 2017-01

INTERNATIONAL STANDARD

**Test method for erosion of wave soldering equipment using molten lead-free
solder alloy –
Part 3: Selection guidance of erosion test methods**





THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2017 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.

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

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
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 corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

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 also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

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: csc@iec.ch.



IEC 62739-3

Edition 1.0 2017-01

INTERNATIONAL STANDARD

**Test method for erosion of wave soldering equipment using molten lead-free
solder alloy –
Part 3: Selection guidance of erosion test methods**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 31.190; 31.240

ISBN 978-2-8322-3769-4

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	6
4 General remarks.....	7
5 Selection of the appropriate erosion test method	8
5.1 Correlation between test methods and stresses induced in the field.....	8
5.2 Recommended test method by materials.....	9
6 Common items for each test method.....	10
6.1 Specimen preparation	10
6.2 Solder alloy.....	10
6.3 Accelerated stress conditions.....	10
6.3.1 Test temperature	10
6.3.2 Rotation speed	10
6.3.3 Bending stress to the specimen	11
6.4 Dross.....	11
6.4.1 Dross generation and removal interval.....	11
6.4.2 Dross removal method.....	11
6.4.3 Molten solder volume after dross removal.....	11
6.5 Erosion depth measurement method	11
6.5.1 Post test treatment	11
6.5.2 Local erosion depth	12
6.5.3 General (uniform) erosion depth	13
6.5.4 Evaluation	14
7 Overview of the test methods	14
7.1 Test methods	14
7.2 Metal material without surface processing.....	14
7.2.1 General	14
7.2.2 Rotation test at 350 °C	15
7.3 Metal material with surface processing.....	16
7.3.1 Test method	16
7.3.2 Rotation test at 450 °C	16
7.3.3 Rotation test at 450 °C with 2 mm bending	17
Annex A (informative) Selection of test temperature, test duration and bending stress	18
A.1 Specimen without surface processing	18
A.2 Specimen with surface processing	20
Annex B (informative) Maximum depth and other measurements	23
B.1 General.....	23
B.2 Maximum depth measurement	23
Annex C (informative) Erosion mechanism.....	26
C.1 Specimen without surface processing	26
C.2 Specimen with surface processing	26
C.3 Further guidance.....	27
Annex D (informative) Thermal acceleration for erosion	28
D.1 Specimen without surface processing	28
D.2 Specimen with surface processing	28

D.3 Further guidance document	30
Bibliography.....	31
Figure 1 – Schematic example of wave soldering equipment.....	8
Figure 2 – Example of dross removal tool	11
Figure 3 – Schematic general definition of erosion depth	12
Figure 4 – Schematic definition of erosion depth by focal depth method.....	12
Figure 5 – Examples of local erosion	13
Figure 6 – Example of evaluation region	13
Figure 7 – Examples with non-erosion area	14
Figure 8 – Examples without a non-erosion area and an example of a cross section.....	14
Figure 9 – Configuration example of test equipment.....	15
Figure 10 – Configuration example of test equipment for rotation test at 450 °C with 2 mm bending.....	17
Figure A.1 – Specimen configuration for preliminary test.....	18
Figure A.2 – Erosion depth against molten solder temperature	19
Figure A.3 – Erosion depth against rotation speed	19
Figure A.4 – Erosion depth against immersion time.....	20
Figure C.1 – Erosion mechanism for material with nitriding	27
Figure D.1 – Tin (Sn) diffusion layer growth in the plasma nitriding layer for various stainless steel.....	29
Table 1 – Location of erosion in the field and examples of problems.....	8
Table 2 – Correlation between test methods and stresses induced in the field	9
Table 3 – Applicable test method depending on the materials	9
Table 4 – Test conditions for rotation test at 350 °C.....	16
Table 5 – Test conditions for rotation test at 350 °C.....	16
Table A.1 – Erosion test results for the materials of gas nitriding and nitrocarburizing	21
Table A.2 – Erosion test results for the materials of coating type surface processing	22
Table B.1 – Measurement methods, features and accuracy.....	24
Table B.2 – Example of measurement equipment.....	25
Table D.1 – Plasma nitriding layer peeling off period (incubation period in Figure D.1)	29
Table D.2 – Initial growth rate for tin (Sn) diffusion layer.....	30

INTERNATIONAL ELECTROTECHNICAL COMMISSION

TEST METHOD FOR EROSION OF WAVE SOLDERING EQUIPMENT USING MOLTEN LEAD-FREE SOLDER ALLOY –

Part 3: Selection guidance of erosion test methods

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.

International Standard IEC 62739-3 has been prepared by IEC technical committee 91: Electronics assembly technology.

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

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

CDV	Report on voting
91/1368/CDV	91/1400/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.

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

A list of all the parts in the IEC 62739 series, under the general title *Test method for erosion of wave soldering equipment using molten lead-free solder alloy*, 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,
- replaced by a revised edition, or
- amended.

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

TEST METHOD FOR EROSION OF WAVE SOLDERING EQUIPMENT USING MOLTEN LEAD-FREE SOLDER ALLOY –

Part 3: Selection guidance of erosion test methods

1 Scope

This part of IEC 62739 describes the selection methodology of an appropriate evaluating test method for the erosion of the metal materials without or with surface processing intended to be used for lead-free wave soldering equipment as a solder bath and other components which are in contact with the molten solder.

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

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

IEC 62739-1:2013, *Test method for erosion of wave soldering equipment using molten lead-free solder alloy – Part 1: Erosion test method for metal materials without surface processing*

IEC 62739-2, *Test method for erosion of wave soldering equipment using molten lead-free solder alloy – Part 2: Erosion test method for metal materials with surface processing*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 <http://www.iso.org/obp>

3.1 erosion

phenomenon where a base material is dissolved and made thinner by coming into contact with molten solder

[SOURCE: IEC 62739-1:2013, 3.1]

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

-
- [Looking for additional Standards? Visit Intertek Inform Infostore](#)
 - [Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation](#)
-