



# SLOVENSKI STANDARD

## SIST EN IEC 61190-1-3:2018

01-oktober-2018

Nadomešča:

SIST EN 61190-1-3:2007

SIST EN 61190-1-3:2007/A1:2010

---

**Povezovalni materiali za elektronske sestave - 1-3. del: Zahteve za spajkalne zlitine ter za spajkalne žice s spajkalno tekočino in brez nje za uporabo v elektroniki**

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

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN IEC 61190-1-3:2018](https://standards.iteh.ai/catalog/standards/sist/c69ae83e-9192-492c-b42f-5c600c91241b/sist-en-iec-61190-1-3-2018)

<https://standards.iteh.ai/catalog/standards/sist/c69ae83e-9192-492c-b42f-5c600c91241b/sist-en-iec-61190-1-3-2018>

**Ta slovenski standard je istoveten z: EN IEC 61190-1-3:2018**

---

**ICS:**

25.160.50	Trdo in mehko lotanje	Brazing and soldering
31.190	Sestavljeni elektronski elementi	Electronic component assemblies

**SIST EN IEC 61190-1-3:2018**

**en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN IEC 61190-1-3:2018

<https://standards.iteh.ai/catalog/standards/sist/c69ae83e-9192-492c-b42f-5c600c91241b/sist-en-iec-61190-1-3-2018>

EUROPEAN STANDARD

**EN IEC 61190-1-3**

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2018

ICS 31.190

Supersedes EN 61190-1-3:2007

English Version

**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 61190-1-3:2017)**

Matériaux de fixation pour les assemblages électroniques -  
Partie 1-3: Exigences relatives aux alliages à braser de  
catégorie électronique et brasure solide fluxée et non-fluxée  
pour les applications de brasage électronique  
(IEC 61190-1-3:2017)

Verbindungsmaterialien für Baugruppen der Elektronik - Teil  
1-3: Anforderungen an Elektroniklote und an Festformlote  
mit oder ohne Flussmittel für das Löten von  
Elektronikprodukten  
(IEC 61190-1-3:2017)

This European Standard was approved by CENELEC on 2018-01-17. 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: Rue de la Science 23, B-1040 Brussels**

**EN IEC 61190-1-3:2018 (E)****European foreword**

The text of document 91/1468/FDIS, future edition 3 of IEC 61190-1-3, prepared by IEC/TC 91 "Electronics assembly technology" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61190-1-3:2018.

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) 2018-10-17
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-01-17

This document supersedes EN 61190-1-3:2017 and EN 61190-1-3:2017/A1:2010.

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 61190-1-3:2017 was approved by CENELEC as a European Standard without any modification.

**ITEH STANDARD PREVIEW**  
(standards.iteh.ai)

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

IEC 61189-5 (series)	NOTE	Harmonized as EN 61189-5 (series).
IEC 61189-6	NOTE	Harmonized as EN 61189-6
ISO 9453	NOTE	Harmonized as EN ISO 9453.
ISO 9454-1	NOTE	Harmonized as EN ISO 9454-1.
ISO 9454-2	NOTE	Harmonized as EN ISO 9454-2.

## 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](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60194	2015	Printed board design, manufacture and assembly - Terms and definitions	-	-
IEC 61189-5-2	2015	Test methods for electrical materials, interconnection structures and assemblies - Part 5-2: Test methods for printed board assemblies: Soldering flux	EN 61189-5-2	2015
IEC 61189-5-3	2015	Test methods for electrical materials, interconnection structures and assemblies - Part 5-3: Test methods for printed board assemblies: Soldering paste	EN 61189-5-3	2015
IEC 61189-5-4	2015	Test methods for electrical materials, interconnection structures and assemblies - Part 5-4: Test methods for printed board assemblies: Solder alloys and fluxed and non-fluxed solid wire	EN 61189-5-4	2015
IEC 61190-1-1	2002	Attachment materials for electronic assembly - Part 1-1: Requirements for soldering fluxes for high-quality interconnections in electronics assembly	EN 61190-1-1	2002
IEC 61190-1-2	-	Attachment materials for electronic assembly - Part 1-2: Requirements for soldering pastes for high-quality interconnects in electronics assembly	EN 61190-1-2	-

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN IEC 61190-1-3:2018](#)

<https://standards.iteh.ai/catalog/standards/sist/c69ae83e-9192-492c-b42f-5c600c91241b/sist-en-iec-61190-1-3-2018>



IEC 61190-1-3

Edition 3.0 2017-12

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**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**

**Matériaux de fixation pour les assemblages électroniques –  
Partie 1-3: Exigences relatives aux alliages à braser de catégorie électronique et  
brasure solide fluxée et non-fluxée pour les applications de brasage  
électronique**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 31.190

ISBN 978-2-8322-5127-0

**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.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references .....	8
3 Terms and definitions .....	8
4 Classification.....	11
4.1 General.....	11
4.2 Alloy composition.....	11
4.3 Solder form.....	12
4.4 Flux type.....	12
4.5 Flux percentage and metal content .....	13
4.6 Other characteristics.....	14
5 Requirements.....	14
5.1 Materials.....	14
5.2 Alloys.....	14
5.2.1 General .....	14
5.2.2 Variation D alloys .....	14
5.3 Solder forms.....	15
5.3.1 General .....	15
5.3.2 Bar solder.....	15
5.3.3 Wire solder.....	15
5.3.4 Ribbon solder.....	15
5.3.5 Solder powder.....	15
5.3.6 Special solder.....	16
5.4 Flux type and form.....	16
5.4.1 General .....	16
5.4.2 Flux percentage.....	16
5.4.3 Solder cores .....	17
5.4.4 Solder coatings.....	17
5.5 Flux residue dryness.....	17
5.6 Spitting .....	17
5.7 Solder pool .....	17
5.8 Labelling for product identification.....	17
5.9 Workmanship.....	18
6 Quality assurance provisions .....	18
6.1 Responsibility for inspection and compliance .....	18
6.1.1 General .....	18
6.1.2 Quality assurance programme .....	18
6.1.3 Test equipment and inspection facilities.....	18
6.1.4 Inspection conditions .....	18
6.2 Classification of inspections.....	18
6.3 Inspection of materials .....	23
6.4 Qualification inspections .....	23
6.4.1 General .....	23
6.4.2 Sample size.....	23
6.4.3 Inspection routine .....	23



6.5	Quality conformance .....	24
6.5.1	General .....	24
6.5.2	Inspection routine .....	24
6.5.3	Sampling plan.....	24
6.5.4	Rejected lots .....	24
6.6	Preparation of solder alloy for test .....	24
6.6.1	General .....	24
6.6.2	Wire solder up to approximately 6 mm diameter.....	24
6.6.3	Ribbon solder and wire solder larger than approximately 6 mm diameter .....	24
7	Preparation for delivery – Preservation, packing and packaging .....	24
Annex A (informative) Selection of various alloys and fluxes for use in electronic soldering – General information concerning IEC 61190-1-3 .....		25
A.1	Overview.....	25
A.2	Intended use .....	25
A.2.1	General .....	25
A.2.2	Alloys .....	25
A.3	Acquisition requirements.....	26
A.4	Standard solder product packages .....	27
A.4.1	General .....	27
A.4.2	Wire and ribbon solders.....	27
A.4.3	Bar solders .....	27
A.4.4	Solder powder .....	27
A.5	Protocol for establishing short names for IEC 61190-1-3 alloys.....	28
A.5.1	Lead containing solder alloys and specialty alloy .....	28
A.5.2	Lead-free solder alloys .....	28
A.6	Standard description of solid solder products .....	29
Annex B (normative) Lead-free solder alloys.....		30
Annex C (informative) Marking method of solder designation for mounted board, used in electronic equipment.....		41
C.1	General.....	41
C.2	Marking.....	41
C.2.1	Recommendation for marking .....	41
C.2.2	Marking for solder designation .....	41
C.2.3	Marking unit and location .....	42
Bibliography.....		43
Figure 1 – Report form for solder alloy tests .....		19
Figure 2 – Report form for solder powder tests .....		20
Figure 3 – Report form for non-fluxed solder tests .....		21
Figure 4 – Report form for fluxed wire/ribbon solder tests .....		22
Figure C.1 – Example of the marking for assembled board .....		42
Table 1 – Solder materials .....		12
Table 2 – Flux types and designating symbols .....		13
Table 3 – Flux percentage .....		14
Table 4 – Standard solder powders.....		16
Table 5 – Solder inspections.....		23

Table B.1 – The composition and temperature characteristics of lead-free solder alloys .....	30
Table B.2 – The composition and temperature characteristics of common tin-lead alloys .....	33
Table B.3 – The composition and temperature characteristics for specialty (non-tin/lead) alloys .....	36
Table B.4 – the cross-reference from solidus and liquidus temperatures to alloy names by temperature .....	37
Table B.5 – The cross-reference from ISO 9453 alloy numbers and designations to IEC 61190-1-3 alloy names .....	39

## **iTeh STANDARD PREVIEW** **(standards.iteh.ai)**

[SIST EN IEC 61190-1-3:2018](https://standards.iteh.ai/catalog/standards/sist/c69ae83e-9192-492c-b42f-5c600c91241b/sist-en-iec-61190-1-3-2018)

<https://standards.iteh.ai/catalog/standards/sist/c69ae83e-9192-492c-b42f-5c600c91241b/sist-en-iec-61190-1-3-2018>

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## 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**

## 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 61190-1-3 has been prepared by IEC technical committee 91: Electronics assembly technology.

This third edition cancels and replaces the second edition, published in 2007 and Amendment 1:2010. This edition constitutes a technical revision.

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

- a) The maximum impurity level of Pb has been revised and the table of lead free solder alloys includes some additional lead free solder alloys.

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

FDIS	Report on voting
91/1468/FDIS	91/1488/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.

A list of all parts in the IEC 61190 series, under the general title *Attachment materials for electronic assembly*, can be found on the IEC website.

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

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN IEC 61190-1-3:2018](https://standards.iteh.ai/catalog/standards/sist/c69ae83e-9192-492c-b42f-5c600c91241b/sist-en-iec-61190-1-3-2018)

<https://standards.iteh.ai/catalog/standards/sist/c69ae83e-9192-492c-b42f-5c600c91241b/sist-en-iec-61190-1-3-2018>

## INTRODUCTION

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

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of patents concerning particular alloy compositions.

IEC takes no position concerning the evidence, validity and scope of these patent rights.

The holders of these patent rights have assured the IEC that they are willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statements of the holders of these patent rights are registered with IEC. Information may be obtained from:

KR PAT No. 10-0797161  
(KR patent application number: KR10-2007-0050905)  
KOREA Institute of Industrial technology  
89, Yangdaegiro-gil, Ipjang-myeon, Seobuk-gu, Cheonan-si Chungcheongnam-do 331-822 Korea

KR PAT No.10-0445350  
Heesung Material LTD.  
820-7, Donghang-ri, Yangseong-myeon, Anseong-Si, Gyeonggi-Do, 456-931, KOREA

JP PAT No.3152945 , and the foreign patents  
Nihon Superior  
NS Bldg., 1-16-15 Esaka-Cho, Suita City, Osaka, 564-0063, Japan

JP PAT No.3296289, and the foreign patents  
Fuji Electronics  
Gate City Ohsaki, East tower 11-2, Osaki 1-Chome, Shinagawa-ku, Tokyo, 141-0032, Japan

JP PAT No. 3736819  
Toyota Central R&D Labs., Inc.  
41-1, Yokomichi, Nagakute, Aichi 480-1192, Japan  
Taiho Kogyo Co., Ltd.  
3-65 Midorigaoka Toyota-city, Aichi 471-8502, Japan

JP PAT No. 3622788, and the foreign patents  
JP PAT No.3753168, and the foreign patents  
Senju Metal Industry Co., Ltd.  
Senju Hashido-cho 23, Adachi-ku, Tokyo, 120-8555, Japan

NOTE Patent rights vary between country of manufacture, sale, use and final destination; suppliers or users remain responsible for establishing the exact legal position relevant to their own situation.

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

ISO ([www.iso.org/patents](http://www.iso.org/patents)) and IEC (<http://patents.iec.ch>) maintain on-line data bases of patents relevant to their standards. Users are encouraged to consult the data bases for the most up to date information concerning patents.