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Standards

Irish Standard  
I.S. EN 61190-1-3:2007

# 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 (IEC 61190-1-3:2007 (EQV))

## I.S. EN 61190-1-3:2007

*Incorporating amendments/corrigenda issued since publication:*

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

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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.

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 61190-1-3/A1**

September 2010

ICS 31.190

English version

**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  
(IEC 61190-1-3:2007/A1:2010)**

Matériaux de fixation  
pour les assemblages électroniques -  
Partie 1-3: Exigences relatives  
aux alliages à braser de catégorie  
électronique et brasures solides fluxées  
et non fluxées pour les applications  
de brasage électronique  
(CEI 61190-1-3:2007/A1:2010)

Verbindungsmaterialien für Baugruppen  
der Elektronik -  
Teil 1-3: Anforderungen an Elektroniklote  
und an Festformlote  
mit oder ohne Flussmittel für das Löten  
von Elektronikprodukten  
(IEC 61190-1-3:2007/A1:2010)

This amendment A1 modifies the European Standard EN 61190-1-3:2007; it was approved by CENELEC on 2010-09-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 Central Secretariat or to any CENELEC member.

This amendment 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 Central Secretariat 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**CENELEC**

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

**Management Centre: Avenue Marnix 17, B - 1000 Brussels**

## **Foreword**

The text of document 91/920/FDIS, future amendment 1 to IEC 61190-1-3:2007, prepared by IEC TC 91, Electronics assembly technology, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 61190-1-3:2007 on 2010-09-01.

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

The following dates were fixed:

- |   |       |            |
|---|-------|------------|
| – latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2011-06-01 |
| – latest date by which the national standards conflicting with the amendment have to be withdrawn   | (dow) | 2013-09-01 |

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## **Endorsement notice**

The text of amendment 1:2010 to the International Standard IEC 61190-1-3:2007 was approved by CENELEC as an amendment to the European Standard without any modification.

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## **Annex ZA** (normative)

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

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

*Remove the existing reference ISO 9453 and replace it by the following new reference:*

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO 9453	2006	Soft solder alloys - Chemical compositions and forms	EN ISO 9453	2006

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 61190-1-3**

June 2007

ICS 31.190

Supersedes EN 61190-1-3:2002

English version

**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  
(IEC 61190-1-3:2007)**

Matériaux de fixation  
pour les assemblages électroniques -  
Partie 1-3: Exigences relatives  
aux alliages à braser de catégorie  
électronique et brasures solides  
fluxées et non-fluxées pour les  
applications de brasage électronique  
(CEI 61190-1-3:2007)

Verbindungsmaterialien  
für Baugruppen der Elektronik -  
Teil 1-3: Anforderungen  
an Elektroniklote und an Festformlote  
mit oder ohne Flussmittel  
für das Löten von Elektronikprodukten  
(IEC 61190-1-3:2007)

This European Standard was approved by CENELEC on 2007-05-01. 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.

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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 Central Secretariat has the same status as the official versions.

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

**CENELEC**

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

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

**I.S. EN 61190-1-3:2007**

EN 61190-1-3:2007

- 2 -

**Foreword**

The text of document 91/647/FDIS, future edition 2 of IEC 61190-1-3, prepared by IEC TC 91, Electronics assembly technology, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61190-1-3 on 2007-05-01.

This European Standard supersedes EN 61190-1-3:2002.

The main changes with regard to EN 61190-1-3:2002 concern a definition of lead-free solder alloy and an amendment to Table B.1 concerning lead-free solder alloys.

The following dates were fixed:

- |  |       |            |
|--|-------|------------|
| – latest date by which the EN has to be implemented<br>at national level by publication of an identical<br>national standard or by endorsement | (dop) | 2008-02-01 |
| – latest date by which the national standards conflicting<br>with the EN have to be withdrawn  | (dow) | 2010-05-01 |

Annex ZA has been added by CENELEC.

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**Endorsement notice**

The text of the International Standard IEC 61190-1-3:2007 was approved by CENELEC as a European Standard without any modification.

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## Annex ZA (normative)

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

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60194	- <sup>1)</sup>	Printed board design, manufacture and assembly - Terms and definitions	EN 60194	2006 <sup>2)</sup>
IEC 61189-5	- <sup>1)</sup>	Test methods for electrical materials, interconnection structures and assemblies - Part 5: Test methods for printed board assemblies	EN 61189-5	2006 <sup>2)</sup>
IEC 61189-6	- <sup>1)</sup>	Test methods for electrical materials, interconnection structures and assemblies - Part 6: Test methods for materials used in manufacturing electronic assemblies	EN 61189-6	2006 <sup>2)</sup>
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	- <sup>1)</sup>	Attachment materials for electronic assembly - Part 1-2: Requirements for soldering pastes for high-quality interconnects in electronics assembly	EN 61190-1-2	2007 <sup>2)</sup>
ISO 9001	- <sup>1)</sup>	Quality systems - Model for quality assurance in design/ development, production, installation and servicing	EN ISO 9001	2000 <sup>2)</sup>
ISO 9453	- <sup>1)</sup>	Soft solder alloys - Chemical compositions and forms	EN ISO 9453	2006 <sup>2)</sup>
ISO 9454-1	1990	Soft soldering fluxes - Classification and requirements - Part 1: Classification, labelling and packaging	EN 29454-1	1993
ISO 9454-2	1998	Soft soldering fluxes - Classification and requirements - Part 2: Performance requirements	EN ISO 9454-2	2000

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<sup>1)</sup> Undated reference.

<sup>2)</sup> Valid edition at date of issue.

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## CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions .....	7
4 Classification .....	8
4.1 Alloy composition.....	8
4.2 Solder form .....	9
4.3 Flux type .....	9
4.4 Flux percentage and metal content .....	10
4.5 Other characteristics.....	11
5 Requirements .....	11
5.1 Materials .....	11
5.2 Alloys .....	11
5.3 Solder forms.....	12
5.4 Flux type and form .....	13
5.5 Flux residue dryness.....	14
5.6 Spitting.....	14
5.7 Solder pool .....	14
5.8 Labelling for product identification.....	14
5.9 Workmanship .....	14
6 Quality assurance provisions.....	15
6.1 Responsibility for inspection and compliance.....	15
6.2 Classification of inspections.....	15
6.3 Materials inspection.....	20
6.4 Qualification inspections .....	20
6.5 Quality conformance.....	20
6.6 Preparation of solder alloy for test.....	21
7 Preparation for delivery – Preservation, packing and packaging.....	21
Annex A (informative) Selection of various alloys and fluxes for use in electronic soldering – General information concerning IEC 61190-1-3.....	22
Annex B (normative) Lead-free solder alloys.....	26
Figure 1 – Report form for solder alloy tests .....	16
Figure 2 – Report form for solder powder tests .....	17
Figure 3 – Report form for non-fluxed solder tests .....	18
Figure 4 – Report form for fluxed wire/ribbon solder tests .....	19
Table 1 – Solder materials.....	9
Table 2 – Flux types and designating symbols .....	10
Table 3 – Flux percentage.....	11
Table 4 – Standard solder powders .....	13
Table 5 – Solder inspections .....	20
Table B.1 – Composition and temperature characteristics of lead-free solder alloys <sup>a,b</sup> .....	26
Table B.2 – Composition and temperature characteristics of common tin-lead alloys <sup>a,b</sup> .....	28

**I.S. EN 61190-1-3:2007**

61190-1-3 © IEC:2007

– 3 –

Table B.3 – Composition and temperature characteristics for specialty (non-tin/lead) alloys <sup>a,b</sup> .....	30
Table B.4 – Cross reference from solidus and liquidus temperatures to alloy names by temperature <sup>a</sup> .....	31
Table B.5 – Cross-reference from ISO 9453 alloy numbers and designations to IEC 61190-1-3 alloy names .....	34

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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### 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**

### 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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The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning in particular alloy compositions. IEC takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the IEC that he/she is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with IEC. Information may be obtained from:

For Sn96Ag2,5Bi1Cu,5:  
US PAT No. 4879096  
Cookson Electronics Assembly Materials  
600 Route 440 Jersey City, New Jersey 07304

For Sn96,5Ag3Cu,5, Sn95,8Ag3,5Cu,7 and Sn95,5Ag3,8Cu,7:  
US PAT No. 5527628  
Iowa State University Research Foundation, Inc.  
310 Lab of Mechanics  
Ames, Iowa 50011-2131, U.S.A.

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– 5 –

For Sn88In8Ag3,5Bi,5:

JP PAT No. 3040929

For Sn96,5Ag3Cu,5, Sn95,8Ag3,5Cu,7 and Sn95,5Ag3,8Cu,7:

JP PAT No. 3027441

Matsushita Electric Industrial Co., Ltd.

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For Sn92In4Ag3,5Bi,5

JP PAT No. 2805595

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For Sn96,5Ag3Cu,5, Sn95,8Ag3,5Cu,7, Sn95,5Ag3,8Cu,7 and Sn95,5Ag4,0Cu,5

JP PAT No. 3027441

Senju Metal Industry Co., Ltd.

Senju Hashido-cho 23, Adachi-ku, Tokyo, 120-8555, Japan

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

This second edition cancels and replaces the first edition, published in 2002, and constitutes a technical revision. The main changes with regard to the first edition concern a definition of lead-free solder alloy and an amendment to Table B.1 concerning lead-free solder alloys.

This bilingual version, published in 2008-05, corresponds to the English version.

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

FDIS	Report on voting
91/647/FDIS	91/679/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.

The French version of this standard has not been voted upon.

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

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.

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.

## **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**

#### **1 Scope**

This part of IEC 61190 prescribes the requirements and test methods for electronic grade solder alloys, for fluxed and non-fluxed bar, ribbon, powder solders and solder paste, for electronic soldering applications and for “special” electronic grade solders. For the generic specifications of solder alloys and fluxes, see ISO 9453, ISO 9454-1 and ISO 9454-2. This standard is a quality control document and is not intended to relate directly to the material's performance in the manufacturing process

Special electronic grade solders include all solders which do not fully comply with the requirements of standard solder alloys and solder materials listed herein. Examples of special solders include anodes, ingots, preforms, bars with hook and eye ends, multiple-alloy solder powders, etc.

#### **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 61190-1-1:2002, *Attachment materials for electronic assembly – Part 1-1: Requirements for soldering fluxes for high-quality interconnects in electronics assembly*

IEC 61190-1-2, *Attachment materials for electronic assembly – Part 1-2: Requirements for solder pastes for high-quality interconnections in electronics assembly*

IEC 61189-5, *Test methods for electrical materials, interconnection structures and assemblies – Part 5: Test methods for printed board assemblies*

IEC 61189-6, *Test methods for electrical materials, interconnection structures and assemblies – Part 6: Test methods for materials used in manufacturing electronic assemblies*

ISO 9001, *Quality management systems – Requirements*

ISO 9453, *Soft solder alloys – Chemical compositions and forms*

ISO-9454-1:1990, *Soft soldering fluxes – Classification and requirements – Part 1: Classification, labelling and packing*

ISO-9454-2:1998, *Soft soldering fluxes – Classification and requirements – Part 2: Performance requirements*

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