SLOVENSKI STANDARD
SIST EN 61193-3:2013

01-julij-2013

Sistemi ocenjevanja kakovosti - 3. del: Izbira in uporaba planov vzorčenja za pregledovanje tiskanih plošč in laminatov končnih izdelkov in presojanje med procesom

Quality assessment systems - Part 3: Selection and use of sampling plans for printed boards and laminate end-products and in-process auditing

Qualitätsbewertungssysteme - Teil 3: Auswahl und Anwendung von Stichprobenanweisungen für Endprodukte von Leiterplatten und Laminaten und fertigungsbegleitende Auditierung

Système d'assurance de la qualité - Partie 3: Choix et utilisation de plans d'échantillonnage pour cartes imprimées et produits finis stratifiés et audits en cours de fabrication

Ta slovenski standard je istoveten z: **EN 61193-3:2013**

ICS:

03.120.99	Drugi standardi v zvezi s kakovostjo	Other standards related to quality
31.180	Tiskana vezja (TIV) in tiskane plošče	Printed circuits and boards

SIST EN 61193-3:2013 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61193-3

April 2013

ICS 31.190

English version

Quality assessment systems - Part 3: Selection and use of sampling plans for printed board and laminate end-product and in-process auditing

(IEC 61193-3:2013)

Système d'assurance de la qualité - Partie 3: Choix et utilisation de plans d'échantillonnage pour cartes imprimées et produits finis stratifiés et audits en cours de fabrication (CEI 61193-3:2013)

Qualitätsbewertungssysteme - Teil 3: Auswahl und Anwendung von Stichprobenanweisungen für Endprodukte von Leiterplatten und Laminaten und fertigungsbegleitende Auditierung (IEC 61193-3:2013)

This European Standard was approved by CENELEC on 2013-02-28. 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.

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CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 61193-3:2013 E

Foreword

The text of document 91/1061/FDIS, future edition 1 of IEC 61193-3, prepared by IEC TC 91 "Electronics assembly technology" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61193-3:2013.

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)	2013-11-28
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-02-28

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Endorsement notice

The text of the International Standard IEC 61193-3:2013 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 60068-2-20	NOTE	Harmonized as EN 60068-2-20.
IEC 60068-2-38	NOTE	Harmonized as EN 60068-2-38.
IEC 61189-2	NOTE	Harmonized as EN 61189-2.
IEC 61189-3	NOTE	Harmonized as EN 61189-3.
IEC 61193-1	NOTE	Harmonized as EN 61193-1.
IEC 61193-2	NOTE	Harmonized as EN 61193-2.
IEC 62326-1	NOTE	Harmonized as EN 62326-1.
IEC 62326-4-1	NOTE	Harmonized as EN 62326-4-1.
ISO 14001	NOTE	Harmonized as EN ISO 14001.

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

Publication	Year	Title	EN/HD	Year
IEC 60194	2006	Printed board design, manufacture and assembly - Terms and definitions	EN 60194	2006
IEC 62326-4	1996	Printed boards - Part 4: Rigid multilayer printed boards with interlayer connections - Sectional specification	EN 62326-4	1997
ISO 9000	2005	Quality management systems - Fundamentals and vocabulary	EN ISO 9000	2005
ISO 14560	2004	Acceptance sampling procedures by attributes - Specified quality levels in nonconforming items per million	-	-

IEC 61193-3

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Quality assessment systems – Part 3: Selection and use of sampling plans for printed board and laminate end-product and in-process auditing

Système d'assurance de la qualité – Partie 3: Choix et utilisation de plans d'échantillonnage pour cartes imprimées et produits finis stratifiés et audits en cours de fabrication

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

QUALITY ASSESSMENT SYSTEMS –

Part 3: Selection and use of sampling plans for printed board and laminate end-product and in-process auditing

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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International Standard IEC 61193-3 has been prepared by IEC technical committee 91: Electronics assembly technology.

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

FDIS	Report on voting
91/1061/FDIS	91/1080/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.

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

A list of all parts of the IEC 61193 series, under the general title *Quality assessment systems,* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability 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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

A clear description in IEC standards and specifications and their reference to sampling plans in order to insure adherence to customer requirements is essential. All the details should be clear as to their implementation or adjustment for evaluation of the product to be shipped, the use of process control and SPC, or the applicability for using these principles in controlled experimentation. The general characteristics of these principles relate to a gradual reduction that might be needed in examining the product being manufactured. As such, they are sometimes referred to as the logical steps to process improvement. These steps are as follows.

a) STATISTICAL SAMPLING: where, when, and why

   - To determine a proper amount of examples from a given lot of product and using statistics to evaluate the occurrence of anomalies.

b) ZERO DEFECT STANDARDS: role of specifications

   - To adopt the role of attempting to achieve no defects in a production lot through the recommendations identified in standards or specifications that define the product requirements.

c) ECONOMICS: AQL versus cost of defects

   - To establishing the highest level of non-conforming product characteristics, determining the cost that is incurred when these are discovered or delivered accidentally to the customer (cost of quality) and establishing an acceptable quality assessment methodology in order to reduce these occurrences.

d) SPC REDUCED INSPECTION: rules for use and control

   - To create a process control program that is based on reject criteria, followed by controlled experimentation to improve the process and then using statistical analysis in order to determine that the process improvement has reduced the occurrences of these reject criteria.

The explosion of the electronics industry has led to a situation where the design of the printed board mounting structure or the material used to produce the product is so complex, that the quality level of these items delivered with known failures are no longer acceptable. The acceptable number of non-conforming products should be directed toward approaching zero in producer-customer contracts.

This has led to the development of new methods of quality assurance like the application of Statistical Process Control (SPC). The low number of permitted non-conforming product according to the AQL tables caused many to resort to 100 % testing or inspection.

At the same time the quality thinking has developed so that the idea to accept failures has become impossible, and the use of the AQL tables in the traditional way has been diminishing very rapidly.

QUALITY ASSESSMENT SYSTEMS –

Part 3: Selection and use of sampling plans for printed board and laminate end-product and in-process auditing

1 Scope

This part of IEC 61193 establishes sampling plans for inspection by attributes, including sample plan selection criteria and implementation procedures for printed board and laminate end-product and in-process auditing. The principles established herein permit the use of different sampling plans that may be applied to an individual attribute or set of attributes, according to classification of importance with regard to form, fit and function.

2 Normative references

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.

IEC 60194:2006, *Printed board design, manufacture and assembly – Terms and definitions*

IEC 62326-4:1996, *Printed boards – Part 4: Rigid multilayer printed boards with interlayer connections – Sectional specification*

ISO 9000:2005, *Quality management systems – Fundamentals and vocabulary*

ISO 14560:2004, *Acceptance sampling procedures by attributes – Specified quality levels in non-conforming items per million*

3 Terms and definitions

For purposes of this document, the terms and definitions given in IEC 60194:2006, ISO 9000:2005 and the following apply.

3.1
attribute
aspect or characteristic of a unit of a defined product in terms of actual requirement and allowable deviation

Note 1 to entry: An actual requirement signifies the following:

- a requirement that is stated as a measurement with an allowable more and/or less deviation;
- a requirement stated as an absolute desired condition with allowable anomalies;
- a requirement stated as an absolute without exception (go/ no-go).

3.1.1
critical attribute
attribute where a defect, that judgment and experience indicate, is likely to result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the product; or where a defect is likely to prevent performance or function of a major end item such as a ship, aircraft, computer, medical equipment, or telecommunication satellite

3.1.2
major attribute
attribute where a defect, other than critical, is likely to result in failure, or where a defect reduces the usability of the unit of a product for its intended purpose

3.1.3
minor attribute
attribute where a defect is not likely to reduce materially the usability of the unit of product for its intended purpose, or where a defect is a deviation from established standards having little bearing on the effective use or operation of the unit

3.2
acceptable quality level
DEPRECATED: AQL
maximum percent of defects that can be tolerated as a risk, stated for the purposes of sampling inspection

Note 1 to entry: Sample inspection with associated risk tolerance is employed only where all units of a product within an inspection lot is expected to completely conform to the specification requirements.

Note 2 to entry: See 3.3.

3.3
acceptance quality limit
lower than perfect quality level

Note 1 to entry: Revised term for AQL.

Note 2 to entry: The term is used to indicate a certain degree of risk in that some products may have non-conforming characteristics. However, they do not impact the final performance. These decisions are based on customer/supplier agreements.

Note 3 to entry: The use of the abbreviation AQL to mean "acceptable quality level" (refer to 3.2) is no longer recommended.

3.4
defective
unit of product that contains one or more defects

3.4.1
critical defective
unit of product that contains one or more defects of critical attributes, and that may also contain defects of major or minor attributes

3.4.2
major defective
unit of product that contains one or more defects of major attributes, and may also contain defects of minor attributes, but contains no defects of critical attributes

3.4.3
minor defective
unit of product that contains one or more defects of minor attributes, but contains no defects of major or critical attributes

3.5
inspection
process of measuring, examining, testing, or otherwise comparing the unit of product with the specified requirements

3.5.1
inspection by attributes
inspection of individual attributes (aspects or characteristics) of the unit of product per specified requirements, procedures, and/or instructions

3.5.2
inspection lot
collection of product units that are identified and treated as a unique entity from which a sample is drawn and inspected in order to determine conformance with acceptability criteria

3.5.3
inspection rate
number of features per unit of time that can be evaluated at specified false-alarm and escape-rate settings

3.6
risk management factor
RMF
maximum tolerable percentage of possible defects within a lot (group) of units, based on approximately 95 % confidence level

3.7
shipment-ready product
product shipped to the customer without having to meet any further acceptance criteria

3.8
unit of product
item(s) being inspected in order to determine conformance to specific requirements

Note 1 to entry: These requirements consist of the following:

- a single article, a pair, a set, a length, an area, an operation, a volume, a component of an end product, or the end product itself;
- may or may not be the same as the unit of purchase, supply, production or shipment.

4 Sampling methodologies

4.1 General

There is a considerable number of ISO standards on acceptance sampling (see Annex D for details). However, most of these standards contain plans that allow a lot to be accepted even when the sample from the lot contains one or more non-conforming items, although there are some exceptions (ISO 18414 and ISO 21247).

The zero acceptance number plans (c = 0) were originally designed and used to provide equal or greater consumer protection with less inspection than that required by corresponding sampling plans. The c = 0 plans are simple to use and administer since there is greater emphasis on zero defects and product liability prevention. The concepts stated herein provide a set of attribute plans for product lot inspection. The acceptance number in all cases is zero. This means that for some level of protection, a sample size is selected and if one or more non-conforming attributes are present, the lot will be withheld.

The terminology "withhold the lot" does not necessarily mean rejection. A lot is not automatically accepted or rejected if one or more non-conformances are found. It is only accepted if zero non-conformances are found in the sample.

Withholding the lot obliges engineering/management personnel to review the results and to withdraw the lot depending on the seriousness of the case. This relates to whether the attribute