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SLOVENSKI STANDARD
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01-marec-2001

Sectional Specification: Capability approval of manufacturers of printed board assemblies of assessed quality

Sectional Specification: Capability approval of manufacturers of printed board assemblies of assessed quality

Rahmenspezifikation: Befähigungsanerkennung für Hersteller von bestückten Leiterplatten mit bewerteter Qualität

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Ta slovenski standard je istoveten z: EN 160100:1997

ICS:

31.180	Vã\æ}æ妿^: bæ(Ç/Q(X)D}Áã\æ}^][z ^ Printed circuits and boards

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2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 160100

August 1997

ICS 31.180

Descriptors: Printed board assemblies, quality assessment, capability approval, test, measurement procedures

English version

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

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

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Foreword

This European Standard was prepared by the British ONH under the CECC Single Originator Procedure.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 160100 on 1996-12-09.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1998-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1998-03-01

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1 General

1.1 Scope

This document is a sectional specification relating to printed board assemblies (as defined in 1.3.2 below) of assessed quality which meet the criteria for a modular electronic unit as defined in the generic specification EN 160000. It applies to both custom built products and to standard catalogue items and defines the characteristics to be assessed and the test methods to be used for capability approval, for quality conformance inspection (lot-by-lot) and maintenance of approval. Acceptance criteria for specific printed board assemblies will be given in the relevant detail specifications in accordance with blank detail specification EN 160101.

This sectional specification is to be read in conjunction with EN 160000. It invokes all of the requirements of CECC 00 114: Part III in addition to meeting the requirements of annex A of EN 160000.

1.2 Related documents

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IEC publication 68:	Basic environmental testing procedures
IEC publication 194:	Terms and definitions for printed circuits
IEC publication 321-2:	Auxiliary printed board information Part 2: Rework, repair, modifications
IEC publication 410:	Sampling procedures
IEC publication 589:	Methods of test for determination of ionic impurities in electrical insulating materials by extraction with liquids
CECC 00 400: Part IV:	Preparation of capability approval generic, sectional and blank detail specifications
EN 100 114: Part 1:	Quality assessment procedures - Approval of manufacturers and other organisations
CECC 00 114: Part III:	Capability approval of an electronic component manufacturing activity
CECC00200	Register of firms products and services approved under the CECC system

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CECC 00 802:	CECC standard method for the specification of surface mounting components (SMDs) of assessed quality
CECC 00 803	Guidance document: Visual inspection of soldered surface mounted assemblies
EN 123000:	Generic specification: printed boards
EN 100015	Basic specification: Protection of electrostatic sensitive devices
EN 160000:	Generic specification: modular electronic units
EN 160101:	Blank detail specification: Printed board assembly modular electronic units of assessed quality (capability approval)

NOTE: The above references apply to the current editions except for parts of IEC 68 where the referenced edition applies.

1.3 Units, symbols and terminology

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Units, graphical symbols, letter symbols and terminology shall, whenever possible, be taken from the following documents:

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IS0 1000:	SI units and recommendations for the use of their multiples and of certain other units
IEC 27:	Letter symbols to be used in electrical technology
IEC 50:	International electrotechnical vocabulary
IEC 617:	Graphical symbols for diagrams

All other units, symbols and terminology peculiar to printed board assemblies, shall be taken from the relevant IEC or IS0 documents, listed under "Related documents".

When none in the standard are suitable, appropriate ones shall be devised and shall be listed in the detail specification for the printed board assembly. General dimensioning and tolerancing procedures used for production of drawings shall be in accordance with the relevant IS0 standards.

Other terms are in accordance with EN 100114-1 and EN 160000. For the purpose of this sectional specification the following additional definitions apply:

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1.3.1 *Printed circuit (IEC 194)*

This term is in common use with at least three meanings:

a) A generic term to describe a certain technique;

b) Circuit obtained by printing and comprising printed components, printed wiring, or a combination thereof, all formed in a predetermined design in, or attached to, a surface or surfaces of a common base;

c) Circuit obtained by printing and comprising printed wiring and conventional components, all arranged in a predetermined design in, or attached to a surface or surfaces of a common base.

1.3.2 *Printed board (IEC 194)*

Base material cut to size containing all holes and bearing at least one conductive pattern.

Printed boards are typically subdivided according to:

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- their structure (e.g. single and double sided, multilayers);

- the nature of the base material (e.g. rigid, flexible).

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1.3.3 *Printed board assembly (IEC 194)*

Printed board with electrical and mechanical components and/or other printed boards attached to it with all manufacturing processes, soldering, coating, etc. completed. The completed assembly may be supplied with or without an individual housing relevant to the structure and performance of the unit and must meet the criteria for a Modular Electronic Unit set down in CECC 60 000.

1.3.4 *Pin-in-hole assembly (PIH)*

Components have wire or tape leads which are inserted into holes in the mounting substrate and soldered to connect the lead mechanically and electrically to the conductors on the substrate.

1.3.5 *Surface mounting assembly (SMA) or surface mounting technology (SMT)*

Components which may or may not have wire or tape terminations are mounted on the surface of the substrate. They may be held initially by adhesive or by a solder paste but are finally soldered to the pads on the substrate surface to provide electrical and mechanical connections to the circuit.

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1.3.6 *Rework (RP14: Part 111: subsection 1.4)*

Rework is the rectification, of processing errors prior to release of the printed board assembly by means not differing from those used in the current process or the rework process described by the approved manufacturer in his quality manual or referenced therein.

1.3.7 *Repair (RP14: Part III: subsection 1.5)*

Repair is the making good of an approved printed board assembly which has been damaged or has become defective after release. In accordance with RP 14: Part III: subsection 7.2, printed board assemblies which have been repaired shall not be released under the CECC system.

1.4 Marking of the printed board assembly and package

Marking materials used shall be resistant to discoloration, abrasion and to common solvents employed for fluxes and cleaning of electronic assemblies. The following information shall be marked as appropriate on the assembly and/or package:

a) function and/or type number;

b) identification of termination and their polarity where applicable;

c) date code;

d) manufacturer's factory identification code;

e) climatic category in accordance with IEC 68, if applicable;

f) any special markings, e.g. relating to hazard or special operating conditions;

g) the number of the detail specification to which the printed board assembly conforms and any other designations prescribed by that specification shall be marked on the package.

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2 Quality assessment procedures

2.1 General

2.1.1 *Eligibility for capability approval* (subsection 2.1: RP 14: Part III)

Prior to making application for capability approval a manufacturer shall first obtain manufacturer's inspection approval in accordance with CECC 00 114: Part 1.

The manufacturer is eligible for capability approval in accordance with the system if he can demonstrate that supervision by the approved person(s) of one or more approved manufacturers is applied to the manufacturing process, either in its entirety or commencing at the primary stage of manufacture.

2.1.2 *Primary stage of manufacture*

The primary stage of manufacture is the stage at which the electronic components and substrate are selected, procured and brought together to create a kit of parts for issue to the assembly shop floor.

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NOTE: It is the responsibility of the procuring authority to demonstrate, by test or otherwise, that the solderability of all soldering terminations is adequate for the method of soldering to be employed.

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2.1.3 *Structural similarity*

Structural similarity is applicable to capability approval of PBAs in terms of similar substrates, similar mounting (PIH or SMT or mixed, see 3.5) and jointing technology and similar tests and inspections.

2.1.4 *Subcontracting*

Procedures used shall be as set down in CECC 00 114: Part III, 2.2

(1) Subcontracting to an unapproved manufacturer

Subcontracting of any operations corresponding to the primary stage or any subsequent stage to an unapproved manufacturer shall be controlled as set down in CECC 00 114: Part III.

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(2) **Subcontracting of specialized processes**

Specialized processes such as the following may be subcontracted to a specialist processor provided that the approved manufacturer's approved person is able to verify that the process has been performed in a satisfactory manner, CECC 00 114: Part III, 2.2.2:

- deposition of specific metallic coatings;

- application of specific paint finishes;

- polyparaxylylene;

- encapsulation;

- component pre-conditioning;

- burn-in.

All specialist processes subcontracted shall be listed and described in the approved manufacturer's capability manual and shall be demonstrated by an appropriate CQC.

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2.1.5 ***Incorporated components*** (subsection 2.3: RP 14: Part III)

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Incorporated components include the printed board substrate (which may be a printed board with discrete wired layers) and all electronic components be to assembled thereon. They do not include piece parts without a distinctive electronic function.

In addition to the correct specification of electronic/electrical performance and outline dimensions, see 2.1.5 (2) and (3), the process suitability of all surface mounting components shall be specified in accordance with guidance document CECC 00 802.

No changes may be made to any component incorporated in the approval build without reference to the design authority for the printed board assembly. This includes the purchase of an approved component from an alternative supplier not specifically listed by the design authority as an alternative source.

(1) **Printed board substrate materials**

Printed board substrate materials shall normally be selected from those covered by IEC Publication 249 base materials for printed circuits. Other materials such as fluoropolymers, cyanate esters and alumina ceramics may be used provided that the quality is verified as outlined below for unapproved components.

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(2) **Approved components**

Wherever possible, incorporated components, including printed boards, shall be approved to a relevant CECC detail specification and shall be procured using normal CECC release procedures.

(3) **Unapproved components**

Components which cannot be obtained with release to a relevant CECC specification shall be treated as unapproved components. The approved manufacturer's approved person shall verify their quality before their incorporation and shall:

- be satisfied that the quality and performance of an unapproved component is adequate for its purpose;

- ensure that a specification exists for the unapproved component covering all those aspects necessary to ensure its satisfactory performance as part of the final product;

- establish a quality programme to verify continuing supply of the component in accordance with the specification requirements;

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- ensure that goods inward inspection procedures are adequate for determining the level of quality of the product(s) being received.

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2.1.6 ***Validity of release***

(1) **General**

The validity of release is maintained provided that the requirements both for maintenance of capability approval (2.3.1) and release for delivery (2.4) are met and that continuous production (2.3.1 (3)) subsists.

(2) **Delayed delivery**

Following successful completion of final testing, printed board assemblies held by the manufacturer for more than twelve months shall be reinspected visually for cleanliness and freedom from corrosion and other visible defects, 3.4.8. The solderability of any items required to be soldered by the customer, e.g. terminations, shall be shown to be satisfactory prior to delivery. When appropriate, the printed board assembly shall be electrically retested before release.

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Unless otherwise prescribed by the detail specification, PBAs shall be stored at a temperature in the range +10 °C to +25 °C. Conditions shall be clean and free from condensation. The assembly shall be supported in such a way as to minimise distortion and packed in a clean container to prevent contamination and mechanical damage. Care must be taken to meet any requirement for protection from static electricity.

(3) **Repair**

In accordance with CECC 00 114: Part III, 7.2, printed board assemblies which have been repaired shall not be released under the CECC system.

(4) **Modifications**

Modifications, for example to customise standard catalogue items, shall be permitted only as agreed with the customer and stated in the customer detail specification (customer detail specification), or by an agreed written customer amendment. The procedures and controls for carrying out modifications shall be set down or referenced in the description of capability.

e) Rework (subsection 7.1: RP 14: Part III)

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Whenever possible, rework methods shall be based on those shown in IEC 321-2. Rework is restricted in accordance with the following requirements:

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- the approved manufacturer must have written procedures available for all rework methods used, covering the equipment required, the process to be used and the workmanship standards set these procedures shall be included in the approved manufacturer's quality manual or shall be in a separate document referenced by the quality manual;

- provided that there is no visible sign of damage to the printed board, laminate, lands or conductors, or to the component, a component may be removed and replaced three times maximum;

- the customer detail specification may place restrictions on rework permitted on a particular contract.