SLOVENSKI STANDARD
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Sectional Specification: Multilayer printed boards

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Rahmenspezifikation: Mehrlagen-Leiterplatten

Spécification intermédiaire: Cartes imprimées multicouches

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Multilayer printed boards

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This European Standard was approved by the CENELEC Electronic Components Committee (CECC) on 12 December 1991. The text of this standard consists of the text of CECC 23 300 Issue 1 1985 (with Amdt.1) of the corresponding CECC Specification. CENELEC members are bound to comply with 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 General Secretariat of the CECC 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 CECC General Secretariat has the same status as the official versions.

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CECC

CENELEC Electronic Components Committee

Comité des Composants Electroniques du CENELEC

CENELEC Komitee für Bauelemente der Elektronik

General Secretariat: Gartenstr. 179, D- 6000 Frankfurt/Main 70

This blue page shall be inserted after the title page of CECC 23 300 (Issue 1)

Dieses blaue Blatt ist nach der Titelseite von CECC 23 300 (Ausgabe 1) einzufügen

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AMENDMENT 1 TO CECC 23 300 (Issue 1)

SECTIONAL SPECIFICATION

MULTILAYER PRINTED BOARDS

ÄNDERUNG 1 ZU CECC 23 300 (Ausgabe 1)

RAHMENSPEZIFIKATION

MEHRLAGENLEITERPLATTEN

The following amendments shall be made:

Remove pages 25/26 and 27/28 and replace by the amended pages 25/26 and 27/28.

Folgende Änderungen sind vorzunehmen:

Die Seiten 27/28 sind herauszunehmen und durch die geänderten Seiten 27/28 zu ersetzen.

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FOREWORD

The CENELEC Electronic Components Committee (CECC) is composed of those member countries of the European Committee for Electrotechnical Standardization (CENELEC) who wish to take part in a harmonized System for electronic components of assessed quality.

The object of the System is to facilitate international trade by the harmonization of the specifications and quality assessment procedures for electronic components, and be the grant of an internationally recognized Mark, or Certificate, of Conformity. The components produced under the System are thereby accepted by all member countries without further testing.

This specification has been formally approved by the CECC, and has been prepared for those countries taking part in the System who wish to issue national harmonized SECTIONAL SPECTIFICATIONS for MULTILAYER PRINTED BOARDS. It should be read in conjunction with the current regulations for the CECC System.

At the date of printing of this document the member countries of the CECC are Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom, and copies of it can be obtained from the addresses shown on the blue fly sheet.

PREFACE

This Sectional Specification was prepared by CECC Working Group 23: Printed Circuits.

It is based on publications of the International Electrotechnical Commission (IEC).

The text of this specification was circulated to the CECC for voting in the documents indicated below and was ratified by the President of the CECC for printing as a CECC Specification.

Document	Date of Voting	Report on the Voting
CECC(Secretariat)1054/1054A	November 1981	CECC(Secretariat)1252
CECC(Secretariat)1549	August 1984	CECC(Secretariat)1640

SECRETARIAT NOTE:

DUE TO THE URGENT INDUSTRIAL NEED FOR THIS SPECIFICATION, THE PRESIDENT OF THE CECC HAS RULED THAT IT BE PUBLISHED WITHOUT THE FULL EDITORIAL PROCEDURE BEING APPLIED. USERS OF THE SPECIFICATION ARE ASKED TO REPORT TO THE CECC GENERAL SECRETARIAT ANY ERRORS THEY FIND SO THAT AMENDING ACTION CAN BE INITIATED.

The text is published initially in English and German. The French version will follow as soon as it has been prepared.

1. Introduction

IEC 326-6 is the IEC Standard for multilayer printed boards. The following document comprises this IEC Standard and in accordance with the generic specification CECC 23 000 the information additionally necessary for printed boards intended to be handled within the CENELEC system for Electronic Components of Assessed Quality.

1.1 Scope and Object

This document is a Sectional Specification (SS) relating to multilayer printed boards irrespective of their method of manufacture, when they are ready for mounting of the components. It defines the characteristics to be assessed and the test methods to be used for capability approval testing and for quality conformance inspection (lot-by-lot and periodic inspection).

1.2 Related documents

IEC 68	- Basic environmental testing procedures
IEC 194	- Terms and definitions for printed circuits
IEC 249	- Metal-clad base materials for printed circuits
IEC 321	- Guidance for the design and use of components intended for mounting on printed boards.
IEC 326-2	- Printed boards - test methods
IEC 326-3	- Design and use of printed boards
IEC 326-6	- Specification for multilayer printed boards boards
CECC 00 010	- Printed boards - test methods
CECC 23 000	- Generic Specification Printed boards of assessed quality.

2. General

This Sectional Specification (SS) applies to multilayer printed boards and is intended as a basis for the preparation of

- Capability Detail Specification (Cap DS) applying to specific materials, e.g. according to IEC 249-2, and to be used for capability approval procedures.
  It may be necessary to have a Cap DS for each type of material.
  A Cap DS may be prepared by an international or a national body or by a manufacturer (see also CECC 00 111).

- Customer Detail Specification (CDS) for the custom built printed boards, according to 5 of CECC 23 000. The CDS will normally be written by the customer and allocated a number within his own system.

  Further details are also given in CECC 23 000 and in CECC 00 107 Part III.

Table I contains the basic characteristics that will normally be important for multilayer printed boards and makes reference to the appropriate tests to verify these characteristics.

Table II contains the additional characteristics that may be important for certain multilayer printed boards and/or certain applications and makes reference to the appropriate tests to verify these characteristics. Where necessary, the relevant specification may quote characteristics and tests from this Table II.

Where additional details for a test have to be specified in the relevant specification, this is indicated by an asterisk in the relevant column. These details shall then be specified in accordance with CECC 00 010 (IEC 326-2).

Table III contains the capability test programme. A specified composite test pattern (CTP) is used as capability qualifying component.

Table IV contains the information for the quality conformance inspection.

The tables are not intended to prescribe a test sequence, the tests may be carried out in any sequence, unless otherwise specified.

3. Test specimens

3.1 Capability Approval

3.1.1 Basic Capability

The test shall be carried out on the composite test pattern given in 8.

3.1.2 Additional Capability

3.5.3 of CECC 23 000 shall apply. For multiple arrangements see also 8.

3.1.3 Maintenance of Capability Approval

3.8 of CECC 23 000 shall apply.

3.2 Quality conformance inspection

Unless otherwise specified production boards and/or specially designed test patterns may be used for carrying out tests for the lot-by-lot and the periodic inspection.

Where specially designed test patterns shall be used they may be included in the panel. They may be based on the appropriate pattern of the composite test pattern clause 8. Consultation between manufacturer and customer will usually be necessary.

4. Relevant specification

The term "Relevant Specification" means a product specification for an actual printed board, i.e. a CDS as well as a Cap DS applied to a specific material and technique, as applicable.

The relevant specification shall contain all information necessary to define the printed board clearly and completely. The recommendations given in IEC 326-3 shall preferably be followed.

Care should be taken to avoid unnecessary prescriptions. Permissible deviations shall be stated where necessary, nominal values without tolerances or simple maxima or minima shall be given where sufficient. Where tolerances are necessary for certain areas or parts of the printed board only, they shall be applied and restricted to those areas or parts.

If there are several possibilities of presentation, of tolerance classes etc., the selections given in IEC 326-3 shall preferably be applied.

In case of discrepancy between the CDS and any other pertinent specification (e.g. BS, GS, or SS), the CDS shall prevail.

5. Characteristics of printed boards

Basic characteristics of multilayer printed boards are given in Table I.

Additional characteristics of multilayer printed boards are given in Table II.

TABLE I

Basic characteristics

Characteristics	Test No. IEC Publication 326-2	Additional test details to be specified in the relevant specification	Specimen of composite test pattern	Requirements	Remarks
General examination					
Visual examination					
Conformity, identification	1	*		Pattern, marking identification and material finishes shall comply with the relevant specification. There shall be no apparent defects	
Appearance and workmanship	1a			The boards shall appear to have been processed in a careful and workmanlike manner, in accordance with good current practice	
Plated-through holes				Plated-through holes shall be clean and free from inclusions of any sort that could affect component insertion and solderability	
				Total area of the voids shall not exceed 10% of the total wall area. The largest dimension shall not exceed 25% of the hole circumference in the horizontal plane and 25% of the thickness of the board in the vertical plane	
			Complete composite test pattern	Plated-through holes shall have no plating voids at the interface of the hole wall and the conductive pattern or internal layer ring	
				The interface shall be considered to extend into the hole below the surface of the board a distance of one and a half times the total copper thickness on the surface or to be two times the inner layer copper thickness at level of contact ring	
	1c			Resin smear at the edge of the clad-copper and the continuous plated copper is permitted provided the smear does not interrupt electrical continuity	
	1a			There shall be no circumferential cracks of the copper, or circumferential separation of the copper from the wall in the plated-through hole	
				Holes with plating voids shall not exceed 5% of the total number of plated-through holes	

*See 2.

TABLE I *(continued)*

Characteristics	Test No. IEC Publication 326-2	Additional test details to be specified in the relevant specification	Specimen of composite test pattern	Requirements	Remarks
Conductor defects	1b		Complete composite test pattern	There shall be no cracks nor breaks. Imperfections such as voids or edge defects are permissible provided the conductor width or the leakage path between conductors is not reduced by more than specified in the relevant specification, for example 20% or 35%	Where necessary, this shall be verified by dimensional examination, using Test 2a
Particles between conductors	1b or 1c		F	Residual metallic particles are permissible provided the leakage path is not reduced by more than 20% or to less than the distance required for the circuit voltages	Where necessary, this shall be verified by dimensional examination, using Test 2a
Dimensional examination					
Board dimensions	2			Dimensions and tolerances shall comply with the relevant specification The nominal board thickness shall comply with the relevant specification	
Board thickness in the zone of edge board contacts	2		K	The total board thickness and the tolerances shall comply with the relevant specification	Total board thickness and tolerances shall be specified in accordance with Amendment No. 1 to IEC Publication 321
Holes	2			Nominal diameter and tolerances of mounting holes and of component holes shall comply with the relevant specification	A recommended range of hole sizes and tolerances is given in IEC Publication 326-3
				The nominal diameter of plated-through holes used for through connections only shall comply with the relevant specification	Accurate measurement is not necessary since deviations are not important
Slots, notches	2		Complete composite test pattern	The dimensions shall comply with the relevant specification	
Conductor width	2			The width shall comply with any specific dimensions given in the relevant specification	If no tolerances are stated, the coarse deviations given in IEC Publication 326-3 shall apply

TABLE I *(continued)*

Characteristics	Test No. IEC Publication 326-2	Additional test details to be specified in the relevant specification	Specimen of composite test pattern	Requirements	Remarks
	2a			Imperfections such as voids or edge defects are permissible, provided the conductor width is not reduced by more than specified in the relevant specification, e.g. 20% or 35%. The length L of a defect shall be not greater than the conductor width S, or 5 mm (0.2 in), whichever is the smaller (see Figure 1.	
Spacing between conductors	2		F	The spacing shall comply with any specific dimensions given in the relevant specification	
Misalignment of hole and land	1a, 2a		Complete composite test pattern	There shall be no interruption of the land. There shall be no break-out at the junction of the land and the conductor	
Positional tolerance of hole centres				The hole centres shall be within any deviation specified in the relevant specification	
Electrical tests					
Resistance of interconnections	3b	*	L	The resistance shall comply with the relevant specification	
Short circuit	4a	*	C		
Insulation resistance	6a			The insulation resistance shall comply with the relevant specification	Insulation resistance shall be measured before and after environmental conditioning and at elevated temperature, as specified in the relevant specification
Preconditioning	18a				
Measurement at standard atmospheric conditions					
Surface layers	6a	*	E		
Internal layers	6b	*	J		
Between layers	6c	*	M		
Conditioning, as specified in IEC Publication 68-2-3: Test Ca: Damp Heat, Steady State, or Publication 68-2-38: Test Z/AD: Composite Temperature/Humidity Cyclic Test					Applicable conditioning to be specified in the relevant specification

*See 2.