



**SLOVENSKI STANDARD**  
**SIST CECC 23 600-801:2002**  
**01-maj-2002**

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**Capability Detail Specification: Flex-rigid multilayer printed boards with through connections**

Capability Detail Specification: Flex-rigid multilayer printed boards with through connections

Bauartspezifikation zur Anerkennung der Befähigung: Starr-flexible Mehrlagen-Leiterplatten mit Durchverbindungen

Spécification particulière d'agrément: Cartes imprimées multicouches flexorigides avec connexions transversales

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**Ta slovenski standard je istoveten z: CECC 23 600-801:1998**

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DETAIL SPECIFICATION  
SPÉCIFICATION PARTICULIÈRE  
BAUARTSPEZIFIKATION

CECC 23 600-801

February 1998

English version

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Flex-rigid multilayer printed boards with through connections**

Spécification particulière  
d'Agrément:  
Cartes imprimées multicouches  
flexorigides avec connexions  
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This Capability Detail Specification was approved on 1997-08-06.

Up-to-date lists and bibliographical references of other detail specifications relating to EN 123000:1991 and EN 123600:1996 may be obtained on application to the Central Secretariat or to any CENELEC member.

This CECC Detail Specification 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.

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**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**

## Foreword

This Capability Detail Specification has been prepared by CENELEC/TC CECC/SC 52, Printed Boards (formerly designated CECC Working Group 23).

It was approved as CECC 23 600-801 on 1997-08-06.

It should be read in conjunction with EN 123000:1991 and EN 123600:1996 and with the current regulations for the CECC System.

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## 1 General

### 1.1 Scope

This Capability Detail Specification (CapDS) is based upon EN 123600. It relates to flex-rigid multilayer printed boards with through connections, made with materials and surface finishes as specified in clause 2.

### 1.2 Object

To specify the Capability Qualifying Component (CQC), its characteristics to be tested, the test methods and conditions to be applied and the requirements to be fulfilled for testing basic and extended capability.

## 2 Capability Qualifying Component (CQC)

Test boards to be used as CQCs for basic capability shall:

- be made from a combination of the materials specified in 2.1 of this CapDS. The construction shall be as given in 8.3 of EN 123600.
- bear the composite test pattern (CTP) specified in 8.3 of EN 123600 (or equivalent CTP), for basic and other metallic finishes. CTPs as specified in 8.2 of EN 123200 (or equivalent CTP) shall be used to demonstrate organic surface finishes and external bonded heat sinks.
- have one of the surface finishes specified by groups 11, 12, 13, 14, 15, 16, or 18 in 2.2 of this CapDS.

Requirements for test boards to be used as modified CQCs for the demonstration of additional capability are detailed in clause 5 of this CapDS.

### 2.1 Materials

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Material group designation	Specification	Base Material		Base material (thickness range)	Cu thickness (µm)
		Type	Grade		
A	EN 60249-2-11	Epoxide woven glass	General purpose	0,05 .....0,8 mm	18, 35 70, 105
	EN 60249-2-12	Epoxide woven glass	Defined flammability	≥ 0,05 mm	
	EN 60249-3-1G	Prepreg	General purpose	≥ 0,05 mm	n.a.
	EN 60249-3-1GF	Prepreg	Defined flammability		
B	EN 60249-2-8	Polyester (PETP) film	General Purpose	12,5 ..... 125 µm	18, 35, 70
	EN 60249-2-13	Polyimide film	General purpose	12,5 ..... 125 µm	
	EN 60249-2-15	Polyimide film	Defined flammability	12,5 ..... 125 µm	

## 2.2 Surface finishes

### 2.2.1 Metallic finishes

Finish group Designation	Surface finish	Abbreviation for QPL	Remarks
11	Bare copper	Cu	
12	Copper with solderable organic protective coating	Cu(opc)	
13	Copper with oxide	Cu(CuO)	
14	Tin, Tin-Lead	Sn, SnPb	
15	Tin-Lead (fused)	SnPb(f)	
16	Tin-Lead (dipped and levelled)	SnPb(dl)	
17			not assigned
18	Immersion Gold over Electroless Nickel	AuNi(smt)	
19			not assigned
20			not assigned
21	Specimen K 5µm, gold plated on copper, remainder using finish group 11-17 (see below)	5AuCu	
22	Specimen K 0,7 µm, gold plated on nickel, remainder using finish group 11-17 (see below)	0,7AuNi	
23	Specimen K 2,5 µm, gold plated on copper, remainder using finish group 11-17 (see below)	2,5AuCu	
24	Specimen K 2,5 µm, gold plated on nickel, remainder using finish group 11-17 (see below)	2,5AuNi	

The demonstration of metallic group finishes 21, 22, 23 or 24 shall be combined with a finish from groups 11, 12, 13, 14, 15, 16 or 18. Each claimed combination of metallic finishes shall be tested separately. Selective and non-selective finishes of the same material, where claimed, shall be demonstrated separately.

#### 2.2.1.1 Accelerated ageing

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The ability of finish groups 11, 12, 13, 14, 15, 16 or 18 to solder after extended or adverse storage conditions is demonstrated using accelerated ageing. This test shall be carried out on those finishes where accelerated ageing is claimed. Each finish that has complied with the requirements of the ageing test is highlighted by the inclusion of an asterisk (\*) adjacent to that finish in the manufacturers abstract of capability as published in the QPL.

### 2.2.2 Organic finishes (where claimed)

Finish group designation	Organic finish	Abbreviation for QPL
a	Adhesive Coated film coverlayer	AFC
b	Dry film solder mask	DSM
c	Wet resist solder mask / coverlayer	WSM
d	Liquid photopolymer solder mask	LSM
e	Liquid Photopolymer coverlayer	LPC
f	Marking inks	MI
g	Conductive Ink	CI

The demonstration of organic finish groups a, b, c, d, e, f or g shall be over a finish from groups 11, 12, 13, 14, 15, 16, or 18. All claimed types of solder resist shall be tested separately.

### 2.3 Variant designation

The combination of any material group designated in 2.1 and any of the surface finishes designated in 2.2 constitutes a variant. The variant is designated by the combination of both material and finish group designations . e.g. A12(b) or A12/21(c).

## 3 Capability approval

### 3.1 Range of capability approval

Capability approval granted on the testing of one variant is valid within the limits specified in 3.7 of EN 123000 for metal clad base material within one group designation, all base material thicknesses and all foil thicknesses of the material in accordance with 2.1 of this CapDS; and all metallic surface finishes within one surface finish group as given in 2.2.1 of this CapDS, that is

finish group 11	covers finish group 11 only
finish group 12	covers finish group 11 and 12
finish group 13	covers finish group 11 and 13
finish group 14	covers finish group 11 and 14
finish group 15	covers finish group 11 and 15
finish group 16	covers finish group 11 and 16
finish group 18	covers finish group 18 only
finish group 21	covers finish group 21 only
finish group 22	covers finish group 22 and 24
finish group 23	covers finish group 21 and 23
finish group 24	covers finish group 24 only

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### 3.2 QPL information

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Information for the QPL (published as CECC 00.200) shall be given in accordance with 3.4 of EN 123000 , and shall contain the following details relative to the CapDS:

- reference to the CECC Generic Specification EN 123000
- reference to the CECC Sectional Specification EN 123600
- reference to the CECC CapDS CECC 23 600-801
- base material for which approval is granted as given in 2.1 of this CapDS
- the surface finishes for which approval is granted as given in 2.2 of this CapDS
- any additional capability 3.5.3 of EN 123000 refers

## 4 Capability test programme

NOTE: In all cases the number of failures permitted is zero.

### 4.1 Capability demonstration

Capability shall be demonstrated using 9 CTPs, of one variant from each material group claimed. Testing shall be in accordance with Table I.

#### 4.1.1 Other metallic surface finishes

If claimed, other metallic surface finishes, as designated in 2.2.1 shall be demonstrated by the manufacture and testing of 3 CTPs plus sufficient extra A and H specimens to meet the requirements of Table II. The maximum active board size for the finish shall be demonstrated. See also clause 5.

#### 4.1.2 Organic surface finishes



#### 4.1.2 Organic surface finishes

Each claimed organic surface finish, as designated in 2.2.2, shall be demonstrated by the manufacture and testing of 3CTPs using the pattern specified in annex A (marking inks) or annex B (solder masks) of CECC 23 200-801. Testing shall be in accordance with Table III of this CapDS.

#### 5 Additional capability

Maximum active board size	see 8.3 of EN 123000
Minimum conductor width and spacing	Specimen F of the CTP to be modified to provide additionally 5 conductors and 4 spacings, each of the claimed minimum. Initial foil thickness of less than 35 µm may be used for this demonstration, but the thickness used shall be declared.
Metallic conductor finishes	Manufacturers are permitted to demonstrate conductor finishes other than those detailed in 2.2.1. The finish shall be demonstrated in accordance with table IIa and detailed in the manufacturer's Capability Manual.

#### 6 Traceability

Traceability of all specimens to the original product shall be maintained. The method used to identify individual test specimens shall not prejudice the test result.

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(Table I)

Characteristics	Test No. IEC 60326-2	Specimen of Composite Test Pattern	Requirements	Remarks
			Holes with plating voids shall not exceed 5% of the total number of plated-through holes	
Board edges		All CQCs	The edges of the board and internal cut-outs shall be clean cut without tears or nicks	
Eyelets		All CQCs	Eyelets shall be firmly secured. Plated eyelets shall not have exposed bare metal. Eyelets shall not have cracked flanges. There shall be no damage to conductors or substrate around the eyelet.	
Bonding Conductor to substrate	1a	All CQCs	There shall be no separation of the conductors from the substrate by apparent blisters or wrinkles other than those permitted in the material specification.	
Bonding Coverlayer to substrate and pattern	1	All CQCs	<p>The bonding shall appear to be complete and uniform. Minor delaminations are permitted in the following positions:</p> <p>a) At random locations away from the conductors. Such delaminations shall have an area not exceeding 5 mm<sup>2</sup> and shall be more than 0,5 mm<sup>2</sup> from the edges.</p> <p>b) Along conductor edges. Such delaminations shall not infringe upon the design spacing between the conductors by more than 20% of the design width by visual estimation.</p> <p>There shall be a minimum continuous bonding width of 0,5 mm between adjacent conductors. There shall be no delamination with conductor spacings less than 0,5 mm.</p>	
Conductor defects	1b	All CQCs	<p>There shall be no breaks in conductors intended to be continuous.</p> <p>The presence of local defects (e.g. nicks and pinholes) shall not reduce the conductor width by more than 25%</p> <p>The length of the defect shall not be greater than the nominal conductor width.</p>	<p>Where necessary, this shall be verified by dimensional examination using test 2a.</p> <p>Indentations in conductors, other than those in edge board contacts, shall not be a reason for rejection.</p>
Particles between conductors	1b or 1c	All CQCs	Residual metallic particles are permissible provided that the leakage path is not reduced by more than 20% or to less than the distance required for circuit voltage.	Where necessary, this shall be verified by dimensional examination using test 2a.
Edge connector defects	2a	All specimens K	The surface of edge board contacts within the contact zone shall be smooth, and free from pitting or scratches penetrating the surface finish.	