

Förderverein für Elektrotechnische Normung (FEN) e. V.
Cenelec Electronic Components Committee

CECC

Système Harmonisé d'Assurance de la Qualité
des Composants Electroniques

SPECIFICATION PARTICULIERE CADRE

● RESEAUX RESISTIFS A COUCHES (HOMOLOGATION)

Harmonized System of Quality Assessment for
Electronic Components

BLANC DETAIL SPECIFICATION

● FILM RESISTOR NETWORKS (QUALIFICATION APPROVAL)

Harmonisiertes Gütebestätigungssystem für
Bauelemente der Elektronik

VORDRUCK FÜR
BAUARTSPEZIFIKATION

NETZWERKE AUS FESTWIDERSTÄNDEN IN SCHICHTTECHNIK (BAUARTZULASSUNG)



1

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Information about the System may be obtained from:



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and
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or from the National Authorized Institutions
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who can supply copies of:

- 1 The Internal Regulations of the FEN e.V.
- 2 CECC Specifications of the FEN and National Specifications for the System
- 3 CECC 00 200: Qualified Products List (QPL)
- 4 CECC 00 300: CECC Publications and their related national documents

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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 by 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 specifications for FILM AND HYBRID INTEGRATED CIRCUITS. It should be read in conjunction with the current regulations for the CECC System.

At the date of printing of this specification, 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 specification was prepared by CECC WG 21 : "HYBRID MICRO-CIRCUITS".

It is based, wherever possible, on the Publications of the International Electrotechnical Commission.

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

<u>Document</u>	<u>Date of voting</u>	<u>Report on the voting</u>
CECC(Secretariat)1925	May 1986	CECC(Secretariat)2107

BLANK DETAIL SPECIFICATION

A blank detail specification is a supplementary document to the sectional specification and contains requirements for style and layout and minimum content of detail specifications.

In the preparation of detail specifications the content of Sub-clause 2.3 of the sectional specification shall be taken into account.

The numbers between square brackets on the first page correspond to the following information which shall be inserted in the position indicated :

Identification of the detail specification and of the resistor network

- [1] The name of the National Standards Organization under whose authority the detail specification is published and, if applicable, the organization from whom the detail specification is available.
- [2] The CECC Symbol and the number allotted to the detail specification by the CECC General Secretariat.
- [3] The number and issue number of the CECC generic or sectional specification as relevant; also national reference if different.
- [4] If different from the CECC number, the national number of the detail specification, date of issue and any further information required by the national system, together with any amendment numbers.
- [5] If possible, a short description of the technique and of the type or function of the film resistor network.
- [6] Electrical circuit drawing showing all resistors and connections contained in the network. Terminal pin number shall be shown. Individual resistors shall be marked as R₁, R₂, R₃, etc.
- [7] Information on typical construction (when applicable)

Note : When the resistor network is not designed for use on printed board applications, this shall be clearly stated in the detail specification in this position.

- [8] Outline drawing with main dimensions which are of importance for interchangeability and/or reference to the national or international documents for outlines. Alternatively, this drawing may be given in an annex to the detail specification.
- [9] Application or group of applications covered and/or assessment level

Note : The assessment level(s) to be used in a detail specification shall be selected from 3.3 of CECC 64 100. This implies that one blank detail specification may be used in combination with several assessment levels, provided the grouping of the tests does not change.

- [10] Reference data on the most important properties to allow comparison between the various resistor network types.

Specification available from : [1]	CECC 64 101-XXX [2] Page 1 of ... 
ELECTRONIC COMPONENTS OF ASSESSED QUALITY IN ACCORDANCE WITH : [3]	[4]
Outline and dimensions - (see Table 1) (first angle projection) : [8] (Other shapes are permitted within the dimensions given) (1) All dimensions in mm	FIXED FILM RESISTOR NETWORK [5]
	ENCAPSULATED/EMBEDDED [7]
	ASSESSMENT LEVEL(S) : E [9] Stability class : ... %

NOTE 1 : The non-dimensioned details do not affect the performance of the devices.

[6] [10]

Information about manufacturers who have components qualified to this detail specification is available in the current CECC 00 200 : Qualified Products List.

SECTION 1

GENERAL DATA

1.1 RECOMMENDED METHOD(S) OF MOUNTING (to be inserted)

In accordance with 2.3.2 of CECC 64 100.

1.2 DIMENSIONS, RATINGS AND CHARACTERISTICS

TABLE 1

Style	Rated network dissipation at 70 °C (W)	Isolation voltage between elements (if applicable) (V)	Dimensions (mm)

1.2.1 Ratings and characteristics of the resistor elements

TABLE 2

Resistor element	Rated resistance (Ω)	Resistance tolerance (%)	Rated element dissipation at 70 °C (W)	Limiting element voltage V d.c. or a.c. r.m.s. (V)	Temperature coefficient ($10^{-6}/^{\circ}\text{C}$)	Stability class (%)	Stability long term test (% + Ω)	Stability short term test (% + Ω)
R ₁								
R ₂								
R ₃								
R ₄								

Note : Other presentations of the above information may be necessary, but the above presentation should be followed as much as possible.

1.2.2 Ratings and characteristics of the network

Climatic category	/ /
Low air pressure	8,5 kPa (85 mbar)
Functional characteristics (if applicable)	
Differential temperature resistance characteristic between Rx and Ry (if applicable)	... %
Tolerance on rated ratio between Rx and Ry (if applicable)	... %
Differential resistance change between Rx and Ry (if applicable)	... %
Test method for differential drift	

1.2.3 Derating

Networks covered by this specification are derated according to the following curve :

(A suitable curve to be included
in the detail specification)

Note : See also 2.2.5 of CECC 64 100.

1.3 RELATED DOCUMENTS

Generic Specification : CECC 64 000 (1988)
Sectional Specification : CECC 64 100 (1988)

1.4 MARKING

The marking of the components and package shall be in accordance with the requirements of 2.5 of CECC 64 000.

Note : The details of the marking of the component and package shall be given in full in the detail specification.

1.5 ORDERING INFORMATION

Orders for networks covered by this specification shall contain, in clear or in coded form, the following minimum information :

- 1) Circuit type for example : thick film resistor network.
- 2) Number of the detail specification with style reference and assessment level, if appropriate.
- 3) Function of the circuit, if appropriate.
- 4) Basic functional characteristics with tolerances, if appropriate.

1.6 CERTIFIED TEST RECORDS

Required/not required.

1.7 ADDITIONAL INFORMATION (not for inspection purposes)

The detail specification may include information (which is not normally required to be verified by the inspection procedure) such as curves, drawings and notes for the clarification of the detail specification.

1.8 ADDITIONAL OR INCREASED SEVERITIES OR REQUIREMENTS TO THOSE SPECIFIED IN THE GENERIC AND/OR SECTIONAL SPECIFICATION

Note : Additions or increased requirements should be specified only when essential.

SECTION 2

INSPECTION REQUIREMENTS

2.1 PROCEDURES

- 2.1.1 For qualification approval the procedure shall be in accordance with CECC 64 100.
- 2.1.2 For Quality Conformance Inspection the test schedule Table 3 includes sampling, periodicity, severities and requirements. The formation of inspection lots is covered by 3.3.1 of CECC 64 100.

Note : When drying is called for, Procedure I of 4.2.1 of CECC 64 000 shall be used.

TABLE 3

- Notes :
1. Sub-clause numbers of tests refer to CECC 64 000 for fixed film resistors networks except for functional characteristics, resistance ratio, differential resistance/ temperature characteristic which refer to CECC 64 100. Since performance requirements depend very much on the configuration of the network, they will be given by the detail specification. When appropriate these performance requirements shall be selected from Tables 1a, 1b and 2 of CECC 64 100.
 2. Inspection Levels and AQLs are selected from IEC 410 : Sampling Plans and Procedures for Inspection by Attributes.
 3. In this table : p = periodicity (in months)
 n = sample size
 c = acceptance criterion (permitted number of defectives)
 D = destructive
 ND = non-destructive
 IL = inspection level
 AQL = acceptable quality level } IEC 410
 4. In those cases where the measurements of individual resistive elements is not appropriate, the detail specification shall specify which measurements shall be made.

TABLE 2

(See notes on page 7)

SUB-CLAUSE NUMBER AND TEST (See Note 1)	D or ND	CONDITIONS OF TEST (See Note 1)	IL (See Note 2)	AQL	PERFORMANCE REQUIREMENTS (See Note 1)
GROUP A INSPECTION (lot-by-lot) Sub-Group A1 4.3.1 Visual examination	ND		S-4	1,0%	As in 4.3.1 Legible marking and as speci- fied in 1.4 of this specifica- tion
Sub-Group A2 4.3.2 Dimensions (gauging) 4.4.1 Resistance (see Note 4) 4.4.3 Functional characte- ristics (if applicable) 4.4.2 Resistance ratio (if applicable)	ND		S-4	1,0%	As specified in Table 1 of this specification ... ± ... %
GROUP B INSPECTION (lot-by-lot) Sub-Group B1 4.4.5 Voltage proof (Insulated networks only)	ND	Method : ...	S-3	1,0%	No breakdown or flashover
Sub-Group B2 4.5.2 Solderability 4.5.4 Rapid change of temperature	D	Without ageing Method : ... θ : Lower category A temperature θ : Upper category B temperature Visual examination Resistance	S-3	2,5%	Good tinning as evidenced by free flowing of the solder with wetting of the terminations or solder shall flow within ... s, as applicable As in 4.3.1 Legible marking and as speci- fied in 1.4 of this specifica- tion No visible damage $\Delta R \leq \pm (... \% R + ... \Omega)$

(Continued)

(Continuation)

SUB-CLAUSE NUMBER AND TEST (See Note 1)	D or ND	CONDITIONS OF TEST (See Note 1)	IL (See Note 2)	AQL	PERFORMANCE REQUIREMENTS (See Note 1)
<u>Sub-Group B3</u> 4.4.6 Temperature coefficient of resistance	ND	This test is applicable only when a temperature coefficient of resistance of less than $\pm 50 \cdot 10^{-6}/^{\circ}\text{C}$ is claimed. One cycle of 20°C to 70°C to 20°C only	S-3	2,5%	$\alpha: \dots 10^{-6}/^{\circ}\text{C}$
2.3.23 Differential resistance/temperature characteristic (if applicable)		Lower category temperature/ 20°C 20°C /upper category temperature			$\Delta \text{R.T.C.} \leq \dots \%$ $\Delta \text{R.T.C.} \leq \dots \%$

SUB-CLAUSE NUMBER AND TEST (See Note 1)	D or ND	CONDITIONS OF TEST (See Note 1)	SAMPLE SIZE AND CRITERION OF ACCEPTABILITY (See Note 3)			PERFORMANCE REQUIREMENTS (See Note 1)
<u>GROUP C INSPECTION</u> (periodic) <u>Sub-Group C1A</u> Half of the sample of Sub-Group C1	D		p	n	c	
4.5.1 Robustness of terminations		See 2.4.9 of CECC 64 100. Visual examination Resistance	3	5		No visible damage $\Delta R \leq \pm (\dots \% R + \dots \Omega)$
4.5.3 Resistance to soldering heat		Solder bath method 1A Visual examination Resistance				No visible damage Legible marking $\Delta R \leq \pm (\dots \% R + \dots \Omega)$

(Continuation)

SUB-CLAUSE NUMBER AND TEST (See Note 1)	D or ND	CONDITIONS OF TEST (See Note 1)	SAMPLE SIZE AND CRITERION OF ACCEP- TABILITY (See Note 3)			PERFORMANCE REQUIREMENTS (See Note 1)
			P	n	c	
4.4.6 Variation of resistance with temperature		Lower category - temperature/20 °C 20 °C/upper cate- gory temperature				ΔR $R \leq \dots \%$ or $\alpha: \dots 10^{-6}/^{\circ}\text{C}$ ΔR $R \leq \dots \%$ or $\alpha: \dots 10^{-6}/^{\circ}\text{C}$
4.4.8 Overload		See 2.4.4 of CECC 64 100. Visual examination Resistance				No visible damage Legible marking $\Delta R \leq \pm(\dots \%R + \dots \Omega)$
<u>Sub-Group C1B</u> Other half of the sample of Sub-Group C1	D		3	5		
4.5.4 Rapid change of temperature		0 : Lower cate- A gory tempera- ture 0 : Upper cate- B gory tempera- ture Visual examination Resistance				No visible damage $\Delta R \leq \pm(\dots \%R + \dots \Omega)$
4.5.6 Vibration		Method of mounting See 1.1 of this specification Procedure B4 Frequency range : 10 to 500 Hz Amplitude : 0,75mm or acceleration 98 m/s ² (whichever is the less severe) Total duration : 6h Visual examination Resistance				No visible damage $\Delta R \leq \pm(\dots \%R + \dots \Omega)$

(Continuation)

SUB-CLAUSE NUMBER AND TEST (See Note 1)	D OR ND	CONDITIONS OF TEST (See Note 1)	SAMPLE SIZE AND CRITERION OF ACCEP- TABILITY (See Note 3)			PERFORMANCE REQUIREMENTS (See Note 1)
			p	n	c	
<u>Sub-group C1</u> Combined sample of specimens of Sub-groups C1A and C1B	D		3	10	1	
4.5.7 Climatic sequence - Dry heat, - Damp heat, cyclic, Test D _b , first cycle - Cold, - Low air pressure, - Damp heat, cyclic Test D _b , remaining cycles		8,5 kPa (85 mbar) Visual examination Resistance Differential resistance change (if applicable) Insulation resis- tance between resistor elements (if applicable), See also 2.4.6 of CECC 64 100 Meas.volt.: ...V Voltage proof between resistor elements (if applicable), see also 2.2.5 of CECC 64 100				No visible damage Legible marking $\Delta R \leq \pm (.. \% R + .. \Omega)$ $< ... \%$ $R \geq 1 \text{ G}\Omega$ No breakdown or flashover
<u>Sub-group C2</u> 4.5.10 Endurance at 70 °C	D	See also 2.4.5 of CECC 64 100 Duration : 1000 h Examination at 48 h, 500 h and 1000 h : Visual examination Resistance	3	5	1	No visible damage $\Delta R \leq \pm (.. \% R + .. \Omega)$

(Continuation)

SUB-CLAUSE NUMBER AND TEST (See Note 1)	D or ND	CONDITIONS OF TEST (See Note 1)	SAMPLE SIZE AND CRITERION OF ACCEPTABILITY (See Note 3)			PERFORMANCE REQUIREMENTS (See Note 1)
		Differential resistance change (if applicable) Examination at 1000 h Insulation resistance between resistor elements (if applicable), see 2.4.6 of CECC 64 100 Meas. volt.: ...V ----- The tests on one sample, each year, shall be extended to 8000 h Examination at 2000 h, 4000 h and 8000 h : Resistance	p	n	c	$\leq \dots \%$ $R \geq 1 \text{ G}\Omega$ ----- $\Delta R \leq \pm (\dots \% R + \dots \Omega)$ (The results obtained are for information only)
<u>Group D INSPECTION</u> (periodic) <u>Sub-Group D1</u> 4.5.8 Damp heat, steady state	D	Visual examination Resistance Insulation resistance between resistor elements (if applicable), see also 2.4.6 of CECC 64 100 Meas. volt.: ...V Voltage proof between resistor elements (if applicable), see also 2.4.7 of CECC 64 100.	12	12	1	No visible damage Legible marking $\Delta R \leq \pm (\dots \% R + \dots \Omega)$ $R \geq 1 \text{ G}\Omega$ No breakdown or flashover

(Continuation)

SUB-CLAUSE NUMBER AND TEST (See Note 1)	D or ND	CONDITIONS OF TEST (See Note 1)	SAMPLE SIZE AND CRITERION OF ACCEPTABILITY (See Note 3)			PERFORMANCE REQUIREMENTS (See Note 1)
<u>Sub-group D2</u> 4.3.2 Dimensions (detail) 4.5.11 Endurance at upper category temperature	D	Duration : 1000 h Examination at 48 h, 500 h and 1000 h : Visual examination Resistance Differential resistance change (if applicable) Examination at 1000 h : Insulation resistance between resistor elements (if applicable), see 2.4.6 of CECC 64 100 Meas. volt.: ...V	p 36	n 10	c 1	As specified in Table 1 of this specification No visible damage $\Delta R \leq \pm (.. \% R + .. \Omega)$ $\leq ... \%$ $R \geq 1 \text{ G}\Omega$