



BS E9076 : Part 1 : 1976
CECC 30100 : 1975

UDC 621.37/.39 : 621.319.4 : 621.315.616.9 : 678.7 - 416

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Specification

Harmonized system of quality assessment for electronic components: Sectional specification for polycarbonate dielectric capacitors and polyethylene terephthalate dielectric capacitors for d.c. use

Part 1. Polyester film capacitors with metal foil electrodes

Système harmonisé d'assurance de la qualité des composants électroniques
Spécification intermédiaire : Condensateurs à diélectrique en film de polyester

Harmonisiertes Gütebestätigungssystem für Bauelemente der Elektronik
Rahmenspezifikation: Kondensatoren mit polyester-film-dielektrikum

Amendments issued since publication

Amd. No.	Date of issue	Text affected

British Standards Institution

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FOREWORD

This British Standard has been prepared under the authority of the Telecommunication Industry Standards Committee. It is identical to CENELEC Electronic Components Committee (CECC) 30100 'Harmonized system of quality assessment for electronic components : Sectional specification for polyester film capacitors' from section one to the end of appendix A. For the purposes of this British Standard the text of CECC 30100 should be modified as follows:

- (a) the decimal point should replace the decimal comma wherever it appears;
- (b) all references to CECC 30000 should be replaced by references to BS E9070 : 1975 'Harmonized system of quality assessment for electronic components : Generic specification for fixed capacitors';
- (c) all references to IEC 63 should be replaced by references to BS 2488 : 1966 'Schedule of preferred numbers for the resistance of resistors and the capacitance of capacitors for telecommunication equipment';
- (d) all references to a part of IEC 68 should be replaced by references to the corresponding part of BS 2011 'Methods for the environmental testing of electronic components and electronic equipment', i.e.
 - references to IEC 68-2-1 should be replaced by references to BS 2011 : Part 2A : 1967;
 - references to IEC 68-2-2 should be replaced by references to BS 2011 : Part 2B : 1966;
- (e) all references to IEC 202 should be replaced by references to BS 2401 : 1966, 'Specification for polyester film dielectric capacitors for direct use in telecommunication and allied electronic equipment';
- (f) all references to ISO 3 should be replaced by references to BS 2045 : 1965 'Preferred numbers'.

This specification gives the standard values for characteristics and ratings and also the inspection requirements for fixed polyester film capacitors of assessed quality. It selects those tests given in BS 9070, which are considered appropriate to fixed polyester film capacitors, and should be read in conjunction with that standard.

This standard is issued in the BS E9000 series as it is a harmonized specification within the CECC system. It is uniform in content with the forthcoming BS E9076 : Part 2 'Sectional specification for metallized polycarbonate film capacitors', and BS E9076 : Part 3 'Sectional specification for metallized PETP capacitors'. The existing non-harmonized British Standard BS 9070 : Section 6, will eventually be superseded by these standards, but for a period both standards will exist because of existing approvals.

A brief explanation of the CECC is given in appendix B.

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BRITISH STANDARD SPECIFICATION

HARMONIZED SYSTEM OF QUALITY ASSESSMENT FOR ELECTRONIC COMPONENTS:
SECTIONAL SPECIFICATION FOR POLYCARBONATE DIELECTRIC CAPACITORS
AND POLYETHYLENE TEREPHTHALATE DIELECTRIC CAPACITORS
FOR D.C. USE

PART 1. POLYESTER FILM CAPACITORS WITH METAL FOIL ELECTRODES

SECTION 1 - GENERAL1.1 Scope

This document relates to fixed polyester film dielectric d.c. capacitors whose electrodes are metal foils.

1.2 Related documents

The following documents and any other documents to which they may relate are mandatory unless otherwise stated:

CECC 30 000	1975	Generic Specification : Fixed Capacitors
IEC 202	1965	Polyester film dielectric capacitors for direct current

1.3 Terminology

See clause 2.2 of CECC 30 000.

1.4 Marking

The following marking information, in the order of importance given below, is required :

- 1 Rated capacitance
- 2 Rated voltage
Direct voltage may be indicated by the symbol $\overline{\text{---}}$
- 3 Category voltage and maximum category temperature
- 4 Indication as to which termination is connected to the outside foil (where applicable) ; This indication shall be made by a heavy type arrowhead pointing towards the outside foil termination or by any other suitable means
- 5 Tolerance on rated capacitance
Tolerances may be indicated by letters if sufficient space is not available for figures and the following letters shall be used :
 $J = \pm 5 \%$, $K = \pm 10 \%$ and $M = \pm 20 \%$
- 6 Manufacturer's name or Trade Mark
- 7 Indication of the appropriate category
- 8 Manufacturer's type designation



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- 9 Week (or month) and year of manufacture. This may be in code form ;
- 10 Reference to the national or CECC number of the blank detail specification.

The capacitor shall be clearly marked with 1, 2, 3 and 4 above and with as many as possible of the remaining items as are considered useful.

The package containing the capacitor(s) shall be clearly marked with all the information listed above.

Any additional marking shall be so applied that no confusion can arise.

SECTION 2 - RATINGS AND CHARACTERISTICS

2.1 Climatic categories

The capacitors, covered by this specification, are classified into categories according to the general rules given in IEC 68.

The preferred climatic categories are :

Category	Temperature range	Damp heat, long term
55/125/56	-55°C to +125°C	56 days
40/085/21	-40°C to + 85°C	21 days
10/085/04	-10°C to + 85°C	4 days

2.2 Rated capacitance

The standard values of the rated capacitance shall be taken from the following series :

1 - 1,5 - 2,2 - 3,3 - 4,7 - 6,8 - 10 and their decimal multiples.

These values conform with the E6 series of preferred values given in IEC 63 : Preferred Number Series for Resistors and Capacitors.

2.3 Tolerances on rated capacitance

The standard tolerances on the rated capacitance are :

$\pm 5 \%$, $\pm 10 \%$ and $\pm 20 \%$.

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2.4 Rated voltage

The standard values of rated voltage are :

50 - 63 - 100 - 125 - 160 - 200 - 250 - 400 - 630 -
1 000 - 1 600 - 2 500 - 4 000 and 6 300 V.

These values conform to the basic series of preferred values R5 given in ISO 3, with the addition of the values 5, 125 and 200 V, chosen from the R10 series of the same Recommendation.

Note: - If other values are needed, they shall be chosen from the R10 series.

SECTION 3 - QUALITY ASSESSMENT PROCEDURES

3.1 Primary stage of manufacture

The primary stage of manufacture is the winding of the capacitor element or the equivalent operation.

3.2 Certified test records

When certified test records are prescribed in the detail specification, the information required in clause 3.6 of CECC 30 000, Generic Specification : Fixed Capacitors shall be made available when requested by a purchaser. After the endurance test the parameters for which variables information is required are the capacitance change, $\tan \delta$ and the insulation resistance.

3.3 Qualification approval

Note. - Corresponds to type test in IEC 202.

3.3.1 Sampling

The sample shall be representative of the range of capacitors for which approval is sought. This may or may not be the complete range covered by the detail specification.

The sample shall consist of specimens having the lowest and highest voltages, and for these voltages the lowest and highest capacitances. When there are more than four rated voltages, an intermediate voltage shall also be tested. Thus for the approval of a range, testing is required of either four or six values (voltage/capacitance

combinations). Where the range consists of less than four values, the number of specimens to be tested shall be that required for four values.

The test schedule and the samples required for qualification approval are given in Table 1. The headings of columns No 4 to 10 have the following significance :

- 4 This is the number of specimens per value for each group or sub-group.
- 5 This is the total number of specimens required where four or less values are to be tested.
- 8 This is the total number of specimens required where six values are to be tested.
- 6 and 9 These are the corresponding numbers of permissible defectives in any group or sub-group for 5 and 8 respectively.
- 7 and 10 These are total numbers of permissible defectives for all groups (other than Group 0) and sub-groups combined for 5 and 8 respectively.

Spares are permitted as follows :

- One per value which may be used to replace the permitted defective in Group 0 ;
- One per value which may be used as replacements for specimens lost due to incidents not attributable to the manufacturer.

3.3.2 Tests

The complete series of tests specified in Table 1 are required for the approval of capacitors covered by one detail specification. The tests of each group shall be carried out in the given order.

The whole sample shall be subjected to the tests of Group 0 and then divided for the other Groups.

Specimens found defective during the tests of Group 0 shall not be used for the other Groups.

"One defective" is counted when a capacitor has not satisfied the whole or a part of the tests of a Group.

The approval is granted when the number of defectives does not exceed the number of permissible defectives per Group and for the whole sample.

3.4 Quality conformance inspection

3.4.1 Groups A and B inspection

These tests shall be carried out on a lot by lot basis according to Table 2.

A manufacturer may aggregate the current production into inspection lots subject to the following safeguards :

- 1 The inspection lot shall consist of capacitors produced with similar processes and materials, though they may be of different case sizes and values.
- 2 The sample tested shall comprise capacitors of each of the values and dimensions contained in the inspection lot
 - proportionately to their number
 - with a minimum of five of the same value.
- 3 If the strict application of the sampling plan requires less than five of any one value in the sample, the basis for the drawing of samples shall be agreed between manufacturers and the ONS.

3.4.2 Group C inspection

These tests shall be carried out on a periodic basis according to Table 3.

Samples shall be representative of the current production of the specified periods and shall be divided into high, medium and low voltage ratings. In each period a large, medium and small case size shall be tested from each voltage group. In subsequent periods other case sizes and/or voltage ratings in production shall be tested with the aim of covering the whole range.

Table 1

Test schedule for qualification approval

(Other assessment levels will be included later)

1	2	3	4	5	6	7	8	9	10
Group	Test	Clause No	Number of specimens and perm. defectives per value						
			for 4 or less values to be tested			for 6 values to be tested			
			nb. of specim.	nb. of specimens	perm. def.	perm. defect. total	nb. of specim.	perm. defect.	perm. defect. total
0	Visual examination, marking, dimensions	4.2							
	Voltage proof (between termin.)	4.3							
	Capacitance	4.4							
	Tangent of loss angle	4.5							
	Insulation resistance (between terminations)	4.6	24	96	1		144	2 ⁽²⁾	
	Sealing (1)	4.7							
	Spares		2	8			12		
1a	U : Robustness of terminations	4.8.1							
	Tb : Resistance to soldering heat	4.8.2	3	12	1		18	1	
1b	T : Solderability	4.9.2							
	Na : Rapid change of temperature	4.9.3							
	Fo : Vibration	4.9.4	6	24	1		36	2 ⁽²⁾	
	Eb : Bump	4.9.5							
1	*Ea : Shock and/or Climatic sequence, consisting of Tests Ba: Dry heat - D: Damp heat, accel. (1st cycle) - Aa: Cold - M: Low air pressure (1) .. D : Damp heat, accel., (rem. cycles	4.9.5.1 4.10	9	36	2 ⁽²⁾	3	54	3 ⁽²⁾	4
2	Ca : Damp heat steady state	4.11	5	20	1		30	2 ⁽²⁾	
3	Endurance	4.12	10	40	2 ⁽²⁾		60	3 ⁽²⁾	

(1) If required in the detail specification

(2) Not more than one defective is permitted from any one value