INTERNATIONAL STANDARD

IEC 60384-6-1

QC 300501

Second edition
2005-09

Fixed capacitors for use in electronic equipment –

Part 6-1:
Blank detail specification:
Fixed metallized polycarbonate film dielectric d.c. capacitors –
Assessment level E

Reference number
IEC 60384-6-1:2005(E)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 6-1: Blank detail specification: Fixed metallized polycarbonate film dielectric d.c. capacitors – Assessment level E

FOREWORD

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International Standard IEC 60384-6-1 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This second edition of IEC 60384-6-1 cancels and replaces the first edition published in 1987. It constitutes a technical revision. All changes that have been agreed upon can be categorized as minor revisions related to tables, figures and references..

The text of this standard is based on the following documents:

FDIS	Report on voting
40/1589/FDIS	40/1609/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The QC number that appears on the front cover of this publication is the specification number in the IEC Quality Assessment System for Electronic Components (IECQ).

This publication should be read in conjunction with IEC 60384-1 and IEC 60384-6.

This standard forms Part 6-1 of IEC 60384 which is published under the general title *Fixed capacitors for use in electronic equipment.*

Part 6 is composed as follows:

Part 6: Sectional specification – Fixed metallized polycarbonate film dielectric d.c. capacitors

Part 6-1: Blank detail specification – Fixed metallized polycarbonate film dielectric d.c. capacitors – Assessment level E

NOTE For the complete list of parts, see IEC 60384-6.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 6-1: Blank detail specification: Fixed metallized polycarbonate film dielectric d.c. capacitors – Assessment level E

INTRODUCTION

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. Detail specifications not complying with these requirements may not be considered as being in accordance with IEC specifications nor shall they so be described.

In the preparation of detail specifications, the content of 1.3 of the sectional specification shall be taken into account. The numbers between brackets on the first page correspond to the following information which shall be inserted in the position indicated.

Identification of the detail specification

[1] The International Electrotechnical Commission or the National Standards Organization under whose authority the detail specification is published.

[2] The IEC or National Standards number of the detail specification, date of issue and any further information required by the national system.

[3] The number and issue number of the IEC or national generic specification.

[4] The IEC number of the blank detail specification.

Identification of the capacitor

[5] A short description of the type of capacitor.

[6] Information on typical construction (when applicable).

NOTE When the capacitor is not designed for use in printed board applications, this should be clearly stated in the detail specification in this position.

[7] 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 appendix to the detail specification.

[8] Application or group of applications covered and/or assessment level.

NOTE The assessment level(s) to be used in a detail specification is/are selected from 3.5.4 of the sectional specification. 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.

[9] Reference data on the most important properties, to allow comparison between the various capacitor types.

[1]	IEC 60384-6-1-XXX [2] QC 300501-XXX
ELECTRONIC COMPONENTS OF ASSESSED QUALITY IN ACCORDANCE WITH: [3]	IEC 60384-6-1 [4] QC 300501
	FIXED METALLIZED POLYCARBONATE FILM DIELECTRIC DC CAPACITORS [5]
Outline drawing: (see Table 1) (...angle projection) [7]	[6]
	Assessment level(s): E [8]
(Other shapes are permitted within the dimensions given)	Performance grade:
For notes [ ], see preceding page.	

REFERENCE DATA: [9]

Information on the availability of components qualified to this detail specification is given in IEC QC 001005

1 General data

1.1 Recommended method(s) of mounting

See 1.3.1.1 of IEC 60384-6.

1.2 Dimensions

Table 1 – Case-size reference and dimensions

Case size reference	Dimensions mm						
	⌀	*L*	*H*	*d*	.....		

NOTE 1 When there is no case-size reference, Table 1 may be omitted and the dimensions should be given in Table 2, which then becomes Table 1.

NOTE 2 The dimensions should be given as maximum dimensions or as nominal dimensions with the tolerance.

1.3 Ratings and characteristics

Capacitance range (see Table 2)

Tolerance on rated capacitance

Rated voltage (see Table 2)

Category voltage (if applicable) (see Table 2)

Climatic category

Rated temperature

Maximum a.c. voltage (if applicable)

Maximum pulse load

Tangent of loss angle

Insulation resistance

Table 2 – Values of capacitance and of voltage related to case sizes

Rated voltage				
Category voltage[a]				
Rated capacitance (in nF and/or µF)	**Case size**	**Case size**	**Case size**	**Case size**

[a] If different from the rated voltage.

1.4 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60384-1:*Fixed capacitors for use in electronic equipment – Part 1: Generic specification*

IEC 60384-6:*Fixed capacitors for use in electronic equipment – Part 6: Sectional specification – Fixed metallized polycarbonate film dielectric d.c. capacitors*

IEC 60410 (all parts), *Terms and nomenclature for cores made of magnetically soft ferrites*

1.5 Marking

The marking of the capacitor and the package shall be in accordance with the requirements of 1.5 of IEC 60384-6.

NOTEThe details of the marking of the component and package should be given in full in the detail specification.

1.6 Ordering information

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

a) rated capacitance;

b) tolerance on rated capacitance;

c) rated d.c. voltage;

d) number and issue reference of the detail specification and style reference.

1.7 Certified records of released lots

Required/not required.

1.8 Additional information

(not for inspection purposes)

1.9 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.

Table 3 – Other characteristics

This table is to be used for defining characteristics which are additional to, or more severe than, those given in the sectional specification.

2 Inspection requirements

2.1 Procedures

2.1.1 For qualification approval, the procedures shall be in accordance with 3.4 of IEC 60384-6.

2.1.2 For quality conformance inspection, the test schedule (Table 4) includes sampling, periodicity, severities and requirements. The formation of inspection lots is covered by 3.5.1 of IEC 60384-6.

Table 4 – Test schedule for quality conformance inspection

Subclause number and test[a]	D or ND	Conditions of test[a]	*IL*	*AQL* [b]	Performance requirements[a]
Group A inspection (lot-by-lot)					
Subgroup A1	ND		S-4	2,5 %	
4.1 Visual examination					As in 4.1 Legible marking and as specified in 1.5 of this specification
4.1 Dimensions (gauging)					As specified in Table 1 of this specification
Subgroup A2	ND		II	1,0 %	
4.2.2 Capacitance					Within specified tolerance
4.2.3 Tangent of loss angle					As in 4.2.3.2
4.2.1 Voltage proof (Test A)					No breakdown or flashover
4.2.4 Insulation resistance (Test A)					As in 4.2.4.2
Group B inspection (lot-by-lot)					
Subgroup B1	ND		S-3	2,5	
4.5 Solderability		Without ageing Method: ...			Good tinning as evidenced by free flowing of the solder with wetting of the terminations or solder shall flow within ... s, as applicable
4.15 Solvent resistance of the marking (if applicable)		Solvent: ... Solvent temperature: ... Method 1 Rubbing material: ... Recovery time:			Legible marking

Subclause number and test[a]	D or ND	Conditions of test[a]	Sample size and criterion of acceptability[c]			Performance requirements[a]
			p	*n*	*c*	
Group C inspection (periodic)						
Subgroup C1A	D		6	9	1	
Part of sample of subgroup C1						
4.1 Dimensions (detail)						See detail specification
4.3.1 Initial measurements		Capacitance Tangent of loss angle: For C_R > 1 µF: at 1 kHz C_R ≤ 1 µF: at 10 kHz				
4.3 Robustness of terminations		Visual examination				No visible damage
4.4 Resistance to soldering heat		Method:				
4.14 Component solvent resistance (if applicable)		Solvent: ... Solvent temperature: ... Method 2 Recovery time:				See detail specification
4.4.2 Final measurements		Visual examination				No visible damage Legible marking
		Capacitance				$\Delta C/C$ ≤1 % for Grade 1 ≤2 % for Grade 2 of value measured initially
		Tangent of loss angle				Increase of tan δ: ≤0,003 C ≤ 1 µF Grade 1 ≤0,002 C > 1 µF Grade 1 ≤0,005 C ≤ 1 µF Grade 2 ≤0,003 C > 1 µF Grade 2 compared to values measured in 4.3.1
Subgroup C1B	D		6	18	1	
Other part of sample of subgroup C1						
4.6.1 Initial measurements		Capacitance Tangent of loss angle: For C_R > 1 µF: at 1 kHz C_R ≤ 1 µF: at 10 kHz				
4.6 Rapid change of temperature		T_A = Lower category temperature T_B = Upper category temperature Five cycles Duration t = 30 min				
		Visual examination				No visible damage
4.7 Vibration		Method of mounting: see 1.1 of this specification Frequency range: ... Hz to ... Hz Amplitude 0,75 mm or acceleration 100 m/s^2 (whichever is the less severe) Total duration: 6 h				

Subclause number and test[a]		D or ND	Conditions of test[a]	Sample size and criterion of acceptability[c]			Performance requirements[a]
				p	*n*	*c*	
4.7.2	Final inspection		Visual examination				No visible damage
4.8	Bump (or shock, see 4.9)		Method of mounting: see 1.1 of this specification Number of bumps: ... Acceleration: .. m/s^2 Duration of pulse: ... ms				
4.9	Shock (or bump, see 4.8)		Method of mounting: see 1.1 of this specification Acceleration: ... m/s^2 Duration of pulse: ... ms				
4.8.3 or 4.9.3	Final measurements		Visual examination				No visible damage
			Capacitance				$\Delta C/C$ ≤1 % for Grade 1 ≤2 % for Grade 2 of value measured initially
			Tangent of loss angle				Increase of tan δ: ≤0,003 $C \leq 1$ µF Grade 1 ≤0,002 $C > 1$ µF Grade 1 ≤0,005 $C \leq 1$ µF Grade 2 ≤0,003 $C > 1$ µF Grade 2 compared to values measured in 4.6.1
			Insulation resistance				≥ 50 % of values in 4.2.4.2
Subgroup C1		D		6	27	2	
Combined sample of specimens of subgroups C1A and C1B							
4.10	Climatic sequence						
4.10.2	Dry heat		Temperature: upper category temperature Duration: 16 h				
4.10.3	Damp heat, cyclic, Test Db, first cycle						
4.10.4	Cold		Temperature: lower category temperature Duration: 2 h				
4.10.5	Low air pressure (if required by the detail specification)		Air pressure: 8 kPa				
4.10.5.3	Final measurement		Visual examination				No permanent breakdown, flashover or harmful deformation of the case
4.10.6	Damp heat, cyclic, Test dB, remaining cycles						