

INTERNATIONAL STANDARD

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60384-9-1

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Fixed capacitors for use in electronic equipment –

Part 9-1:

Blank detail specification:

**Fixed capacitors of ceramic dielectric,
Class 2 – Assessment level EZ**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –**Part 9-1: Blank detail specification:
Fixed capacitors of ceramic dielectric, Class 2 –
Assessment level EZ**

FOREWORD

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International Standard IEC 60384-9-1 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment

This second edition cancels and replaces the first edition published in 1988. This second edition is a result of maintenance activities related to the previous edition. All changes that have been agreed upon can be categorized as minor revisions.

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

FDIS	Report on voting
40/1531/FDIS	40/1551/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.

IEC 60384 consists of the following parts, under the general title *Fixed capacitors for use in electronic equipment*:

- Part 1: Generic specification
- Part 2: Sectional specification: Fixed metallized polyethylene-terephthalate film dielectric d.c. capacitors
- Part 3: Sectional specification: Fixed tantalum chip capacitors
- Part 4: Sectional specification: Aluminium electrolytic capacitors with solid and non-solid electrolyte
- Part 5: Sectional specification: Fixed mica dielectric d.c. capacitors with a rated voltage not exceeding 3000 V – Selection of methods of test and general requirements
- Part 6: Sectional specification: Fixed metallized polycarbonate film dielectric d.c. capacitors
- Part 7: Sectional specification: Fixed polystyrene film dielectric metal foil d.c. capacitors
- Part 8: Sectional specification: Fixed capacitors of ceramic dielectric, Class 1
- Part 9: Sectional specification: Fixed capacitors of ceramic dielectric, Class 2
- Part 11: Sectional specification: Fixed polyethylene-terephthalate film dielectric metal foil d.c. capacitors
- Part 12: Sectional specification: Fixed polycarbonate film dielectric metal foil d.c. capacitors
- Part 13: Sectional specification: Fixed polypropylene film dielectric metal foil d.c. capacitors
- Part 14: Sectional specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains
- Part 15: Sectional specification: Fixed tantalum capacitors with non-solid or solid electrolyte
- Part 16: Sectional specification: Fixed metallized polypropylene film dielectric d.c. capacitors
- Part 17: Sectional specification: Fixed metallized polypropylene film dielectric a.c. and pulse capacitors
- Part 18: Sectional specification: Fixed aluminium electrolytic chip capacitors with solid and non-solid electrolyte
- Part 19: Sectional specification: Fixed metallized polyethylene-terephthalate film dielectric chip d.c. capacitors
- Part 20: Sectional specification: Fixed metallized polyphenylene sulfide film dielectric chip d.c. capacitors
- Part 21: Sectional specification: Fixed surface mount multilayer capacitors of ceramic dielectric, Class 1
- Part 22: Sectional specification: Fixed surface mount multilayer capacitors of ceramic dielectric, Class 2
- Part 23: Sectional specification: Fixed surface mount metallized polyethylene naphthalate film dielectric d.c. capacitors¹
- Part 24: Sectional specification – Surface mount fixed tantalum electrolytic capacitors with conductive polymer solid electrolyte^①
- Part 25: Sectional specification – Surface mount fixed aluminium electrolytic capacitors with conductive polymer solid electrolyte^①

¹ To be published.

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

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.

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FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –**Part 9-1: Blank detail specification:
Fixed capacitors of ceramic dielectric, Class 2 –
Assessment level EZ****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 be so described.

In the preparation of detail specifications, the content of 1.4 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 drafted.
- [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).

When the capacitor is not designed for use in printed board applications, this shall 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.

The assessment level(s) to be used in a detail specification shall be selected from the sectional specification, 3.5.4. 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.

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

[9]

1.1 Recommended method(s) of mounting (to be inserted)

(See IEC 60384-9, 1.4.2).

Table 1 – Case size reference and dimensions

Case size reference	Dimensions (in mm)						
	$\varnothing$	L	H	d			

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

The dimensions shall be given as maximum dimensions or as nominal dimensions with a tolerance.

1.3 Ratings and characteristics

Rated capacitance range (see Table 2)

Tolerance on rated capacitance

Rated voltage

Climatic category

Rated temperature

Tangent of loss angle

Insulation resistance

Temperature characteristic of capacitance

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

Rated voltage					
Rated capacitance (in pF and/or nF)	Tolerance %	Case size	Case size	Case size	Case size

Table 3 – Temperature characteristic of capacitance

Temperature range	Permissible capacitance variation	
	With no voltage applied	With U_R applied
–... °C/ +... °C	+... % / –... %	+... % / –... %

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 60384-9:200X, *Fixed capacitors for use in electronic equipment. Part 9: Sectional specification: Fixed capacitors of ceramic dielectric, Class 2*

IEC 60410:1973, *Sampling plans and procedures for inspection by attributes*

1.5 Marking

The marking of the capacitor and the packing shall be in accordance with the requirements of IEC 60384-9, 1.6.

The details of the marking of the component and packing shall 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:

- rated capacitance;
- tolerance on rated capacitance;
- rated d.c. voltage;
- temperature characteristic of capacitance;
- 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 4 – 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 the sectional specification, IEC 60384-9, 3.4.

2.1.2 For quality conformance inspection the test schedule (Table 5) includes sampling, periodicity, severities and requirements. The formation of inspection lots is covered by 3.5.1 of the sectional specification IEC 60384-9.

Table 5 – Test schedule for qualification conformance inspection

Subclause number and test ^a	D or ND	Conditions of test ^a	Number of specimens (<i>n</i>) and number of non-conforming items (<i>c</i>) ^b			Performance requirements ^a
			<i>IL</i>	<i>n</i>	<i>c</i>	
Group A inspection (lot-by-lot) Subgroup A0 4.3.1 Capacitance 4.3.2 Tangent of loss angle 4.3.3 Insulation resistance (Test A) 4.3.4 Voltage proof (Test A)	ND	Frequency: ... kHz Measuring Voltage: ... V Frequency and measuring voltage same as in 4.3.1 Method: ... Method: ...		100 % ^c		Within specified tolerance As in 4.3.2.3 As in 4.3.3.2 No breakdown or flashover
Subgroup A1 4.2 Visual examination	ND		S-4	^d	0	As in 4.2 Legible marking and as specified in 1.5 of this specification
Subgroup A2 4.2 Dimensions (gauging) ^e	ND		S-3	^d	0	As specified in Table 1 of this specification

Table 5 (continued)

Subclause number and test ^a	D or ND	Conditions of test ^a	Number of specimens (<i>n</i>) and number of non-conforming items (<i>c</i>) ^b			Performance requirements ^a
			<i>IL</i>	<i>n</i>	<i>c</i>	
Group B inspection (lot-by-lot) Subgroup B1 4.7 Solderability 4.16 Solvent resistance of the marking (if applicable)	D	Method: ... Solvent: ... Solvent temperature: ... Method 1 Rubbing material: cotton wool Recovery: ...	S-3	^{d)}	0	Good tinning as evidenced by free flowing of the solder with wetting of the terminations or solder shall flow within ... s, as applicable Legible marking
Subgroup B2 ^{g)} 4.4 Temperature characteristic of capacitance	ND	Special preconditioning as in 4.1 Capacitance	S-2	^{d)}	0	$\Delta C/C$ as in 4.4.3

Table 5 (continued)

Subclause number and test ^a	D or ND	Conditions of test ^a	Number of specimens (<i>n</i>) and number of non-conforming items (<i>c</i>) ^b			Performance requirements ^a
			<i>p</i>	<i>n</i>	<i>c</i>	
Group C inspection (periodic) Subgroup C1A Part of sample of subgroup C1 4.2 Dimensions (detail) 4.5 Robustness of terminations 4.6.2 Initial measurement 4.6 Resistance to soldering heat 4.6.4 Final measurements 4.15 Component solvent resistance (if applicable)	D	Visual examination Capacitance Special preconditioning as in 4.1 Method: ... Visual examination Capacitance Solvent: ... Solvent temperature: ... Method 2 Recovery: 24 h ± 2 h...	6	9	0 ^{f)}	As specified in Table 1 of this specification No visible damage No visible damage Legible marking ΔC/C as in 4.6.4
Subgroup C1B Other part of sample of subgroup C1 4.8 Rapid change of temperature 4.8.2 Initial measurement	D	Special preconditioning as in 4.1 Capacitance <i>T</i> _A = Lower category temperature <i>T</i> _B = Upper category temperature Five cycles Duration <i>t</i> ₁ = 30 min Recovery: 24 h ± 2 h Visual examination	6	18	0 ^{f)}	No visible damage