

INTERNATIONAL STANDARD

NORME INTERNATIONALE

QC 300301

Fixed capacitors for use in electronic equipment –
Part 4-1: Blank detail specification – Fixed aluminium electrolytic capacitors with
non-solid electrolyte – Assessment level EZ

Condensateurs fixes utilisés dans les équipements électroniques –
Partie 4-1: Spécification particulière cadre – Condensateurs fixes électrolytiques
à l'aluminium, à électrolyte non solide – Niveau d'assurance EZ



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –**Part 4-1: Blank detail specification –
Fixed aluminium electrolytic capacitors with non-solid electrolyte –
Assessment level EZ**

FOREWORD

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International Standard IEC 60384-4-1 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This third edition cancels and replaces the second edition published in 2000 and constitutes a minor revision related to tables, figures and references.

This bilingual version, published in 2008, corresponds to the English version.

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

CDV	Report on voting
40/1762/CDV	40/1820/RVC

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 French version of this standard has not been voted upon.

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).

The list of all parts of the IEC 60384 series, under the general title *Fixed capacitors for use in electronic equipment*, can be found on the IEC website.

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- withdrawn,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.

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FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 4-1: Blank detail specification – Fixed aluminium electrolytic capacitors with non-solid electrolyte – 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 contents 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, data 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 is 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 annex 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 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 60384-4-1-XXX QC 300301-XXX	[2]
ELECTRONIC COMPONENTS OF ASSESSED QUALITY IN ACCORDANCE WITH: IEC 60384-1 IEC 60384-4	IEC 60384-4-1 QC 300301	[4]
	FIXED ALUMINIUM ELECTROLYTIC CAPACITORS WITH NON-SOLID ELECTROLYTE	[5]
[3]		
Outline drawing: (see Table 1) (..... angle projection)		[6]
	[7]	
(Other shapes are permitted within the dimensions given.)	Assessment level(s): EZ Performance grade:	[8]

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

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[9]

[IEC 60384-4-1:2007](https://standards.iteh.ai/catalog/standards/sist/5e802ac6-3d67-4828-9f41-f0dfbe343a28/iec-60384-4-1-2007)

<https://standards.iteh.ai/catalog/standards/sist/5e802ac6-3d67-4828-9f41-f0dfbe343a28/iec-60384-4-1-2007>

1 General data

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

See 1.4.2 of IEC 60384-4.

1.2 Dimensions

Table 1 – Case size reference and dimensions

Case size reference	Dimensions mm					
	\varnothing	L	H	d	

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

NOTE 2 The dimensions are given as maximum dimensions or as nominal dimensions with a tolerance.

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1.3 Ratings and characteristics

Capacitance range (see Table 2)

Tolerance on rated capacitance [IEC 60384-4-1:2007](https://standards.iteh.ai/catalog/standards/sist/5e802ac6-3d67-4828-9f41-f0dfbe343a28/iec-60384-4-1-2007)

Rated voltage <https://standards.iteh.ai/catalog/standards/sist/5e802ac6-3d67-4828-9f41-f0dfbe343a28/iec-60384-4-1-2007> (see Table 2)

Category voltage (if applicable) (see Table 2)

Climatic category

Rated temperature

Rated ripple current (see Table 3)

Tangent of loss angle (see Table 3)

NOTE Instead of the tangent of loss angle ($\tan \delta$), the equivalent series resistance ESR may be specified in accordance with 4.3.3.2 of IEC 60384-4.

Leakage current

Impedance (if applicable) (see Table 3)

Reverse voltage (if required)

Insulation resistance (if applicable)

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

Rated voltage				
Category voltage ^a				
	Case size	Case size	Case size	Case size
Rated capacitance μF				

^a If different from the rated voltage.

Table 3 – Tangent of loss angle, impedance and rated ripple current

U_R	C_R	Tangent of loss angle at..... °C,..... Hz	Impedance at..... °C, Hz (if applicable)	Rated ripple current at..... °C,..... Hz
V	μF		Ω	A

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 60384-4:2007, *Fixed capacitors for use in electronic equipment – Part 4: Sectional specification – Aluminium electrolytic capacitors with solid (MnO₂) and non-solid electrolyte*

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

1.5 Marking

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The marking of the capacitor and the package shall be in accordance with the requirements of 1.6 of IEC 60384-4.

The details of the marking of the component and package are given in full in the detail specification.

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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 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 3.4 of the sectional specification, IEC 60384-4.

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.

Table 5 – Test schedule for qualification conformance inspection

Subclause number and test ^a	D ^b or ND	Conditions of test ^a	IL ^b	n ^b	c ^b	Performance requirements ^a
Group A inspection (lot-by-lot)						
<i>Subgroup A1</i>	ND		S-3 ^c	^c	0	
4.2 Visual examination						As in 4.2
4.2 Dimensions (gauging)						Legible marking and as specified in 1.5 of this specification
						As specified in Table 1 of this specification
<i>Subgroup A2</i>	ND		S-3 ^c	^c	0	
4.3.1 Leakage		Protective resistance:.... Ω				As in 4.3.1.2
4.3.2 Capacitance		Frequency:.... Hz				Within specified tolerance
4.3.3 Tangent of loss angle		Frequency:.... Hz				As in 4.3.3.2
4.3.4 Impedance (if applicable)		Frequency:.... Hz				Within limit specified in the detail specification
^a Subclause number of tests and performance requirements refer to IEC 60384-4 and Clause 1 of this specification.						
^b In this table, IL = inspection level (IEC 60410) n = sample size c = permissible number of non-conforming items p = periodicity in months D = destructive ND = non-destructive						
^c Number to be tested: Sample size as directly allotted to the code letter for IL in Table II A of IEC 60410.						

Table 5 (continued)

Subclause number and test ^a	D ^b or ND	Conditions of test ^a	IL ^b	n ^b	c ^b	Performance requirements ^{a,e}										
Group B inspection (lot-by-lot) <i>Subgroup B1</i> 4.6 Solderability ^d 4.17.1 Initial measurement 4.17 Storage at high temperature (if required) 4.17.3 Final measurements	ND	Method:..... Capacitance Temperature: Upper category temperature Duration: 96 h ± 4 h Recovery: 16 h min. Visual examination Leakage current Capacitance Tangent of loss angle	S-3 ^c	c	0	Good tinning as evidenced by free flowing of the solder with wetting of the terminations or meet the required parameter(s) in the detail specification as applicable No visible damage and no leakage of electrolyte ≤2 times the limits in 4.3.1 ΔC/C ≤10 % of value measured in 4.17.1 ≤1,2 times the limit in 4.3.3										
<i>Subgroup B2</i> 4.19 Characteristics at high and low temperature	ND	The capacitors shall be measured at each temperature step Step 1: 20 °C Impedance (at same frequency as Step 2) Step 2: Lower category temperature Impedance	S-3 ^c	c	0	Ratio with respect to value in Step 1 <table border="1"> <thead> <tr> <th>Rated voltage V</th> <th>Ratio of impedance</th> </tr> </thead> <tbody> <tr> <td>$U_R \leq 6,3$</td> <td>≤ 10</td> </tr> <tr> <td>$6,3 < U_R \leq 16$</td> <td>≤ 8</td> </tr> <tr> <td>$16 < U_R \leq 160$</td> <td>≤ 6</td> </tr> <tr> <td>$160 < U_R$</td> <td>≤ 10</td> </tr> </tbody> </table>	Rated voltage V	Ratio of impedance	$U_R \leq 6,3$	≤ 10	$6,3 < U_R \leq 16$	≤ 8	$16 < U_R \leq 160$	≤ 6	$160 < U_R$	≤ 10
Rated voltage V	Ratio of impedance															
$U_R \leq 6,3$	≤ 10															
$6,3 < U_R \leq 16$	≤ 8															
$16 < U_R \leq 160$	≤ 6															
$160 < U_R$	≤ 10															

^a Subclause number of tests and performance requirements refer to IEC 60384-4 and Clause 1 of this specification.

^b In this table,
 IL = inspection level (IEC 60410)
 n = sample size
 c = permissible number of non-conforming items
 p = periodicity in months
 D = destructive
 ND = non- destructive

^c Number to be tested: Sample size as directly allotted to the code letter for IL in Table II A of IEC 60410.

^d Not applicable to capacitors with screw terminations or other terminations not designed to be soldered, as stated in the detail specifications.

^e The tests in subgroup B1 are considered non-destructive provided that the (optional) high-temperature storage test is not applied. If the storage at high-temperature test is carried out, the capacitors are re-aged and submitted for inspection as part of a subsequent lot.