

INTERNATIONAL STANDARD

IEC 60384-16

QC 301200

Second edition
2005-11

Fixed capacitors for use in electronic equipment –

Part 16:

Sectional specification:

**Fixed metallized polypropylene film
dielectric d.c. capacitors**

(<https://standards.iteh.ai>)
Document Preview

IEC 60384-16:2005

<https://standards.iteh.ai/standards/iec/4/179b9f4-2e91-4656-be7c-af71c6e7cf96/iec-60384-16-2005>



Reference number
IEC 60384-16:2005(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Further information on IEC publications

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

- **IEC Web Site** (www.iec.ch)

- **Catalogue of IEC publications**

The on-line catalogue on the IEC web site (www.iec.ch/searchpub) enables you to search by a variety of criteria including text searches, technical committees and date of publication. On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.

- **IEC Just Published**

This summary of recently issued publications (www.iec.ch/online_news/justpub) is also available by email. Please contact the Customer Service Centre (see below) for further information.

- **Customer Service Centre**

If you have any questions regarding this publication or need further assistance, please contact the Customer Service Centre:

Email: custserv@iec.ch
Tel: +41 22 919 02 11
Fax: +41 22 919 03 00

<https://standards.iteh.ai/catalog/standards-iec/4/796914-2e91-4656-be7c-af71c6e7cf96/iec-60384-16-2005>

INTERNATIONAL STANDARD

IEC 60384-16

QC 301200

Second edition
2005-11

Fixed capacitors for use in electronic equipment –

Part 16:

Sectional specification: Fixed metallized polypropylene film dielectric d.c. capacitors

(<https://standards.iteh.ai>)
Document Preview

IEC 60384-16:2005

<https://standards.iteh.ai/standards/iec/4/179b9f4-2e91-4656-be7c-af71c6e7cf96/iec-60384-16-2005>

© IEC 2005 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

U

For price, see current catalogue

CONTENTS

FOREWORD.....	4
1 General.....	7
1.1 Scope.....	7
1.2 Object.....	7
1.3 Normative references.....	7
1.4 Information to be given in a detail specification.....	8
1.5 Terms and definitions.....	9
1.6 Marking.....	10
2 Preferred ratings and characteristics.....	10
2.1 Preferred characteristics.....	10
2.2 Preferred values of ratings.....	10
3 Quality assessment procedures.....	11
3.1 Primary stage of manufacture.....	11
3.2 Structurally similar components.....	11
3.3 Certified records of released lots.....	11
3.4 Qualification approval.....	12
3.5 Quality conformance inspection.....	18
4 Test and measurement procedures.....	19
4.1 Visual examination and check of dimensions.....	19
4.2 Electrical tests.....	20
4.3 Robustness of terminations.....	23
4.4 Resistance to soldering heat.....	23
4.5 Solderability.....	23
4.6 Rapid change of temperature.....	23
4.7 Vibration.....	23
4.8 Bump.....	24
4.9 Shock.....	24
4.10 Climatic sequence.....	25
4.11 Damp heat, steady state.....	26
4.12 Endurance.....	26
4.13 Charge and discharge.....	26
4.14 Component solvent resistance.....	28
4.15 Solvent resistance of the marking.....	28
Bibliography.....	29
Table 1 – Preferred values.....	9
Table 2 – Preferred combinations.....	11
Table 3 – Sampling plan together with numbers of permissible defectives for qualification approval tests.....	13
Table 4 – Test schedule for qualification approval.....	14
Table 5 – Lot-by-lot inspection.....	19
Table 6 – Periodic inspection.....	19

Table 7 – Voltages to be applied.....	20
Table 8 – Measurement requirements.....	21
Table 9 – Insulation resistance requirements.....	21
Table 10 – Correction factors.....	22
Table 11 – Characteristics at lower category temperature.....	22
Table 12 – Characteristics at upper category temperature.....	22
Table 13 – Preferred severities.....	24
Table 14 – Test conditions.....	26
Table 15 – Lead spacing.....	27

Withdrawing

iTech Standards
(<https://standards.iteh.ai>)
Document Preview

IEC 60384-16:2005
<https://standards.iteh.ai/catalog/standards/iec/4/4179b9f4-2e91-4656-be7c-af71c6e7cf96/iec-60384-16-2005>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 16: Sectional specification: Fixed metallized polypropylene film dielectric d.c. capacitors

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60384-16 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 1982, amendment 1 (1987) and amendment 2 (1992) and constitutes minor revisions related to tables, figures and references.

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

FDIS	Report on voting
40/1595/FDIS	40/1628/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 (new) 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. capacitors
- Part 24: Sectional specification – Surface mount fixed tantalum electrolytic capacitors with conductive polymer solid electrolyte (under consideration)
- Part 25: Sectional specification – Surface mount fixed aluminium electrolytic capacitors with conductive polymer solid electrolyte (under consideration)

All sectional specifications mentioned above do have one or more blank detail specifications being a supplementary document, containing requirements for style, layout and minimum content of detail specifications.

The QC 301 200 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.

Withdrawing

iTech Standards
(<https://standards.itih.ai>)
Document Preview

IEC 60384-16:2005

<https://standards.itih.ai/standards/iec/4/179b9f4-2e91-4656-be7c-af71c6e7cf96/iec-60384-16-2005>

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 16: Sectional specification: Fixed metallized polypropylene film dielectric d.c. capacitors

1 General

1.1 Scope

This part of IEC 60384 applies to fixed capacitors with metallized electrodes and polypropylene dielectric for use in electronic equipment.

These capacitors may have "self-healing properties" depending on conditions of use. They are mainly intended for use with direct voltage. Capacitors for alternating voltage and pulse applications are not included, but are covered by IEC 60384-17.

The maximum power to be applied is 500 var at 50 Hz and the maximum peak voltage is 2 500 V. Two performance grades of capacitors are covered, Grade 1 for long-life application and Grade 2 for general application.

Capacitors for electromagnetic interference suppression are not included, but are covered by IEC 60384-14.

Capacitors for electrical shock hazard protection (covered by IEC 60065) and fluorescent lamp and motor capacitors (covered by IEC technical committee 33, and IEC technical committee 34).

1.2 Object

The object of this standard is to prescribe preferred ratings and characteristics and to select from IEC 60384-1 (1999) the appropriate quality assessment procedures, tests and measuring methods and to give general performance requirements for this type of capacitor. Test severities and requirements prescribed in detail specifications referring to this sectional specification shall be of equal or higher performance level, because lower performance levels are not permitted.

1.3 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 60063:1963, *Preferred number series for resistors and capacitors*
Amendment 1 (1967)
Amendment 2 (1977)

IEC 60068-1, *Environmental testing. Part 1: General and guidance*

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

IEC 60384-16-1, *Fixed capacitors for use in electronic equipment – Part 16: Blank detail specification: Fixed metallized polypropylene film dielectric d.c. capacitors – Assessment level E*

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

ISO 3, *Preferred numbers – Series of preferred numbers*

1.4 Information to be given in a detail specification

Detail specifications shall be derived from the relevant blank detail specification.

Detail specifications shall not specify requirements inferior to those of the generic, sectional or blank detail specification. When more severe requirements are included, they shall be listed in 1.9 of the detail specification and indicated in the test schedules, for example by an asterisk.

NOTE The information given in 1.4.1 may for convenience, be presented in tabular form.

The following information shall be given in each detail specification and the values quoted shall preferably be selected from those given in the appropriate clause of this sectional specification.

1.4.1 Outline drawing and dimensions

There shall be an illustration of the capacitor as an aid to easy recognition and for comparison of the capacitor with others. Dimensions and their associated tolerances, which affect interchangeability and mounting, shall be given in the detail specification. All dimensions shall preferably be stated in millimetres.

Normally, the numerical values shall be given for the length of the body, the width and height of the body and the wire spacing, or for cylindrical types, the body diameter, and the length and diameter of the terminations. When necessary, for example when a number of items (capacitance values/voltage ranges) are covered by a detail specification, the dimensions and their associated tolerances shall be placed in a table below the drawing.

When the configuration is other than described above, the detail specification shall state such dimensional information as will adequately describe the capacitor. When the capacitor is not designed for use on printed boards, this shall be clearly stated in the detail specification

1.4.2 Mounting

The detail specification shall specify the method of mounting to be applied for normal use and for the application of the vibration and the bump or shock tests. The capacitors shall be mounted by their normal means. The design of the capacitor may be such that special mounting fixtures are required in its use. In this case, the detail specification shall describe the mounting fixtures and they shall be used in the application of the vibration and bump or shock tests.

1.4.3 Ratings and characteristics

The ratings and characteristics shall be in accordance with the relevant clauses of this specification, together with the following:

1.4.3.1 Rated capacitance range

See 2.2.1.

NOTE When products approved to the detail specification may have different ranges, the following statement should be added:

"The range of values available in each voltage range is given in IEC QC 001005.

1.4.3.2 Particular characteristics

Additional characteristics may be listed, when they are considered necessary to specify adequately the component for design and application purposes.

1.4.3.3 Soldering

The detail specification shall prescribe the test methods, severities and requirements applicable for the solderability and the resistance to soldering heat test.

1.4.4 Marking

The detail specification shall specify the content of the marking on the capacitor and on the package. Deviations from 1.6 of this sectional specification, shall be specifically stated.

1.5 Terms and definitions

For the purposes of this document, the terms and definitions of IEC 60384-1 and the following apply.

1.5.1 Performance grades

1.5.1.1

performance grade 1 capacitors (long-life)

capacitors intended for long-life applications with stringent requirements for the electrical parameters

1.5.1.2

performance grade 2 capacitors (general purpose)

capacitors for general application where the stringent requirements of performance grade 1 are not necessary

1.5.2

stability grade

capacitance drift after climatic and mechanical tests and after endurance tests

NOTE The performance grade and the stability grade shall be noted in the detail specification.

1.5.3

performance grade and stability grade combinations

see the table below for preferred values

Table 1 – Preferred values

Performance grades	Stability grades	Combination designations
1	1	1.1
	2	1.2
2	–	2

The three combinations of performance grades and stability grades concern capacitance stability and $\tan \delta$ values. Distinction in performance of the three combinations is shown in Table 4.

1.5.4

rated voltage

maximum d.c. voltage which may be applied continuously to a capacitor at the rated temperature

NOTE The sum of the d.c. voltage and the peak a.c. voltage applied to the capacitor must not exceed the rated voltage. The value of the peak a.c. voltage allowed at different frequencies is under consideration.