Fixed capacitors for use in electronic equipment - Part 13: Sectional specification - Fixed polypropylene film dielectric metal foil DC capacitors

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 60384-13:2020 sisaldab Euroopa standardi EN IEC 60384-13:2020 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 60384-13:2020 consists of the English text of the European standard EN IEC 60384-13:2020.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 18.12.2020.	Date of Availability of the European standard is 18.12.2020.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 31.060.30

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60384-13

December 2020

ICS 31.060.30

Supersedes EN 60384-13:2012 and all of its amendments and corrigenda (if any)

English Version

Fixed capacitors for use in electronic equipment - Part 13: Sectional specification - Fixed polypropylene film dielectric metal foil DC capacitors (IEC 60384-13:2020)

Condensateurs fixes utilisés dans les équipements électroniques - Partie 13: Spécification intermédiaire - Condensateurs fixes pour courant continu à diélectrique en film de polypropylène à armatures en feuilles métalliques (IEC 60384-13:2020)

Festkondensatoren zur Verwendung in Geräten der Elektronik - Teil 13: Rahmenspezifikation - Festkondensatoren mit einem Dielektrikum aus Polypropylen und Belägen aus Metallfolien für Gleichspannung (IEC 60384-13:2020)

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN IEC 60384-13:2020 E

European foreword

The text of document 40/2751/FDIS, future edition 5 of IEC 60384-13, prepared by IEC/TC 40 "Capacitors and resistors for electronic equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60384-13:2020.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-09-16
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-12-16

This document supersedes EN 60384-13:2012 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 60384-13:2020 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60384-14	NOTE	Harmonized as EN 60384-14

IEC 60384-13

Edition 5.0 2020-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fixed capacitors for use in electronic equipment – Part 13: Sectional specification – Fixed polypropylene film dielectric metal foil DC capacitors

Condensateurs fixes utilisés dans les équipements électroniques – Partie 13: Spécification intermédiaire – Condensateurs fixes pour courant continu à diélectrique en film de polypropylène à armatures en feuilles métalliques

IEC 60384-13:2020-11(en-fr)

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary
67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

A propos de l'IEC
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC - webstore.iec.ch/advsearchform
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,…). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

Electropedia - www.electropedia.org
Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary
67 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

IEC 60384-13

Edition 5.0 2020-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fixed capacitors for use in electronic equipment – Part 13: Sectional specification – Fixed polypropylene film dielectric metal foil DC capacitors

Condensateurs fixes utilisés dans les équipements électroniques – Partie 13: Spécification intermédiaire – Condensateurs fixes pour courant continu à diélectrique en film de polypropylène à armatures en feuilles métalliques

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 31.060.30

ISBN 978-2-8322-8569-5

CONTENTS

FOREWORD 5
1 Scope 7
2 Normative references 7
3 Terms and definitions 7
4 Preferred ratings and characteristics 8
4.1 Preferred climatic categories 8
4.1.1 General 8
4.1.2 Assisted drying 8
4.2 Preferred values of ratings 8
4.2.1 Nominal capacitance (C_N) 8
4.2.2 Tolerance on nominal capacitance 8
4.2.3 Nominal capacitance with associated tolerance values 9
4.2.4 Rated voltage (U_R) 9
4.2.5 Stability classes in relation to temperature coefficients and change of capacitance 9
4.2.6 Category voltage (U_C) 10
4.2.7 Rated temperature 10
5 Test and measurement procedures and performance requirements 10
5.1 Visual examination and check of dimensions 10
5.1.1 General 10
5.1.2 Examination methods 10
5.1.3 Requirements 10
5.2 Electrical tests 11
5.2.1 Voltage proof 11
5.2.2 Capacitance 11
5.2.3 Tangent of loss angle (tan δ) 12
5.2.4 Insulation resistance 12
5.2.5 Characteristics depending on temperature (if required in the detail specification) 13
5.2.6 Inductance (if required) 14
5.2.7 Outer foil determination (if required) 14
5.3 Robustness of terminations 14
5.3.1 General 14
5.3.2 Initial inspections 14
5.3.3 Final inspections and requirements 14
5.4 Resistance to soldering heat 14
5.4.1 General 14
5.4.2 Preconditioning 14
5.4.3 Test conditions 14
5.4.4 Final inspections and requirements 15
5.5 Solderability 15
5.5.1 General 15
5.5.2 Preconditioning 15
5.5.3 Test conditions 15
5.5.4 Final inspections and requirements 15
5.6 Rapid change of temperature 15

5.6.1 General 15
5.6.2 Initial inspections 15
5.6.3 Test conditions 16
5.6.4 Final inspections and requirements 16
5.7 Vibration 16
5.7.1 General 16
5.7.2 Initial inspections 16
5.7.3 Mounting 16
5.7.4 Test conditions 16
5.7.5 Final inspections and requirements 16
5.8 Bump (repetitive shock) 16
5.8.1 General 16
5.8.2 Mounting 16
5.8.3 Initial measurements 17
5.8.4 Test conditions 17
5.8.5 Final inspections and requirements 17
5.9 Shock 17
5.9.1 General 17
5.9.2 Mounting 17
5.9.3 Initial measurements 17
5.9.4 Test conditions 17
5.9.5 Final inspections and requirements 18
5.10 Climatic sequence 18
5.10.1 General 18
5.10.2 Initial measurements 18
5.10.3 Dry heat 18
5.10.4 Damp heat, cyclic, test Db, first cycle 18
5.10.5 Cold 18
5.10.6 Low air pressure (if required) 18
5.10.7 Damp heat, cyclic, Test Db, remaining cycles 18
5.10.8 Recovery 19
5.10.9 Final inspections and requirements 19
5.11 Damp heat, steady state 19
5.11.1 General 19
5.11.2 Initial inspections 19
5.11.3 Test conditions 19
5.11.4 Recovery 19
5.11.5 Final inspections and requirements 19
5.12 Endurance 19
5.12.1 General 19
5.12.2 Initial inspections 19
5.12.3 Test conditions 20
5.12.4 Final inspections and requirements 20
5.13 Component solvent resistance (if applicable) 20
5.14 Solvent resistance of the marking (if applicable) 20
6 Marking 20
6.1 General 20
6.2 Information for marking 20
6.3 Marking on capacitors 21

6.4 Marking on packaging 21
6.5 Additional marking 21
7 Information to be given in the detail specification 21
7.1 General 21
7.2 Outline drawing and dimensions 21
7.3 Mounting 22
7.4 Ratings and characteristics 22
7.4.1 General 22
7.4.2 Nominal capacitance range 22
7.4.3 Particular characteristics 22
7.4.4 Soldering 22
7.5 Marking 22
8 Quality assessment procedures 22
8.1 Primary stage of manufacture 22
8.2 Structurally similar components 22
8.3 Certified records of released lots 23
8.4 Qualification approval 23
8.4.1 General 23
8.4.2 Qualification approval on the basis of the fixed sample size procedure 23
8.5 Quality conformance inspection 29
8.5.1 Formation of inspection lots 29
8.5.2 Test schedule 29
8.5.3 Delayed delivery 29
8.5.4 Assessment levels 30
Annex X (informative) Cross-references for references to the previous edition of this document 31
Bibliography 33

Table 1 – Preferred combinations of capacitance series and tolerance 9
Table 2 – Preferred values and combinations 10
Table 3 – Test voltages 11
Table 4 – Insulation resistance 13
Table 5 – Correction factor dependent on test temperature 13
Table 6 – Acceleration and duration of the pulse 17
Table 7 – Endurance test 20
Table 8 – Fixed sample size test plan for qualification approval Assessment level EZ 24
Table 9 – Test schedule for qualification approval 25
Table 10 – Lot-by-lot inspection 30
Table 11 – Periodic inspection 30
Table X.1 – Cross-references 31

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 13: Sectional specification – Fixed polypropylene film dielectric metal foil DC 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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
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 60384-13 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This fifth edition cancels and replaces the fourth edition published in 2011. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) revision of all parts of the document based on the ISO/IEC Directives, Part 2:2018, and harmonization with other similar kinds of documents;
b) the document structure has been organized to follow new sectional specification structure decided in TC 40;
c) revised tables and Clause 5 so as to prevent duplications and contradictions.

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

FDIS	Report on voting
40/2751/FDIS	40/2759/RVD

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

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

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 document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 13: Sectional specification – Fixed polypropylene film dielectric metal foil DC capacitors

1 Scope

This part of IEC 60384 specifies preferred ratings and characteristics, selects from IEC 60384-1:2016 the appropriate quality assessment procedures, tests and measuring methods, and gives general performance requirements for this type of capacitor. Test severities and requirements specified in detail specifications referring to this sectional specification are of an equal or higher performance level. Lower performance levels are not permitted.

This part of IEC 60384 applies to fixed direct current capacitors, using as dielectric a polypropylene film with electrodes of thin metal foils. The capacitors covered by this document are intended for use in electronic equipment.

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60062, *Marking codes for resistors and capacitors*

IEC 60063, *Preferred number series for resistors and capacitors*

IEC 60068-1:2013, *Environmental testing – Part 1: General and guidance*

IEC 60384-1:2016, *Fixed capacitors for use in electronic equipment – Part 1: Generic specification*

IEC 60417, *Graphical symbols for use on equipment*
(available at http://www.graphicalsymbols.info/equipment)

IEC 61193-2:2007, *Quality assessment systems – Part 2: Selection and use of sampling plans for inspection of electronic components and packages*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions of IEC 60384-1:2016, and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses: