IEC 62391-1

Edition 2.0 2015-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Fixed electric double-layer capacitors for use in electric and electronic equipment –
Part 1: Generic specification

Condensateurs électriques fixes à double couche utilisés dans les équipements électriques et électroniques –
Partie 1: Spécification générique

IEC62391-1:2015-10(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIXED ELECTRIC DOUBLE-LAYER CAPACITORS FOR USE IN ELECTRIC AND ELECTRONIC EQUIPMENT –

Part 1: Generic specification

FOREWORD

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International Standard IEC 62391-1 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This bilingual version (2017-12) corresponds to the monolingual English version, published in 2015-10.

This second edition cancels and replaces the first edition published in 2006 and constitutes a technical revision.

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

a) enhancement of the scope to include electric (high power) application;
b) implementation of Annex Q, replacing Clause 3 in the first edition;

c) in addition, minor revisions related to tables, figures and references.

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

FDIS	Report on voting
40/2393/FDIS	40/2415/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.

The French version of this standard has not been voted upon.

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

A list of all parts of IEC 62391 under the general title *Fixed electric double-layer capacitors for use in electric and electronic equipment* can be found in the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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- withdrawn,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.

The contents of the corrigenda of December 2016 and June 2019 have been included in this copy.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

FIXED ELECTRIC DOUBLE-LAYER CAPACITORS FOR USE IN ELECTRIC AND ELECTRONIC EQUIPMENT –

Part 1: Generic specification

1 Scope

This part of IEC 62391 applies to fixed electric double-layer capacitors (hereafter referred to as capacitor(s)) mainly used in d.c. circuits of electric and electronic equipment.

This part of IEC 62391 establishes standard terms, inspection procedures and methods of test for use in sectional and detail specifications of electronic components for quality assessment or any other purpose.

2 Normative references

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

IEC 60027 (all parts), *Letter symbols to be used in electrical technology*

IEC 60050 (all parts), *International Electrotechnical Vocabulary*

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 60068-2-1:2007, *Environmental testing – Part 2-1: Tests – Tests A: Cold*

IEC 60068-2-2:2007, *Environmental testing – Part 2-2: Tests – Tests B: Dry Heat*

IEC 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-14:2009, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-20:2008, *Environmental testing – Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices of with leads*

IEC 60068-2-21:2006, *Environmental testing – Part 2-21: Tests – Test U: Robustness of terminations and integral mounting devices*

IEC 60068-2-45:1980, *Environmental testing – Part 2-45: Tests – Test XA and guidance: Immersion in cleaning solvents*
Amendment 1:1993)

IEC 60068-2-54:2006, *Environmental testing – Part 2-54: Tests – Test Ta: Solderbility testing of electronic components by the wetting balance method*

IEC 60068-2-58:2015, *Environmental testing – Part 2-58: Tests – Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)*

IEC 60068-2-69:2007, *Environmental testing – Part 2-69: Tests – Test Te: Solderability testing of electronic components for surface mounting devices (SMD) by the wetting balance method*

IEC 60068-2-78:2012, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60294:2012, *Measurement of the dimensions of a cylindrical component with axial terminations*

IEC 60617 (all parts), *Graphical symbols for diagrams*

IEC 60695-11-5, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

IEC 60717:2012, *Method for the determination of the space required by capacitors and resistors with unidirectional terminations*

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply:

3.1
type
group of components having similar design features and manufacturing techniques, enabling them to be considered together, either for qualification approval or for quality conformance inspection

Note 1 to entry: In some cases, components described in several detail specifications may be considered as belonging to the same type.

[SOURCE: IEC 60384-1:2008, 2.2.39 – modified, the remark on "single detail specification" was deleted from the definition and the Note was rephrased.]

3.2
style
subdivision of a type, generally based on dimensional factors

Note 1 to entry: A style may include several variants, generally of a mechanical order.

3.3
class
classification of the capacitor by the capacitance value and the internal resistance value depending upon the application

3.4
family
<electronic components> group of components which predominantly displays a particular physical attribute and/or fulfils a defined function

3.5
subfamily
<electronic components> group of components within a family manufactured by similar technological methods

3.6
d.c. capacitor
capacitor designed essentially for application with direct voltage

Note 1 to entry: A d.c. capacitor may not be suitable for use on a.c. supplies.

3.7
nominal capacitance
C_N
designated capacitance value usually indicated on the capacitor

3.8
category temperature range
range of ambient temperatures for which the capacitor has been designed to operate continuously

Note 1 to entry: This is given by the lower and upper category temperature.

3.9
lower category temperature
minimum ambient temperature for which a capacitor has been designed to operate continuously

3.10
upper category temperature
highest ambient temperature including internal heating in which a capacitor is designed to operate continuously

[SOURCE: IEC 61881-3:2012, 3.17, modified – The note to entry has been deleted.]

3.11
rated temperature
maximum ambient temperature at which the rated voltage may be continuously applied

3.12
rated voltage
U_R
maximum d.c. voltage or peak value of pulse voltage which may be applied continuously or repetitively to a capacitor at any temperature between the lower category temperature and the rated temperature

3.13
category voltage
U_C
maximum voltage which may be applied continuously to a capacitor at its upper category temperature

3.14
temperature derated voltage
maximum voltage that may be applied continuously to a capacitor when it is at any temperature between the rated temperature and the upper category temperature

Note 1 to entry: Information on the voltage/temperature dependence at temperatures between the rated temperature and the upper category temperature is given in the detail specification.

3.15
surge voltage ratio
quotient of the maximum instantaneous voltage which may be applied to the terminations of the capacitor for a specified time at any temperature within the category temperature range and the rated voltage or the temperature derated voltage, as appropriate

Note 1 to entry: The number of times per hour that this voltage may be applied is specified in the detail specification.

3.16
rated ripple voltage
r.m.s. value of the maximum allowable alternating voltage at a specified frequency superimposed on the d.c. voltage at which the capacitor may be operated continuously at a specified temperature

Note 1 to entry: The sum of the direct voltage and the peak value of the alternating voltage applied to the capacitor does not exceed the rated voltage or temperature derated voltage, as applicable.

3.17
reverse voltage
<polar capacitors> voltage applied to the capacitor terminations in the reverse polarity direction

3.18
rated ripple current
r.m.s. value of the maximum allowable alternating current of a specified frequency, at which the capacitor may be operated continuously at a specified temperature

3.19
time constant
product of the internal resistance (including circuit resistance) and the capacitance

Note 1 to entry: The time constant is normally expressed in seconds.

3.20
internal resistance
resistance component in an equivalent series circuit of capacitance and resistance of a capacitor

Note 1 to entry: The internal resistance is given in ohms (Ω).

3.21
IR drop
voltage drop between the capacitor terminals that is generated at the start of discharge and quantified by the product of the discharge current and the internal resistance of the capacitor

3.22
maximum temperature of a capacitor
temperature at the hottest point of its external surface

Note 1 to entry: The terminations are considered as a part of the external surface.

3.23
minimum temperature of a capacitor
temperature at the coldest point of the external surface

Note 1 to entry: The terminations are considered to be part of the external surface.

3.24
minimum storage temperature
minimum ambient temperature which the capacitor should withstand in the non-operating condition without damage

3.25
maximum storage temperature
maximum ambient temperature which the capacitor withstands in the non-operating condition without damage

[SOURCE: IEC 60384-1:2008, 2.2.11]

3.26
temperature characteristic of capacitance
maximum reversible variation of capacitance produced over a given temperature range within the category temperature range

Note 1 to entry: The term characterizing this property applies mainly to capacitors of which the variations of capacitance as a function of temperature, linear or non-linear, cannot be expressed with precision and certainty.

Note 2 to entry: The temperature characteristic of capacitance is normally expressed as a percentage of the capacitance related to a reference temperature of 20 °C.

3.27
visible damage

visible damage which reduces the usability of the capacitor for its intended purpose

3.28
leakage current
value of the current that flows through a capacitor after a charge for a fixed period of time

Note 1 to entry: Leakage current is given in amperes (A).

3.29
maintain voltage
self discharge
voltage held while being left for a fixed period of time under no load after a charge for a fixed period of time

3.30
temperature rise
<capacitor> increase of temperature of the capacitor relative to the ambient temperature resulting from the losses in the capacitor due to operation under charge and/or discharge conditions

3.31
insulated capacitor
capacitor in which all terminations of a section may be raised to a potential different (but not less than the rated voltage) from that of any conducting surface with which the case is liable to come into contact in normal use