

INTERNATIONAL STANDARD



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

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IEC 62391-1:2015

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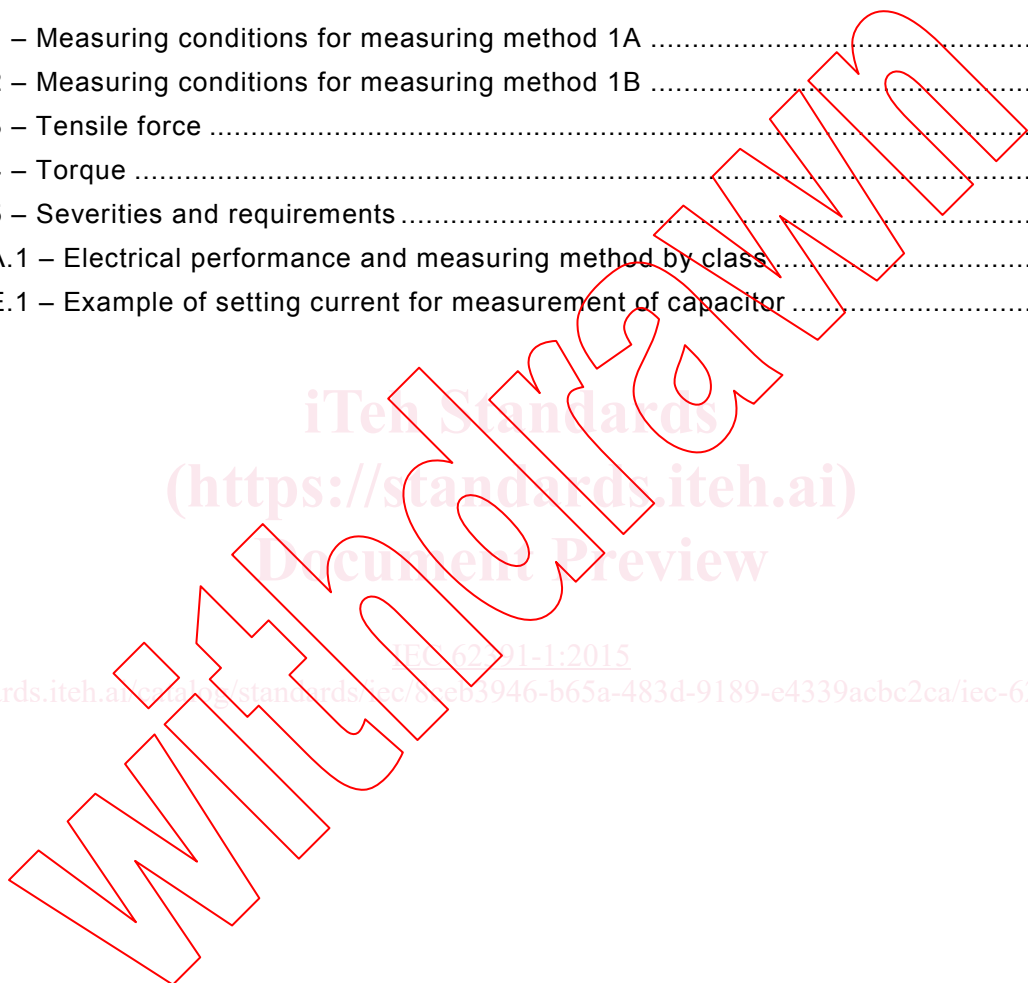
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**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 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.

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- withdrawn,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.

A bilingual version of this publication may be issued at a later date.

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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: Solderability 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.