

Fixed electric double-layer capacitors for use in electronic equipment —

Part 1: Generic specification

The European Standard EN 62391-1:2006 has the status of a
British Standard

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National foreword

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**Fixed electric double-layer capacitors
for use in electronic equipment
Part 1: Generic specification
(IEC 62391-1:2006)**

Condensateurs électriques fixes
à double couche utilisés dans
les équipements électroniques
Partie 1: Spécification générique
(CEI 62391-1:2006)

Elektrische
Doppelschichtfestkondensatoren zur
Verwendung in Geräten der Elektronik
Teil 1: Fachgrundnorm
(IEC 62391-1:2006)

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CENELEC

European Committee for Electrotechnical Standardization
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Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 40/1640/FDIS, future edition 1 of IEC 62391-1, prepared by IEC TC 40, Capacitors and resistors for electronic equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62391-1 on 2006-05-01.

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with the EN have to be withdrawn (dow) 2009-05-01

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 62391-1:2006 was approved by CENELEC as a European Standard without any modification.

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FIXED ELECTRIC DOUBLE-LAYER CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT

Part 1: Generic specification

1 General

1.1 Scope

This part of IEC 62391 applies to fixed electric double layer capacitors (hereafter called “capacitor(s)”) mainly used in DC circuits of electronic equipment.

It 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.

1.2 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 60027 (all parts), *Letter symbols to be used in electrical technology*

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

IEC 60062, *Marking codes for resistors and capacitors*

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

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*
Amendment 1 (1992)

IEC 60068-2-1:1990, *Environmental testing – Part 2: Tests – Tests A: Cold*
Amendment 1 (1993)
Amendment 2 (1994)

IEC 60068-2-2:1974, *Environmental testing – Part 2: Tests – Tests B: Dry Heat*
Amendment 1 (1993)
Amendment 2 (1994)

IEC 60068-2-6:1995, *Environmental testing – Part 2: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-14:1984, *Environmental testing – Part 2: Tests – Test N: Change of temperature*
Amendment 1 (1986)

IEC 60068-2-20:1979, *Environmental testing – Part 2: Tests – Test T: Soldering*
Amendment 2 (1987)

IEC 60068-2-21:1999, *Environmental testing – Part 2-21: Tests – Test U: Robustness of terminations and integral mounting devices*

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

IEC 60068-2-47:1999, *Environmental testing – Part 2-47: Test methods – Mounting of components, equipment and other articles for vibration, impact and similar dynamic tests*

IEC 60068-2-58:2004, *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 60068-2-78:2001, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state.*

IEC 60294:1969, *Measurement of the dimensions of a cylindrical component having two axial terminations*

IEC 60617 (all parts) [DB]¹, *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 60717:1981, *Method for the determination of the space required by capacitors and resistors with unidirectional terminations*

IEC 61760-1:1998, *Surface mounting technology – Part 1: Standard method for the specification of surface mounting components (SMDs)*

QC001002-3, *Rules of procedure – Part 3: Approval procedures*

ISO 1000:1992, *SI units and recommendations for the use of their multiples and of certain other units*

2 Technical data

2.1 Unit and symbols

Units, graphical symbols, letter symbols and terminology shall, whenever possible, be taken from the following publications:

- IEC 60027
- IEC 60050
- IEC 60617
- ISO 1000

When further items are required they should be derived in accordance with the principles of the publications listed above.

¹ "DB" refers to the IEC on-line database.

2.2 Terms and definitions

For the purpose of this document, the following definitions apply:

2.2.1

type

group of components having similar design features and the similarity of whose manufacturing techniques enables them to be grouped together either for qualification approval or for quality conformance inspection; they are generally covered by a single detail specification

NOTE Components described in several detail specifications, may, in some cases, be considered as belonging to the same type.

2.2.2

style

subdivision of a type, generally based on dimensional factors; a style may include several variants, generally of a mechanical order

2.2.3

grade

term to indicate an additional general characteristic concerning the intended application of the component which may only be used in combination with one or more words (e.g. long life grade) and not by a single letter or number

2.2.4

family (of electronic components)

group of components which predominantly displays a particular physical attribute and/or fulfils a defined function

2.2.5

subfamily (of electronic components)

group of components within a family manufactured by similar technological methods

2.2.6

d.c. capacitor

capacitor designed essentially for application with direct voltage

NOTE A d.c. capacitor may not be suitable for use on a.c. supplies.

2.2.7

rated capacitance

C_R

designated capacitance value usually indicated on the capacitor

2.2.8

category temperature range

range of ambient temperatures for which the capacitor has been designed to operate continuously; this is given by the lower and upper category temperature

2.2.9

lower category temperature

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

2.2.10

upper category temperature

maximum ambient temperature for which a capacitor has been designed to operate continuously

2.2.11**rated temperature**

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

2.2.12**rated voltage (d.c.)** U_R

maximum direct voltage or peak value of pulse voltage which may be applied continuously to a capacitor at any temperature between the lower category temperature and the rated temperature

2.2.13**category voltage** U_C

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

2.2.14**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 Information on the voltage/temperature dependence at temperatures between the rated temperature and the upper category temperature should, if applicable, be given in the relevant specification.

2.2.15**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 The number of times per hour that this voltage may be applied should be specified.

2.2.16**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 The sum of the direct voltage and the peak value of the alternating voltage applied to the capacitor should not exceed the rated voltage or temperature derated voltage as applicable.

2.2.17**reverse voltage** (for polar capacitors only)

voltage applied to the capacitor terminations in the reverse polarity direction

2.2.18**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

2.2.19**time constant**

product of the internal resistance (including circuit resistance) and the capacitance, normally expressed in seconds

2.2.20**internal resistance**

expresses the resistance component in an equivalent series circuit of capacitance and resistance of a capacitor, given in ohms (Ω)

2.2.21

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

2.2.22

maximum temperature of a capacitor

temperature at the hottest point of its external surface

NOTE The terminations are considered to be part of the external surface.

2.2.23

minimum temperature of a capacitor

temperature at the coldest point of the external surface

NOTE The terminations are considered to be part of the external surface.

2.2.24

minimum storage temperature

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

2.2.25

maximum storage temperature

maximum ambient temperature which is equal to the upper category temperature of the capacitor

2.2.26

temperature characteristic of capacitance

maximum reversible variation of capacitance produced over a given temperature range within the category temperature range, normally expressed as a percentage of the capacitance related to a reference temperature of 20 °C

NOTE 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.

2.2.27

visible damage

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

2.2.28

leakage current

value of the current that flows through a capacitor after a charge for a fixed period of time, given in amperes (A)

2.2.29

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

2.2.30

temperature rise

temperature rise of the capacitor relative to the ambient temperature resulting from the losses in the capacitor due to operation under a.c. or pulse conditions

2.2.31

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