

INTERNATIONAL STANDARD

IEC 62391-1

First edition
2006-04

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

Part 1: Generic specification

© IEC 2006 — 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

V

For price, see current catalogue

CONTENTS

FOREWORD.....	4
1 General.....	6
1.1 Scope.....	6
1.2 Normative references	6
2 Technical data.....	7
2.1 Unit and symbols.....	7
2.2 Terms and definitions	8
2.3 Preferred values.....	11
2.4 Marking.....	11
3 Quality assessment procedures.....	12
3.1 General.....	12
3.2 Primary stage of manufacture.....	12
3.3 Structurally similar components.....	12
3.4 Declaration of conformity.....	12
3.5 Test schedule and requirement for initial assessment.....	12
4 Tests and measurement procedures.....	12
4.1 General.....	12
4.2 Standard atmospheric conditions.....	12
4.3 Drying	13
4.4 Visual examination and check of dimensions.....	14
4.5 Capacitance	14
4.6 Internal resistance.....	17
4.7 Leakage current	19
4.8 Self-discharge	19
4.9 Robustness of terminations	20
4.10 Resistance to soldering heat	21
4.11 Solderability	22
4.12 Rapid change of temperature	23
4.13 Vibration.....	23
4.14 Damp heat, steady state.....	23
4.15 Endurance.....	23
4.16 Storage	24
4.17 Characteristics at high and low temperature	25
4.18 Component solvent resistance.....	25
4.19 Solvent resistance of marking.....	26
4.20 Passive flammability.....	26
4.21 Pressure relief (if applicable).....	27
Annex A (normative) Classification according to capacitance and internal resistance.....	28
Annex B (informative) Measuring method of capacitance and low resistance by low frequency a.c. method (reference)	30

Figure 1 – Circuit for constant current discharge method	14
Figure 2 – Voltage characteristic between capacitor terminals	15
Figure 3 – Circuit for constant resistance charging method	16
Figure 4 – Circuit for a.c. resistance method.....	17
Figure 5 – Voltage characteristic between capacitor terminals	18
Figure 6 – Self-discharge test diagram	19
Figure A.1 – Conceptual rendering orientated by characteristics in each classification.....	29
Figure B.1 – Capacitance measuring system by low frequency a.c. method	30
Table 1 – Reference test: standard atmospheric conditions	13
Table 2 – Discharge conditions	15
Table 3 – Discharge current.....	18
Table 4 – Tensile force	20
Table 5 – Torque	21
Table 6 – Severities and requirements	27
Table A.1 – Measurement items for electric performance.....	29

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FIXED ELECTRIC DOUBLE-LAYER CAPACITORS
FOR USE IN ELECTRONIC EQUIPMENT**
Part 1: Generic specification

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

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

FDIS	Report on voting
40/1640/FDIS	40/1712/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 62391 consists of the following parts, under the general title *Fixed electric double layer capacitors for use in electronic equipment*

Part 1: Generic specification

Part 2: Sectional specification – Electric double-layer capacitors for power application

The sectional specification mentioned above does have a blank detail specification being a supplementary document, containing requirements for style, layout and minimum content of detail specifications.

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 standard may be issued at a later date.

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* ²

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*

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

² To be published.