

© Copyright SEK. Reproduction in any form without permission is prohibited.

Elektronikkomponenter – Varistorer – Del 1: Artspecifikation

*Varistors for use in electronic equipment –
Part 1: Generic specification*

Som svensk standard gäller europastandarden EN 61051-1:2008. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61051-1:2008.

Nationellt förord

Europastandarden EN 61051-1:2008

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 61051-1, Second edition, 2007 - Varistors for use in electronic equipment - Part 1: Generic specification**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-CECC 42000, utgåva 1, 1978, gäller ej fr o m 2011-10-01.

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard

Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

English version

**Varistors for use in electronic equipment -
Part 1: Generic specification
(IEC 61051-1:2007)**

Varistances utilisées
dans les équipements électroniques -
Partie 1: Spécification générique
(CEI 61051-1:2007)

Varistoren zur Verwendung
in Geräten der Elektronik -
Teil 1: Fachgrundspezifikation
(IEC 61051-1:2007)

This European Standard was approved by CENELEC on 2008-10-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 40/1775/CDV, future edition 2 of IEC 61051-1, prepared by IEC TC 40, Capacitors and resistors for electronic equipment, was submitted to the IEC-CENELEC parallel Unique Acceptance Procedure and was approved by CENELEC as EN 61051-1 on 2008-10-01.

This European Standard supersedes CECC 42 000:1978.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2009-07-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2011-10-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61051-1:2007 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60027	Series	Letter symbols to be used in electrical technology	EN 60027	Series
IEC 60050	Series	International Electrotechnical Vocabulary (IEV)	-	-
IEC 60060-2	1994	High-voltage test techniques - Part 2: Measuring systems	EN 60060-2	1994
IEC 60062	2004	Marking codes for resistors and capacitors	EN 60062 + corr. January	2005 2007
IEC 60068-1 + corr. October + A1	1988 1988 1992	Environmental testing - Part 1: General and guidance	EN 60068-1	1994
IEC 60068-2-1	2007	Environmental testing - Part 2-1: Tests - Test A: Cold	EN 60068-2-1	2007
IEC 60068-2-2 A1 A2	1974 1993 1994	Environmental testing - Part 2: Tests - Tests B: Dry heat	EN 60068-2-2 ¹⁾ A1 A2	1993 1993 1994
IEC 60068-2-6	1995	Environmental testing - Part 2: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6 ²⁾	1995
IEC 60068-2-13	1983	Environmental testing - Part 2: Tests - Test M: Low air pressure	EN 60068-2-13	1999
IEC 60068-2-14 + A1	1984 1986	Environmental testing - Part 2: Tests - Test N: Change of temperature	EN 60068-2-14	1999
IEC 60068-2-20 + A2	1979 1987	Environmental testing - Part 2: Tests - Test T: Soldering	HD 323.2.20 S3 ³⁾	1988
IEC 60068-2-21	2006	Environmental testing - Part 2-21: Tests - Test U: Robustness of terminations and integral mounting devices	EN 60068-2-21	2006
IEC 60068-2-27	1987	Environmental testing - Part 2: Tests - Test Ea and guidance: Shock	EN 60068-2-27	1993
IEC 60068-2-29	1987	Environmental testing - Part 2: Tests - Test Eb and guidance: Bump	EN 60068-2-29	1993
IEC 60068-2-30	2005	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)	EN 60068-2-30	2005

¹⁾ EN 60068-2-2, which includes supplement A:1976 to IEC 60068-2-2, and its amendments are superseded by EN 60068-2-2:2007, which is based on IEC 60068-2-2:2007.

²⁾ EN 60068-2-6 is superseded by EN 60068-2-6:2008, which is based on IEC 60068-2-6:2007.

³⁾ HD 323.2.20 S3 is superseded by EN 60068-2-20:2008, which is based on IEC 60068-2-20:2008.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-2-45	1980	Environmental testing - Part 2: Tests - Test XA and guidance: Immersion in cleaning solvents	EN 60068-2-45	1992
IEC 60068-2-54	2006	Environmental testing - Part 2-54: Tests - Test Ta: Solderability testing of electronic components by the wetting balance method	EN 60068-2-54	2006
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)	EN 60068-2-58 + corr. December	2004 2004
IEC 60068-2-69	1995	Environmental testing - Part 2: Tests - Test Te: Solderability testing of electronic components for surface mount technology by the wetting balance method	EN 60068-2-69 ⁴⁾	1996
IEC 60068-2-78	2001	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state	EN 60068-2-78	2001
IEC 60294	1969	Measurement of the dimensions of a cylindrical component having two axial terminations	-	-
IEC 60410	1973	Sampling plans and procedures for inspection - by attributes	-	-
IEC 60617	Data- base	Graphical symbols for diagrams	-	-
IEC 60695-11-5	2004	Fire hazard testing - Part 11-5: Test flames - Needle-flame test method - Apparatus, confirmatory test arrangement and guidance	EN 60695-11-5	2005
IEC 60717	1981	Method for the determination of the space required by capacitors and resistors with unidirectional terminations	-	-
IEC 61249-2-7	2002	Materials for printed boards and other interconnecting structures - Part 2-7: Reinforced base materials, clad and unclad - Epoxide woven E-glass laminated sheet of defined flammability (vertical burning test), copper-clad	EN 61249-2-7 + corr. September	2002 2005
IEC QC 001002-3	- ⁵⁾	IEC Quality Assessment System for Electronic- Components (IECQ) - Rules of Procedure - Part 3: Approval procedures		-
ISO 1000 A1	1992 1998	SI units and recommendations for the use of their multiples and of certain other units	-	-

⁴⁾ EN 60068-2-69 is superseded by EN 60068-2-69:2007, which is based on IEC 60068-2-69:2007.

⁵⁾ Undated reference.

CONTENTS

1	General	7
1.1	Scope.....	7
1.2	Object	7
1.3	Normative references	7
2	Technical data	8
2.1	Units, symbols and terminology	8
2.2	Terms and definitions	9
2.3	Preferred values and characteristics.....	13
2.4	Marking	13
2.4.1	General	13
2.4.2	Coding.....	14
3	Quality assessment procedures	14
3.1	Qualification approval/quality assessment systems	14
3.2	Primary stage of manufacture.....	14
3.3	Structurally similar components.....	14
3.4	Qualification approval procedures	15
3.5	Quality conformance inspection.....	15
3.5.1	Certified records of released lots	15
3.5.2	Delayed delivery	15
3.5.3	Release for delivery before the completion of Group B tests	16
3.6	Alternative test methods	16
3.7	Unchecked parameters.....	16
4	Test and measurement procedures.....	16
4.1	General.....	16
4.2	Standard atmospheric conditions.....	16
4.2.1	Standard atmospheric conditions for testing	16
4.2.2	Recovery conditions	17
4.2.3	Referee conditions	17
4.2.4	Reference conditions.....	17
4.3	Drying and recovery	17
4.4	Visual examination and check of dimensions	18
4.4.1	Visual examination	18
4.4.2	Marking	18
4.4.3	Dimensions (gauging).....	18
4.4.4	Dimensions (detail).....	18
4.5	Nominal varistor voltage or leakage current (not applicable to pulse measurements)	18
4.5.1	Test procedure	18
4.5.2	Measurement and requirements.....	18
4.6	Pulse current.....	18
4.6.1	Standard pulse currents.....	19
4.6.2	Tolerances	19
4.6.3	Measurement of the pulse current	19
4.7	Voltage under pulse condition	19
4.8	Capacitance	20

4.9	Voltage proof (for insulated varistors only)	20
4.9.1	V-block method	20
4.9.2	Metal ball method	20
4.9.3	Foil method	21
4.10	Insulation resistance (for insulated varistors only)	21
4.10.1	Test procedure	21
4.10.2	Measurement and requirements	21
4.11	Robustness of terminations	22
4.11.1	General	22
4.11.2	Test U_{a1} – Tensile	22
4.11.3	Test U_b – Bending (half of the number of terminations)	22
4.11.4	Test U_c – Torsion (other half of the number of terminations)	22
4.11.5	Test U_d – Torque (for terminations with threaded studs or screws and for integral mounting devices)	22
4.11.6	Visual examination	22
4.11.7	Final measurement	22
4.12	Resistance to soldering heat	23
4.12.1	Preconditioning	23
4.12.2	Test procedure	23
4.12.3	Recovery	23
4.12.4	Final inspection, measurement and requirements	23
4.13	Solderability	23
4.13.1	Test procedure	23
4.13.2	Final inspection, measurements and requirements	24
4.14	Rapid change of temperature	24
4.14.1	Initial measurement	24
4.14.2	Test procedure	24
4.14.3	Final inspection, measurement and requirements	24
4.15	Bump	25
4.15.1	Initial measurement	25
4.15.2	Test procedure	25
4.15.3	Final inspection, measurement and requirements	25
4.16	Shock	25
4.16.1	Initial measurement	25
4.16.2	Test procedure	25
4.16.3	Final inspection, measurement and requirements	25
4.17	Vibration	25
4.17.1	Initial measurement	25
4.17.2	Test procedure	26
4.17.3	Final inspection, measurement and requirements	26
4.18	Climatic sequence	26
4.18.1	Initial measurement	26
4.18.2	Dry heat	26
4.18.3	Damp heat, cyclic, Test Db, first cycle	26
4.18.4	Cold	26
4.18.5	Low air pressure	26
4.18.6	Damp heat, cyclic, Test Db, remaining cycles	26
4.18.7	Final inspection, measurement and requirements	27
4.19	Damp heat, steady state	27

4.19.1	Initial measurement	27
4.19.2	Test procedure	27
4.19.3	Final inspection, measurement and requirements	27
4.20	Fire hazard	28
4.21	Endurance at upper category temperature	28
4.22	Solvent resistance of marking	29
4.22.1	Test procedure	29
4.22.2	Requirements	29
4.23	Component solvent resistance	29
4.23.1	Initial measurements	29
4.23.2	Test procedure	29
4.23.3	Measurement and requirements	30
4.24	Mounting (for surface mount varistors only)	30
Annex A (normative) Mounting for measurements of varistors		32
Annex B (normative) Interpretation of sampling plans and procedures as described in IEC 60410 for use within the IEC quality assessment system for electronic components		34
Annex C (normative) Rules for the preparation of detail specifications for capacitors and resistors for electronic equipment		35
Figure 1 – Shape of pulse current type 1		11
Figure 2 – Shape of pulse current type 2		12
Figure A.1 – Mounting methods for measurements		32
Figure A.2 – Mounting method for measurements of surface mount varistors		33
Table 1 – Standard atmospheric conditions		17
Table 2 – Accepted differences between specified and recorded pulse current values		19
Table 3 – Force for wire terminations		22
Table 4 – Torque		22
Table 5 – Number of cycles		27

VARISTORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 1: Generic specification

1 General

1.1 Scope

This part of IEC 61051 is applicable to varistors with symmetrical voltage-current characteristics for use in electronic equipment.

1.2 Object

The object of this standard is to establish standard terms, inspection procedures and methods of test for use in sectional and detail specifications for Qualification Approval and for Quality Assessment Systems for electronic components.

1.3 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 60060-2:1994, *High-voltage test techniques – Part 2: Measuring systems*

IEC 60062:2004, *Marking codes for resistors and capacitors.*

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

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

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 and guidance: Vibration (Sinusoidal)*

IEC 60068-2-13:1983, *Environmental testing – Part 2: Tests – Test M: Low air pressure*

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

IEC 60068-2-27:1987, *Environmental testing – Part 2: Tests – Test Ea and guidance: Shock*