



IEC 60664-3

Edition 3.0 2016-11
REDLINE VERSION

INTERNATIONAL STANDARD



BASIC SAFETY PUBLICATION

Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.080.30

ISBN 978-2-8322-3738-0

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD	4
INTRODUCTION	6
1 Scope	7
2 Normative references	7
3 Terms and definitions	8
4 Design requirements	10
4.1 Principles	10
4.2 Application range regarding with regards to the environment	10
4.3 Requirements for the types of protection	10
4.4 Dimensioning procedures	10
5 Tests	11
5.1 General	11
5.2 Specimens for testing coatings	12
5.3 Specimens for testing mouldings and potting	12
5.4 Preparation of test specimens	12
5.5 Visual examination	12
5.6 Scratch-resistance test	12
5.7 Conditioning of the test specimens	13
5.7.1 General	13
5.7.2 Cold conditioning	13
5.7.3 Dry-heat conditioning	14
5.7.4 Rapid change of temperature	14
5.7.5 Damp heat, steady-state with polarizing voltage	15
5.8 Mechanical and electrical tests after conditioning and electromigration	15
5.8.1 General test conditions	15
5.8.2 Adhesion of coating	16
5.8.3 Insulation resistance between conductors	16
5.8.4 AC withstand Voltage test	16
5.8.5 Partial discharge extinction voltage	17
5.9 Additional tests	17
5.9.1 General	17
5.9.2 Resistance to soldering heat	17
5.9.3 Flammability	17
5.9.4 Solvent resistance	17
Annex A (normative) Test sequences	18
Annex B (normative) Decisions to be taken by the technical committees' decisions	21
B.1 General	21
B.2 Decisions required by technical committees	21
B.3 Optional test conditions	21
Annex C (normative) Printed wiring board for testing coatings	22
C.1 General	22
C.2 Specification of the printed wiring board	22
C.3 Arrangement of the conductors	22
C.4 Arrangement of lands	23
C.5 Connections for the tests	23

Bibliography.....	26
Figure 1 – Scratch-resistance test for protecting layers.....	13
Figure C.1 – Configuration of the test specimen.....	24
Figure C.2 – Configuration of lands and adjacent conductors.....	25
Table 1 – Minimum spacings for type 2 protection.....	11
Table 2 – Dry-heat conditioning	14
Table 3 – Degrees of severities for rapid change of temperature.....	15
Table A.1 – Test sequence 1	18
Table A.2 – Test sequence 2 additional conditioning with respect to electromigration	19
Table A.3 – Additional tests	20

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INSULATION COORDINATION FOR EQUIPMENT
WITHIN LOW-VOLTAGE SYSTEMS –****Part 3: Use of coating, potting or moulding
for protection against pollution****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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 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.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 60664-3 has been prepared by IEC technical committee TC 109: Insulation co-ordination for low-voltage equipment.

It has the status of a basic safety publication in accordance with IEC Guide 104.

This third edition cancels and replaces the second edition published in 2003 and Amendment 1:2010. This edition constitutes a technical revision.

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

- a) information added concerning interpolation;
- b) provided scratch test is only for type 2 **protection**;
- c) renumbered the scratch test to follow the visual examination test, since it makes more sense there;
- d) separated the tables under what is now called Annex A, to make them clearer.

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

FDIS	Report on voting
109/153/FDIS	109/154/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.

In this standard, the following types are used:

- Terms used throughout this standard which have been defined in Clause 3: **bold type**

A list of all parts in the IEC 60664 series, published under the general title *Insulation coordination for equipment within low-voltage systems*, can be found on 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.

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 publication using a colour printer.

INTRODUCTION

This part of IEC 60664 details the conditions in which the reduction of clearance and creepage distances can apply to rigid assemblies such as **printed boards** or terminals of components. **Protection** against pollution can be achieved by any kind of encapsulation such as **coating**, potting or moulding. The **protection** may be applied to one or both sides of the assembly. This standard specifies the insulating properties of the protecting material.

Between any two unprotected conductive parts, the clearance and creepage distance requirements of IEC 60664-1 ~~or IEC 60664-5~~ apply.

This document refers only to permanent **protection**. It does not cover assemblies after repair.

Technical committees ~~need to~~ **should** consider the influence on the **protection** of ~~overheated~~ **overheating conductors** and components, especially under fault conditions, and to decide if any additional requirements are necessary.

Safe performance of assemblies is dependent upon a precise and controlled manufacturing process for the application of the protective system. Requirements for quality control, e.g. by sampling tests, should be considered by technical committees.

INSULATION COORDINATION FOR EQUIPMENT WITHIN LOW-VOLTAGE SYSTEMS –

Part 3: Use of coating, potting or moulding for protection against pollution

1 Scope

This part of IEC 60664 applies to assemblies protected against pollution by the use of **coating**, potting or moulding, thus allowing a reduction of clearance and creepage distances as described in ~~Part 1 or Part 5~~ IEC 60664-1.

~~NOTE 1—When reference is made to Part 1 or Part 5, IEC 60664-1 or IEC 60664-5 are meant.~~

This document describes the requirements and test procedures for two methods of **protection**:

- type 1 **protection** improves the microenvironment of the parts under the **protection**;
- type 2 **protection** is considered to be similar to **solid insulation**.

This document also applies to all kinds of protected **printed boards**, including the surface of inner layers of multi-layer boards, substrates and similarly protected assemblies. In the case of multi-layer **printed boards**, the distances through an inner layer are covered by the requirements for **solid insulation** in ~~Part 1~~ IEC 60664-1.

~~NOTE 2~~ Examples of substrates are hybrid integrated circuits and thick-film technology.

This document refers only to permanent **protection**. It does not cover assemblies that are subjected to mechanical adjustment or repair.

The principles of this standard are applicable to functional, basic, supplementary and reinforced insulation.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60068-2-1:~~1990~~, *Environmental testing – Part 2-1: Tests – Tests A: Cold*
~~Amendment 1 (1993)~~
~~Amendment 2 (1994)~~

IEC 60068-2-2:~~1974~~, ~~Basic~~ *Environmental testing—procedures – Part 2-2: Tests – Tests B: Dry heat*
~~Amendment 1 (1993)~~
~~Amendment 2 (1994)~~

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

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

~~IEC 60249-1:1982, Base materials for printed circuits – Part 1: Test methods
Amendment 4 (1993)~~

~~IEC 60249-2 (all parts), Base materials for printed circuit – Part 2: Specifications~~

IEC 60326-2:1990, *Printed boards – Part 2: Test methods*
~~Amendment 1 (1992)~~

IEC 60454-3-1:1998/~~AMD1:2001~~, *Pressure-sensitive adhesive tapes for electrical purposes – Part 3: Specifications for individual materials – Sheet 1: PVC film tapes with pressure-sensitive adhesive*

IEC 60664-1:~~1992~~ 2007, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*
~~Amendment 1 (2000)~~
~~Amendment 2 (2002)~~

~~IEC 60664-5: , Insulation coordination for equipment within low-voltage systems – Part 5:
A comprehensive method for determining clearance and creepage distances equal to or less
than 2 mm ¹⁾~~

IEC 61189-2:2006, *Test methods for electrical materials, printed boards and other interconnection structures and assemblies – Part 2: Test methods for materials for interconnection structures*

IEC 61189-3:2007, *Test methods for electrical materials, printed boards and other interconnection structures and assemblies – Part 3: Test methods for interconnection structures (printed boards)*

IEC 61249-2 (all parts), *Materials for printed boards and other interconnecting structures – Reinforced base materials, clad and unclad*

IEC Guide 104:~~1997~~ 2010, *The preparation of safety publications and the use of basic safety publications and group safety publications*

ISO/IEC Guide 51, *Safety aspects – Guidelines for their inclusion in standards*

¹⁾~~To be published.~~

INTERNATIONAL STANDARD

NORME INTERNATIONALE

BASIC SAFETY PUBLICATION

PUBLICATION FONDAMENTALE DE SÉCURITÉ

**Insulation coordination for equipment within low-voltage systems –
Part 3: Use of coating, potting or moulding for protection against pollution**

**Coordination de l'isolement des matériels dans les systèmes (réseaux) à basse
tension –**

**Partie 3: Utilisation de revêtement, d'empotage ou de moulage pour la protection
contre la pollution**

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	8
4 Design requirements.....	9
4.1 Principles.....	9
4.2 Application range with regards to the environment	9
4.3 Requirements for the types of protection	10
4.4 Dimensioning procedures.....	10
5 Tests	11
5.1 General.....	11
5.2 Specimens for testing coatings	11
5.3 Specimens for testing mouldings and potting	12
5.4 Preparation of test specimens.....	12
5.5 Visual examination.....	12
5.6 Scratch-resistance test	12
5.7 Conditioning of the test specimens.....	13
5.7.1 General	13
5.7.2 Cold conditioning.....	13
5.7.3 Dry-heat conditioning.....	13
5.7.4 Rapid change of temperature.....	14
5.7.5 Damp heat, steady-state with polarizing voltage	15
5.8 Mechanical and electrical tests after conditioning and electromigration	15
5.8.1 General test conditions	15
5.8.2 Adhesion of coating	15
5.8.3 Insulation resistance between conductors.....	16
5.8.4 Voltage test	16
5.8.5 Partial discharge extinction voltage	16
5.9 Additional tests	16
5.9.1 General	16
5.9.2 Resistance to soldering heat.....	17
5.9.3 Flammability	17
5.9.4 Solvent resistance	17
Annex A (normative) Test sequences.....	18
Annex B (normative) Decisions to be taken by the technical committees	20
B.1 General.....	20
B.2 Decisions required by technical committees	20
B.3 Optional test conditions.....	20
Annex C (normative) Printed wiring board for testing coatings	21
C.1 General.....	21
C.2 Specification of the printed wiring board.....	21
C.3 Arrangement of the conductors	21
C.4 Arrangement of lands.....	22
C.5 Connections for the tests	22
Bibliography.....	25

Figure 1 – Scratch-resistance test for protecting layers	13
Figure C.1 – Configuration of the test specimen.....	23
Figure C.2 – Configuration of lands and adjacent conductors.....	24
Table 1 – Minimum spacings for type 2 protection.....	10
Table 2 – Dry-heat conditioning	14
Table 3 – Degrees of severities for rapid change of temperature.....	14
Table A.1 – Test sequence 1	18
Table A.2 – Test sequence 2 additional conditioning with respect to electromigration	19
Table A.3 – Additional tests	19

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INSULATION COORDINATION FOR EQUIPMENT
WITHIN LOW-VOLTAGE SYSTEMS –****Part 3: Use of coating, potting or moulding
for protection against pollution**

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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 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 60664-3 has been prepared by IEC technical committee TC 109: Insulation co-ordination for low-voltage equipment.

It has the status of a basic safety publication in accordance with IEC Guide 104.

This third edition cancels and replaces the second edition published in 2003 and Amendment 1:2010. This edition constitutes a technical revision.

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

- a) information added concerning interpolation;
- b) provided scratch test is only for type 2 **protection**;

- c) renumbered the scratch test to follow the visual examination test, since it makes more sense there;
- d) separated the tables under what is now called Annex A, to make them clearer.

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

FDIS	Report on voting
109/153/FDIS	109/154/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.

In this standard, the following types are used:

- Terms used throughout this standard which have been defined in Clause 3: **bold type**

A list of all parts in the IEC 60664 series, published under the general title *Insulation coordination for equipment within low-voltage systems*, can be found on 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.

INTRODUCTION

This part of IEC 60664 details the conditions in which the reduction of clearance and creepage distances can apply to rigid assemblies such as **printed boards** or terminals of components. **Protection** against pollution can be achieved by any kind of encapsulation such as **coating**, potting or moulding. The **protection** may be applied to one or both sides of the assembly. This standard specifies the insulating properties of the protecting material.

Between any two unprotected conductive parts, the clearance and creepage distance requirements of IEC 60664-1 apply.

This document refers only to permanent **protection**. It does not cover assemblies after repair.

Technical committees should consider the influence on the **protection** of overheating **conductors** and components, especially under fault conditions, and to decide if any additional requirements are necessary.

Safe performance of assemblies is dependent upon a precise and controlled manufacturing process for the application of the protective system. Requirements for quality control, e.g. by sampling tests, should be considered by technical committees.

INSULATION COORDINATION FOR EQUIPMENT WITHIN LOW-VOLTAGE SYSTEMS –

Part 3: Use of coating, potting or moulding for protection against pollution

1 Scope

This part of IEC 60664 applies to assemblies protected against pollution by the use of **coating**, potting or moulding, thus allowing a reduction of clearance and creepage distances as described in IEC 60664-1.

This document describes the requirements and test procedures for two methods of **protection**:

- type 1 **protection** improves the microenvironment of the parts under the **protection**;
- type 2 **protection** is considered to be similar to **solid insulation**.

This document also applies to all kinds of protected **printed boards**, including the surface of inner layers of multi-layer boards, substrates and similarly protected assemblies. In the case of multi-layer **printed boards**, the distances through an inner layer are covered by the requirements for **solid insulation** in IEC 60664-1.

NOTE Examples of substrates are hybrid integrated circuits and thick-film technology.

This document refers only to permanent **protection**. It does not cover assemblies that are subjected to mechanical adjustment or repair.

The principles of this standard are applicable to functional, basic, supplementary and reinforced insulation.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60068-2-1, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

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

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

IEC 60326-2:1990, *Printed boards – Part 2: Test methods*

IEC 60454-3-1:1998/AMD1:2001, *Pressure-sensitive adhesive tapes for electrical purposes – Part 3: Specifications for individual materials – Sheet 1: PVC film tapes with pressure – sensitive adhesive*

IEC 60664-1:2007, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 61189-2:2006, *Test methods for electrical materials, printed boards and other interconnection structures and assemblies – Part 2: Test methods for materials for interconnection structures*

IEC 61189-3:2007, *Test methods for electrical materials, printed boards and other interconnection structures and assemblies – Part 3: Test methods for interconnection structures (printed boards)*

IEC 61249-2 (all parts), *Materials for printed boards and other interconnecting structures – Reinforced base materials, clad and unclad*

IEC Guide 104:2010, *The preparation of safety publications and the use of basic safety publications and group safety publications*

ISO/IEC Guide 51, *Safety aspects – Guidelines for their inclusion in standards*

SOMMAIRE

AVANT-PROPOS	28
INTRODUCTION.....	30
1 Domaine d'application	31
2 Références normatives	31
3 Termes et définitions	32
4 Exigences de conception	33
4.1 Principes.....	33
4.2 Plage d'application concernant l'environnement	33
4.3 Exigences relatives aux types de protections	34
4.4 Procédures de dimensionnement	34
5 Essais	35
5.1 Généralités	35
5.2 Echantillons destinés aux essais de revêtements.....	36
5.3 Echantillons destinés aux essais des moulages et de l'empotage	36
5.4 Préparation des échantillons d'essai	36
5.5 Examen visuel	36
5.6 Essai de résistance aux éraflures	36
5.7 Conditionnement des échantillons d'essai	37
5.7.1 Généralités	37
5.7.2 Conditionnement froid.....	37
5.7.3 Conditionnement de chaleur sèche	37
5.7.4 Variation rapide de température.....	38
5.7.5 Essai continu de chaleur humide avec tension de polarisation	39
5.8 Essais mécaniques et électriques après conditionnement et électromigration	39
5.8.1 Conditions générales d'essai	39
5.8.2 Adhérence du revêtement.....	39
5.8.3 Résistance d'isolement entre conducteurs	40
5.8.4 Essai de tension	40
5.8.5 Tension d'extinction de décharge partielle	40
5.9 Essais additionnels	41
5.9.1 Généralités	41
5.9.2 Résistance à la chaleur de brasage	41
5.9.3 Inflammabilité	41
5.9.4 Résistance au solvant.....	41
Annexe A (normative) Séquences d'essai	42
Annexe B (normative) Décisions des comités d'études.....	44
B.1 Généralités	44
B.2 Décisions exigées de la part des comités d'études.....	44
B.3 Conditions d'essai facultatives	44
Annexe C (normative) Cartes à câblage imprimé pour revêtements d'essai.....	45
C.1 Généralités	45
C.2 Spécification de la carte à câblage imprimé	45
C.3 Disposition des conducteurs	45
C.4 Disposition des pastilles	46
C.5 Connexions pour les essais	46
Bibliographie.....	50

Figure 1 – Essai de résistance aux éraflures pour couches de protection.....	37
Figure C.1 – Configuration de l'échantillon d'essai	48
Figure C.2 – Configuration des pastilles et des conducteurs adjacents	49
Tableau 1 – Espacements minimaux pour la protection de type 2	35
Tableau 2 – Conditionnement de chaleur sèche	38
Tableau 3 – Degrés de sévérité des variations rapides de température.....	38
Tableau A.1 – Séquence d'essai 1	42
Tableau A.2 – Séquence d'essai 2 conditionnement additionnel concernant l'électromigration	43
Tableau A.3 – Essais additionnels	43

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

COORDINATION DE L'ISOLEMENT DES MATÉRIELS DANS LES SYSTÈMES (RÉSEAUX) À BASSE TENSION –

Partie 3: Utilisation de revêtement, d'empotage ou de moulage pour la protection contre la pollution

AVANT-PROPOS

- 1) La Commission Electrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. A cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
- 2) Les décisions ou accords officiels de l'IEC concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux de l'IEC intéressés sont représentés dans chaque comité d'études.
- 3) Les Publications de l'IEC se présentent sous la forme de recommandations internationales et sont agréées comme telles par les Comités nationaux de l'IEC. Tous les efforts raisonnables sont entrepris afin que l'IEC s'assure de l'exactitude du contenu technique de ses publications; l'IEC ne peut pas être tenue responsable de l'éventuelle mauvaise utilisation ou interprétation qui en est faite par un quelconque utilisateur final.
- 4) Dans le but d'encourager l'uniformité internationale, les Comités nationaux de l'IEC s'engagent, dans toute la mesure possible, à appliquer de façon transparente les Publications de l'IEC dans leurs publications nationales et régionales. Toutes divergences entre toutes Publications de l'IEC et toutes publications nationales ou régionales correspondantes doivent être indiquées en termes clairs dans ces dernières.
- 5) L'IEC elle-même ne fournit aucune attestation de conformité. Des organismes de certification indépendants fournissent des services d'évaluation de conformité et, dans certains secteurs, accèdent aux marques de conformité de l'IEC. L'IEC n'est responsable d'aucun des services effectués par les organismes de certification indépendants.
- 6) Tous les utilisateurs doivent s'assurer qu'ils sont en possession de la dernière édition de cette publication.
- 7) Aucune responsabilité ne doit être imputée à l'IEC, à ses administrateurs, employés, auxiliaires ou mandataires, y compris ses experts particuliers et les membres de ses comités d'études et des Comités nationaux de l'IEC, pour tout préjudice causé en cas de dommages corporels et matériels, ou de tout autre dommage de quelque nature que ce soit, directe ou indirecte, ou pour supporter les coûts (y compris les frais de justice) et les dépenses découlant de la publication ou de l'utilisation de cette Publication de l'IEC ou de toute autre Publication de l'IEC, ou au crédit qui lui est accordé.
- 8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
- 9) L'attention est attirée sur le fait que certains des éléments de la présente Publication de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets et de ne pas avoir signalé leur existence.

La Norme internationale IEC 60664-3 a été établie par le comité d'études 109 de l'IEC: Coordination de l'isolement pour le matériel à basse tension.

Elle a le statut d'une publication fondamentale de sécurité conformément au Guide IEC 104.

Cette troisième édition annule et remplace la deuxième édition parue en 2003 et l'Amendement 1:2010. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) des informations concernant l'interpolation ont été ajoutées;

- b) l'essai de résistance aux éraflures est destiné uniquement aux **protections** de type 2;
- c) l'essai de résistance aux éraflures a été renuméroté et placé à la suite de l'essai d'examen visuel, ce qui est plus pertinent;
- d) le tableau de l'annexe désormais désignée comme l'Annexe A a été divisé en plusieurs tableaux, pour plus de clarté.

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
109/153/FDIS	109/154/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette norme.

Cette publication a été rédigée selon les Directives ISO/IEC, Partie 2.

Dans la présente norme, les caractères suivants sont utilisés:

- Termes utilisés tout au long de la présente norme qui sont définis à l'Article 3: **caractères gras**

Une liste de toutes les parties de la série IEC 60664, publiées sous le titre général *Coordination de l'isolement des matériels dans les systèmes (réseaux) à basse tension*, peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de cette publication ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "<http://webstore.iec.ch>" dans les données relatives à la publication recherchée. A cette date, la publication sera

- reconduite,
- supprimée,
- remplacée par une édition révisée, ou
- amendée.

INTRODUCTION

La présente partie de l'IEC 60664 précise les conditions dans lesquelles la réduction des distances d'isolement dans l'air et des lignes de fuite peut s'appliquer aux ensembles rigides tels que les **cartes imprimées** ou les bornes des composants. La **protection** contre la pollution peut être obtenue par tous types d'encapsulages, tels que le **revêtement**, l'empotage ou le moulage. La **protection** peut être appliquée sur une face ou sur les deux faces de l'ensemble. La présente norme spécifie les propriétés isolantes du matériau de protection.

Entre deux parties conductrices quelconques non protégées, les exigences relatives aux distances d'isolement et aux lignes de fuite de l'IEC 60664-1 s'appliquent.

Le présent document fait uniquement référence à une **protection** permanente. Elle n'englobe pas les ensembles après réparation.

Il convient que les comités d'études examinent les implications pour la **protection** des **conducteurs** et composants surchauffés, en particulier dans des conditions de défaut, et qu'ils décident si des exigences additionnelles sont nécessaires.

Un fonctionnement performant en toute sécurité des ensembles dépend d'un procédé de fabrication précis et contrôlé pour l'application du système de protection. Il convient que les exigences relatives au contrôle de la qualité, par exemple par des essais par prélèvement, soient prises en considération par les comités d'études.

COORDINATION DE L'ISOLEMENT DES MATÉRIELS DANS LES SYSTÈMES (RÉSEAUX) À BASSE TENSION –

Partie 3: Utilisation de revêtement, d'empotage ou de moulage pour la protection contre la pollution

1 Domaine d'application

La présente partie de l'IEC 60664 est applicable aux ensembles protégés contre la pollution au moyen de **revêtement**, d'empotage ou de moulage, permettant ainsi une réduction des distances d'isolement et des lignes de fuite décrites dans l'IEC 60664-1.

Le présent document décrit les exigences et procédures d'essai pour deux méthodes de **protection**:

- la **protection** de type 1 améliore le microenvironnement des parties sous **protection**;
- la **protection** de type 2 est considérée comme similaire à l'**isolation solide**.

Le présent document s'applique également à toutes sortes de **cartes imprimées** protégées, y compris la surface de couches internes de cartes multicouches, de substrats et d'ensembles protégés de manière similaire. Dans le cas de **cartes imprimées** multicouches, les distances à travers une couche interne sont couvertes par les exigences relatives à l'**isolation solide** dans l'IEC 60664-1.

NOTE Les circuits intégrés hybrides et la technologie à couches épaisses sont des exemples de substrats.

Le présent document fait uniquement référence à une **protection** permanente. Elle n'englobe pas les ensembles soumis à une mise au point mécanique ou à des réparations.

Les principes de la présente norme sont applicables à l'isolation fonctionnelle, principale, supplémentaire et renforcée.

2 Références normatives

Les documents suivants sont cités en référence de manière normative, en intégralité ou en partie, dans le présent document et sont indispensables pour son application. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60068-2-1, *Essais d'environnement – Partie 2-1: Essais – Essai A: Froid*

IEC 60068-2-2, *Essais d'environnement – Partie 2-2: Essais – Essai B: Chaleur sèche*

IEC 60068-2-14, *Essais d'environnement – Partie 2-14: Essais – Essai N: Variation de température*

IEC 60068-2-78, *Essais d'environnement – Partie 2-78: Essais – Essai Cab: Chaleur humide, essai continu*

IEC 60326-2:1990, *Cartes imprimées – Partie 2: Méthodes d'essai*

IEC 60454-3-1: 1998/AMD1:2001, *Rubans adhésifs sensibles à la pression à usages électriques – Partie 3: Spécifications pour matériaux particuliers – Feuille 1: Rubans en PVC avec un adhésif sensible à la pression*

IEC 60664-1, *Coordination de l'isolement des matériels dans les systèmes (réseaux) à basse tension – Partie 1: Principes, exigences et essais*

IEC 61189-2:2006, *Test methods for electrical materials, printed boards and other interconnection structures and assemblies – Part 2: Test methods for materials for interconnection structures* (disponible en anglais uniquement)

IEC 61189-3:2007, *Méthodes d'essai pour les matériaux électriques, les cartes imprimées et autres structures d'interconnexion et ensembles – Partie 3: Méthodes d'essai des structures d'interconnexion (cartes imprimées)*

IEC 61249-2 (toutes les parties), *Matériaux pour circuits imprimés et autres structures d'interconnexion – Matériaux de base renforcés, plaqués et non plaqués*

IEC Guide 104:2010, *The preparation of safety publications and the use of basic safety publications and group safety publications* (disponible en anglais uniquement)

ISO/IEC Guide 51, *Aspects liés à la sécurité – Principes directeurs pour les inclure dans les normes*