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REDLINE VERSION

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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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INSULATION COORDINATION FOR EQUIPMENT WITHIN LOW-VOLTAGE SYSTEMS –

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

FOREWORD

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This Redline version provides you with a quick and easy way to compare all the changes between this standard and its 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 – Test~~s~~ A: Cold*
~~Amendment 1 (1993)~~
~~Amendment 2 (1994)~~

IEC 60068-2-2~~:1974~~, ~~*Basic*~~ *Environmental testing* ~~*procedures*~~ *– Part 2-2: Tests – Test~~s~~ 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.~~

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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

IEC 60664-3:2016-11(en-fr)

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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*

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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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

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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.

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- reconduite,
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- 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*

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