IEC 60071-2

Edition 4.0 2018-03

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HORIZONTAL STANDARD

Insulation co-ordination –
Part 2: Application guidelines

IEC 60071-2:2018-03 RLV(en)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INSULATION CO-ORDINATION –

Part 2: Application guidelines

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.
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International Standard IEC 60071-2 has been prepared by IEC technical committee 28: Insulation co-ordination.

This fourth edition cancels and replaces the third edition published in 1996. This edition constitutes a technical revision.

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

a) the annex on clearance in air to assure a specified impulse withstand voltage installation is deleted because the annex in IEC 60071-1 is overlapped;
b) 4.2 and 4.3 on surge arresters are updated;
c) 4.3.5 on very-fast-front overvoltages is revised. Annex J on insulation co-ordination for very-fast-front overvoltages in UHV substations is added;
d) Annex H on atmospheric correction – altitude correction is added.
e) Annex I on evaluation method of non-standard lightning overvoltage shape is added.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
28/255/FDIS	28/256/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

It has the status of a horizontal standard in accordance with IEC Guide 108.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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INSULATION CO-ORDINATION –

Part 2: Application guidelines

~~1 General~~

1 Scope

This part of IEC 60071 constitutes ~~an~~ application guidelines and deals with the selection of insulation levels of equipment or installations for three-phase electrical systems. Its aim is to give guidance for the determination of the rated withstand voltages for ranges I and II of IEC 60071-1 and to justify the association of these rated values with the standardized highest voltages for equipment.

This association is for insulation co-ordination purposes only. The requirements for human safety are not covered by this document.

This document covers three-phase systems with nominal voltages above 1 kV. The values derived or proposed herein are generally applicable only to such systems. However, the concepts presented are also valid for two-phase or single-phase systems.

This document covers phase-to-earth, phase-to-phase and longitudinal insulation.

This document is not intended to deal with routine tests. These are to be specified by the relevant product committees.

The content of this document strictly follows the flow chart of the insulation co-ordination process presented in Figure 1 of IEC 60071-1:2006. Clauses 4 to 7 correspond to the squares in this flow chart and give detailed information on the concepts governing the insulation co-ordination process which leads to the establishment of the required withstand levels.

This document emphasizes the necessity of considering, at the very beginning, all origins, all classes and all types of voltage stresses in service irrespective of the range of highest voltage for equipment. Only at the end of the process, when the selection of the standard withstand voltages takes place, does the principle of covering a particular service voltage stress by a standard withstand voltage apply. Also, at this final step, this document refers to the correlation made in IEC 60071-1 between the standard insulation levels and the highest voltage for equipment.

The annexes contain examples and detailed information which explain or support the concepts described in the main text, and the basic analytical techniques used.

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 56: 1987, *High-voltage alternating-current circuit-breakers*~~

IEC 60060-1:~~1989~~ 2010, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60071-1:~~1993~~ 2006, *Insulation co-ordination – Part 1: Definitions, principles and rules*
IEC 60071-1:2006/AMD1:2010

~~IEC 99-1:1991, *Surge arresters – Part 1: Non-linear resistor type gapped surge arresters for a.c. systems*~~

~~IEC 99-4:1991, *Surge arresters – Part 4: Metal-oxide surge arresters without gaps for a.c. systems*~~

~~IEC 99-5:1996, *Surge arresters – Part 5: Selection and application recommendations – Section 1: General*~~

~~IEC 505:1975, *Guide for the evaluation and identification of insulation systems of electrical equipment*~~

~~IEC 507:1991, *Artificial pollution test on high-voltage insulators to be used on a.c. systems*~~

~~IEC 721-2-3:1987, *Classification of environmental conditions – Part 2: Environmental conditions appearing in nature – Air pressure*~~

~~IEC 815:1986, *Guide for the selection of insulators in respect of polluted conditions*~~

IEC 60505:2011, *Evaluation and qualification of electrical insulation systems*

IEC TS 60815-1, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 1: Definitions, information and general principles*

ISO 2533:1975, *Standard Atmosphere*

IEC 60071-2

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

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HORIZONTAL STANDARD

NORME HORIZONTALE

Insulation co-ordination – Part 2: Application guidelines

Coordination de l'isolement – Partie 2: Lignes directrices en matière d'application

IEC 60071-2:2018-03(en-fr)

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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COORDINATION DE L'ISOLEMENT –

Partie 2: Lignes directrices en matière d'application

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. À 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.
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La Norme internationale IEC 60071-2 a été établie par le Comité d'études 28 de l'IEC: Coordination de l'isolement.

Cette quatrième édition annule et remplace la troisième édition parue en 1996. Cette édition constitue une révision technique.

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

a) l'annexe relative à la distance d'isolement dans l'air pour installation garantissant une tension de tenue aux chocs spécifiée est supprimée car cette annexe est déjà présente dans l'IEC 60071-1;
b) 4.2 et 4.3 relatifs aux parafoudres ont été mis à jour;

c) 4.3.5 relatif aux surtensions à front très rapide a été révisé. L'Annexe J relative à la coordination de l'isolement pour les surtensions à front très rapide dans les postes UHT a été ajoutée;

d) l'Annexe H relative à la correction atmosphérique – correction de l'altitude a été ajoutée;

e) l'Annexe I relative à la méthode d'évaluation de la forme de la surtension de foudre non normalisée a été ajoutée.

Le texte de cette Norme internationale est issu des documents suivants:

FDIS	Rapport de vote
28/255/FDIS	28/256/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 internationale.

Le présent document a été rédigé selon les Directives ISO/IEC, Partie 2.

Il a le statut d'une norme horizontale conformément au Guide 108 de l'IEC.

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COORDINATION DE L'ISOLEMENT –

Partie 2: Lignes directrices en matière d'application

1 Domaine d'application

La présente partie de l'IEC 60071 constitue des lignes directrices en matière d'application et concerne le choix des niveaux d'isolement des matériels ou des installations pour les réseaux triphasés. Elle a pour objet de donner des recommandations pour la détermination des tensions de tenue assignées pour les plages I et II de l'IEC 60071-1 et de justifier l'association de ces valeurs assignées avec les valeurs normalisées des tensions les plus élevées pour le matériel.

Cette association ne couvre que les besoins de la coordination de l'isolement. Les exigences relatives à la sécurité des personnes ne sont pas traitées dans le présent document.

Le présent document traite des réseaux triphasés de tension nominale supérieure à 1 kV. Les valeurs déduites ou qui y sont proposées ne sont généralement applicables qu'à ces seuls réseaux. Cependant, les principes présentés sont également valables pour les réseaux biphasés ou monophasés.

Le présent document traite de l'isolement phase-terre, entre phases et longitudinal.

Le présent document n'est pas destiné à détailler les essais individuels de série, qui doivent être spécifiés par les comités de produits concernés.

Le contenu du présent document suit strictement l'organigramme de la procédure de coordination de l'isolement présenté à la Figure 1 de l'IEC 60071-1:2006. Les Articles 4 à 7 correspondent à chacun des rectangles de l'organigramme et donnent des informations détaillées sur les principes de la procédure de coordination de l'isolement qui conduit à déterminer les niveaux de tenue spécifiés.

Ce document insiste sur la nécessité de prendre en considération, dès le départ, toutes les origines, toutes les classes et tous les types de contraintes de tension en service quelle que soit la plage de la tension la plus élevée pour le matériel. Ce n'est qu'à la fin de la procédure, au moment de sélectionner les tensions de tenue normalisées, que le principe de couvrir une contrainte de tension particulière en service par une tension de tenue normalisée est appliqué. De même, le document fait référence, à cette étape finale, aux corrélations établies dans l'IEC 60071-1 entre les niveaux d'isolement normalisés et la tension la plus élevée pour le matériel.

Les annexes contiennent des exemples et des informations détaillées qui expliquent ou corroborent les principes décrits dans le texte principal, et les techniques analytiques de base qui sont utilisées.

2 Références normatives

Les documents suivants cités dans le texte constituent, pour tout ou partie de leur contenu, des exigences du présent document. 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 60060-1:2010, *Techniques des essais à haute tension – Partie 1: Définitions et exigences générales*

IEC 60071-1:2006, *Coordination de l'isolement – Partie 1: Définitions, principes et règles*
IEC 60071-1:2006/AMD1:2010

IEC 60505:2011, *Évaluation et qualification des systèmes d'isolation électrique*

IEC TS 60815-1, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions– Part 1: Definitions, information and general principles (disponible en anglais seulement)*

ISO 2533:1975, *Atmosphère type*