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Interested committees:

Title: BS EN 60071-1 Ed.10.0 Draft Insulation co-ordination. Part 1: Definitions, principles and rules.

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



99/491/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:

IEC 60071-1 ED10

DATE OF CIRCULATION:

2025-05-02

CLOSING DATE FOR COMMENTS:

2025-06-27

SUPERSEDES DOCUMENTS:

99/450/RR

IEC TC 99 : INSULATION CO-ORDINATION AND SYSTEM ENGINEERING OF HIGH VOLTAGE ELECTRICAL POWER INSTALLATIONS ABOVE 1,0 kV AC AND 1,5 kV DC

SECRETARIAT:

Australia

SECRETARY:

Ms Erandi Chandrasekare

OF INTEREST TO THE FOLLOWING COMMITTEES:

TC 8,TC 14,TC 17,SC 17A,SC 17C,SC 22F,TC 33,TC 36,TC 37,TC 38,TC 42,TC 115,TC 122

HORIZONTAL FUNCTION(S):

TC 99 Horizontal Basic

ASPECTS CONCERNED:

Electricity transmission and distribution

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Recipients of this document are invited to submit, with their comments, notification of any local regulations or technical reasons that may exist and should be considered should this proposal proceed, recognizing that failure to address such requirements could result in the need for new or existing "In Some Countries" clauses. (SEE AC/22/2007 OR NEW GUIDANCE DOC).

TITLE:

Insulation co-ordination - Part 1: Definitions, principles and rules

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INSULATION CO-ORDINATION –

Part 1: Definitions, principles and rules

FOREWORD

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International Standard IEC 60071-1 has been prepared by IEC technical committee 99: Insulation co-ordination and system engineering of high voltage electrical power installations above 1,0 kV AC and 1,5 kV DC.

This tenth edition cancels and replaces the ninth edition published in 2019. This edition constitutes a technical revision.

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

The main changes from the previous edition are as follows:

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

CDV	Report on voting

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.

- 114 This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.
- 115 A list of all parts in the IEC 60071 series, published under the general title *Insulation co-*
116 *ordination*, can be found on the IEC website.
- 117 The committee has decided that the contents of the base publication and its amendments will
118 remain unchanged until the stability date indicated on the IEC web site under
119 "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the
120 publication will be
- 121 • reconfirmed,
 - 122 • withdrawn,
 - 123 • replaced by a revised edition, or
 - 124 • amended.

125

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.

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INSULATION CO-ORDINATION –

Part 1: Definitions, principles and rules

Scope

This part of IEC 60071 applies to three-phase AC systems having a highest voltage for equipment above 1 kV. It specifies the procedure for the selection of the rated withstand voltages for the phase-to-earth, phase-to-phase and longitudinal insulation of the equipment and the installations of these systems. It also gives the lists of the standard withstand voltages from which the rated withstand voltages are selected.

This document describes that the selected withstand voltages are associated with the highest voltage for equipment. This association is for insulation co-ordination purposes only. The requirements for human safety are not covered by this document.

Although the principles of this document also apply to transmission line insulation, the values of their withstand voltages can be different from the standard rated withstand voltages.

The apparatus committees are responsible for specifying the rated withstand voltages and the test procedures suitable for the relevant equipment taking into consideration the recommendations of this document.

NOTE In IEC 60071-2, all rules for insulation co-ordination given in this document are justified in detail, in particular the association of the standard rated withstand voltages with the highest voltage for equipment. When more than one set of standard rated withstand voltages is associated with the same highest voltage for equipment, guidance is provided for the selection of the most suitable set.

This horizontal standard is primarily intended for use by technical committees in the preparation of standards in accordance with the principles laid down in IEC Guide 108.

One of the responsibilities of a technical committee is, wherever applicable, to make use of horizontal standards in the preparation of its publications. The contents of this horizontal standard will not apply unless specifically referred to or included in the relevant publications.

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 60038, *IEC standard voltages*

IEC 60050-601, *Amendment 1 - International Electrotechnical Vocabulary (IEV) - Part 601: Generation, transmission and distribution of electricity - General*

IEC 60050-614, *International Electrotechnical Vocabulary (IEV) - Part 614: Generation, transmission and distribution of electricity - Operation*

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

IEC 60071-2, *Insulation co-ordination – Part 2: Application guidelines*

170 IEC 60099-4, *Surge arresters – Part 4: Metal-oxide surge arresters without gaps for*
171 *a.c. systems*

172 **Terms and definitions**

173 For the purposes of this document, the following terms and definitions apply.

174 ISO and IEC maintain terminological databases for use in standardization at the following
175 addresses:

- 176 • IEC Electropedia: available at <http://www.electropedia.org/>
- 177 • ISO Online browsing platform: available at <http://www.iso.org/obp>

178 **3.1**

179 **insulation co-ordination**

180 selection of the dielectric strength of equipment in relation to the operating voltages and
181 overvoltages which can appear on the system for which the equipment is intended, and taking
182 into account the service environment and the characteristics of the available preventing and
183 protective devices

184 Note 1 to entry: By "dielectric strength" of the equipment, is meant here its rated insulation level (3.36) or its
185 standard insulation level (3.37).

186 [SOURCE: IEC 60050-614:2016, 614-03-08, modified – Note 1 to entry has been added]

187 **3.2**

188 **external insulation**

189 distances in atmospheric air, and the surfaces in contact with atmospheric air of solid insulation
190 of the equipment which are subject to dielectric stresses and to the effects of atmospheric and
191 other environmental conditions from the site, such as pollution, humidity, vermin, etc.

192 Note 1 to entry: External insulation is either weather protected or non-weather protected, designed to operate
193 outside or inside closed shelters, respectively.

194 [SOURCE: IEC 60050-614:2016, 614-03-02, modified – Note 1 to entry has been added]

195 **3.3**

196 **internal insulation**

197 internal distances of the solid, liquid, or gaseous insulation of equipment which are protected
198 from the effects of atmospheric and other external conditions

199 [SOURCE: IEC 60050-614:2016, 614-03-03]

200 **3.4**

201 **self-restoring insulation**

202 insulation which completely recovers its insulating properties within a short time interval after a
203 disruptive discharge

204 Note 1 to entry: Insulation of this kind is generally, but not necessarily, external insulation.

205 Note 2 to entry: This definition applies only when the discharge is caused by the application of a test voltage during
206 a dielectric test. However, discharges occurring in service may cause a self-restoring insulation to lose partially or
207 completely its original insulating properties.

208 [SOURCE: IEC 60050-614:2016, 614-03-04]

209 **3.5**

210 **non-self-restoring insulation**

211 insulation which loses its insulating properties, or does not recover them completely, after a
212 disruptive discharge

213 Note 1 to entry: This definition applies only when the discharge is caused by the application of a test voltage during
214 a dielectric test. However, discharges occurring in service may cause a self-restoring insulation to lose partially or
215 completely its original insulating properties.

216 [SOURCE: IEC 60050-614:2016, 614-03-05]

217 **3.6**

218 **insulation configuration terminal**

219 any of the terminals between any two of which a voltage that stresses the insulation can be
220 applied

221 Note 1 to entry: The types of terminal are:

- 222 a) phase terminal, between which and the neutral is applied in service the phase-to-neutral voltage of the system;
- 223 a) neutral terminal, representing, or connected to, the neutral point of the system (neutral terminal of transformers,
224 etc.);
- 225 b) earth terminal, always solidly connected to earth in service (tank of transformers, base of disconnectors,
226 structures of towers, ground plane, etc.).

227 **3.7**

228 **insulation configuration**

229 complete geometric configuration of the insulation in service, consisting of the insulation and of
230 all terminals and including all elements (insulating and conducting) which influence its dielectric
231 behaviour

232 Note 1 to entry: The insulation configurations defined in 3.7.1 to 3.7.4 are identified.

233 **3.7.1**

234 **three-phase insulation configuration**

235 insulation configuration having three phase terminals, one neutral terminal and one earth
236 terminal

237 **3.7.2**

238 **phase-to-earth insulation configuration**

239 three-phase insulation configuration where two-phase terminals are disregarded and, except in
240 particular cases, the neutral terminal is earthed

241 **3.7.3**

242 **phase-to-phase insulation configuration**

243 three-phase insulation configuration where one phase terminal is disregarded. In particular
244 cases, the neutral and the earth terminals are also disregarded

245 **3.7.4**

246 **longitudinal insulation configuration**

247 insulation configuration having two phase terminals and one earth terminal, the phase terminals
248 belonging to the same phase of a three-phase system temporarily separated into two
249 independently energized parts (e.g. open switching devices)

250 Note 1 to entry: The four terminals belonging to the other two phases are disregarded or earthed. In particular
251 cases one of the two phase terminals considered is earthed.

252 **3.8**

253 **nominal voltage of a system**

254 U_n a suitable approximate value of voltage used to designate or identify a system

255 [IEV: 601-01-21]

3.9**highest voltage of a system** U_s

highest value of the phase-to-phase operating voltage (RMS value) which occurs under normal operating conditions at any time and at any point in the system

[SOURCE: IEC 60050-601:1985, 601-01-23, modified – Clear meaning on the voltage has been added.]

3.10**highest voltage for equipment** U_m

highest value of phase-to-phase voltage (RMS value) for which the equipment is designed in respect of its insulation as well as other characteristics which relate to this voltage in the relevant equipment standards

Note 1 to entry: Under normal service conditions specified by the relevant apparatus committee, this voltage can be applied continuously to the equipment.

[SOURCE: IEC 60050-614:2016, 614-03-01]

3.11**isolated neutral system**

system where the neutral point is not intentionally connected to earth, except for high impedance connections for protection or measurement purposes

[SOURCE: IEC 60050-601:1985, 601-02-24]

3.12**solidly earthed neutral system**

system whose neutral point(s) is(are) earthed directly

[SOURCE: IEC 60050-601:1985, 601-02-25]

3.13**impedance earthed (neutral) system**

system whose neutral point(s) is(are) earthed through impedances to limit earth fault currents

[SOURCE: IEC 60050-601:1985, 601-02-26]

3.14**resonant earthed (neutral) system**

system in which one or more neutral points are connected to earth through reactances which approximately compensate the capacitive component of a single-phase-to-earth fault current

Note 1 to entry: With resonant earthing of a system, the residual current in the fault is limited to such an extent that an arcing fault in air is usually self-extinguishing.

[SOURCE: IEC 60050-601:1985, 601-02-27]

3.15**earth fault factor k**

at a given location of a three-phase system, and for a given system configuration, the ratio of the highest RMS phase-to-earth power-frequency voltage on a healthy phase during a fault to earth affecting one or more phases at any point on the system to the RMS phase-to-earth power-frequency voltage which would be obtained at the given location in the absence of any such fault