



BSI Standards Publication

**Guidance on clearances and  
creepage distances in particular  
for distances equal to or less  
than 2 mm — Test results of  
research on influencing  
parameters**

**National foreword**

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# TECHNICAL REPORT



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**Guidance on clearances and creepage distances in particular for distances equal to or less than 2 mm – Test results of research on influencing parameters**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions .....	7
4 Fundamental aspects and phenomena of clearance and creepage distances.....	9
4.1 Mutual correlation of insulation characteristics with regard to environmental conditions .....	9
4.2 Pollution .....	9
4.2.1 General .....	9
4.2.2 Humidity level (HL).....	10
4.2.3 Relation of humidity levels to macro-environment .....	10
4.2.4 Comparative tracking index (CTI) .....	11
4.2.5 Flashover characteristics.....	11
5 Clearances and creepage distances .....	12
5.1 General.....	12
5.2 Clearances .....	12
5.2.1 Influencing criteria .....	12
5.2.2 Altitude .....	14
5.3 Creepage distances .....	16
5.3.1 General .....	16
5.3.2 Influencing factors.....	16
5.3.3 Dimensioning of creepage distances of functional insulation .....	22
6 Additional information regarding creepage distance characteristics – surface current over a creepage distance (minimum insulation resistance) .....	22
7 Water adsorption test.....	24
7.1 Object.....	24
7.2 Withstand characteristics of creepage distances under high humidity .....	24
7.3 Recommended test method .....	25
7.3.1 Test specimen .....	25
7.3.2 Measurement of the impulse withstand voltage .....	25
7.3.3 Procedure for characterization of the insulating materials.....	25
7.4 Definitions of the water adsorption groups .....	26
8 Dimensioning diagrams.....	28
9 Withstand voltage test for creepage distance under humidity conditions.....	32
Bibliography .....	33
Figure 1 – Clearances in air for mutual correlation of insulation characteristics to withstand transient overvoltages up to 2000 m above sea level .....	14
Figure 2 – Creepage distances for mutual correlation of insulation characteristics to avoid failure due to tracking .....	19
Figure 3 – Creepage distances for mutual correlation of insulation characteristics to avoid flashover .....	21
Figure 4 – Creepage distances required to maintain minimum insulation resistance.....	24
Figure 5 – Layout of the test specimen .....	27

Figure 6 – Test circuit .....	27
Figure 7 – Critical relative humidity of insulating materials .....	28
Figure 8 – Diagram for dimensioning of clearances $\leq 2$ mm for circuits directly connected to the supply mains (for low-voltage equipment up to 2000 m) .....	29
Figure 9 – Diagram for dimensioning of clearances $\leq 2$ mm for circuits not directly connected to the supply mains (for low-voltage equipment up to 2000 m) .....	30
Figure 10 – Diagram for dimensioning of creepage distances $\leq 2$ mm (for low-voltage equipment up to 2000 m) .....	31
Figure 11 – Withstand voltage test for creepage distance under humidity conditions.....	32
 Table 1 – Relation of the humidity levels to macro-environments.....	10
Table 2 – Clearances for mutual correlation of insulation characteristics to withstand transient overvoltages.....	13
Table 3 – Clearances to withstand steady-state voltages, temporary overvoltages or recurring peak voltages.....	15
Table 4 – Creepage distances for mutual correlation of insulation characteristics in equipment to avoid failure due to tracking .....	18
Table 5 – Creepage distances for mutual correlation of insulation characteristics to avoid flashover .....	20
Table 6 – Minimum insulation resistance .....	22
Table 7 – Creepage distances to maintain minimum insulation resistance (without condensation).....	23

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**GUIDANCE ON CLEARANCES AND CREEPAGE  
DISTANCES IN PARTICULAR FOR DISTANCES EQUAL  
TO OR LESS THAN 2 mm – TEST RESULTS OF RESEARCH  
ON INFLUENCING PARAMETERS**

## FOREWORD

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IEC TR 63040, which is a Technical Report, has been prepared by IEC technical committee 109: Insulation co-ordination for low-voltage equipment.

The text of this Technical Report is based on the following documents:

Enquiry draft	Report on voting
109/140/DTR	109/144/RVC

Full information on the voting for the approval of this Technical Report 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.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site 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.

A bilingual version of this publication may be issued at a later date.

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## INTRODUCTION

This document provides information on printed board assemblies and other equivalent plane arrangements of insulation, where the clearance and the creepage distance follows the same path along the surface of solid insulation.

This document is based on German research data published in May 1989 [9], [10]<sup>1</sup>. SC 28A, the predecessor of TC 109, began analysing this research data in November 1990.

The following points provide background information to the research.

- The research was carried out on test samples that were manufactured with the same technology being used for printed circuit boards (PCBs) with selected spacing of circuit patterns from 0,16 mm to 6,3 mm.
- Ten types of materials were used for the test samples. The influence of manufacturing operations on the surface of a material, for example moulding or machining, was not part of this research project.
- The test samples were placed in different locations, such as large city, rural, industrial, desert, sea side, and periodically exposed to a voltage stress and the data was accumulated over a long period of time.

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<sup>1</sup> Numbers in square brackets refer to the bibliography.



# **GUIDANCE ON CLEARANCES AND CREEPAGE DISTANCES IN PARTICULAR FOR DISTANCES EQUAL TO OR LESS THAN 2 mm – TEST RESULTS OF RESEARCH ON INFLUENCING PARAMETERS**

## **1 Scope**

This document describes test results of research on dimensioning of clearances and creepage distances, for spacing equal to or less than 2 mm for printed wiring material and other equivalent arrangements of insulation, where the clearance and the creepage distance follows the same path along the surface of solid insulation.

The information contained in this document is the result of research only and cannot be used for dimensioning the clearances and creepage distances for equipment within low-voltage systems, where IEC 60664-1 applies. However distances can be taken into account for functional reasons.

This document provides results of research related to the following criteria:

- 1) clearances independent from the micro-environment;
- 2) creepage distances for pollution degree 1, 2 and 3 which extends the use of smaller distances to products having design features similar to printed circuit boards;
- 3) creepage distances to avoid flashover of the insulating surface;
- 4) information on minimum creepage distances to maintain minimum insulation resistance.

A test method for the evaluation of the relevant water adsorption group for the surface of any insulating material which has not yet been classified is described.

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

## **3 Terms and definitions**

For the purposes of this document, the terms and definitions given in IEC 60664-1 and the following apply.

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

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