

TECHNICAL SPECIFICATION

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First edition
2003-06

Guidance on the measurement of wettability of insulator surfaces

*Mesure de l'hydrophobicité
de la surface des isolateurs*



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International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



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CONTENTS

FOREWORD	4
INTRODUCTION	6
1 Scope and object	7
2 Terms and definitions	7
3 Methods for measurement of wetting properties	9
4 Method A – Contact angle method	10
4.1 General	10
4.2 Equipment	10
4.3 Measurement procedure	10
4.4 Evaluation	11
5 Method B – Surface tension method	11
5.1 General	11
5.2 Safety precautions	12
5.3 Equipment and reagents	12
5.4 Measurement procedure	12
5.5 Evaluation	13
6 Method C – The spray method	13
6.1 General	13
6.2 Equipment	13
6.3 Measurement procedure	13
6.4 Evaluation	14
7 Documentation	15
Annex A (normative) Guidelines regarding the applicability and comments on the limitations of the different methods described in this technical specification	16
Annex B (normative) Method A – Contact angle method	18
Annex C (normative) Method B – Surface tension method	19
Annex D (normative) Method C – Spray method	21
Figure 1 – Definition of the static contact angle	8
Figure 2 – Definition of the advancing angle (θ_a) and the receding angle (θ_r) inside a liquid drop resting on an inclined solid surface	9
Figure 3 – Measurements of the advancing angle (θ_a) and the receding angle (θ_r) by adding or withdrawing water from a droplet	11
Figure B.1 – Measurement of the advancing angle (θ_a) and the receding angle (θ_r) by using the captive bubble technique	18

Table 1 – Criteria for the determination of wettability class (WC).....	14
Table C.1 – Concentrations of ethylene-glycol-monoethyl-ether (cellosolve), formamide mixtures used in measuring surface tension of insulator surfaces in the range 30 mN/m to 56 mN/m ($T = 20\text{ °C}$).....	19
Table C.2 – Concentrations of distilled water and formamide mixture used in measuring surface tension of insulator surfaces in the range 58 mN/m to 73 mN/m ($T = 20\text{ °C}$).....	20
Table C.3 – Concentrations of distilled water and sodium chloride in mixtures used in measuring surface tension of insulator surfaces in the range 73 mN/m to 82 mN/m ($T = 20\text{ °C}$)	20

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

GUIDANCE ON THE MEASUREMENT OF WETTABILITY OF INSULATOR SURFACES

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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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- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 62073, which is a technical specification, has been prepared by IEC technical committee 36: Insulators.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
36/185/DTS	36/197A/RVC

Full information on the voting for the approval of this technical specification 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 2006. At this date, the publication will be

- transformed into an International standard;
- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

Withdrawn

INTRODUCTION

The wetting properties of a surface by water are commonly described by the terms hydrophobic (or hydrophobicity) and hydrophilic (or hydrophilicity). A hydrophobic surface is water-repellent, while a surface that is easily wetted by water is hydrophilic.

The wetting phenomenon of a surface is complex and many different parameters can influence its apparent wettability. Some important parameters include: type of insulator material, surface roughness, heterogeneities of the surface, chemical composition (e.g. due to ageing) and presence of pollution. For some of the insulator materials in common use, the wetting properties can change over time, due to the influence of the ambient conditions. This change can be either reversible or irreversible. Thus, the result of the measurement of the wettability may be influenced by the ambient conditions and the HV corona or dry-band arcing to which the insulator has been previously exposed. This dynamic wetting behaviour is more or less specific to different insulator materials.

The dynamic wetting behaviour exhibited by insulator materials is due to their chemical composition. Different processes such as oxidation, hydrolysis, migration of low molecular weight compounds, formation of complex compounds between e.g. siloxanes and water, rotation of flexible polymer chains, inter- and intra-molecular rearrangements, microbial growth, deposition of contaminants, adhesion and encapsulation of contaminant particles, may take place at different rates, depending on material and ambient conditions. Thus, wettability along and around an insulator can vary, due to differences in the exposure to solar radiation, rain, corona discharges, deposited pollution, etc. Therefore, wettability measurement of insulators should be performed on several separate areas of the insulator.

Measurement of the wettability of a surface is readily performed in the laboratory on well defined, homogeneous, smooth and planar surfaces of prepared specimens. In the case of insulators, for which non-destructive measurements are usually required (and where cut-out of material samples is usually not desired), these conditions do not exist and measurement with high precision is a difficult task. This is especially true when the measurement has to be performed on an insulator installed in an overhead line, substation or even in a high voltage test set-up in the laboratory.