

TECHNICAL SPECIFICATION

Artificial pollution tests on high-voltage polymeric insulators to be used on AC and DC systems

<https://standards.iteh.ai>
Document Preview

[IEC TS 63414:2025](https://standards.iteh.ai/catalog/standards/iec/22ec35ae-9f51-402e-a557-2d7018551017/iec-ts-63414-2025)

<https://standards.iteh.ai/catalog/standards/iec/22ec35ae-9f51-402e-a557-2d7018551017/iec-ts-63414-2025>



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2025 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search -

webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

[IEC TS 63414:2025](https://standards.iteh.ai/catalog/standards/iec/22ec35ae-9f51-402e-a557-2d7018551017/iec-ts-63414-2025)

<https://standards.iteh.ai/catalog/standards/iec/22ec35ae-9f51-402e-a557-2d7018551017/iec-ts-63414-2025>

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD	4
1 Scope	6
2 Normative references	6
3 Terms and definitions	7
3.1 General definitions	7
3.3 Definitions related to tests with AC voltage	7
3.4 Definitions related to tests with DC voltage	7
3.5 Definitions related to characteristics of the test insulator	8
3.6 Definitions related to characteristics of the artificial pollution	9
3.7 Definitions related to statistical characteristics of disruptive-discharge voltage values	10
4 General	11
5 General test requirements	11
5.1 Test methods available	11
5.2 Arrangement of insulator for test	11
5.2.1 Test configuration	11
5.2.2 Cleaning of insulator	12
5.3 Standard reference atmosphere	12
5.4 Atmospheric corrections	12
5.5 Requirements for the AC testing plant	13
5.5.1 Test voltage	13
5.5.2 Characterization of the measuring circuit	13
5.5.3 Identification of disruptive-discharge (flashover)	13
5.5.4 Minimum short-circuit current	13
5.6 Requirements for the DC testing plant	15
5.6.1 Test voltage	15
5.6.2 Characterization of the measuring circuit	16
5.6.3 Identification of disruptive-discharge (flashover)	16
6 Salt fog method for AC and DC	16
6.1 General information	16
6.2 Salt solution	17
6.3 Salt fog generation	18
6.4 Conditions before starting the test	21
6.5 Test procedures and acceptance criteria	21
6.5.1 General	21
6.5.2 Quick flashover test procedure	21
6.5.3 Withstand voltage test	24
7 Solid layer method for AC and DC	25
7.1 General information	25
7.2 Main characteristics of inert materials	25
7.3 Composition of the Kaolin (or Tonoko) contaminating suspension	26
7.4 Application of the pollution layer	26
7.4.1 General	26
7.4.2 Preconditioning procedure	27
7.4.3 Contamination procedure	28
7.5 Determination of the degree of pollution of the tested insulator	28

7.5.1	General	28
7.5.2	SDD calculations	28
7.5.3	NSDD calculations	29
7.6	Steam fog generation.....	29
7.7	Test procedures and acceptance criteria.....	30
7.7.1	General	30
7.7.2	Flashover test.....	31
7.7.3	Withstand voltage test	33
Annex A	(informative) Additional recommendations concerning the solid layer method	34
A.1	General.....	34
A.2	Contamination practice	34
A.3	Drying of the pollution layer	34
A.4	Check of the wetting action of the steam fog	34
A.5	Checking fog uniformity for large or complex test objects.....	35
A.6	Fog input in the test chamber.....	36
A.7	Minimum duration of the withstand test	36
Annex B	(informative) Supplementary information on artificial pollution tests on insulators for higher system voltages (above 800 kV for AC and ± 600 kV for DC) using the solid layer method.....	37
B.1	General.....	37
B.2	Test chamber.....	37
B.3	Fog generator	37
B.4	Wetting action and uniformity of fog density	37
Annex C	(informative) Alternative recommendation concerning preconditioning and contamination procedures for solid layer method	38
C.1	General.....	38
C.2	Slurry method	38
Bibliography	39
https://standards.iteh.ai/catalog/standards/iec/22ee35ae-9f51-402e-a557-2d7018551017/iec-ts-63414-2025		
Figure 1	– Minimum short-circuit current, $I_{sc \min}$, required for the testing plant as a function of the unified specific creepage distance under test (USCD _t) of the insulator under test	14
Figure 2	– Ripple amplitude and actual mean voltage, measured on a resistive load absorbing 100 mA.....	15
Figure 3	– Voltage drop and voltage overshoot and leakage current	16
Figure 4	– Value of factor b as a function of solution temperature	18
Figure 5	– Typical construction of fog spray nozzle	19
Figure 6	– Test layout for inclined insulators	20
Figure 7	– Flow chart illustrating quick flashover test procedure	23
Figure 8	– Example of voltage application during quick flashover test procedure	24
Figure 9	– Flow chart illustrating solid layer method for polymeric insulators in comparison to ceramic or glass insulators.....	27
Figure 10	– Procedure for measuring NSDD	29
Figure 11	– Flow chart illustrating rapid flashover test procedure	32
Figure 12	– Example of voltage application during rapid flashover test procedure	33
Figure A.1	– Determination of layer conductance and evaluation of its rise time	35

Table 1 – Salt fog method: correspondence between the value of salinity and volume conductivity of the solution at a temperature of 20 °C	17
Table 2 – Main characteristics of the inert materials used in solid layer suspensions	25
Table 3 – Kaolin (or Tonoko) composition: approximate correspondence between the reference degrees of pollution on the insulator and the volume conductivity of the suspension at a temperature of 20 °C	26

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC TS 63414:2025](https://standards.iteh.ai/catalog/standards/iec/22ec35ae-9f51-402e-a557-2d7018551017/iec-ts-63414-2025)

<https://standards.iteh.ai/catalog/standards/iec/22ec35ae-9f51-402e-a557-2d7018551017/iec-ts-63414-2025>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

Artificial pollution tests on high-voltage polymeric insulators to be used on AC and DC systems

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC TS 63414 has been prepared by subcommittee 36B: Insulators for overhead lines, of IEC technical committee 36: Insulators. It is a Technical Specification.

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

Draft	Report on voting
36/630/DTS	36/637/RVDTS

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Specification is English.