



# INTERNATIONAL STANDARD

REDLINE VERSION

UHV AC transmission systems -  
Part 301: On-site acceptance tests

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

[IEC TS 63042-301:2026](https://standards.iteh.ai/catalog/standards/iec/a31efcb9-9d4a-4916-bc14-f25cdf944fd2/iec-ts-63042-301-2026)

<https://standards.iteh.ai/catalog/standards/iec/a31efcb9-9d4a-4916-bc14-f25cdf944fd2/iec-ts-63042-301-2026>



**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2026 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](mailto:info@iec.ch)  
[www.iec.ch](http://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](http://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 It also gives information on projects, replaced and withdrawn publications.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](http://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](http://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](mailto:sales@iec.ch).

**IEC Products & Services Portal - [products.iec.ch](http://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](http://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.

<https://standards.iteh.ai/catalog/standards/iec/a31efcb9-9d4a-4916-bc14-f25cdf944fd2/iec-ts-63042-301-2026>

<https://standards.iteh.ai/catalog/standards/iec/a31efcb9-9d4a-4916-bc14-f25cdf944fd2/iec-ts-63042-301-2026>

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

## CONTENTS

|  |    |
|--|----|
| FOREWORD .....   | 5  |
| INTRODUCTION .....   | 7  |
| 1 Scope .....  | 8  |
| 2 Normative references .....   | 8  |
| 3 Terms and definitions .....  | 9  |
| 4 General .....  | 9  |
| 5 Power transformers .....   | 9  |
| 5.1 General .....  | 9  |
| 5.2 Leak testing with pressure (tightness test) .....  | 10 |
| 5.3 Winding resistance measurement .....   | 10 |
| 5.4 Ratio test .....   | 10 |
| 5.5 Polarity check .....   | 11 |
| 5.6 Insulation resistance test on each winding to earth and between windings including bushings .....                    | 11 |
| 5.7 Dissipation factor ( $\tan \delta$ ) and capacitance measurement on each winding to earth and between windings ..... | 11 |
| 5.8 Core and frame insulation check .....  | 11 |
| 5.9 Tests on bushings .....  | 11 |
| 5.9.1 Visual inspection .....  | 11 |
| 5.9.2 $\tan \delta$ and capacitance measurement .....  | 11 |
| 5.9.3 Tap withstand voltage .....  | 11 |
| 5.10 Insulating oil tests .....  | 12 |
| 5.11 Dissolved gas analysis (DGA) test .....   | 12 |
| 5.12 Excitation current measurements at reduced voltage .....  | 12 |
| 5.13 Frequency-response analysis (FRA) .....   | 12 |
| 5.14 Short-circuit impedance measurement at reduced current .....  | 12 |
| 5.15 Induced voltage tests with partial discharge measurement .....  | 13 |
| 5.16 Applied voltage tests .....   | 13 |
| 5.17 Measurement of short-circuit impedance and load loss (for an on-site assembly transformer) .....                    | 13 |
| 5.18 Measurement of no-load loss and current (for an on-site assembly transformer) .....                                 | 13 |
| 6 Circuit-breakers (CB) .....  | 13 |
| 6.1 General .....  | 13 |
| 6.2 Dielectric test on main circuit .....  | 14 |
| 6.3 Dielectric test on auxiliary circuit .....   | 14 |
| 6.4 Measurement of the resistance of the main circuit .....  | 14 |
| 6.5 Checks after installation including gas tightness tests, gas quality, insulation resistance test .....               | 14 |
| 6.5.1 General .....  | 14 |
| 6.5.2 General checks .....   | 14 |
| 6.5.3 Checks of electrical circuits .....  | 15 |
| 6.5.4 Checks of the insulation and/or extinguishing fluid(s) .....   | 15 |
| 6.5.5 Checks on operating fluid(s), where filled or added to on-site .....   | 15 |
| 6.5.6 Site operations .....  | 15 |
| 6.6 Mechanical test and measurement .....  | 15 |
| 6.7 Test of accessories .....  | 16 |

|        |   |    |
|--------|---|----|
| 7      | GIS and GIL .....   | 17 |
| 7.1    | General.....  | 17 |
| 7.2    | Dielectric tests on the main circuits.....  | 17 |
| 7.3    | Dielectric tests on auxiliary circuits .....  | 19 |
| 7.4    | Measurement of the resistance of the main circuit.....  | 19 |
| 7.5    | Gas tightness tests .....   | 19 |
| 7.6    | Checks and verifications .....  | 20 |
| 7.7    | Gas quality verifications .....   | 20 |
| 8      | Surge arresters.....  | 20 |
| 8.1    | General.....  | 20 |
| 8.2    | Insulation resistance test .....  | 21 |
| 8.3    | Insulation resistance test of the base insulator.....   | 21 |
| 8.4    | Leakage current test .....  | 21 |
| 8.5    | Checks and verifications .....  | 21 |
| 8.6    | Tests of accessories .....  | 21 |
| 9      | Voltage and current transformers.....   | 21 |
| 9.1    | Capacitive voltage transformers (CVTs).....   | 21 |
| 9.1.1  | General .....   | 21 |
| 9.1.2  | Insulation resistance measurement of low voltage terminal to earth terminal .....                                   | 22 |
| 9.1.3  | Capacitance and dissipation factor ( $\tan \delta$ ) measurement .....  | 22 |
| 9.1.4  | Tightness of the liquid-filled capacitor voltage dividers .....   | 22 |
| 9.1.5  | Winding resistance measurement of electromagnetic units .....   | 22 |
| 9.1.6  | Insulation resistance measurement of each component of electromagnetic units.....                                   | 22 |
| 9.1.7  | Connection check between components of electromagnetic units .....  | 22 |
| 9.1.8  | Tightness of electromagnetic units.....   | 23 |
| 9.1.9  | Accuracy check (determination of error).....  | 23 |
| 9.1.10 | Damper check .....  | 23 |
| 9.2    | Bushing-type current transformers (CT) .....  | 23 |
| 9.2.1  | General .....   | 23 |
| 9.2.2  | Insulation resistance test .....  | 23 |
| 9.2.3  | Resistance measurement .....  | 24 |
| 9.2.4  | Applied voltage test on secondary windings.....   | 24 |
| 9.2.5  | Determination of error and polarity check .....   | 24 |
| 9.2.6  | Excitation test.....  | 24 |
| 10     | Shunt reactors .....  | 24 |
| 10.1   | General.....  | 24 |
| 10.2   | Leak testing with pressure (tightness test) .....   | 25 |
| 10.3   | Winding resistance measurement .....  | 25 |
| 10.4   | Insulation resistance tests on each winding to earth and between windings including bushings .....                  | 25 |
| 10.5   | Dissipation factor ( $\tan \delta$ ) and capacitance measurement on each winding to earth and between windings..... | 25 |
| 10.6   | Core and frame insulation check .....   | 25 |
| 10.7   | Tests on bushings.....  | 25 |
| 10.7.1 | Visual inspection .....   | 25 |
| 10.7.2 | Tan $\delta$ and capacitance measurement.....   | 25 |
| 10.7.3 | Tap withstand voltage.....  | 26 |

|        |  |    |
|--------|--|----|
| 10.8   | Insulating oil tests .....   | 26 |
| 10.9   | DGA test .....   | 26 |
| 10.10  | Applied voltage tests .....  | 26 |
| 11     | Series compensators .....  | 26 |
| 11.1   | General .....  | 26 |
| 11.2   | Test on capacitors .....   | 26 |
| 11.3   | Tests on metal oxide varistors .....   | 27 |
| 11.4   | Tests on damping equipment .....   | 27 |
| 11.5   | Tests on spark gaps .....  | 28 |
| 11.6   | Tests on current transformers .....  | 29 |
| 11.7   | Tests on by-pass switches .....  | 29 |
| 11.8   | Tests on disconnectors .....   | 30 |
| 11.9   | Tests on insulators .....  | 30 |
| 11.10  | Tests on control and protection systems of series compensator .....  | 31 |
| 12     | Insulators .....   | 31 |
| 12.1   | General .....  | 31 |
| 12.2   | On-site acceptance tests of suspension insulators .....  | 31 |
| 12.3   | On-site acceptance tests of post insulators .....  | 31 |
| 13     | Air-insulated disconnectors and earthing switches .....  | 32 |
| 13.1   | Air-insulated disconnectors .....  | 32 |
| 13.1.1 | General .....  | 32 |
| 13.1.2 | Dielectric test on control and auxiliary circuits .....  | 32 |
| 13.1.3 | Measurement of the resistance of the main circuit .....  | 32 |
| 13.1.4 | Design and visual inspection checks .....  | 32 |
| 13.1.5 | Mechanical test .....  | 32 |
| 13.2   | Air-insulated earthing switches .....  | 32 |
| 13.2.1 | General .....  | 32 |
| 13.2.2 | Appearance Design and visual checks .....  | 32 |
| 13.2.3 | Dielectric tests on control and auxiliary circuits .....   | 33 |
| 13.2.4 | Mechanical test .....  | 33 |
| 14     | High-speed earthing switches (HSES) .....  | 33 |
| 14.1   | General .....  | 33 |
| 14.2   | Dielectric test on main circuit .....  | 33 |
| 14.3   | Dielectric test on auxiliary circuit .....   | 33 |
| 14.4   | Measurement of the resistance of the main circuit .....  | 33 |
| 14.5   | Checks and verifications after installation including gas tightness tests, gas quality, insulation resistance test ..... | 33 |
| 14.6   | Mechanical tests and measurements .....  | 33 |
| 14.7   | Tests of accessories .....   | 34 |
| 14.8   | CB and HSES operating sequence test .....  | 34 |
| 15     | Protection and control system .....  | 34 |
| 15.1   | General .....  | 34 |
| 15.2   | Visual inspection .....  | 34 |
| 15.3   | Wiring check .....   | 34 |
| 15.4   | Insulation test .....  | 35 |
| 15.5   | AC/DC power supply check .....   | 35 |
| 15.6   | Device current and voltage sampling test .....   | 35 |
| 15.7   | Binary input/output contact and signal check .....   | 35 |

|       |   |               |
|-------|---|---------------|
| 15.8  | Protection function verification .....  | 35            |
| 15.9  | Control function verification.....  | 35            |
| 15.10 | Auxiliary relay test .....  | 35            |
|       | Bibliography.....   | 36            |
|       | Figure 1 – Delay time of opening resistor and pre-insertion time of closing resistor..... | 16            |
|       | Table 1 – Requirements of insulating oil .....  | 12            |
|       | <del>Table 2 – On-site test voltages .....</del>  | <del>28</del> |
|       | Table 2 – Tan $\delta$ (%) of bushings.....   | 28            |
|       | Table 3 – Limiting value of tan $\delta$ (%) .....  | 29            |

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

[IEC TS 63042-301:2026](https://standards.iteh.ai/catalog/standards/iec/a31efcb9-9d4a-4916-bc14-f25cdf944fd2/iec-ts-63042-301-2026)

<https://standards.iteh.ai/catalog/standards/iec/a31efcb9-9d4a-4916-bc14-f25cdf944fd2/iec-ts-63042-301-2026>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**UHV AC transmission systems -  
Part 301: On-site acceptance tests**

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.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC TS 63042-301:2018. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.