



NSAI
Standards

Irish Standard
I.S. EN 61481-1:2014

Live working - Phase comparators - Part 1:
Capacitive type to be used for voltages
exceeding 1 kV a.c.

I.S. EN 61481-1:2014

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This document is based on:

EN 61481-1:2014

Published:

2014-12-05

This document was published under the authority of the NSAI and comes into effect on:

2015-01-16

ICS number:

NOTE: If blank see CEN/CENELEC cover page

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EUROPEAN STANDARD

EN 61481-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2014

ICS 13.260; 29.240.20; 29.260.99

Supersedes EN 61481:2001 (partially)

English Version

**Live working - Phase comparators -
Part 1: Capacitive type to be used for voltages
exceeding 1 kV a.c.
(IEC 61481-1:2014)**

Travaux sous tension - Comparateurs de phase -
Partie 1: Type capacitif pour usage sur des tensions
alternatives de plus de 1 kV
(CEI 61481-1:2014)

Arbeiten unter Spannung - Phasenvergleich -
Teil 1: Kapazitive Ausführung für Wechselspannungen
über 1 kV
(IEC 61481-1:2014)

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Foreword

The text of document 78/1051/FDIS, future edition 1 of IEC 61481-1, prepared by IEC/TC 78 "Live working" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61481-1:2014.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2015-08-28
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-11-28

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IEC 60071-1:2006	NOTE	Harmonized as EN 60071-1:2006 (not modified).
IEC 60743:2013	NOTE	Harmonized as EN 60743:2013 (not modified).
IEC 61235:1993	NOTE	Harmonized as EN 61235:1995 (modified).
IEC 61936-1:2010	NOTE	Harmonized as EN 61936-1:2010 (modified).
ISO/IEC 17025	NOTE	Harmonized as EN ISO/IEC 17025 (not modified).

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
CISPR 11	-	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement	EN 55011	-
IEC 60060-1	2010	High-voltage test techniques - Part 1: General definitions and test requirements	EN 60060-1	2010
IEC 60068-1	-	Environmental testing - Part 1: General and guidance	EN 60068-1	-
IEC 60068-2-6	-	Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	-
IEC 60068-2-14	-	Environmental testing - Part 2-14: Tests - Test N: Change of temperature	EN 60068-2-14	-
IEC 60068-2-31	-	Environmental testing - Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens	EN 60068-2-31	-
IEC 60068-2-75	-	Environmental testing - Part 2-75: Tests - Test Eh: Hammer tests	EN 60068-2-75	-
IEC 60304	-	Standard colours for insulation for low-frequency cables and wires	HD 402 S2	-
IEC 60417-DB	-	Graphical symbols for use on equipment	-	-
IEC 60942	-	Electroacoustics - Sound calibrators	EN 60942	-
IEC 61000-4-2	-	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	EN 61000-4-2	-
IEC 61000-4-3	-	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	EN 61000-4-3	-
IEC 61260	-	Electroacoustics - Octave-band and fractional-octave-band filters	EN 61260	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61318	-	Live working - Conformity assessment applicable to tools, devices and equipment	EN 61318	-
IEC 61326-1	-	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements	EN 61326-1	-
IEC 61477	-	Live working - Minimum requirements for the utilization of tools, devices and equipment	EN 61477	-
IEC 61672-1	-	Electroacoustics - Sound level meters - Part 1: Specifications	EN 61672-1	-
ISO 354	-	Acoustics - Measurement of sound absorption in a reverberation room	EN ISO 354	-
ISO 3744	2010	Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane	EN ISO 3744	2010
ISO 3745	-	Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Precision methods for anechoic rooms and hemi-anechoic rooms	EN ISO 3745	-
CIE 15	-	Colorimetry	-	-



IEC 61481-1

Edition 1.0 2014-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Live working – Phase comparators –
Part 1: Capacitive type to be used for voltages exceeding 1 kV a.c.**

**Travaux sous tension – Compérateurs de phase –
Partie 1: Type capacitif pour usage sur des tensions alternatives de plus de 1 kV**





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IEC 61481-1

Edition 1.0 2014-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Live working – Phase comparators –
Part 1: Capacitive type to be used for voltages exceeding 1 kV a.c.**

**Travaux sous tension – Compérateurs de phase –
Partie 1: Type capacitif pour usage sur des tensions alternatives de plus de 1 kV**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE **XC**
CODE PRIX

ICS 13.260; 29.240.20; 29.260.99

ISBN 978-2-8322-1879-2

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LIVE WORKING – PHASE COMPARATORS –

Part 1: Capacitive type to be used for voltages exceeding 1 kV a.c.

FOREWORD

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International Standard IEC 61481-1 has been prepared by IEC technical committee 78: Live working.

This first edition, together with the first edition of IEC 61481-2, cancels and replaces the first edition of IEC 61481 published in 2001, Amendment 1:2002 and Amendment 2:2004. This edition constitutes a technical revision.

The major changes are:

- split of the standard in two parts;
- extension of the scope to include two-pole phase comparators operating with a wireless connection up to 245 kV a.c.;
- review of the requirements for indication;
- introduction of a requirement for a new marking “LU” for limited use;
- addition of requirements and tests for two-pole phase comparators operating with a wireless connection;
- clarification of the test procedures in case of additional contact electrodes, accessories and combination of accessories, as well as in case of family of phase comparators;
- addition of requirements and tests for electromagnetic compatibility (EMC);
- clarification of the test provisions for the function tests;
- clarification of the test procedure for clear perceptibility of audible indication;
- preparation of the elements of evaluation of defects, and general application of IEC 61318:2007;
- revision of existing annexes;
- change of existing normative Annex C in two new Annexes D and F giving the classification of defects (normative) and the rationale for the classification of defects (informative);
- deletion of existing Annex D, no longer needed following the specification of IEC 60068-2-75;
- deletion of existing Annex F, not applicable according to IEC 61318:2007;
- addition of a new informative Annex E giving additional information on the use of the limit mark and of a contact electrode extension.

The text of this standard is based on the following documents:

FDIS	Report on voting
78/1051/FDIS	78/1087/RVD

Full information on the voting for the approval of this standard 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.

In this standard terms defined in Clause 3 appear in *italics*.

A list of all parts of the IEC 61481 series, published under the general title *Live working – Phase comparators*, can be found on the IEC website.

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.

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INTRODUCTION

This International Standard has been prepared in accordance with the requirements of IEC 61477.

Taking into consideration the two different functioning principles of portable *phase comparators* of capacitive type available on the market, the maximum a.c. *nominal voltage* to be associated with each of them has been considered for delimiting the scope of this standard.

The following table presents the rationale for the resulting maximum *nominal voltage* to be associated with each functioning principle of *phase comparator of capacitive type*.

Functioning principle	Maximum nominal voltage kV rms	Rationale
Single-pole <i>phase comparators</i> operating with a memory system	36	<ul style="list-style-type: none"> – With this principle of functioning, the <i>clear indication</i> of the <i>phase comparator</i> is limited by the <i>memory holding time</i>. With higher <i>nominal voltages</i>, the distance between phases of the installation increases and the time necessary to move the pole of the <i>phase comparator</i> between the two parts to be compared becomes the limitation.
Two-pole <i>phase comparators</i> operating with a wireless connection	245	<ul style="list-style-type: none"> – With this principle of functioning, there is no theoretical limit for the maximum <i>nominal voltage</i>. – The definition of 245 kV corresponds to the present limit of validation of the electric test set-up.

The product covered by this standard may have an impact on the environment during some or all stages of its life cycle. These impacts can range from slight to significant, be short-term or long-term, and occur at the global, regional or local level.

In terms of environmental improvement, this standard includes neither requirements nor test provisions for the manufacturers of the product nor recommendations to the users of the product. However, all parties intervening in its design, manufacture, packaging, distribution, use, maintenance, repair, reuse, recovery and disposal are invited to take account of environmental considerations.

LIVE WORKING – PHASE COMPARATORS –

Part 1: Capacitive type to be used for voltages exceeding 1 kV a.c.

1 Scope

This part of IEC 61481 is applicable to portable *phase comparators* of capacitive type to be used on electrical systems for voltages exceeding 1 kV a.c. and frequencies of 50 Hz and/or 60 Hz.

This standard is applicable to:

- single-pole *phase comparators* of capacitive type operating with a memory system up to 36 kV a.c.,
- two-pole *phase comparators* of capacitive type operating with a wireless connection up to 245 kV a.c.

This standard is applicable to *phase comparators* of capacitive type used in contact with the bare conductive parts to be compared:

- as a complete device including its *insulating element* or
- as a separate device, adaptable to an *insulating stick* which, as a separate tool, is not covered by this standard.

NOTE Some parts such as the *contact electrode* or the *insulating element* of a *phase comparator* as a complete device may be dismantled.

Some restrictions on their use are applicable in the case of factory-assembled switchgear and on overhead systems of electrified railways (see Annex A).

A device that is designed to provide other functions than phase comparison is a different device and is not covered by this standard. For example a device designed to be also used as a voltage detector is not covered by this standard (see Annex A).

Products designed and manufactured according to this standard contribute to the safety of users provided they are used by persons trained for the work, in accordance with the hot stick working method and the instructions for use.

Except when otherwise specified, all the voltages defined in this standard refer to phase-to-phase voltages of three-phase systems. In other systems, the applicable phase-to-phase or phase-to-earth (ground) voltages should be used to determine the operating voltage.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CISPR 11, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*

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