SLOVENSKI STANDARD
SIST EN 61481-2:2015

01-april-2015

Nadomešča:
SIST EN 61481:2002
SIST EN 61481:2002/A1:2003
SIST EN 61481:2002/A2:2007

Delo pod napetostjo - Fazni primerjalniki - 2. del: Uporovne vrste za izmenične napetosti od 1 kV do 36 kV (IEC 61481-2:2014)

Live working - Phase comparators -- Part 2: Resistive type to be used for voltages from 1 kV to 36 kV a.c.

Ta slovenski standard je istoveten z: **EN 61481-2:2014**

ICS:

13.260	Varstvo pred električnim udarom. Delo pod napetostjo	Protection against electric shock. Live working
17.220.20	Merjenje električnih in magnetnih veličin	Measurement of electrical and magnetic quantities

SIST EN 61481-2:2015 **en**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61481-2

December 2014

ICS 13.260; 29.240.20; 29.260.99

Supersedes EN 61481:2001 (partially)

English Version

Live working - Phase comparators - Part 2: Resistive type to be used for voltages from 1 kV to 36 kV a.c. (IEC 61481-2:2014)

Travaux sous tension - Comparateurs de phase - Partie 2: Type résistif pour usage sur des tensions alternatives de 1 kV à 36 kV (CEI 61481-2:2014)

Arbeiten unter Spannung - Phasenvergleicher - Teil 2: Resistive (ohmsche) Ausführung für Wechselspannungen über 1 kV bis 36 kV (IEC 61481-2:2014)

This European Standard was approved by CENELEC on 2014-11-28. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 61481-2:2014 E

Foreword

The text of document 78/1052/FDIS, future edition 1 of IEC 61481-2, prepared by IEC/TC 78 "Live working" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61481-2:2014.

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

This document supersedes EN 61481:2001 (partially).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61481-2:2014 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60038	NOTE	Harmonized as EN 60038.
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

Publication	Year	Title	EN/HD	Year
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 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	-

Publication	Year	Title	EN/HD	Year
IEC 61000-4-8	-	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test	EN 61000-4-8	-
IEC 61260	-	Electroacoustics - Octave-band and fractional-octave-band filters	EN 61260	-
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 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
CIE 15	-	Colorimetry	-	-

IEC 61481-2

Edition 1.0 2014-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Live working – Phase comparators –
Part 2: Resistive type to be used for voltages from 1 kV to 36 kV a.c.

Travaux sous tension – Comparateurs de phase –
Partie 2: Type résistif pour usage sur des tensions alternatives de 1 kV à 36 kV

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX XC

ICS 13.260; 29.240.20; 29.260.99

ISBN 978-2-8322-1878-5

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

LIVE WORKING – PHASE COMPARATORS –

Part 2: Resistive type to be used for voltages from 1 kV to 36 kV a.c.

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) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61481-2 has been prepared by IEC technical committee 78: Live working.

This first edition, together with the first edition of IEC 61481-1, 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;
- review of the requirements for indication;
- elimination of class C (±110°);
- introduction of a requirement for a new marking "LU" for limited use;
- increase of the specified range of voltage fluctuation in a network for clear indication;

- clarification of the design requirements by specifying a resistive element in each pole of the device;
- clarification of the test procedures in the case of additional contact electrodes, accessories and combination of accessories, as well as in the 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, not needed anymore 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
78/1052/FDIS	78/1088/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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

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

Taking into consideration the functioning principle of portable *phase comparators of resistive type* available on the market, the associated maximum a.c. *nominal voltage* is 36 kV.

The rationale for this maximum *nominal voltage* is:

- design of the *phase comparator* for operation by one person (see 4.4.2) – ergonomic consideration.

  With higher *nominal voltages*, the distance between phases of the installation increases and the positioning of the two poles of the *phase comparator* by one person becomes a limitation;
- correct performance of each component (including the connecting lead) under normal working conditions – performance consideration;
- possible contact of the connecting lead between the two poles of the *phase comparator* with a part of the installation at a phase or earth potential under normal working conditions.

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 2: Resistive type to be used for voltages from 1 kV to 36 kV a.c.

1 Scope

This part of IEC 61481 is applicable to portable *phase comparator*s of resistive type to be used on electrical systems for voltages from 1 kV a.c. to 36 kV a.c. and frequencies of 50 Hz and/or 60 Hz.

This standard is applicable to *phase comparators of resistive 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 the 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*

IEC 60060-1:2010, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60068-1, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*