SLOVENSKI STANDARD
SIST EN 61481:2002

01-september-2002

Delo pod napetostjo - Prenosni fazni primerjalniki za napetosti od 1 kV do 36 kV izmeniļ no (IEC 61481:2001)

Live working - Portable phase comparators for use on voltages from 1 kV to 36 kV a.c.

Arbeiten unter Spannung - Phasenvergleicher für Wechselspannungen von 1 kV bis 36 kV

Travaux sous tension - Comparateurs de phase portatifs pour utilisation à des tensions alternatives de 1 kV à 36 kV

Ta slovenski standard je istoveten z: **EN 61481:2001**

ICS:

13.260	Varstvo pred elektriļ nim udarom. Delo pod napetostjo	Protection against electric shock. Live working
17.220.20	Merjenje elektriļ nih in magnetnih veliļ in	Measurement of electrical and magnetic quantities

SIST EN 61481:2002 **en**

EUROPEAN STANDARD **EN 61481**

NORME EUROPÉENNE

EUROPÄISCHE NORM May 2001

ICS 13.260; 29.240.20; 29.260.99

English version

Live working - Portable phase comparators for voltages of 1 kV to 36 kV a.c. (IEC 61481:2001)

Travaux sous tension - Comparateurs de phase portatifs pour utilisation à des tensions alternatives de 1 kV à 36 kV (CEI 61481:2001)

Arbeiten unter Spannung - Phasenvergleicher für Wechselspannungen von 1 kV bis 36 kV (IEC 61481:2001)

This European Standard was approved by CENELEC on 2001-03-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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Foreword

The text of document 78/338/FDIS, future edition 1 of IEC 61481, prepared by IEC TC 78, Live working, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61481 on 2001-03-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2001-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2004-03-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annexes A to E and ZA are normative and annexes F and G are informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61481:2001 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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

Publication	Year	Title	EN/HD	Year
IEC 60050-151	1978	International Electrotechnical Vocabulary (IEV) Chapter 151: Electrical and magnetic devices	-	-
IEC 60050-601	1985	Chapter 601: Generation, transmission and distribution of electricity - General	-	-
IEC 60050-651	1999	Part 651: Live working	-	-
IEC 60060-1 + corr. March	1989 1990	High-voltage test techniques Part 1: General definitions and test requirements	HD 588.1 S1	1991
IEC 60068-1	1988	Environmental testing Part 1: General and guidance	EN 60068-11)	1994
IEC 60068-2-6 + corr. March	1995 1995	Part 2: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	1995
IEC 60068-2-14	1984	Part 2: Tests - Test N: Change of temperature	EN 60068-2-142)	1999
IEC 60068-2-32	1975	Part 2: Tests - Test Ed: Free fall	EN 60068-2-323)	1993
IEC 60071-1	1993	Insulation co-ordination Part 1: Definitions, principles and rules	EN 60071-1	1995
IEC 60651	1979	Sound level meters	EN 60651	1994
IEC 60855 (mod)	1985	Insulating foam-filled tubes and solid rods for live working	EN 60855	1996
IEC 61235 (mod)	1993	Live working - Insulating hollow tubes for electrical purposes	EN 61235	1995

1) EN 60068-1:1994 includes A1:1992 + corrigendum October 1989 to IEC 60068-1:1988.

2) EN 60068-2-14:1999 includes A1:1986 to IEC 60068-2-14:1984.

3) EN 60068-2-32:1993 includes A2:1990 to IEC 60068-2-32:1975.

Publication	Year	Title	EN/HD	Year
IEC 61318	1994	Live working - Guidelines for quality assurance plans	-	-
ISO 3745	1977	Acoustics - Determination of sound power levels of noise sources - Precision methods for anechoic and semi-anechoic rooms	-	-
ISO 8402	1994	Quality management and quality assurance - Vocabulary	-	-
ISO 9000	Series	Quality management and quality assurance standards	EN ISO 9000	Series
ISO 9002	1994	Quality systems - Model for quality assurance in production, installation and servicing	EN ISO 9002	1994
ISO 9004	Series	Quality management and quality system elements	EN 29004	Series
CIE 15.2	1986	Colorimetry	-	-

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Travaux sous tension – Comparateurs de phase portatifs pour utilisation à des tensions alternatives de 1 kV à 36 kV

Live working – Portable phase comparators for use on voltages from 1 kV to 36 kV a.c.

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LIVE WORKING –

PORTABLE PHASE COMPARATORS FOR USE ON VOLTAGES FROM 1 kV TO 36 kV AC

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.

2) The formal decisions or agreements of the 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 National Committees.

3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.

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

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

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

FDIS	Report on voting
78/338/FDIS	78/358/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 3.

Annexes A, B, C, D and E form an integral part of this standard.

Annexes F and G are for information only.

The committee has decided that the contents of this publication will remain unchanged until 2004-12. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

LIVE WORKING –
PORTABLE PHASE COMPARATORS FOR USE ON VOLTAGES FROM 1 kV TO 36 kV AC

1 Scope

This International Standard is applicable to portable phase comparators with or without a built-in power source to be used on electrical systems for voltages from 1 kV to 36 kV a.c. and frequencies from 50 Hz to 60 Hz.

This standard is applicable to two-pole phase comparators having a connecting lead between them, two-pole phase comparators operating with a wireless connection and single-pole phase comparators operating with a memory system.

This standard is applicable to phase comparators used in contact with the part to be tested, as a single unit or as a separate device completed by an adaptable insulating pole covered in IEC 60855 or IEC 61235.

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

Devices which can be used as voltage detector and phase comparator are not covered by this standard.

NOTE Except when otherwise specified, all the voltages defined in this standard refer to phase-to-phase voltages of three-phase systems. Phase comparators may be used in other than three-phase systems, but the applicable phase-to-phase or phase-to-earth (ground) voltage must be used to determine the operating voltage.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

IEC 60050(151):1978, *International Electrotechnical Vocabulary (IEV) – Chapter 151: Electrical and magnetic devices*

IEC 60050(601):1985, *International Electrotechnical Vocabulary (IEV) – Chapter 601: Generation, transmission and distribution of electricity – General*

IEC 60050(651):1999, *International Electrotechnical Vocabulary (IEV) – Part 651: Live working*

IEC 60060-1:1989, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-6:1995, *Environmental testing – Tests – Test Fc and guidance: Vibration sinusoidal*

IEC 60068-2-14:1984, *Environmental testing – Part 2: Tests – Test N: Change of temperature*

IEC 60068-2-32:1975, *Environmental testing – Part 2: Tests – Test Ed: Free fall (Procedure 1)* Amendment 2 (1990)

IEC 60071-1:1993, *Insulation co-ordination – Part 1: Definitions, principles and rules*

IEC 60651:1979, *Sound level meters*

IEC 60855:1985, *Insulating foam-filled tubes and solid rods for live working*

IEC 61235:1993, *Live working – Insulating hollow tubes for electrical purposes*

IEC 61318:1994, *Live working – Guidelines for quality assurance plans*

ISO 3745:1977, *Acoustics – Determination of sound power levels of noise sources – Precision methods for anechoic and semi-anechoic rooms*

ISO 8402:1994, *Quality management and quality assurance – Vocabulary*

ISO 9000 (all parts), *Quality management and quality assurance standards*

ISO 9002:1994, *Quality systems – Model for quality assurance in production, installation and servicing*

ISO 9004 (all parts), *Quality management and quality system elements*

CIE 15.2:1986, *Colorimetry*

3 Definitions

For the purpose of this International Standard, the following definitions apply.

3.1
phase comparator
portable device used to detect and indicate the presence or absence of the correct phase relationship between two energized parts at the same nominal voltage and frequency

3.2
capacitive phase comparator
device used to detect and indicate the phase relationship whose operation is based on the current passing through the stray capacitance to earth (ground). Capacitive phase comparators are two-pole phase comparators operating with wireless connection and single-pole phase comparators operating with memory system

NOTE Capacitive phase comparators mainly work on the basis of angle measurement (frequency-based).

3.3
resistive phase comparator
device used to detect and indicate the phase relationship whose operation is based on the current passing through a resistor located in the resistive element. Resistive phase comparators are always two-pole phase comparators

NOTE Resistive phase comparators mainly work on the basis of voltage measurement (voltage-based).

3.4
types of phase comparators
single unit including its insulating elements and separate unit completed with an insulating pole; both devices with or without contact electrode extension

3.5
contact electrode
bare conductive part which makes the electrical connection to the part to be tested

[IEV 651-10-09, modified]

3.6
contact electrode extension
externally insulated conductive section between the resistive element and the contact electrode or between the indicator and the contact electrode intended to achieve the correct position of the indicator relative to the part to be tested

3.7
resistive element
element which contains the current-limiting resistor and conductive parts

NOTE Other current limiting components may be used.

3.8
indicator
part of the phase comparator which indicates the presence or absence of the correct phase relationship between two parts. In the case of single-pole phase comparators, it contains the electronics and the indication that the phase comparator is ready for the next measurement on the second part to be tested ("memory ready")

3.9
connecting lead
lead that connects the two poles electrically

3.10
connecting system
electronic arrangement used to send information between the two poles

3.11
earth lead
lead that connects the phase comparator to earth (ground). It includes an earth clip or clamp or another device suitable for establishing a permanent or semi-permanent contact

3.12
adaptor
part allowing the assembly of the phase comparator

3.13
insulating element
section of insulating material which provides adequate distance and insulation to the user

3.14
limit mark
distinctive location or mark to indicate to the user the physical limit to which the phase comparator may be inserted between live parts or may touch them

3.15
hand guard
distinctive physical guard separating the handle from the insulating element

3.16
insulating pole
pole made of insulating material

3.17
testing element
built-in or external device, by means of which the functioning of the phase comparator can be checked by the user

3.18
accessories
items used to lengthen the contact electrode in order to improve its efficiency or to enable it to reach the part to be tested. Accessories may also be used to lengthen the handle

3.19
nominal voltage, U_n
suitable approximate value of voltage used to identify a system or device

[IEV 601-01-21, modified]

The nominal voltage of the phase comparator is the parameter associated with its clear indication. A phase comparator may have more than one nominal voltage, or a nominal voltage range. Limit values of the nominal voltage range are named $U_{n\ min}$ and $U_{n\ max}$

3.20
threshold voltage
minimum voltage between the two parts to be compared to give a change of signal state which indicates incorrect phase relationship (not applicable for capacitive phase comparator)

3.21
threshold angle
minimum phase angle between the two parts to be compared which gives a change of signal state which indicates incorrect phase relationship

3.22
measurement time
available time between indication "memory ready" and contact to the second part to be tested

3.23
rated voltage, U_r
value of voltage generally agreed upon by manufacturer and customer, to which certain operating specifications are referred. The rated voltage of the phase comparator is the voltage selected from IEC 60071-1, table 2, column 1, which should either be equal to the nominal voltage (or the highest nominal voltage of its nominal range), or the next higher voltage selected from those tables

3.24
interference field
electric or magnetic field capable of affecting the indication. It may result from the part to be tested or other adjacent parts

3.25
clear indication
unambiguous detection and indication of incorrect phase relationship between the parts to be tested

3.26
clear perceptibility
case when the indication is unmistakably discernible by the user under specific environmental conditions when the phase comparator is in its operating position

3.27
protection against bridging
protection against flashover or breakdown, when the insulation between the parts of the installation to be tested, at different potentials, is reduced by the presence of the phase comparator

3.28
indoor type
phase comparator designed for use in dry conditions, normally indoors

3.29
outdoor type
phase comparator designed for use in wet conditions, either indoors or outdoors

3.30
acceptance test
contractual test to prove to the customer that the device meets certain conditions of its specification

[IEV 151-04-20]

3.31
maintenance test
test carried out periodically on a device or equipment to ascertain and, if necessary, make certain adjustments to ensure that its performance remains within specified limits

[IEV 151-04-22]