SLOVENSKI STANDARD
SIST EN 60495:1997

01-avgust-1997

Single sideband power-line carrier terminals (IEC 495:1993)

Single sideband power-line carrier terminals

Geräte für die Einseitenband-Trägerfrequenz-Nachrichtenübertragung über Hochspannungsleitungen

Equipements terminaux à courants porteurs sur lignes d'énergie, à bande latérale unique

Ta slovenski standard je istoveten z: **EN 60495:1994**

ICS:

33.040.50	Vodi, zveze in tokokrogi	Lines, connections and circuits

SIST EN 60495:1997 **en**

EUROPEAN STANDARD · EN 60495

NORME EUROPEENNE

EUROPÄISCHE NORM March 1994

UDC 621.3.052.63:621.315.027.3:621.395.44

Descriptors: Power-line carrier terminal, carrier frequency, information transmission, single sideband, telecommunications, power line, transmission line, performance characteristic, operating requirement, electromagnetic compatibility

ENGLISH VERSION

Single sideband power-line carrier terminals (IEC 495:1993)

Equipements terminaux à courants porteurs sur lignes d'énergie, à bande latérale unique

(CEI 495:1993)

Geräte für die Einseitenband-Trägerfrequenz-Nachrichtenübertragung über Hochspannungsleitungen

(IEC 495:1993)

This European Standard was approved by CENELEC on 1993-12-08. 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, 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

FOREWORD

The text of document 57(CO)63, as prepared by IEC Technical Committee 57: Telecontrol, teleprotection and associated telecommunications for electric power systems, was submitted to the IEC-CENELEC parallel vote in October 1992.

The reference document was approved by CENELEC as EN 60495 on 8 December 1993.

The following dates were fixed:

- latest date of publication of an identical national standard	(dop)	1994-12-01
- latest date of withdrawal of conflicting national standards	(dow)	1994-12-01

For products which have complied with the relevant national standard before 1994-12-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1999-12-01.

Annexes designated "normative" are part of the body of the standard. Annexes designated "informative" are given only for information. In this standard, annexes A and ZA are normative and annexes B, C and D are informative.

ENDORSEMENT NOTICE

The text of the International Standard IEC 495:1993 was approved by CENELEC as a European Standard without any modification.

ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD WITH THE REFERENCES OF THE RELEVANT 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.

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

IEC Publication	Date	Title	EN/HD	Date
38 (mod)	1983	IEC standard voltages !	HD 472 S1	1989
50(55)	1970	International Electrotechnical Vocabulary (IEV) - Chapter 55: Telegraphy and telephony	-	-
50(151)	1978	Chapter 151: Electrical and magnetic devices	-	-
255-4	1976	Electrical relays - Part 4: Single input energizing quantity measuring relays with dependent specified time	-	-
255-5	1977	Part 5: Insulation tests for electrical relays	-	-
255-22-1	1988	Part 22: Electrical disturbance tests for measuring relays and protection equipment Section one: 1 MHz burst disturbance tests	-	-
663	1980	Planning of (single-sideband) power line carrier systems	-	-
721-3-1	1987	Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Storage	EN 60721-3-1*	1993
721-3-2	1985	Transportation	EN 60721-3-2*	1993

! The title of HD 472 S1 is: Nominal voltages for low voltage public electricity supply systems

* EN 60721-3-1 includes A1:1991 to IEC 721-3-1
  EN 60721-3-2 includes A1:1991 to IEC 721-3-2

IEC Publication	Date	Title	EN/HD	Date
721-3-3	1987	Stationary use at weatherprotected locations	EN 60721-3-3*	1993
721-3-4	1987	Stationary use at non-weatherprotected locations	EN 60721-3-4*	1993
801-2	1991	Electromagnetic compatibility for industrial-process measurement and control equipment - Part 2: Electrostatic discharge requirements	EN 60801-2	1993
801-3	1984	Part 3: Radiated electromagnetic field requirements	HD 481.3 S1	1987
801-4	1988	Part 4: Electrical fast transient/burst requirements	-	-
834-1 (mod)	1988	Performance and testing of teleprotection equipment of power systems - Part 1: Narrow-band command systems	HD 543.1 S1	1991

Other publications:

CCITT Blue Book, Volume V, 1988 - Telephone transmission quality Series P recommendations

CCITT Blue Book, Volume III, Fascicle III.1, 1988 - General characteristics of international telephone connections and circuits Recommendations G.100 to G. 181

CCITT Blue Book, Volume III, Fascicle III.2, 1988 - International analogue carrier systems - Recommendations G.211 to G.544

---

* EN 60721-3-3 includes A1:1991 to IEC 721-3-3
  EN 60721-3-4 includes A1:1991 to IEC 721-3-4

NORME INTERNATIONALE
INTERNATIONAL STANDARD

CEI
IEC
495

Deuxième édition
Second edition
1993-09

Equipements terminaux à courants porteurs sur lignes d'énergie, à bande latérale unique

Single sideband power-line carrier terminals

Bureau Central de la Commission Electrotechnique Internationale 3, rue de Varembé Genève, Suisse

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX
PRICE CODE W

Pour prix, voir catalogue en vigueur
For price, see current catalogue

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SINGLE SIDEBAND POWER-LINE CARRIER TERMINALS

FOREWORD

1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.

3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

This International Standard has been prepared by IEC Technical Committee No. 57: Telecontrol, teleprotection and associated telecommunications for electric power systems.

This second edition of IEC 495 cancels and replaces the first edition issued in 1974.

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

DIS	Report on Voting
57(CO)63	57(CO)69

Full information on the voting for the approval of this standard can be found in the Voting Report indicated in the above table.

Annex A forms an integral part of this standard. Annexes B, C and D are for information only.

INTRODUCTION

The complexity and extensive size of present-day electricity generation, transmission and distribution systems are such that it is possible to control them only by means of an associated and often equally large and complex telecommunication system having a high order of reliability. The facilities which can normally be provided as part of the telecommunication system can be listed as follows:

- telephony (operation, maintenance and administration speech circuits);
- facsimile transmission;
- telegraphy;
- telecontrol;
- load frequency control;
- teleprotection;
- data transmission.

The communication channels can be provided by circuits leased from public facilities, by means of utility-owned private circuits or, national regulations permitting, by a combination of both types of circuit. The need for a high availability on these circuits generally calls for the provision of multiple routing, preferable by geographically diverse routes.

In many countries, Power Line Carrier (PLC) channels represent a main part of the utility-owned telecommunication system. A circuit which would normally be routed via a PLC channel may also be routed via a channel using a different transmission medium, such as a point to point radio or open-wire circuit. Since, in many cases, automatic switching is used, the actual rerouting, although predetermined, is unpredictable. It is important, therefore, that the voice frequency input and output criteria of all equipment used in the communications system are compatible. This compatibility is also beneficial in creating the ability to interchange and interwork equipment from different sources.

This International Standard has been prepared to enable compatibility between PLC links from different sources or between PLC links and other transmission media to be achieved and to define the terminal performance required in PLC networks.

This International Standard covers basically 4 kHz and 2,5 kHz bandwidth single channel PLC equipments that use amplitude modulation with single sideband transmission.

The application of this International Standard to multichannel equipment is described in annex A.

SINGLE SIDEBAND POWER-LINE CARRIER TERMINALS

1 General

1.1 *Scope and object*

This International Standard applies to Single Sideband (SSB) Power Line Carrier (PLC) Terminals used to transmit information over High Voltage (HV) Lines.

The object of this standard is to establish recommended values for characteristic input and output quantities of single sideband PLC terminals (see figure 1) and the definitions essential for an understanding of these recommendations. All the tests verifying the requirements shall be considered as type tests as defined in the International Electrotechnical Vocabulary (IEV 151-04-15) .

This standard defines two versions of the PLC equipment intended for two different applications:

– **standard terminal,** i.e. equipment with a voice frequency side interface which offers transmission of a frequency band of 300 Hz to 3 400 Hz on a four-wire basis plus signalling facilities. This equipment is capable, via analog interfaces, of being connected to networks that may consist of transmission equipment of different types and from different manufacturers. There may be facilities for additional point-to-point connections (e.g. a teleprotection connection) which may fall outside the frequency band of 300 Hz to 3 400 Hz (see figure 2);

– **speech-plus terminal,** i.e. equipment where specific interfaces for signals like speech, data and teleprotection are present at the voice frequency side (see figure 3).

The two versions will have parts in common and the requirements of these common parts are dealt with in 5.2 and 5.3.1.

1.2 *Normative references*

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and 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. Members of IEC and ISO maintain registers of currently valid international standards.

IEC 38: 1983, *IEC standard voltages.*

IEC 50 (55): 1970, *International Electrotechnical Vocabulary (IEV) – Chapter 55: Telegraphy and telephony.*

IEC 50 (151): 1978, *International Electrotechnical Vocabulary (IEV) – Chapter 151: Electrical and magnetic devices.*

IEC 255-4: 1976, *Electrical relays – Part 4: Single input energizing quantity measuring relays with dependent specified time.*

IEC 255-5: 1977, *Electrical relays – Part 5: Insulation tests for electrical relays.*

IEC 255-22-1: 1988, *Electrical relays – Part 22: Electrical disturbance tests for measuring relays and protection equipment – Section one: 1 MHz burst disturbance tests.*

IEC 663: 1980, *Planning of (single-sideband) power line carrier systems.*

IEC 721-3-1: 1987, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Storage.*

IEC 721-3-2: 1985, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Transportation.*

IEC 721-3-3: 1987, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Stationary use at weatherprotected locations.*

IEC 721-3-4: 1987, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Stationary use at non-weatherprotected locations.*

IEC 801-2: 1991, *Electromagnetic compatibility for industrial-process measurement and control equipment – Part 2: Electrostatic discharge requirements.*

IEC 801-3: 1984, *Electromagnetic compatibility for industrial-process measurement and control equipment – Part 3: Radiated electromagnetic field requirements.*

IEC 801-4: 1988, *Electromagnetic compatibility for industrial-process measurement and control equipment – Part 4: Electrical fast transient/burst requirements.*

IEC 834-1: 1988, *Performance and testing of teleprotection equipment of power systems – Part 1: Narrow-band command systems.*

CCITT Blue Book, Volume V, 1988. *Telephone transmission quality. Series P recommendations.*

CCITT Blue Book, Volume III, Fascicle III.1, 1988. *General characteristics of international telephone connections and circuits. Recommendations G.100 to G.181.*

CCITT Blue Book, Volume III, Fascicle III.2, 1988. *International analogue carrier systems. Recommendations G.211 to G.544.*

2 Definitions

2.1 *General*

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

Other terms used in this standard and not defined in this clause have the meaning attributed to them according to the International Electrotechnical Vocabulary (IEV).

In addition to these, a number of relevant established telecommunications terms are given in annex B.

2.2 *Frequency bands*

2.2.1 **carrier-frequency range:** The total band available for power line carrier use.

2.2.2 **basic carrier-frequency band:** The elementary subdivision of the carrier frequency range or part thereof allocated to a single PLC transmit or receive channel.

2.2.3 **nominal carrier-frequency band:** The frequency band in which a particular PLC transmitter or receiver is operating.

2.2.4 **effectively transmitted speech-band:** That part of the voice-frequency band used for telephone communication, not including the telephone signalling channel.

2.2.5 **effectively transmitted signal-frequency band:** That part of the voice-frequency band used for the transmission of signals essential for the operation of power systems (including data transmission, protection signals and any other signals); this band may include the telephone signalling channel.

2.3 *Nominal impedance*

The nominal impedance, as used in this standard, is the value of impedance for which an input or output circuit has been designed and for which the prescribed requirements apply.

2.4 *Carrier-frequency output power*

2.4.1 **nominal carrier-frequency output power:** The nominal carrier-frequency output power of a PLC terminal is the peak envelope power, PEP, (see annex B) for which the equipment has been designed, compatible with the requirements for spurious emissions, available at the carrier-frequency output (point G of figures 2 and 3) across a resistive load equal to the nominal impedance.