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Sistemi komunikacij po elektroenergetskih vodih za elektroenergetska podjetja - 1. del: Načrtovanje analognih in digitalnih nosilnih frekvenc na elektroenergetskih vodih, ki obratujejo na najvišjenapetostnih (EHV), visokonapetostnih (HV) in srednjenapetostnih (MV) električnih omrežjih (IEC 62488-1:2012)

Power line communication systems for power utility applications - Part 1: Planning of analogue and digital power line carrier systems operating over EHV/HV/MV electricity grids

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Systeme zur Kommunikation über Hochspannungsleitungen für Anwendungen der elektrischen Energieversorgung - Teil 1: Planung von Systemen zur analogen und digitalen Nachrichtenübertragung über Hochspannungsleitungen

Systèmes de communication sur lignes d'énergie pour les applications des compagnies d'électricité - Partie 1: Conception des systèmes à courants porteurs de lignes d'énergie analogiques et numériques fonctionnant sur des réseaux d'électricité EHT/HT/MT

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**Power line communication systems for power utility applications -
Part 1: Planning of analogue and digital power line carrier systems
operating over EHV/HV/MV electricity grids
(IEC 62488-1:2012)**

Systèmes de communication sur lignes
d'énergie pour les applications des
compagnies d'électricité -
Partie 1: Conception des systèmes à
courants porteurs de lignes d'énergie
analogiques et numériques fonctionnant
sur des réseaux d'électricité EHT/HT/MT
(CEI 62488-1:2012)

Systeme zur Kommunikation über
Hochspannungsleitungen für
Anwendungen der elektrischen
Energieversorgung -
Teil 1: Planung von Systemen zur
analogen und digitalen
Nachrichtenübertragung über
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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 57/1279/FDIS, future edition 1 of IEC 62488-1, prepared by IEC/TC 57 "Power systems management and associated information exchange" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62488-1:2013.

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) 2013-10-03
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-01-03

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

CISPR 22:2008	NOTE Harmonised as EN 55022:2010 (modified).
IEC 60038:2009	NOTE Harmonised as EN 60038:2011 (modified).
IEC 60044-1:1996	NOTE Harmonised as EN 60044-1:1999 (modified).
IEC 60255-5:2000	NOTE Harmonised as EN 60255-5:2001 (not modified).
IEC 60255-22-1:2007	NOTE Harmonised as EN 60255-22-1:2008 (not modified).
IEC 60255-151:2009	NOTE Harmonised as EN 60255-151:2009 (not modified).
IEC 60358-1:2012	NOTE Harmonised as EN 60358-1:2012 (not modified).
IEC 60721-3-1:1987 + A1:1991	NOTE Harmonised as EN 60721-3-1:1993 (not modified).
IEC 60721-3-2:1997	NOTE Harmonised as EN 60721-3-2:1997 (not modified).
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IEC 60721-3-4:1995	NOTE Harmonised as EN 60721-3-4:1995 (not modified).
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IEC 61000-4-1	NOTE Harmonised as EN 61000-4-1.
IEC 61000-4-2	NOTE Harmonised as EN 61000-4-2.
IEC 61000-4-3	NOTE Harmonised as EN 61000-4-3.
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Part 1: Planning of analogue and digital power line carrier systems operating
over EHV/HV/MV electricity grids**

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Partie 1: Conception des systèmes à courants porteurs de lignes d'énergie
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EHT/HT/MT**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**POWER LINE COMMUNICATION SYSTEMS
FOR POWER UTILITY APPLICATIONS –**
**Part 1: Planning of analogue and digital power line carrier
systems operating over EHV/HV/MV electricity grids**

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.
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This International Standard has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

This first edition of IEC 62488-1 cancels and replaces the relevant parts of IEC 60663 and IEC 60495, which will be withdrawn at a later date.

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

FDIS	Report on voting
57/1279/FDIS	57/1298/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.

A list of all parts of IEC 62488 series, under the general title *Power line communication systems for power utility applications*, 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
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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 control of electrical networks and transmission and reception of data are through a combination of analogue and digital communication systems controlling devices and systems distributed throughout the electrical network.

The emergence of digital communication systems for controlling the devices of the electrical distribution network enables faster data transmission. The ability to represent the various electrical parameters as an analogue signal and or digital signal ensures the quality and quantitative aspects of seamless communication to be maintained throughout the electrical power network.

Therefore, by using either analogue power line communication (APLC) or digital power line communication (DPLC) or a combination of both types of system, seamless efficient communication may be maintained throughout the power network.

The development of digital techniques for communications in the electrical distribution networks is now very widespread along with other applications in electronics. This is especially relevant for the electrical distribution network where many of the devices have built into them analogue to digital converters, together with digital signal processing enabling them to perform many functions and offer fast seamless communication. The conversion of the analogue signal into a binary signal requires the binary digits to be formed into a code for the transmission of the information. These codes take different forms to represent the information to be transmitted. However, the main advantage for this is that digital signals compared with analogue signals provide for virtually error free transmission and the minimum errors that do arise may be detected and corrected by using suitable data encoding techniques. Further, digital transmission circuits generally are compatible with the digital devices in the communications circuit. The most commonly used multiplex systems are frequency division multiplex (FDM) and time division multiplex (TDM).

The development of the technical report “Planning of power line carrier systems” was first produced by the International Electrotechnical Commission through publication IEC 60663 in 1980 entitled Planning of (single sideband) power line carrier systems. In 1993, the International Electrotechnical Commission produced IEC 60495 “Single sideband power-line carrier terminals”. In the intervening years, electronic systems and the associated communications systems for electronic devices evolved and developed considerably. The introduction of digital transmission and reception techniques improved the quality of transmission and reception within electronic devices, enabling them to provide more detailed quality analysis and control of the data being communicated throughout the electricity distribution network, from control centre to service provider.

Both of these standards, IEC 60663 and IEC 60495, are being updated and replaced by the following: IEC 60663 is replaced by IEC 62488-1 and IEC 60495 is replaced by IEC 62488-2, IEC 62488-3, IEC 62488-4, covering respectively analogue, digital power line carrier and broadband power line terminals.

The first part of this series is IEC 62488-1. Following this standard, parts IEC 62488-2, IEC 62488-3, IEC 62488-4 will follow. During the development of the above mentioned standards, the existing standards IEC 60663 and IEC 60495 will be maintained in use. They will be subsequently phased out at a date to be agreed by the International Electrotechnical Commission in conjunction with IEC technical committee 57.

These international standards apply to power line carrier (PLC) terminals used to transmit information over power networks including extra high, high and medium voltage (EHV/HV/MV) power lines. Both analogue and digital modulation systems will be included.

IEC 62488 series consists of the following parts under the general title: Power line communication systems for power utility applications:

- Part 1: Planning of analogue and digital power line carrier systems operating over EHV/HV/MV electricity grids;
- Part 2: Analogue power line terminals or APLC;
- Part 3: Digital power line carrier terminals or DPLC;
- Part 4: Broadband power line systems or BPL.

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POWER LINE COMMUNICATION SYSTEMS FOR POWER UTILITY APPLICATIONS –

Part 1: Planning of analogue and digital power line carrier systems operating over EHV/HV/MV electricity grids

1 Scope

This part of IEC 62488 applies to the planning of analogue and digital power line carrier systems operating over EHV/HV/MV electricity grids. The object of this standard is to establish the planning of the services and performance parameters for the operational requirements to transmit and receive data efficiently over Power Networks.

The transmission media used by the different electricity supply industries will include analogue and digital systems together with more common communication services including national telecommunications authorities, radio links and fibre optic networks and satellite networks. With the developments in communication infrastructures over the last two decades and the ability of devices connected in the electricity communications network to internally and externally communicate, there is a variety of architectures to use in the electricity distribution network to provide efficient seamless communications.

These series of standards for the planning of power line carrier systems will also be an integral part of the development of the overall architecture, standard IEC 61850 developed within IEC TC57 which provides the fundamental architecture for the formation of the smart grid.

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2 Terms, definitions and abbreviations

2.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE 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).

2.1.1

amplitude modulation

AM

modulation technique in which information is transmitted through amplitude variation of a carrier wave

2.1.2

analogue interface

interface dedicated to the processing of voiceband analogue signals

2.1.3

anomaly

small discrepancy between the actually received and the desired data

Note 1 to entry: The occurrence of a single anomaly does not cause interruptions of the applications using the transmitted data.