

Distribution automation using distribution line carrier systems —

Part 1-2: General considerations — Guide for specification

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National foreword

This British Standard reproduces verbatim IEC 61334-1-2:1997 and implements it as the UK national standard.

The UK participation in its preparation was entrusted to Technical Committee PEL/57, Power systems control and associated communications, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
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Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the CEI IEC title page, page ii, pages 1 to 19 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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**Partie 1-2:
Considérations générales –
Guide pour la spécification**

**Distribution automation using
distribution line carrier systems –**

**Part 1-2:
General considerations –
Guide for specification**



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Introduction

The design of distribution automation systems using distribution line carrier is quite complex, as it involves the specification of a large amount of detailed information concerning:

- system architecture;
- application processes;
- operational parameters;
- processing and transmission equipment;
- interfaces between the components of the system;
- environmental conditions;
- quality assurance procedures.

Most of the above-mentioned aspects are clarified by technical reports or covered by International standards either inside IEC TC 57 publications and within the IEC TC 57(WG 9) series on distribution automation systems using distribution line carrier systems, but many options are available to the engineers who have to design a specific application.

1 Scope and object

This technical report of type 3 is intended to offer useful information to design a distribution automation system (DAS) using distribution line carrier (DLC) systems for a specific application.

For the sake of clarity, the information, useful to design a DAS using DLC systems for a specific application, has been subdivided into three main steps:

- the first step concerns the strategic choices determining the architecture of the DAS (clause 3);
- the second step deals with the specification of the application processes and the related operational parameters (clause 4);
- the third step refers to the facilities that both processing and transmission equipment have to provide in order to cope with the application needs (clause 5).

Clause 6 is dedicated to a general valuation of different coupling methods.

Clause 7 is instead dedicated to the quality assurance procedures in order to meet the application needs included in a DLC system.

Moreover, this technical report contains two annexes:

- *Annex A* containing the comparison and evaluation of two different modulation techniques (narrow-band FSK modulation and wide-band modulation);
- *Annex B* containing the general outline of a quality plan.

2 Reference documents

IEC 60358:1990, *Coupling capacitors and capacitor dividers*.

IEC 60481:1974, *Coupling devices for power line carrier systems*.

IEC 60870-5-1:1990, *Telecontrol equipment and systems — Part 5: Transmission protocols — Section 1: Transmission frame formats*.

IEC 61334-1-1:1995, *Distribution automation using distribution line carrier systems — Part 1: General considerations — Section 1: Distribution automation system architecture*.

IEC 61334-3-1, — *Distribution automation using distribution line carrier systems — Part 3: Mains signalling requirements — Section 1: Frequency bands and output levels*¹⁾.

IEC 61361:1996, *Electricity metering — Local and remote data exchange Application and performance*.

ISO/IEC 8072:1994, *Information technology — Open Systems Interconnection — Transport service definition*.

ISO/IEC 8073:1992, *Information technology — Telecommunications and information exchange between systems — Open Systems Interconnection — Protocol for providing the connection-mode transport service*.

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

ISO 9000, *Quality management and quality assurance standards*.

ISO 9001:1994, *Quality systems — Model for quality assurance in design, development, production, installation and servicing*.

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

ISO 9003:1994, *Quality systems — Model for quality assurance in final inspection and test*.

ISO 9004, *Quality management and quality system elements*.

ISO 9004-1:1994, *Quality management and quality system elements — Part 1: Guidelines*.

¹⁾ To be published.

3 Choice of the architecture

With reference to the general architecture of a DAS using a DLC communication system described in IEC 61334-1-1, the choice of the effective structure of a DAS system depends strictly on the required facilities.

For this purpose, the following possibilities are to be considered:

- a) a DAS that includes both network and customer automation facilities should have the architecture as shown in Figure 1 (general architecture);
- b) a DAS that includes only MV-network automation facilities should have the architecture as shown in Figure 2. This structure comes from the general one eliminating the low voltage network and the MV customers;
- c) a DAS that includes only MV and LV customer automation facilities could have two different types of architecture:

- 1) the general architecture as shown in Figure 1;
- 2) the architecture as shown in Figure 3; this solution makes provision for the use of:
 - “foreign” telecommunication systems (e.g. the public switched telephone network or PSTN) between the central unit and all MV/LV substations and MV customers;
 - DLC system between each MV/LV substation and LV customers.

The choice between these two different architectures should be made by the engineers, who have to plan the DAS and establish the specifications, on the base of the following considerations:

- structure of the MV network and its operation modalities;
- cost of a MV-DLC system and its servicing;
- reliability of a MV-DLC system;
- rent cost and availability of a “foreign” telecommunication system.

4 General description of a distribution automation system

The whole information will be given in the following in order to specify a DAS. Their applicability (total/partial) is function of the selected architecture.

4.1 Description of the network

A detailed description of the power network involved is necessary to design a DLC communication system supporting the DAS.

In the following are pointed out the main information:

- general layout of MV-Network, distinguishing the HV/MV substations (that supplied the MV feeders) and the MV/LV substations controlled;
- layout of the MV busbars section of each HV/MV substation;
- layout of each MV feeder (backbone and/or branches) that energize MV/LV substations up to the disconnection points;
- the whole description of each MV/LV substation (electric layout for both MV and LV sections, type, identification name or number, etc.);
- the whole information identifying each MV customer (name, address, contractual parameters, etc.);
- layout of each LV feeder (backbone and/or branches) that energize LV customers up to the disconnection point;
- the whole information identifying each LV customer (name, address, contractual parameters, etc.).

4.2 Functional requirements for network automation system

4.2.1 Basic application functions

The basic functions of a network automation system, mainly aimed to the improvement of the quality of the electricity supply are indicated in Table 1.

Further indications of the requirements for DAS are contained in IEC 61361.

4.2.2 Extended application functions

These include the following:

- automatic detection and disconnection of the faulty section of the network;
- automatic service restoration on the network portion not affected by fault;
- application of enhanced strategies for voltage and reactive power control on MV-network;
- collection and storage of data related to network operation for planning and engineering purposes;
- data information logging and reporting;
- man machine interface and procedures.