



SLOVENSKI STANDARD

SIST HD 543.1 S1:1997

01-avgust-1997

Performance and testing of teleprotection equipment of power systems - Part 1: Narrow-band command systems (IEC 834-1:1988, modified)

Performance and testing of teleprotection equipment of power systems -- Part 1: Narrow-band command systems

Leistungsmerkmale und Prüfungen für Schutzsignal-Übertragungseinrichtungen für Energieversorgungssysteme mit Übertragung von Befehlen -- Teil 1: Schmalbandsysteme mit Übertragung von Befehlen

Performances et essai des matériels de téléprotection des réseaux d'énergie électrique -
- Partie 1: Systèmes de commande à bande étroite

Ta slovenski standard je istoveten z: **HD 543.1 S1:1991**

ICS:

29.240.20 Daljnovodi Power transmission and
distribution lines

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HARMONIZATION DOCUMENT

HD 543.1 S1

DOCUMENT D'HARMONISATION

HARMONISIERUNGSDOKUMENT

April 1991

UDC 621.398:621.311

Descriptors: Power systems, teleprotection equipment, narrow-band command systems, performance and testing

ENGLISH VERSION

PERFORMANCE AND TESTING OF TELEPROTECTION
EQUIPMENT OF POWER SYSTEMS
PART 1: NARROW-BAND COMMAND SYSTEMS
(IEC 834-1:1988, modified)



REPUBLIKA SLOVENIJA
MINISTRSTVO ZA ZNANOST IN TEHNOLOGIJO
Urad RS za standardizacijo in meroslovje
LJUBLJANA

SIST..... HD 543.1 S1
PREVZET PO METODI RAZGLASITVE

Performances et essai
des matériels de
téléprotection des réseaux
d'énergie électrique
Première partie: Systèmes de
commande à bande étroite
(CEI 834-1:1899, modifiée)

Leistungsmerkmale und Prüfungen
für Schutzsignal-Übertragungs-
einrichtungen für Energie-
versorgungssysteme
Teil 1: Schmalbandssysteme mit
Übertragung von Befehlen
(IEC 834-1:1988, modifiziert)

-08- 1997

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This Harmonization Document was approved by CENELEC on 1990-09-11.
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which stipulate the conditions for implementation of this Harmonization Document
on a national level.

Up-to-date lists and bibliographical references concerning national implementation
may be obtained on application to the Central Secretariat or to any CENELEC member.

This Harmonization Document exists in three official versions (English, French,
German).

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

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Ref. No. HD 543.1 S1:1991 E

FOREWORD

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 834-1:1988 could be accepted without textual changes, has shown that some CENELEC common modifications were necessary for the acceptance as Harmonization Document.

The reference document, together with the common modifications prepared by the CENELEC Reporting Secretariat SR 57, was submitted to the CENELEC members for formal vote.

The text of the draft was approved by CENELEC as HD 543.1 S1 on 11 September 1990.

The following dates were fixed:

- latest date of announcement
of the HD at national level (doa) 1991-01-01
- latest date of publication of
a harmonized national standard (dop) 1991-07-01
- latest date of withdrawal of
conflicting national standards (dow) 1991-07-01

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ENDORSEMENT NOTICE

The text of the International Standard IEC 834-1:1988 was approved by CENELEC as a Harmonization Document with agreed common modifications as given below.

COMMON MODIFICATIONS

3.3 Supply voltage with a.c. mains operation

Replace the subclause by:

The stated performance requirements shall be satisfied for the following conditions:

- | | |
|-----------------------|--------------|
| - Voltage tolerance | +10% to -15% |
| - Frequency tolerance | +5% |
| - Harmonic content | <10% |

18.2 Interruptions

Replace the subclause by:

All teleprotection equipment shall sustain (without any malfunctioning such as unwanted command) short interruptions in the power supply voltage not longer than 20 ms occurring in random sequence for a period not longer than 20 s. This requirement is based on the assumed use of an uninterruptible power-supply system (UPS); otherwise increased requirements with respect to short interruptions of the power supply voltage must be agreed between user and manufacturer. No command must occur if the power is switched off for a longer time and then switched on.

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NORME INTERNATIONALE INTERNATIONAL STANDARD

CEI
IEC
834-1

Première édition
First edition
1988



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

Performances et essai des matériels de téléprotection des réseaux d'énergie électrique

Première partie: Systèmes de commande à bande étroite

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Performance and testing of teleprotection equipment of power systems

Part 1: Narrow-band command systems

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PERFORMANCE AND TESTING OF TELEPROTECTION
EQUIPMENT OF POWER SYSTEMS

Part 1: Narrow-band command systems

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.

PREFACE

This standard has been prepared by IEC Technical Committee No. 57: Telecontrol, Teleprotection and Associated Telecommunications for Electric Power Systems.

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

Six Months' Rule	Report on Voting
57(CO)27	57(CO)35

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

IEC Publication 834 is divided into the two following parts:

- Part 1: Narrow-band command systems (which is the subject of this standard).
- Part 2: Analogue systems (Publication 834-2) (under consideration).

Part 2 will deal with both narrow-band and broad-band analogue systems.

Broad-band command systems are not dealt with in the standard.

The following IEC publications are quoted in this standard:

Publication Nos. 50(151) (1978): International Electrotechnical Vocabulary (IEV),
Chapter 151: Electrical and magnetic devices.

50(448) (1987): Chapter 448: Power system protection.

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.

495(1974): Recommended values for characteristic input and output quantities of single side-band power line carrier terminals.

PERFORMANCE AND TESTING OF TELEPROTECTION EQUIPMENT OF POWER SYSTEMS

Part 1: Narrow-band command systems

SECTION ONE — GENERAL

1. Scope

This standard applies to narrow-band single-signal and multi-signal equipment for teleprotection.

It also applies to voice frequency equipment which is used in connection with various telecommunication systems, such as power line carrier (PLC), radio link, rented circuits, leased or owned cables.

Narrow-band systems include audio frequency systems operating within a 4 kHz maximum band, and PLC channels within a maximum of 4 kHz bandwidth (for one direction of transmission).

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2. Object

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The object of this standard is to establish performance requirements and recommended methods for testing channels used for transmitting signals related to the command information required by the protective devices in power systems, and to give the associated terminology.

Both the power supply belonging to the equipment and the performance of the teleprotection equipment shall be tested. All the tests should be considered as type tests (see IEC Publication 50(151), International Electrotechnical Vocabulary (IEV), Chapter 151):

Type test (151-04-15)

A test of one or more devices made to a certain design to show that the design meets certain specifications.

3. Service conditions

3.1 Ambient conditions

The stated performance requirements shall be satisfied for the following conditions:

— Temperature range	−5 °C to +40 °C
— Maximum rate of change	10 °C/h
— Relative humidity	5% to 95%
— Maximum water content	28 g/m ³

3.2 Supply voltage with battery operation

The stated performance requirements shall be satisfied for the following conditions:

— Voltage tolerances +15% to -20%

Note. — The variation figures quoted are typical for lead-acid batteries, the nominal voltage being taken as 2.1 V per cell.

3.3 Supply voltage with a.c. mains operation

The stated performance requirements shall be satisfied for the following conditions:

— Voltage tolerance +10% to -15%
 — Frequency tolerance ±5%
 — Harmonic content <5%

3.4 Storage conditions

The equipment, during shipment or storage, shall not suffer any damage when the ambient temperature lies between -40 °C and +70 °C unless otherwise agreed upon between user and manufacturer.

4. Telecommunication circuit used

Figure 1 shows the configuration of teleprotection equipment working at an audio frequency band (using part of a 4 kHz baseband). The signals are conveyed from the transmitter to the receiver via a telecommunication circuit.

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The telecommunication circuit can be:

- a) cable link for audio frequency transmission;
- b) carrier frequency links for cables and overhead lines;
- c) carrier frequency links on aerial cables on power lines;
- d) power line carrier links (PLC);
- e) point-to-point radio-links (microwave);
- f) rented circuits;
- g) optical wave guides (fibre optics).

The telecommunication circuits should be chosen with care, as they will be influenced by noise, change of parameters and any kind of interference which may cause maloperation or nonoperation of the teleprotection equipment.

Figure 2 shows the configuration when the guard and command signals are generated and received at power line carrier frequencies.

Figures 1 and 2 apply to both frequency shift and normally quiescent systems.

SECTION TWO — TERMINOLOGY

5. Terminology

The following terms, derived from Chapter 448 of International Electrotechnical Vocabulary (IEV) [IEC Publication 50(448)] are given for the sake of understanding. Figure 3 is intended to clarify the concepts and the relations among terms in use.

5.1 *Protection* (448-01-01)

5.2 *Protection equipment* (448-01-04)

5.3 *Protection system* (448-01-06)

5.4 *Selectivity* (for a protection system) (448-01-07)

5.5 *Absolutely selective protection system* (448-01-08)

5.6 *Relatively selective protection system* (448-01-09)

5.7 *Distance protection system* (448-03-01)

5.8 *Underreaching* (for a distance protection system) (448-03-02)

5.9 *Overreaching* (for a distance protection system) (448-03-03)

5.10 *Teleprotection equipment*

Equipment specially designed to be used in conjunction with a protection system requiring a telecommunication link between the ends of the protected circuit, to transform the information given by the protection equipment in a way suitable for transmission.

a) *Teleprotection system*

System composed by the teleprotection equipment and associated telecommunication system needed, in a protection system requiring a telecommunication link, between the ends of the protected circuit.

b) *Teleprotection channel*

- 1) The frequency band at disposal on the telecommunication system in order to permit the transmission of protection signals in both directions.
- 2) System composed, for testing purposes, by teleprotection equipment connected back-to-back without the associated telecommunication system.

c) *Telecommunication system — Telecommunication link*

System composed by telecommunication equipment and the associated physical link needed to transmit information signals over the distance.

5.11 *Pilot wire protection system* (448-01-16)

5.12 *Power line carrier pilot protection system* (448-01-17)