

Protection against electric shock — Common aspects for installation and equipment

The European Standard EN 61140:2001 has the status of a
British Standard

ICS 13.260; 91.140.50

National foreword

This British Standard is the official English language version of EN 61140:2001. It is identical with IEC 61140:1997. It supersedes PD 6535:1993 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee JPEL/64, Electrical installations of buildings, 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;
- monitor related international and European developments and promulgate them in the UK.

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Attention is drawn to the fact that CEN and CENELEC Standards normally include an annex which lists normative references to international publications with their corresponding European publications. The British Standards which implement these international or European publications 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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This British Standard, having been prepared under the direction of the Electrotechnical Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 June 2001

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 33 and a back cover.

The BSI copyright date displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments

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ISBN 0 580 37512 9

EUROPEAN STANDARD

EN 61140

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2001

ICS 91.140.50;29.020;13.260

Supersedes HD 366 S1:1977

English version

**Protection against electric shock -
Common aspects for installation and equipment
(IEC 61140:1997)**

Protection contre les chocs électriques -
Aspects communs aux installations
et aux matériels
(CEI 61140:1997)

Schutz gegen elektrischen Schlag -
Gemeinsame Anforderungen für
Anlagen und Betriebsmittel
(IEC 61140:1997)

This European Standard was approved by CENELEC on 2000-08-01. 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.

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CENELEC

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

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Foreword

The text of the International Standard IEC 61140:1997, prepared by IEC TC 64, Electrical installations and protection against electric shock, was submitted to the CENELEC Unique Acceptance Procedure and was approved by CENELEC as EN 61140 on 2000-08-01 without any modification.

This European Standard supersedes HD 366 S1:1977.

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) 2001-08-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2003-08-01

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

Endorsement notice

The text of the International Standard IEC 61140:1997 was approved by CENELEC as a European Standard without any modification.

CONTENTS

	Page
INTRODUCTION	5
Clause	
1 Scope.....	6
2 Normative references	6
3 Definitions	7
4 Fundamental rule of protection against electric shock	12
4.1 Normal conditions	13
4.2 Single-fault conditions	13
4.3 Special cases	14
5 Elements of protective measures	14
5.1 Provisions for BASIC PROTECTION	14
5.2 Provisions for FAULT PROTECTION.....	16
5.3 ENHANCED PROTECTIVE PROVISIONS	19
6 Protective measures	20
6.1 Protection by AUTOMATIC DISCONNECTION OF SUPPLY	21
6.2 Protection by DOUBLE or REINFORCED INSULATION	21
6.3 Protection by EQUIPOTENTIAL BONDING.....	21
6.4 Protection by ELECTRICAL SEPARATION	21
6.5 Protection by NON-CONDUCTING ENVIRONMENT	22
6.6 Protection by SELV	22
6.7 Protection by PELV	22
6.8 Protection by LIMITATION OF STEADY-STATE TOUCH CURRENT AND CHARGE	22
6.9 Protection by other measures.....	22
7 Coordination of electrical EQUIPMENT and of protective provisions within an electrical installation	23
7.1 Class 0 EQUIPMENT	23
7.2 Class I EQUIPMENT	23
7.3 Class II EQUIPMENT	24
7.4 Class III EQUIPMENT	26
7.5 Leakage currents	26
8 Special operating and servicing conditions	27
8.1 Devices to be operated manually and components intended to be replaced manually	27
8.2 Electrical values after isolation	28

Annexe A (informative) Survey of protective measures 29

Annex ZA (normative) Normative references to international publications with their
corresponding European publications 32

INTRODUCTION

This International Standard is a Basic Safety Publication intended for use by technical committees in the preparation of standards in accordance with the principles of IEC Guide 104 and in ISO/IEC Guide 51.

The terms used throughout this standard which have been defined in clause 3 are printed in capitals.

PROTECTION AGAINST ELECTRIC SHOCK – Common aspects for installation and equipment

1 Scope

This International Standard applies to the protection of persons and animals against ELECTRIC SHOCK. It is intended to give fundamental principles and requirements which are common to electrical installations, systems and EQUIPMENT or necessary for their co-ordination.

This standard has been prepared for installations, systems and EQUIPMENT having nominal or rated voltages not exceeding a.c. 1 000 V or d.c. 1 500 V. It may be used as guidance for higher voltages generated inside EQUIPMENT but it does not apply to high-voltage distribution systems.

The requirements of this standard apply only if they are incorporated, or are referred to, in the relevant standards. It is not intended to be used as a stand-alone standard.

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

ISO/IEC Guide 51:1990, *Guidelines for the inclusion of safety aspects in standards*

IEC Guide 104:1997, *The preparation of safety publications and the use of basic safety publications and group safety publications*

IEC 60050(131):1978, *International Electrotechnical Vocabulary (IEV) – Chapter 131: Electric and magnetic circuits*

IEC 60050(195): — *International Electrotechnical Vocabulary (IEV) – Chapter 195: Earthing and protection against electric shock*¹⁾

IEC 60050(826):1982, *International Electrotechnical Vocabulary (IEV) – Chapter 826: Electrical installations of buildings*

Amendment 1 (1990)

Amendment 2 (1995)

IEC 60364-4-41:1992, *Electrical installations of buildings – Part 4: Protection for safety – Chapter 41: Protection against electric shock*

IEC 60364-4-443:1995, *Electrical installations of buildings – Part 4: Protection for safety – Chapter 44: Protection against overvoltages – Section 443: Protection against overvoltages of atmospheric origin or due to switching*

¹⁾ To be published.

IEC 60364-6-61:1986, *Electrical installations of buildings – Part 6: Verification – Chapter 61: Initial verification*

IEC 60417-2,— *Graphical symbols for use on equipment – Part 2: Symbol originals* ¹⁾

IEC 60479-1:1994, *Effects of current on human beings and livestock – Part 1: General aspects*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 60601-1:1988, *Medical electrical equipment – Part 1: General requirements for safety*

IEC 60664-1:1992, *Insulation co-ordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60721, *Classification of environmental conditions*

IEC 60990:1990, *Methods of measurement of touch current and protective conductor current*

IEC 61201:1992, *Extra-low voltage (ELV) – Limit values*²⁾

3 Definitions

For the purpose of this International Standard the following definitions apply:

3.1

ELECTRIC SHOCK

physiological effect resulting from an electric current through a human or animal body
[IEV 195-01-04]

3.1.1

BASIC PROTECTION

protection against ELECTRIC SHOCK under fault-free conditions [IEV 195-06-01]

NOTE – BASIC PROTECTION generally corresponds to protection against direct contact as used in IEC 60364-4-41.

3.1.2

FAULT PROTECTION

protection against ELECTRIC SHOCK under single-fault conditions (e.g. failure of BASIC INSULATION)

NOTE – FAULT PROTECTION generally corresponds to protection against indirect contact as used in IEC 60364-4-41, mainly with regard to failure of BASIC INSULATION.

3.2

(electric) CIRCUIT

an arrangement of devices or media through which electric current can flow [IEV 131-01-01]

NOTE – See also IEC 826-05-01 for electrical installations of buildings.

1) To be published.

2) A second edition is under consideration.

3.3

(electrical) EQUIPMENT

any item used for such purposes as generation, conversion, transmission, storage, distribution or utilization of electrical energy, such as machines, transformers, apparatus, measuring instruments, protective devices, EQUIPMENT for wiring systems, appliances [IEV 826-07-01, modified]

3.4

LIVE PART

conductor or conductive part intended to be energized in normal operation, including a neutral conductor, but by convention not a PEN CONDUCTOR or PEM conductor or PEL conductor [IEV 195-02-19]

NOTE 1 – This concept does not necessarily imply a risk of ELECTRIC SHOCK.

NOTE 2 – Definitions of PEM and PEL see IEC 195-02-13 and 195-02-14.

3.5

HAZARDOUS-LIVE-PART

LIVE PART which, under certain conditions, can give a harmful ELECTRIC SHOCK [IEV 195-06-05]

3.6

EXPOSED-CONDUCTIVE-PART

conductive part of EQUIPMENT, which can be touched and which is not normally live, but which can become live when BASIC INSULATION fails [IEV 195-06-10]

NOTE – A conductive part of electrical EQUIPMENT which can only become live through contact with an EXPOSED-CONDUCTIVE-PART which has become live, is not considered to be an EXPOSED-CONDUCTIVE-PART itself.

3.7

EXTRANEOUS-CONDUCTIVE-PART

conductive part not forming part of the electrical installation and liable to introduce an electric potential, generally the electric potential of a local EARTH [IEV 195-06-11]

3.8

TOUCH VOLTAGE

3.8.1

(effective) TOUCH VOLTAGE

voltage between conductive parts when touched simultaneously by a person or an animal

NOTE – The value of the effective TOUCH VOLTAGE may be appreciably influenced by the impedance of the person or the animal in electric contact with these conductive parts. [IEV 195-05-11]

3.8.2

PROSPECTIVE TOUCH VOLTAGE

voltage between simultaneously accessible conductive parts when those conductive parts are not being touched, by a person or an animal [IEV 195-05-09]

3.9

TOUCH CURRENT

electric current which passes through a human body or through an animal body when it touches one or more accessible parts of electrical EQUIPMENT or installation, under normal conditions or under fault conditions (IEC 60990, by analogy)

3.10

INSULATION

NOTE – Insulation can be a solid, a liquid or a gas (e.g. air), or any combination.

3.10.1

BASIC INSULATION

insulation of HAZARDOUS-LIVE-PARTS which provides BASIC PROTECTION

NOTE – This concept does not apply to insulation used exclusively for functional purposes. [IEV 195-06-06].

3.10.2

SUPPLEMENTARY INSULATION

independent insulation applied in addition to BASIC INSULATION, for FAULT PROTECTION
[IEV 195-06-07]

3.10.3

DOUBLE INSULATION:

insulation comprising both BASIC INSULATION and SUPPLEMENTARY INSULATION
[IEV 195-06-08]

3.10.4

REINFORCED INSULATION

insulation of HAZARDOUS-LIVE-PARTS which provides a degree of protection against ELECTRIC SHOCK equivalent to DOUBLE INSULATION

NOTE – REINFORCED INSULATION may comprise several layers which cannot be tested singly as BASIC INSULATION or SUPPLEMENTARY INSULATION. [IEV 195-06-09]

3.11

NON-CONDUCTING ENVIRONMENT:

provision whereby a person or an animal touching an EXPOSED-CONDUCTIVE-PART that has become hazardous-live is protected by the high impedance of his environment (e.g. insulating walls and floors) and by the absence of earthed conductive parts [IEV 195-06-21]

3.12

(electrically) PROTECTIVE OBSTACLE

part preventing unintentional direct contact, but not preventing direct contact by deliberate action [IEV 195-06-16]

NOTE – Direct contact is defined in IEC 195-06-03.

3.13

(electrically) PROTECTIVE BARRIER

part providing protection against direct contact from any usual direction of access
[IEV 195-06-15]

NOTE – Direct contact is defined in IEC 195-06-03.

3.14

(electrically) PROTECTIVE ENCLOSURE

enclosure surrounding internal parts of EQUIPMENT to prevent access to HAZARDOUS-LIVE-PARTS from any direction [IEV 195-06-14]

NOTE – In addition, an enclosure generally provides protection against internal or external influences, e.g. ingress of dust or water or prevention of mechanical damage.

3.15

ARM'S REACH

zone of accessibility to touch extending from any point on a surface where persons usually stand or move about to the limits which a person can reach with the hand, in any direction, without assistance [IEV 195-06-12]