

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Circuit-breakers for equipment (CBE)**

**Disjoncteurs pour équipement (DPE)**

WITHDRAWN

IEC 60934:2000  
<https://standards.iteh.ai/en/standards/iec/60934/60934-2000>



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# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Circuit-breakers for equipment (CBE)**

**Disjoncteurs pour équipement (DPE)**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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# INTERNATIONAL ELECTROTECHNICAL COMMISSION

## CIRCUIT-BREAKERS FOR EQUIPMENT (CBE)

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International Standard IEC 60934 has been prepared by subcommittee 23E: Circuit-breakers and similar equipment for household use, of IEC technical committee 23: Electrical accessories.

This consolidated version of IEC 60934 consists of the third edition (2000) [documents 23E/430/FDIS and 23E/441/RVD], its amendment 1 (2007) [documents 23E/624/FDIS and 23E/627/RVD] and its amendment 2 (2013) [documents 23E/767/FDIS and 23E/774/RVD].

The technical content is therefore identical to the base edition and its amendments and has been prepared for user convenience.

It bears the edition number 3.2.

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

Annexes A, B, C, D, E, G, H, J, K and L form an integral part of this standard.

Annex F is for information only.



In this standard, the following print types are used:

- Requirements proper: in roman type
- *Test specifications: in italic type*
- Explanatory matter: in smaller roman type.

The committee has decided that the contents of the base publication and its amendments 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

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## CIRCUIT-BREAKERS FOR EQUIPMENT (CBE)

### 1 Scope

This International Standard is applicable to mechanical switching devices designed as "circuit-breakers for equipment" (CBE) for household and similar applications. CBEs according to this standard are intended to provide protection to circuits within electrical equipment including its components (e.g. motors, transformers, internal wiring). This standard covers also CBEs applicable for protection of electrical equipment in case of undervoltage and/or overvoltage. This standard also covers CBEs which are suitable for isolation.

NOTE The term "equipment" includes appliances.

CBEs are not applicable for overcurrent protection of wiring installations of buildings.

CBEs according to this standard have:

- a rated voltage not exceeding 440 V a.c. (between phases) and/or d.c. not exceeding 250 V;
- a rated current not exceeding 125 A;
- a short-circuit capacity ( $I_{cn}$ ) of at least  $6xI_n$  (a.c. types) and  $4xI_n$  (d.c.-types) but not exceeding 3 000 A.

CBEs may have a conditional short-circuit current rating in association with a specified short-circuit protective device (SCPD). A guide for coordination of a CBE associated in the same circuit with a SCPD is given in Annex F.

For CBEs having a degree of protection higher than IP20 according to IEC 60529, for use in locations where hazardous environmental conditions prevail (e.g. excessive humidity, heat or cold or deposition of dust) and in hazardous locations (e.g. where explosions are liable to occur), special constructions may be required.

This standard contains all the requirements necessary to ensure compliance with the operational characteristics required for these devices by type tests. It also contains the details relative to test requirements and methods of testing necessary to ensure reproducibility of test results.

This standard states:

- a) the characteristics of CBEs;
- b) the conditions with which CBEs shall comply, with reference to:
  - 1) their operation and behaviour in normal service;
  - 2) their operation and behaviour in case of overload;
  - 3) their operation and behaviour in case of short-circuits up to their rated short-circuit capacity;
  - 4) their dielectric properties;
- c) the tests intended for confirming that these conditions have been met and the methods to be adopted for the tests;
- d) the data to be marked on the devices;
- e) the test sequences to be carried out and the number of samples to be submitted for certification purposes (see Annex C);
- f) the routine tests to be carried out to reveal unacceptable variations in material or manufacture, likely to affect safety (see Annex J).

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050(151):1978, *International Electrotechnical Vocabulary (IEV) – Chapter 151: Electrical and magnetic devices*

IEC 60050(441):1984, *International Electrotechnical Vocabulary (IEV) – Chapter 441: Switchgear, controlgear and fuses*

IEC 60050(604):1987, *International Electrotechnical Vocabulary (IEV) – Chapter 604: Generation, transmission and distribution of electricity – Operation*

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

Amendment 1 (1990)

Amendment 2 (1995)

Amendment 3 (1999)

IEC 60060-1:1989, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60068-2-20:1979, *Environmental testing – Part 2: Tests – Test T: Soldering*

IEC 60099-1:1991, *Surge arresters – Part 1: Non-linear resistor type gapped arresters for a.c. systems*<sup>1)</sup>

IEC 60227 (all parts), *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V*

IEC 60269 (all parts), *Low-voltage fuses*

IEC 60417-1:1998, *Graphical symbols for use on equipment – Part 1: Overview and application*

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

IEC 60664 (all parts), *Insulation coordination for equipment within low-voltage systems*

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

IEC 60664-3:1992, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coatings to achieve insulation coordination of printed board assemblies*

IEC 60695-2-1 (all sheets), *Fire hazard testing – Part 2: Test methods – Section 1: Glow-wire test methods*

IEC 60898:1995, *Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations*

IEC 60947-1:1999, *Low-voltage switchgear and controlgear – Part 1: General rules*

IEC 60950:1999, *Safety of information technology equipment*

IEC 61000-4-2:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test – Basic EMC Publication*<sup>2)</sup>

<sup>1)</sup> There is a consolidated edition 3.1 (1999) that includes IEC 60099-1 (1991) and its amendment 1 (1999).

<sup>2)</sup> There is a consolidated edition 1.1 (1999) that includes IEC 61000-4-2 (1995) and its amendment 1 (1998).

IEC 61000-4-3:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 3: Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test – Basic EMC Publication*

IEC 61000-4-5:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 5: Surge immunity test*

CISPR 22:1997, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*

### 3 Definitions

For the purposes of this International standard, the following definitions apply.

#### 3.1 Definitions related to protection and switching devices

##### 3.1.1

##### **circuit-breaker**

mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal conditions such as those of short circuit [IEV 441-14-20]

##### 3.1.2

##### **circuit-breaker for equipment (CBE)**

circuit-breaker specifically designed for the protection of equipment

2 | NOTE These CBEs are intended for:

- automatic interruption and non-automatic or automatic resetting,
- automatic interruption and non-automatic or automatic resetting and manual switching operation.

##### 3.1.3

##### **E-type CBE**

2 | void

##### 3.1.4

##### **fuse**

device that, by the fusing of one or more of its specially designed and proportioned components, opens the circuit in which it is inserted by breaking the current when this exceeds a given value for a sufficient time. The fuse comprises all of the parts that form the complete device [IEV 441-18-01]

##### 3.1.5

##### **switching device**

device designed to make or break the current in one or more electric circuits [IEV 441-14-01]

##### 3.1.6

##### **mechanical switching device**

switching device designed to close and open one or more electric circuits by means of separable contacts [IEV 441-14-02]

##### 3.1.7

##### **switch (mechanical)**

mechanical switching device capable of making, carrying and breaking currents under normal circuit conditions which may include specified operating overload conditions and also carrying for a specified time currents under specified abnormal circuit conditions such as those of short circuit [IEV 441-14-10]

### 3.1.8

#### **disconnecter**

mechanical switching device which in the open position complies with the requirements specified for the isolating function [IEV 441-14-05, modified]

### 3.1.9

#### **disconnection**

interruption of an electrical circuit in a pole so as to provide insulation between the supply and those parts intended to be disconnected from the supply

### 3.1.10

#### **full-disconnection**

disconnection that provides the equivalent of basic insulation by contact separation

### 3.1.11

#### **micro-disconnection**

disconnection that provides compliance of performance by contact separation

### 3.1.12

#### **isolation (isolating function)**

function intended to cut off the supply from all or a discrete section of the installation by separating the installation from every source of electrical energy for reasons of safety

## 3.2 General terms

### 3.2.1

#### **ambient air temperature**

temperature, determined under prescribed conditions, of the air surrounding the complete CBE (for example, for an enclosed CBE, it is the air outside the enclosure) [IEV 441-11-13, modified]

### 3.2.2

#### **applied voltage**

voltage which exists across the terminals of a pole of a CBE just before the making of the current. In the case of a.c., it is the r.m.s. value [IEV 441-17-24, modified]

### 3.2.3

#### **main circuit (of a CBE)**

all the conductive parts of a CBE included in the circuit which it is designed to close and to open [IEV 441-15-02, modified]

### 3.2.4

#### **control circuit (of a CBE)**

circuit (other than a path of the main circuit) intended for the closing operation or opening operation, or both, of a CBE [IEV 441-15-03, modified]

### 3.2.5

#### **auxiliary circuit (of a CBE)**

all the conductive parts of a CBE intended to be included in a circuit other than the main circuit and the control circuit of the CBE [IEV 441-15-04, modified]

### 3.2.6

#### **pole (of a CBE)**

that part of a CBE associated exclusively with one, electrically separated, conducting path of its main circuit provided with contacts intended to connect and disconnect the main circuit itself and excluding those portions which provide a means for mounting and operating the poles together [IEV 441-15-01, modified]

**3.2.7****protected pole**

pole provided with an overcurrent release (see 3.6.2)

**3.2.8****unprotected pole**

pole without overcurrent release (see 3.6.2) but otherwise generally capable of the same performance as a protected pole of the same CBE

**3.2.9****neutral conductor (symbol N)**

conductor connected to the neutral point of a system and capable of contributing to the transmission of electrical energy [IEV 826-01-03]

**3.2.10****closed position**

position in which the predetermined continuity of the main circuit of a CBE is secured [IEV 441-16-22, modified]

**3.2.11****open position**

position in which the predetermined clearance between open contacts in the main circuit of a CBE is provided [IEV 441-16-23, modified]

**3.2.12****incorporated mounting**

method of mounting where the user provides in his equipment a cavity to fix the CBE in its position

**3.3 Definitions related to current****3.3.1****current**

flow of electric charge through a conductor

**3.3.2****rated current**

current assigned by the manufacturer for a specified operating condition of the CBE

**3.3.3****overcurrent**

current exceeding the rated current [IEV 441-11-06]

**3.3.4****overload current**

overcurrent that occurs in an electrically undamaged circuit

**3.3.5****short-circuit current**

overcurrent resulting from a fault of negligible impedance between points intended to be at different potentials in normal service [IEV 441-11-07, modified]

NOTE A short-circuit current may result from a fault or from an incorrect connection.

**3.3.6****conventional tripping current  $I_t$** 

specified value of current which causes a CBE to operate within a specified time (conventional time)