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Electrical installations of buildings - Part 4-43: Protection for safety - Protection against overcurrent

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Protection contre les surintensités

Electrical installations of buildings –

Part 4-43:
Protection for safety –
Protection against overcurrent

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ELECTRICAL INSTALLATIONS OF BUILDINGS –

Part 4-43: Protection for safety – Protection against overcurrent

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
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5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60364-4-43 has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock.

The IEC 60364 series (parts 1 to 6), is currently being restructured, without any technical changes, into a more simple form (see annex B).

According to a unanimous decision by the Committee of Action (CA/1720/RV (2000-03-21)), the restructured parts of IEC 60364 have not been submitted to National Committees for approval.

The text of this second edition of IEC 60364-4-43 is compiled from and replaces

– part 4-43, first edition (1977) and its amendment 1 (1997),
– part 4-473, first edition (1977) and its amendment 1 (1998).

This publication has been drafted, as close as possible, in accordance with the ISO/IEC Directives, Part 3.

Annexes A and B are for information only.

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

The contents of the corrigendum of August 2002 have been included in this copy.

ELECTRICAL INSTALLATIONS OF BUILDINGS –

Part 4-43: Protection for safety – Protection against overcurrent

430 Introduction

430.1 (431)[1] Scope

Part 4-43 of IEC 60364 describes how live conductors are protected by one or more devices for automatic interruption of the supply in the event of overload (see clause 433) and short-circuits (see clause 434) except in cases where the overcurrent is limited in accordance with clause 436 or by the conditions described in 433.3, 433.5 or 434.3 are met. Further, protection against overload and against short-circuits shall be co-ordinated in accordance with clause 435.

NOTE 1 Live conductors protected against overload in accordance with clause 433 are considered to be protected also against faults likely to cause overcurrents of a magnitude similar to overload currents.

NOTE 2 The requirements of this standard do not take account of external influences. For the application of protective measures in relation to conditions of external influences, see 410.3.4 of IEC 60364-4-41 and clause 422 of IEC 60364-4-42.

NOTE 3 Protection of conductors according to this standard does not necessarily protect the equipment connected to the conductors.

(433.1 and 434.1)[1]

Protective devices shall be provided to break any overcurrent flowing in the circuit conductors before such a current could cause a danger due to thermal and mechanical effects or a temperature rise detrimental to insulation, joints, terminations, or surroundings of the conductors.

430.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60364. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60364 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60269-1:1998, *Low-voltage fuses – Part 1: General requirements*

IEC 60269-2:1986, *Low-voltage fuses – Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application)*

IEC 60269-3:1987, *Low-voltage fuses – Part 3: Supplementary requirements for fuses used by unskilled persons (fuses mainly for household and similar applications)*

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

IEC 60364-5-52: *Electrical installations of buildings – Part 5-52: Selection and erection of electrical equipment – Wiring systems*

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[1] In this standard, references in brackets refer to the previous numbering system.

IEC 60724:1984, *Guide to the short-circuit temperature limits of electric cables with a rated voltage not exceeding 0,6/1,0 kV*

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 60947-2:1995, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*

IEC 60947-4-1:1990, *Low-voltage switchgear and controlgear – Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters*

IEC 61009 (all parts), *Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs)*

431 (473.3) Requirements according to the nature of the circuits

431.1 (473.3.1) Protection of phase conductors

431.1.1 (473.3.1.1) Detection of overcurrent shall be provided for all phase conductors; it shall cause the disconnection of the conductor in which the overcurrent is detected, but not necessarily the disconnection of other live conductors, except where 431.1.2 applies.

431.1.2 (473.3.1.2) In TT systems, for circuits supplied between phases and in which the neutral conductor is not distributed, overcurrent detection need not be provided for one of the phase conductors, provided that the following conditions are simultaneously fulfilled:

a) there exists, in the same circuit or on the supply side, differential protection intended to cause disconnection of all the phase conductors;

b) the neutral conductor is not distributed from an artificial neutral point of the circuits situated on the load side of the differential protective device mentioned in a).

NOTE If disconnection of a single phase may cause danger, for example in the case of three-phase motors, appropriate precautions should be taken.

431.2 (473.3.2) Protection of the neutral conductor

431.2.1 (473.3.2.1) TT or TN systems

Where the cross-sectional area of the neutral conductor is at least equal or equivalent to that of the phase conductors, it is not necessary to provide overcurrent detection for the neutral conductor or a disconnecting device for that conductor.

Where the cross-sectional area of the neutral conductor is less than that of the phase conductors, it is necessary to provide overcurrent detection for the neutral conductor, appropriate to the cross-sectional area of that conductor; this detection shall cause the disconnection of the phase conductors, but not necessarily of the neutral conductor.

However, overcurrent detection need not be provided for the neutral conductor if the two following conditions are simultaneously fulfilled:

- the neutral conductor is protected against short-circuit by the protective device for the phase conductors of the circuit, and
- the maximum current likely to be carried by the neutral conductor is, in normal service, clearly less than the value of the current-carrying capacity of that conductor.

NOTE This second condition is satisfied if the power carried is shared as evenly as possible between the different phases, for example if the sum of the powers absorbed by current-using equipment supplied from each phase and neutral (such as lighting and socket-outlets) is much less than the total power carried by the circuit concerned. The cross-sectional area of the neutral conductor should be not less than the appropriate value prescribed in IEC 60364-5-52.

431.2.2 (473.3.2.2) IT systems

In IT systems it is strongly recommended that the neutral conductor should not be distributed.

However, where the neutral conductor is distributed, it is generally necessary to provide overcurrent detection for the neutral conductor of every circuit, which will cause the disconnection of all the live conductors of the corresponding circuit, including the neutral conductor. This measure is not necessary if

- the particular neutral conductor is effectively protected against short-circuit by a protective device placed on the supply side, for example at the origin of the installation, in accordance with the rules stated in 434.5; or if
- the particular circuit is protected by a residual current-operated protective device with a rated residual current not exceeding 0,15 times the current-carrying capacity of the corresponding neutral conductor. This device shall disconnect all the live conductors of the corresponding circuit, including the neutral conductor.

431.3 (473.3.3) Disconnection and reconnection of the neutral conductor

Where disconnection of the neutral conductor is required, disconnection and reconnection shall be such that the neutral conductor shall not be disconnected before the phase conductors and shall be reconnected at the same time as or before the phase conductors.

432 Nature of protective devices

The protective devices shall be of the appropriate types indicated by 432.1 to 432.3.

432.1 Devices ensuring protection against both overload current and short-circuit current

These protective devices shall be capable of breaking any overcurrent up to and including the prospective short-circuit current at the point where the device is installed. They shall satisfy the requirements of clause 433 and 434.5.1. Such protective devices may be:

- circuit-breakers incorporating overload release complying with IEC 60898, IEC 60947-1, IEC 60947-2 or IEC 61009;
- circuit-breakers in conjunction with fuses;
- fuses having fuse-links with gG characteristics complying with IEC 60269-1 and IEC 60269-2 or IEC 60269-3.

NOTE 1 The fuse comprises all the parts that form the complete protective device.

NOTE 2 The use of a protective device having a breaking capacity below the value of the prospective short-circuit current at its place of installation is subject to the requirements of 434.5.1.

432.2 Devices ensuring protection against overload current only

These are generally inverse-time-lag protective devices whose interrupting capacity may be below the value of the prospective short-circuit current at the point where the devices are installed. They shall satisfy the requirements of clause 433.

432.3 Devices ensuring protection against short-circuit current only

These devices shall be installed where overload protection is achieved by other means or where clause 433 allows overload protection to be dispensed with. The devices shall be capable of breaking the short-circuit current up to and including the prospective short-circuit current. They shall satisfy the requirements of clause 434.