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Partie 4-42:
Protection pour assurer la sécurité –
Protection contre les effets thermiques

Electrical installations of buildings –

Part 4-42:
Protection for safety –
Protection against thermal effects

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL INSTALLATIONS OF BUILDINGS –

Part 4-42: Protection for safety – Protection against thermal effects

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.
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
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 60364-4-42 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 A).

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 60364-4-42 is compiled from and replaces

– part 4-42, first edition (1980),
– part 4-482, first edition (1982).

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

Annex A is for information only.

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be

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- withdrawn;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

ELECTRICAL INSTALLATIONS OF BUILDINGS –

Part 4-42: Protection for safety – Protection against thermal effects

420.1 (421)[1] Scope

Persons, fixed equipment, and fixed materials adjacent to electrical equipment shall be protected against harmful effects of heat developed by electrical equipment, or thermal radiation, particularly the following effects:

- combustion or degradation of materials;
- risk of burns;
- impairment of the safe function of installed equipment.

NOTE Protection against overcurrent is dealt with in IEC 60364-4-43.

420.2 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 60079-14:1996, *Electrical apparatus for explosive gas atmospheres – Part 14: Electrical installations in hazardous areas (other than mines)*

IEC 60332-1:1993, *Tests on electric cables under fire conditions – Part 1: Tests on a single vertical insulated wire or cable*

IEC 60332-3-10:2000, *Tests on electric cables under fire conditions – Part 3-10: Test for vertical flame spread of vertically-mounted bunched wires or cables – Apparatus*

IEC 60332-3-21:2000, *Tests on electric cables under fire conditions – Part 3-21: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category A F/R*

IEC 60332-3-22:2000, *Tests on electric cables under fire conditions – Part 3-22: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category A*

IEC 60332-3-23:2000, *Tests on electric cables under fire conditions – Part 3-23: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category B*

IEC 60332-3-24:2000, *Tests on electric cables under fire conditions – Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category C*

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

IEC 60332-3-25:2000, *Tests on electric cables under fire conditions – Part 3-25: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category D*

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

IEC 60364-4-43: *Electrical installations of buildings – Part 4-43: Protection for safety – Protection against overcurrent*

IEC 60364-5-51: *Electrical installations of buildings – Part 5-51: Selection and erection of electrical equipment – Common rules*

IEC 60614 (all parts), *Conduits for electrical installations*

421 (422) Protection against fire

NOTE Fire terms and related tests are under consideration by co-operation between ISO and IEC. The terms used in this clause are provisional.

421.1 (422.1) Electrical equipment shall not present a fire hazard to adjacent materials

Any relevant manufacturer's erection instructions shall be observed in addition to the requirements of IEC 60364.

421.2 (422.2) Where fixed equipment may attain surface temperatures which could cause a fire hazard to adjacent materials, the equipment shall either:

- be mounted on or within materials which will withstand such temperatures and are of low thermal conductance, or
- be screened from elements of building construction by materials which will withstand such temperatures and are of low thermal conductance, or
- be mounted to allow safe dissipation of heat at a sufficient distance from any material on which such temperatures could have deleterious thermal effects, any means of support being of low thermal conductance.

421.3 (422.3) Where arcs or sparks may be emitted by permanently connected equipment in normal service, the equipment shall either:

- be totally enclosed in arc-resistant material, or
- be screened by arc-resistant material from building elements on which the arcs could have deleterious thermal effects, or
- be mounted to allow safe extinction of the arc at a sufficient distance from building elements on which the arc could have deleterious thermal effects.

Arc-resistant material used for this protective measure shall be non-combustible, of low thermal conductivity, and of adequate thickness to provide mechanical stability.

421.4 (422.4) Fixed equipment causing a focusing or concentration of heat shall be at a sufficient distance from any fixed object or building element so that the object or element, in normal conditions, cannot be subjected to a dangerous temperature.

421.5 (422.5) Wherever electrical equipment in a single location contains flammable liquid in significant quantity, precautions shall be taken to prevent burning liquid and the products of combus tion of the liquid (flame, smoke, toxic gases) spreading to other parts of the building.

NOTE 1 Examples of such precautions are

- a drainage pit to collect leakages of liquid and ensure their extinction in the event of fire, or
- installation of the equipment in a chamber of adequate fire resistance and the provision of sills or other means of preventing burning liquid spreading to other parts of the building, such a chamber being ventilated solely to the external atmosphere.

NOTE 2 The generally accepted lower limit for a significant quantity is 25 l.

NOTE 3 For less than 25 l, an arrangement to prevent the escape of liquid will suffice.

NOTE 4 It is desirable to switch off supply at the onset of a fire.

421.6 (422.6) The materials of enclosures arranged around electrical equipment during erection shall withstand the highest temperature likely to be produced by the electrical equipment.

Combustible materials are not suitable for the construction of these enclosures unless preventive measures against ignition are taken, such as covering with non-combustible or not readily combustible material of low thermal conductivity.

422 (482) Measures for protection against fire

422.1 (482.0) General

The requirements of this clause shall be observed in addition to those of clause 421 for installations in locations where the conditions of external influences described in 422.2 exist.

422.2 (482.1) Conditions of evacuation in an emergency

Condition BD2: Low density occupation, difficult conditions of evacuation
BD3: High density occupation, easy conditions of evacuation
BD4: High density occupation, difficult conditions of evacuation
(according to table 51A of IEC 60364-5-51).

NOTE Authorities responsible for building construction, public gatherings, fire prevention, etc. may specify which BD condition is applicable.

422.2.1 (482.1.1) In conditions BD2, BD3 and BD4, wiring systems shall not encroach on escape routes unless the wiring is provided with sheaths or enclosures which, either during the time authorized by regulations for building elements of the escape route or for 2 h in the absence of such a regulation,

- will not contribute to, or propagate a fire, and
- will not attain a temperature high enough to ignite adjacent material.

NOTE Tests on cables under fire conditions are given in IEC 60332-1, IEC 60332-3-10, IEC 60332-3-21, IEC 60332-3-22, IEC 60332-3-23, IEC 60332-3-24 and IEC 60332-3-25. Tests on conduit under fire conditions are given in IEC 60614.

Wiring systems encroaching on escape routes shall not be within arm's reach unless they are provided with protection against mechanical damage likely to occur during an evacuation. Any wiring systems in escape routes shall be as short as practicable.

422.2.2 (482.1.2) In conditions BD3 and BD4, switchgear and controlgear devices, except certain devices to facilitate evacuation, shall be accessible only to authorized persons. If they are placed in passages, they shall be enclosed in cabinets or boxes constructed of non-combustible or not readily combustible material.

NOTE Definitions for "non-combustible" and "not readily combustible" are under consideration.

422.2.3 (482.1.3) In conditions BD3 and BD4 and in escape routes, the use of electrical equipment containing flammable liquids is prohibited.

NOTE Individual auxiliary capacitors incorporated in apparatus are not subject to this requirement. This exception principally concerns discharge lamps and capacitors of motor starters.

422.3 (482.2) Nature of processed or stored materials

Condition BE2: Fire risk (according to table 51A of IEC 60364-5-51).

NOTE 1 Quantities of flammable materials, surface or volume, of the locations may be regulated by national authorities.

NOTE 2 For explosion risks, see IEC 60079-14.

422.3.1 (482.2.1) Electrical equipment shall be restricted to that necessary to the use of these locations, except wiring systems according to 422.3.6

422.3.2 (482.2.2) Where it is expected that dust sufficient to cause a fire hazard could accumulate on enclosures of electrical equipment, measures shall be taken to prevent the enclosures from attaining excessive temperatures.

422.3.3 (482.2.3) Electrical equipment shall be so selected and erected that its normal temperature rise and foreseeable temperature rise during a fault cannot cause a fire.

These arrangements may be effected by the construction of equipment or its conditions of installation.

Special measures are not necessary where the temperature of surfaces is unlikely to cause combustion of nearby substances.

422.3.4 (482.2.4) Switchgear for protection, control and isolation shall be placed outside locations presenting BE2 conditions, unless it is in an enclosure providing a degree of protection appropriate for such a location but at least IP4X.

422.3.5 (482.2.5) Where wiring is not embedded in non-combustible material, precautions shall be taken to ensure that the wiring cannot propagate flame.

In particular, cables shall, as a minimum, satisfy the test under fire conditions specified in IEC 60332-1.

422.3.6 (482.2.6) Wiring systems which traverse these locations, but are not necessary to the use of these locations, shall satisfy the following conditions:

- the wiring systems are made in accordance with the rules of 422.3.5;
- they have no connection along the route inside these locations, unless these connections are placed in a fire-resistant enclosure;
- they are protected against overcurrent in accordance with the rules of 422.3.11.

422.3.7 (482.2.7) In forced-air heating installations, the air intake shall be outside locations, where presence of combustible dust exists.

The temperature of the outgoing air shall not be such as to cause fire in the location.

422.3.8 (482.2.8) Motors, other than light-duty servomotors, which are automatically or remotely controlled, or which are not continuously supervised, shall be protected against excessive temperature rise by temperature responsive devices.

422.3.9 (482.2.9) Luminaires shall be appropriate for condition BE2 and be provided with enclosures providing a degree of protection of at least IP4X.

Lamps and elements of lighting apparatus shall be adequately protected in places where mechanical damage is anticipated, for example, by sufficiently robust plastic covers, grilles or robust glass covers. These protective devices shall not be fixed on lampholders unless the lampholders are designed for this purpose.

422.3.10 (482.2.10) Where it is necessary to limit the consequences of fault currents in wiring systems from the point of view of fire risks, the circuit shall either be:

- protected by a residual current protective device, the rated operating residual current of which does not exceed 0,5 A, or
- monitored by a continuous insulation monitoring device which initiates an alarm on the occurrence of an insulation fault.

A bare monitoring conductor, which may be a protective conductor, may be incorporated in the wiring system of the corresponding circuit, unless the wiring system comprises a metallic enclosure connected to the protective conductor.

422.3.11 (482.2.11) Circuits supplying or traversing locations where condition BE2 applies, shall be protected against overload and against short-circuits by protective devices located on the supply side of these locations.

422.3.12 (482.2.12) In circuits supplied at safety extra-low voltage, live parts shall be

- either contained in enclosures affording the degree of protection IP2X or IPXXB,
- or provided with insulation capable of withstanding a test voltage of 500 V for 1 min

regardless of the nominal voltage of the circuit. This is in addition to the requirements of 411.1.4.3 of IEC 60364-4-41.

422.3.13 (482.2.13) PEN conductors are not allowed in locations where condition BE2 applies, except for circuits traversing such locations.

422.4 (482.3) Combustible constructional materials

Condition CA2: Combustible materials (according to table 51A of IEC 60364-5-51).

422.4.1 (482.3.1) Precautions shall be taken to ensure that electrical equipment cannot provoke the ignition of walls, floors and ceilings.

422.5 (482.4) Fire propagating structures

Condition CB2: Propagation of fire (according to table 51A of 60364-5-51).

422.5.1 (482.4.1) In structures of which the shape and dimensions facilitate the spread of fire, precautions shall be taken to ensure that the electrical installation cannot propagate a fire (e.g. chimney effect).

NOTE Fire detectors may be provided which ensure the implementation of measures for preventing propagation of fire, for example, the closing of fire-proof shutters in ducts, troughs or trunking.

423 Protection against burns

Accessible parts of electrical equipment within arm's reach shall not attain a temperature likely to cause burns to persons, and shall comply with the appropriate limit stated in table 42A. All parts of the installation likely in normal service to attain, even for short periods, temperatures exceeding the limits stated in table 42A shall be guarded so as to prevent any accidental contact.

However, the values in table 42A do not apply to equipment complying with IEC standards for the type of equipment concerned.

Table 42A – Temperature limits in normal service for accessible parts of equipment within arm's reach

Accessible parts	Material of accessible surfaces	Maximum temperatures °C
Hand-held means of operation	Metallic Non-metallic	55 65
Parts intended to be touched but not hand-held	Metallic Non-metallic	70 80
Parts which need not be touched for normal operation	Metallic Non-metallic	80 90

424 Protection against overheating

424.1 Forced air heating systems

424.1.1 Forced air heating systems shall be such that their heating elements, other than those of central storage heaters, cannot be activated until the prescribed air flow has been established and are deactivated when the air flow is stopped. In addition, they shall have two temperature limiting devices independent of each other which prevent permissible temperatures from being exceeded in air ducts.

424.1.2 The frame and enclosure of heating elements shall be of non-combustible material.

424.2 Appliances producing hot water or steam

All appliances producing hot water or steam shall be protected by design or erection against overheating in all service conditions. Unless the appliances comply as a whole with the appropriate IEC standards, the protection shall be by means of an appropriate non-self-resetting device, functioning independently of the thermostat.

If an appliance has no free outlet, it shall also be provided with a device which limits the water pressure.

Annex A
(informative)

IEC 60364 – Parts 1 to 6: Restructuring

Table A.1 – Relationship between restructured and original parts

Publication number according to the restructuring	Old publications contained in the new part	Title	Published	Amendment (date)
PART 1 Fundamental principles	IEC 60364-1 Ed.3	*Electrical installations of buildings – Part 1: Scope, object and fundamental principles*	1992	
	IEC 60364-2-21 TR3 Ed.1	*Electrical installations of buildings – Part 2: Definitions – Chapter 21: Guide to general terms*	1993	
	IEC 60364-3 Ed.2	*Electrical installations of buildings – Part 3: Assessment of general characteristics*	1993	A1 (1994) A2 (1995)
PART 4-41 Protection for safety – Protection against electric shock	IEC 60364-4-41 Ed.3	*Electrical installations of buildings – Part 4: Protection for safety – Chapter 41: Protection against electric shock*	1992	A1 (1996) A2 (1999)
	IEC 60364-4-46 Ed.1	*Electrical installations of buildings – Part 4: Protection for safety – Chapter 46: Isolation and switching*	1981	
	IEC 60364-4-47 Ed.1	*Electrical installations of buildings – Part 4: Protection for safety – Chapter 47: Application of protective measures for safety – Section 470: General – Section 471: Measures of protection against electric shock*	1981	A1 (1993)
	IEC 60364-4-481 Ed.1	*Electrical installations of buildings – Part 4: Protection for safety – Chapter 48: Choice of protective measures as a function of external influences – Section 481: Selection of measures for protection against electric shock in relation to external influences*	1993	
PART 4-42 Protection for safety – Protection against thermal effects	IEC 60364-4-42 Ed.1	*Electrical installations of buildings – Part 4: Protection for safety – Chapter 42: Protection against thermal effects*	1980	
	IEC 60364-4-482 Ed.1	*Electrical installations of buildings – Part 4: Protection for safety – Chapter 48: Choice of protective measures as a function of external influences – Section 482: Protection against fire*	1982	
PART 4-43 Protection for safety – Protection against overcurrent	IEC 60364-4-43 Ed.1	*Electrical installations of buildings – Part 4: Protection for safety – Chapter 43: Protection against overcurrent*	1977	A1 (1997)
	IEC 60364-4-473 Ed.1	*Electrical installations of buildings – Part 4: Protection for safety – Chapter 47: Application of protective measures for safety – Section 473: Measures of protection against overcurrent*	1977	A1 (1998)
PART 4-44 Protection for safety – Protection against electromagnetic and voltage disturbance	IEC 60364-4-442 Ed.1	*Electrical installations of buildings – Part 4: Protection for safety – Chapter 44: Protection against overvoltages – Section 442: Protection of low-voltage installations against faults between high-voltage systems and earth*	1993	A1 (1995) A2 (1999)
	IEC 60364-4-443 Ed.2	*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*	1995	A1 (1998)
	IEC 60364-4-444 Ed.1	*Electrical installations of buildings – Part 4: Protection for safety – Chapter 44: Protection against overvoltages – Section 444: Protection against electromagnetic interferences (EMI) in installations of buildings*	1996	
	IEC 60364-4-45 Ed.1	*Electrical installations of buildings – Part 4: Protection for safety – Chapter 45: Protection against undervoltage*	1984	

Table A.1 *(continued)*

Publication number according to the restructuring	Old publications contained in the new part	Title	Published	Amendment (date)
PART 5-51 Selection and erection of electrical equipment – Common rules	IEC 60364-5-51 Ed.3	*Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 51: Common rules*	1997	
	IEC 60364-3 Ed.2	*Electrical installations of buildings – Part 3: Assessment of general characteristics*	1993	A1 (1994) A2 (1995)
PART 5-52 Selection and erection of electrical equipment – Wiring systems	IEC 60364-5-52 Ed.1	*Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 52: Wiring systems*	1993	A1 (1997)
	IEC 60364-5-523 Ed.2	*Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 52: Wiring systems – Section 523: Current-carrying capacities*	1999	
PART 5-53 Selection and erection of electrical equipment – Isolation, switching and control	IEC 60364-4-46 Ed.1 (except clause 461 which goes into Part 4-41)	*Electrical installations of buildings – Part 4: Protection for safety – Chapter 46: Isolation and switching*	1981	
	IEC 60364-5-53 Ed.2	*Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 53: Switchgear and controlgear*	1994	
	IEC 60364-5-534 Ed.1	*Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 53: Switchgear and controlgear – Section 534: Devices for protection against overvoltages*	1997	
	IEC 60364-5-537 Ed.1	*Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 53: Switchgear and controlgear – Section 537: Devices for isolation and switching*	1981	A1 (1989)
PART 5-54 Selection and erection of electrical equipment – Earthing arrangements	IEC 60364-5-54 Ed.1	*Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 54: Earthing arrangements and protective conductors*	1980	A1 (1982)
	IEC 60364-5-548 Ed.1	*Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Section 548: Earthing arrangements and equipotential bonding for information technology installations*	1996	A1 (1998)
PART 5-55 Selection and erection of electrical equipment – Other equipment	IEC 60364-5-551 Ed.1	*Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 55: Other equipment – Section 551: Low-voltage generating sets*	1994	
	IEC 60364-5-559 Ed.1	*Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 55: Other equipment – Section 559: Luminaries and lighting installations*	1999	
	IEC 60364-5-56 Ed.1	*Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 56: Safety services*	1980	A1 (1998)
	IEC 60364-3 Ed.2	*Electrical installations of buildings – Part 3: Assessment of general characteristics*	1993	A1 (1994) A2 (1995)
PART 6-61 Verification and testing – Initial verification	IEC 60364-6-61 Ed.1	*Electrical installations of buildings – Part 6: Verification – Chapter 61: Initial verification*	1986	A1 (1993) A2 (1997)

Table A.2 – Relationship between new and old clause numbering

Restructured number	Former, if different	Date of original publication(s)	Clause title
Part 1			
12	3.2	1993	Normative references
Annex B	21	1993	Definitions, guide to general terms
B1.0	21.0	1993	Scope
B1.1	21.1	1993	Characteristics of installations
B1.2	21.2	1993	Voltages
B1.3	21.3	1993	Electric shock
B1.4	21.4	1993	Earthing
B1.5	21.5	1993	Electrical circuits
B1.7	21.7	1993	Other equipment
B1.8	21.8	1993	Isolation and switching
Part 4-41			
410	400.1	1992	Introduction
410.2	New		Normative references
410.3	470		Application of measures of protection against electric shock
Part 4-42			
421	422	1980	Protection against fire
422	482	1982	Protection against fire where particular risks exist
422.1	482.0	1982	General
422.2	482.1	1982	Conditions of evacuation in an emergency
422.3	482.2	1982	Nature of processed or stored materials
422.4	482.3	1982	Combustible constructional materials
422.5	482.4	1982	Fire propagating structures
Part 4-43			
431	473.3	1977	Requirements according to the nature of the circuits
431.1	473.3.1	1977	Protection of phase conductors
431.2	473.3.2	1977	Protection of the neutral conductor
431.3	473.3.3	1977	Disconnection and reconnection of neutral conductor
433.1	433.2	1977	Co-ordination between conductors and overload protective devices
433.2	473.1.1	1977	Position of devices for overload protection
433.3	473.1.2	1977	Omission of devices for protection against overload
433.4	473.1.3	1977	Position or omission of devices for protection against overload in IT systems
433.5	473.1.4	1977	Cases where omission of devices for overload protection is recommended for safety reasons
433.6	473.1.5	1977	Overload protection of conductors in parallel
434.1	434.2	1977	Determination of prospective short circuit currents
434.2	473.2.1	1977	Position of devices for short-circuit protection
434.3	473.2.3	1977	Omission of devices for short-circuit protection
434.4	473.2.4	1977	Short-circuit protection of conductors in parallel
434.5	434.3	1977	Characteristics of short-circuit protective devices

Table A.2 *(continued)*

Restructured number	Former, if different	Date of original publication(s)	Clause title
Part 4-44			
440		1993, 1995 and 1996, respectively	Introduction – Compiled from the introductions from part 4-442 (in part), part 4-443 and part 4-444 (in part)
440.1	442.1.1	1993	Scope
440.2	442.1.4	1993	Normative references
445	45	1984	Protection against undervoltages
445.1	451	1984	General requirements
Part 5-51			
510	51	1997	Introduction
511	320.1 320.2	1993	Operational conditions and external influences
Part 5-52			
Table 52-1	52F	1993	Selection of wiring systems
Table 52-2	52G	1993	Erection of wiring systems
Table 52-3	52H	1993	Examples for methods of installation
Table 52-4	52-A	1993	Maximum operating temperatures for types of insulation
523.5	523.4	1983	Groups containing more than one circuit
523.6	523.5	1983	Number of loaded conductors
523.7	523.6	1983	Conductors in parallel
523.8	523.7	1983	Variation of installation conditions along a route
Table 52-5	52J	1993	Minimum cross-sectional area of conductors
Annex C	Annex B	1993	Formulae to express current-carrying capacities
Annex D	Annex C	1993	Effect of harmonic currents on balanced three-phase systems
Part 5-53			
534.3	535	1997	Devices for protection against undervoltage
535	539	1981	Co-ordination of various protective devices
535.1	539.1		Discrimination between overcurrent protective devices
535.2	539.2		Association of residual current protective devices
535.3	539.3		Discrimination between residual current protective devices
536	46	1981	Isolation and switching
536.0	460	1981	Introduction
536.1	461	1981	General
536.2	462	1981	Isolation
536.3	463	1981	Switching off for mechanical maintenance
536.4	464	1981	Emergency switching
536.5	465	1981	Functional switching
Part 5-54			NOTE No change of clause numbering
Part 5-55			
550.2	551.1.2 559.2	1994	Normative references
556	56	1980	Safety services
556.1	352	1980	General
556.4	562	1980	Safety sources
556.5	563	1980	Circuits
556.6	564	1980	Utilisation equipment
556.7	565	1980	Special requirements for safety services having sources not capable of operation in parallel
556.8	566	1980	Special requirement for safety services having sources capable of operation in parallel
Part 6-61			NOTE No change of clause numbering