



BSI Standards Publication

# Safety requirements for power electronic converter systems and equipment

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Part 1: General

## National foreword

This British Standard is the UK implementation of EN 62477-1:2012+A12:2021. It is derived from IEC 62477-1:2012, incorporating amendment 1:2016. It supersedes BS EN 62477-1:2012+A1:2017, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee PEL/22, Power electronics.

A list of organizations represented on this committee can be obtained on request to its committee manager.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

This publication has been prepared under a mandate given to the European Standards Organizations by the European Commission and the European Free Trade Association and is intended to support essential requirements of the EU legislation detailed in the European foreword. Annex ZA/ZZ describes how the publication relates to the legislation.

For the Great Britain market (England, Scotland and Wales), if the UK Government has designated this publication for conformity with UKCA marking legislation and has not amended the essential requirements of that legislation, Annex ZA/ZZ and any references to EU law in the publication should be read in accordance with the designation as applying to UK legislation in the same way as to EU law. Further information on designated standards can be found at [www.bsigroup.com/standardsandregulation](http://www.bsigroup.com/standardsandregulation).

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More information on legislation can be found at [www.gov.uk](http://www.gov.uk).

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30 September 2014	Implementation of CENELEC amendment A11:2014: EN supersession information updated

Date	Text affected
30 April 2017	Implementation of IEC amendment 1:2016 with CENELEC endorsement A1:2017
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EUROPEAN STANDARD

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**Safety requirements for power electronic converter systems  
and equipment -  
Part 1: General  
(IEC 62477-1:2012)**

Exigences de sécurité applicables  
aux systèmes et matériels électroniques  
de conversion de puissance -  
Partie 1: Généralités  
(CEI 62477-1:2012)

Sicherheitsanforderungen an  
Leistungshalbleiter-Umrichtersysteme  
und -betriebsmittel -  
Teil 1: Allgemeines  
(IEC 62477-1:2012)

This European Standard was approved by CENELEC on 2012-08-28. 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 CEN-CENELEC Management Centre or to any CENELEC member.

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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

## European foreword

The text of document 22/200/FDIS, future edition 1 of IEC 62477-1, prepared by IEC/TC 22 "Power electronic systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62477-1:2012.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2013-05-28
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2015-08-28

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The text of the International Standard IEC 62477-1:2012 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60073:2002	NOTE	Harmonised as EN 60073:2002 (not modified).
IEC 60085	NOTE	Harmonised as EN 60085.
IEC 60216 Series	NOTE	Harmonised as EN 60216 Series (not modified).
IEC 60309-1	NOTE	Harmonised as EN 60309-1.
IEC 60664-5:2007	NOTE	Harmonised as EN 60664-5:2007 (not modified).
IEC 60695-11-5	NOTE	Harmonised as EN 60695-11-5.
IEC 60721 Series	NOTE	Harmonised as EN 60721 Series (not modified).
IEC 60947-7-1	NOTE	Harmonised as EN 60947-7-1.
IEC 60947-7-2	NOTE	Harmonised as EN 60947-7-2.
IEC 60950-1	NOTE	Harmonised as EN 60950-1.
IEC 61008 Series	NOTE	Harmonised as EN 61008 Series (partly modified).
IEC 61009 Series	NOTE	Harmonised as EN 61009 Series (partly modified).
IEC 61082-1	NOTE	Harmonised as EN 61082-1.
IEC 61140:2001	NOTE	Harmonised as EN 61140:2002 (not modified).
IEC 61508 Series	NOTE	Harmonised as EN 61508 Series (not modified).
IEC 61558-1	NOTE	Harmonised as EN 61558-1.
IEC 61558-2-16	NOTE	Harmonised as EN 61558-2-16.
IEC 61643-12	NOTE	Harmonised as CLC/TS 61643-12.
IEC 62079:2001	NOTE	Harmonised as EN 62079:2001 (not modified).
IEC 62423:2009	NOTE	Harmonised as EN 62423:2012 (modified).

## Foreword to amendment A11

This document (EN 62477-1:2012/A11:2014) has been prepared by CLC/TC 22X "Power electronics".

The aim behind this Amendment is to link EN 62477-1:2012 to the Low Voltage Directive 2006/95/EC, further to a CLC/TC 22X request, approved by the Technical Board by the decision D146/C017.

In addition, a recent Technical Board decision (D147/C061), confirmed that EN 62477-1:2012 partially supersedes EN 50178:1997.

Add to the Foreword of EN 62477-1:2012:  
"This document partially supersedes EN 50178:1997."

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2015-07-18
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2017-07-18

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

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## Foreword to amendment A1

The text of document 22/270A/FDIS, future IEC 62477-1:2012/A1, prepared by IEC/TC 22 "Power electronic systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62477-1:2012/A1:2017.

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- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2017-08-10
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2020-02-10

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

**Addition:**

IEC 60865 (series)	NOTE	Harmonized as EN 60865 (series).
IEC 60865-1	NOTE	Harmonized as EN 60865-1.
IEC 60909 (series)	NOTE	Harmonized as EN 60909 (series).
IEC 60909-0:2016	NOTE	Harmonized as EN 60909-0:2016.
IEC 60947-1:2007	NOTE	Harmonized as EN 60947-1:2007.
IEC 60947-6-1:2005	NOTE	Harmonized as EN 60947-6-1:2005.
IEC 60947-6-1:2005/AMD1:2013	NOTE	Harmonized as EN 60947-6-1:2005/A1:2014.
IEC 61439-1:2011	NOTE	Harmonized as EN 61439-1:2011.

## Foreword to amendment A12

This document (EN 62477-1:2012/A12:2021) has been prepared by CLC/TC 22X "Power electronics".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-08-05
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2023-11-17

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This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

## CONTENTS

FOREWORD .....	8
INTRODUCTION .....	10
1 Scope .....	11
2 Normative references .....	12
3 Terms and definitions .....	14
4 Protection against hazards .....	24
4.1 General .....	24
4.2 Fault and abnormal conditions .....	25
4.3 Short circuit and overload protection .....	26
4.3.1 General .....	26
4.3.2 Specification of input short-circuit withstand strength and output short circuit current ability .....	27
4.3.3 Short-circuit coordination (backup protection) .....	28
4.3.4 Protection by several devices .....	28
4.3.5 Input <i>ports short time withstand current, <math>I_{CW}</math></i> .....	29
4.4 Protection against electric shock .....	29
4.4.1 General .....	29
4.4.2 <i>Decisive voltage class</i> .....	29
4.4.3 Provision for <i>basic protection</i> .....	34
4.4.4 Provision for <i>fault protection</i> .....	36
4.4.5 <i>Enhanced protection</i> .....	42
4.4.6 Protective measures .....	43
4.4.7 Insulation .....	45
4.4.8 Compatibility with residual current-operated protective devices (RCD) .....	60
4.4.9 Capacitor discharge .....	60
4.5 Protection against electrical energy hazards .....	61
4.5.1 Operator access areas .....	61
4.5.2 Service access areas .....	62
4.6 Protection against fire and thermal hazards .....	62
4.6.1 Circuits representing a fire hazard .....	62
4.6.2 Components representing a fire hazard .....	62
4.6.3 <i>Fire enclosures</i> .....	63
4.6.4 Temperature limits .....	67
4.6.5 Limited power sources .....	70
4.7 Protection against mechanical hazards .....	71
4.7.1 General .....	71
4.7.2 Specific requirements for liquid cooled <i>PECS</i> .....	72
4.8 Equipment with multiple sources of supply .....	73
4.9 Protection against environmental stresses .....	74
4.10 Protection against sonic pressure hazards .....	75
4.10.1 General .....	75
4.10.2 Sonic pressure and sound level .....	75
4.11 Wiring and connections .....	75
4.11.1 General .....	75
4.11.2 Routing .....	75



4.11.3	Colour coding .....	76
4.11.4	Splices and connections .....	76
4.11.5	Accessible connections .....	76
4.11.6	Interconnections between parts of the <i>PECS</i> .....	76
4.11.7	Supply connections .....	77
4.11.8	Terminals .....	77
4.12	<i>Enclosures</i> .....	78
4.12.1	General .....	78
4.12.2	Handles and manual controls .....	79
4.12.3	Cast metal .....	79
4.12.4	Sheet metal .....	79
4.12.5	Stability test for <i>enclosure</i> .....	82
5	Test requirements .....	83
5.1	General .....	83
5.1.1	Test objectives and classification .....	83
5.1.2	Selection of test samples .....	83
5.1.3	Sequence of tests .....	83
5.1.4	Earthing conditions .....	83
5.1.5	General conditions for tests .....	83
5.1.6	Compliance .....	84
5.1.7	Test overview .....	85
5.2	Test specifications .....	86
5.2.1	Visual inspections ( <i>type test</i> , <i>sample test</i> and <i>routine test</i> ) .....	86
5.2.2	Mechanical tests .....	86
5.2.3	Electrical tests .....	90
5.2.4	Abnormal operation and simulated faults tests .....	104
5.2.5	Material tests .....	110
5.2.6	Environmental tests ( <i>type tests</i> ) .....	114
5.2.7	Hydrostatic pressure test ( <i>type test</i> and <i>routine test</i> ) .....	119
6	Information and marking requirements .....	119
6.1	General .....	119
6.2	Information for selection .....	121
6.3	Information for installation and commissioning .....	122
6.3.1	General .....	122
6.3.2	Mechanical considerations .....	122
6.3.3	Environment .....	122
6.3.4	Handling and mounting .....	122
6.3.5	<i>Enclosure</i> temperature .....	122
6.3.6	Connections .....	123
6.3.7	Protection requirements .....	123
6.3.8	Commissioning .....	125
6.4	Information for use .....	125
6.4.1	General .....	125
6.4.2	Adjustment .....	125
6.4.3	Labels, signs and signals .....	125
6.5	Information for maintenance .....	127
6.5.1	General .....	127
6.5.2	Capacitor discharge .....	128

6.5.3	Auto restart/bypass connection .....	128
6.5.4	Other hazards .....	128
6.5.5	Equipment with multiple sources of supply .....	128
Annex A (normative)	Additional information for protection against electric shock .....	129
Annex B (informative)	Considerations for the reduction of the pollution degree .....	149
Annex C (informative)	Symbols referred to in IEC 62477-1 .....	150
Annex D (normative)	Evaluation of clearance and creepage distances .....	151
Annex E (informative)	Altitude correction for clearances .....	159
Annex F (normative)	Clearance and creepage distance determination for frequencies greater than 30 kHz .....	160
Annex G (informative)	Cross-sections of round conductors .....	166
Annex H (informative)	Guidelines for RCD compatibility .....	167
Annex I (informative)	Examples of overvoltage category reduction .....	171
Annex J (informative)	Burn thresholds for touchable surfaces .....	178
Annex K (informative)	Table of electrochemical potentials .....	181
Annex L (informative)	Measuring instrument for <i>touch current</i> measurements .....	182
Annex M (informative)	Test probes for determining access .....	183
Annex N (informative)	Guidance regarding short-circuit current .....	186
Bibliography	.....	199
Figure 1	– Touch time - d.c. peak voltage zones of <i>ventricular fibrillation</i> in dry skin condition .....	32
Figure 2	– Touch time - d.c. peak voltage zones of <i>ventricular fibrillation</i> in water-wet skin condition .....	32
Figure 3	– Touch time - d.c. peak voltage zones of <i>ventricular fibrillation</i> in saltwater-wet skin condition .....	33
Figure 4	– Example of a <i>PECS</i> assembly and its associated <i>protective equipotential bonding</i> .....	38
Figure 5	– Example of a <i>PECS</i> assembly and its associated <i>protective equipotential bonding</i> .....	39
Figure 6	– <i>Fire enclosure</i> bottom openings below an unenclosed or partially enclosed fire-hazardous component .....	65
Figure 7	– <i>Fire enclosure</i> baffle construction .....	66
Figure 8	– Supported and unsupported <i>enclosure</i> parts .....	80
Figure 9	– Impact test using a steel ball .....	88
Figure 10	– Voltage test procedures .....	95
Figure 11	– Protective equipotential bonding impedance test for separate unit with power fed from the <i>PECS</i> with protection for the power cable .....	101
Figure 12	– Protective equipotential bonding impedance test for sub-assembly with accessible parts and with power fed from the <i>PECS</i> .....	102
Figure 13	– Circuit for high-current arcing test .....	111
Figure 14	– Test fixture for hot-wire ignition test .....	112
Figure A.1	– Protection by <i>DVC As</i> with <i>protective separation</i> .....	129
Figure A.2	– Protection by means of <i>protective impedance</i> .....	130
Figure A.3	– Protection by using limited voltages .....	131
Figure A.4	– Touch time- d.c. voltage zones for dry skin condition .....	134

Figure A.5 – Touch time- d.c. voltage zones for water-wet skin condition.....	134
Figure A.6 – Touch time- d.c. voltage for saltwater-wet skin condition .....	135
Figure A.7 – Touch time- d.c. voltage zones of dry skin condition .....	136
Figure A.8 – Touch time- d.c. voltage zones of water-wet skin condition.....	136
Figure A.9 – Touch time- d.c. voltage zones of saltwater-wet skin condition .....	137
Figure A.10 – Touch time- d.c. voltage zones of dry skin condition .....	138
Figure A.11 – Touch time- d.c. voltage zones of water-wet skin condition.....	138
Figure A.12 – Touch time- a.c. voltage zones for dry skin condition.....	139
Figure A.13 – Touch time- a.c. voltage zones of water-wet skin condition.....	140
Figure A.14 – Touch time- a.c. voltage of saltwater-wet skin condition.....	140
Figure A.15 – Touch time- a.c. voltage zones of dry skin condition .....	141
Figure A.16 – Touch time- a.c. voltage zones of water-wet skin condition.....	142
Figure A.17 – Touch time- a.c. voltage zones of saltwater-wet skin condition.....	142
Figure A.18 – Touch time- a.c. voltage zones of dry skin condition .....	143
Figure A.19 – Touch time- a.c. voltage zones of water-wet skin condition.....	144
Figure A.20 – Typical waveform for a.c. <i>working voltage</i> .....	145
Figure A.21 – Typical waveform for d.c. <i>working voltage</i> .....	145
Figure A.22 – Typical waveform for pulsating <i>working voltage</i> .....	146
Figure F.1 – Diagram for dimensioning of clearances .....	161
Figure F.2 – Diagram for dimensioning of creepage distances.....	163
Figure H.1 – Flow chart leading to selection of the RCD type upstream of a <i>PECS</i> .....	167
Figure H.2 – Fault current waveforms in connections with power electronic converter devices.....	169
Figure F.3 – Permissible field strength for dimensioning of solid <i>insulation</i> according to Equation (1).....	165
Figure I.1 – <i>Basic insulation</i> evaluation for circuits connected to the origin of the <i>installation mains supply</i> .....	171
Figure I.2 – <i>Basic insulation</i> evaluation for circuits connected to the <i>mains supply</i> .....	172
Figure I.3 – <i>Basic insulation</i> evaluation for single and three phase equipment not <i>permanently connected</i> to the <i>mains supply</i> .....	172
Figure I.4 – <i>Basic insulation</i> evaluation for circuits connected to the origin of the <i>installation mains supply</i> where internal <i>SPDs</i> are used .....	172
Figure I.5 – <i>Basic insulation</i> evaluation for circuits connected to the <i>mains supply</i> where internal <i>SPDs</i> are used.....	173
Figure I.6 – Example of <i>protective separation</i> evaluation for circuits connected to the <i>mains supply</i> where internal <i>SPDs</i> are used.....	173
Figure I.7 – Example of <i>protective separation</i> evaluation for circuits connected to the <i>mains supply</i> where internal <i>SPDs</i> are used.....	174
Figure I.8 – Example of <i>protective separation</i> evaluation for circuits connected to the <i>mains supply</i> where internal <i>SPDs</i> are used.....	174
Figure I.9 – <i>Basic insulation</i> evaluation for circuits not connected directly to the <i>mains supply</i> .....	174
Figure I.10 – <i>Basic insulation</i> evaluation for circuits not connected directly to the supply mains .....	175
Figure I.11 – Functional <i>insulation</i> evaluation within circuits affected by external transients .....	175

Figure I.12 – <i>Basic insulation</i> evaluation for circuits both connected and not connected directly to the <i>mains supply</i> .....	176
Figure I.13 – <i>Insulation</i> evaluation for accessible circuit of <i>DVC A</i> .....	176
Figure I.14 – <i>PEC</i> with <i>mains</i> and <i>non-mains supply</i> without galvanic separation .....	177
Figure I.15 – Transformer (basic) isolated <i>PEC</i> inverter with <i>SPD</i> and transformer to reduce impulse voltage for functional and <i>basic insulation</i> .....	177
Figure J.1 – Burn threshold spread when the skin is in contact with a hot smooth surface made of bare (uncoated) metal .....	178
Figure J.2 – Rise in the burn threshold spread from Figure J.1 for metals which are coated by shellac varnish of a thickness of 50 µm, 100 µm and 150 µm.....	179
Figure J.3 – Rise in the burn threshold spread from Figure J.1 for metals coated with the specific materials .....	179
Figure J.4 – Burn threshold spread when the skin is in contact with a hot smooth surface made of ceramics, glass and stone materials .....	180
Figure J.5 – Burn threshold spread when the skin is in contact with a hot smooth surface made of plastics .....	180
Figure K.1 – Electrochemical potentials (V).....	181
Figure L.1 – Measuring instrument.....	182
Figure M.1 – Sphere 50 mm probe (IPXXA).....	183
Figure M.2 – Jointed test finger (IPXXB) .....	184
Figure M.3 – Test rod 2,5 mm (IP3X) .....	185
Figure N.1 – Example of short-circuit current curve under specification of $I_{CC}$ .....	188
Figure N.2 – Example of tripping characteristic of a circuit breaker.....	189
Figure N.3 – Example of tripping characteristic of a current-limiting fuse .....	189
Figure N.4 – Example of short-circuit current curve under specification of $I_{CW}$ .....	190
Figure N.5 – Two <i>PECS</i> with different specifications .....	191
Figure N.6 – One <i>PECS</i> with different specification for each input <i>mains supply port</i> .....	193
Figure N.7 – Flowchart for classification of $I_{CC}$ or $I_{CW}$ .....	196
Table 1 – Alphabetical list of terms .....	15
Table 2 – Selection of <i>DVC</i> for touch voltage to protect against <i>ventricular fibrillation</i> .....	30
Table 3 – Selection of body contact area.....	30
Table 4 – Selection of humidity condition of the skin .....	31
Table 5 – Steady state voltage limits for the <i>decisive voltage classes</i> .....	31
Table 6 – Protection requirements for circuit under consideration .....	34
Table 7 – <i>PE conductor</i> cross-section <sup>a</sup> .....	40
Table 8 – Definitions of pollution degrees.....	46
Table 9 – Impulse withstand voltage and <i>temporary overvoltage</i> versus system voltage.....	48
Table 10 – Clearance distances for <i>functional, basic or supplementary insulation</i> .....	53
Table 11 – Creepage distances (in millimetres).....	55
Table 12 – Generic materials for the direct support of uninsulated <i>live parts</i> .....	57
Table 13 – Permitted openings in <i>fire enclosure</i> bottoms.....	66
Table 14 – Maximum measured total temperatures for internal materials and components.....	68
Table 15 – Maximum measured temperatures for accessible parts of the <i>PECS</i> .....	70

IEC 62477-1:2012+A1:2016  
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Table 16 – Limits for sources without an overcurrent protective device .....	71
Table 17 – Limits for power sources with an overcurrent protective device .....	71
Table 18 – Environmental service conditions.....	74
Table 19 – Wire bending space from terminals to <i>enclosure</i> .....	78
Table 20 – Thickness of sheet metal for <i>enclosures</i> : carbon steel or stainless steel.....	81
Table 21 – Thickness of sheet metal for <i>enclosures</i> : aluminium, copper or brass .....	82
Table 22 – Test overview .....	85
Table 23 – Pull values for handles and manual control securement .....	90
Table 24 – Impulse voltage test .....	91
Table 25 – Impulse test voltage .....	92
Table 26 – AC or d.c. test voltage for circuits connected directly to <i>mains supply</i> .....	93
Table 27 – A.c. or d.c. test voltage for circuits connected to <i>non-mains supply</i> without <i>temporary overvoltages</i> .....	94
Table 28 – Partial discharge test.....	97
Table 29 – Test duration for <i>protective equipotential bonding</i> test .....	103
Table 30 – Environmental tests.....	115
Table 31 – Dry heat test (steady state) .....	116
Table 32 – Damp heat test (steady state).....	117
Table 33 – Vibration test.....	118
Table 34 – Salt mist test .....	118
Table 35 – Dust and sand test .....	119
Table 36 – Information requirements.....	120
Table 37 – A.c. <i>short time withstand current</i> test, minimum PECS requirements .....	110
Table A.1 – Selection of touch voltage sets to protect against <i>ventricular fibrillation</i> .....	132
Table A.2 – Selection of touch voltage sets to protect against <i>muscular reaction</i> .....	133
Table A.3 – Selection of touch voltage sets to protect against <i>startle reaction</i> .....	133
Table A.4 – Examples for protection against electrical shock.....	148
Table C.1 – Symbols used .....	150
Table D.1 – Width of grooves by pollution degree.....	151
Table E.1 – Correction factor for clearances at altitudes between 2 000 m and 20 000 m .....	159
Table E.2 – Test voltages for verifying clearances at different altitudes .....	159
Table F.1 – Minimum values of clearances in air at atmospheric pressure for inhomogeneous field conditions (Table 1 of IEC 60664-4:2005).....	162
Table F.2 – Multiplication factors for clearances in air at atmospheric pressure for approximately homogeneous field conditions .....	162
Table F.3 – Minimum values of creepage distances for different frequency ranges (Table 2 of IEC 60664-4:2005).....	164
Table G.1 – Standard cross-sections of round conductors .....	166

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY REQUIREMENTS FOR POWER ELECTRONIC  
CONVERTER SYSTEMS AND EQUIPMENT –****Part 1: General**

## FOREWORD

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International Standard IEC 62477-1 has been prepared by IEC technical committee 22: Power electronic systems and equipment.

It has the status of a group safety publication in accordance with IEC Guide 104.

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

FDIS	Report on voting
22/200/FDIS	22/204/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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A list of all the parts in the IEC 62477 series, published under the general title *Safety requirements for power electronic convertor systems and equipment* can be found on the IEC website.

In this standard, terms in *italic* are defined in Clause 3.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

**IMPORTANT – The “colour inside” logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.**

## INTRODUCTION

This International Standard relates to products that include power electronic converters, with a rated system voltage not exceeding 1 000 V a.c. or 1 500 V d.c. It specifies requirements to reduce risks of fire, electric shock, thermal, energy and mechanical hazards, except functional safety as defined in IEC 61508. The objectives of this document are to establish a common terminology and basis for the safety requirements of products that contain power electronic converters across several IEC technical committees.

This standard has been developed with the intention:

- to be used as a reference document for product committees inside TC 22 in the development of product standards for power electronic converter systems and equipment;
- to replace IEC 62103 as a product family standard providing minimum requirements for safety aspects of power electronic converter systems and equipment in apparatus for which no product standard exists; and

NOTE The scope of IEC 62103 contains reliability aspects, which are not covered by this standard.

- to be used as a reference document for product committees outside TC 22 in the development of product standards of power electronic converter systems and equipment intended renewable energy sources. TC 82, TC 88, TC 105 and TC 114, in particular, have been identified as relevant technical committees at the time of publication.

Technical committees using this document should carefully consider the relevance of each paragraph in this document for the product under consideration and reference, add, replace or modify requirement as relevant. Product specific topics not covered by this document are in the responsibility of the technical committees using this document as reference document.

This group safety standard will not take precedence on any product specific standard according to IEC Guide 104. IEC Guide 104 provides information about the responsibility of product committees to use group safety standards for the development of their own product standards.



# SAFETY REQUIREMENTS FOR POWER ELECTRONIC CONVERTER SYSTEMS AND EQUIPMENT –

## Part 1: General

### 1 Scope

This part of IEC 62477 applies to Power Electronic Converter Systems (PECS) and equipment, their components for *electronic power conversion* and electronic power switching, including the means for their control, protection, monitoring and measurement, such as with the main purpose of converting electric power, with rated system voltages not exceeding 1 000 V a.c. or 1 500 V d.c.

This document may also be used as a reference standard for product committees producing product standards for:

- adjustable speed electric power drive systems (PDS);
- standalone uninterruptible power systems (UPS);
- low voltage stabilized d.c. power supplies.

For PECS for which no product standard exists, this standard provides minimum requirements for safety aspects.

This part of IEC 62477 has the status of a group safety publication in accordance with IEC Guide 104 for power electronic converter systems and equipment for solar, wind, tidal, wave, fuel cell or similar energy sources.

According to IEC Guide 104, one of the responsibilities of technical committees is, wherever applicable, to make use of basic safety publications and/or group safety publications in the preparation of their product standards.

This International Standard:

- establishes a common terminology for safety aspects relating to PECS and equipment;
- establishes minimum requirements for the coordination of safety aspects of interrelated parts within a PECS;
- establishes a common basis for minimum safety requirements for the PEC portion of products that contain PEC;
- specifies requirements to reduce risks of fire, electric shock, thermal, energy and mechanical hazards, during use and operation and, where specifically stated, during service and maintenance;
- specifies minimum requirements to reduce risks with respect to pluggable and permanently connected equipment, whether it consists of a system of interconnected units or independent units, subject to installing, operating and maintaining the equipment in the manner prescribed by the manufacturer.

This International Standard does not cover:

- telecommunications apparatus other than power supplies to such apparatus;
- functional safety aspects as covered by e.g. IEC 61508;