

CONSOLIDATED VERSION

VERSION CONSOLIDÉE



**Adjustable speed electrical power drive systems –
Part 5-1: Safety requirements – Electrical, thermal and energy**

**Entraînements électriques de puissance à vitesse variable –
Partie 5-1: Exigences de sécurité – Electrique, thermique et énergétique**



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CONTENTS

FOREWORD	5
1 Scope	7
2 Normative references	7
3 Terms and definitions	10
4 Protection against electric shock, thermal, and energy hazards.....	17
4.1 General.....	17
4.2 Fault conditions.....	18
4.3 Protection against electric shock	19
4.4 Protection against thermal hazards.....	53
4.5 Protection against energy hazards.....	58
4.6 Protection against environmental stresses	59
5 Test requirements	59
5.1 General.....	59
5.2 Test specifications.....	62
6 Information and marking requirements	88
6.1 General.....	88
6.2 Information for selection	90
6.3 Information for installation and commissioning	90
6.4 Information for use	94
6.5 Information for maintenance	96
Annex A (informative) Examples of protection in case of direct contact.....	98
Annex B (informative) Examples of overvoltage category reduction	100
Annex C (normative) Measurement of clearance and creepage distances.....	106
Annex D (informative) Altitude correction for clearances.....	112
Annex E (informative) Clearance and creepage distance determination for frequencies greater than 30 kHz	114
Annex F (informative) Cross-sections of round conductors	117
Annex G (informative) Guidelines for RCD compatibility	118
Annex H (informative) Symbols referred to in this part of IEC 61800.....	121
Bibliography	122
Figure 1 – <i>PDS</i> hardware configuration within an <i>installation</i>	17
Figure 2 – Typical waveform for a.c. <i>working voltage</i>	20
Figure 3 – Typical waveform for d.c. <i>working voltage</i>	21
Figure 4 – Typical waveform for pulsating <i>working voltage</i>	21
Figure 5 – Examples for protection against direct contact.....	23
Figure 6 – Example of <i>protective bonding</i>	27
Figure 7 – Voltage limits under fault conditions	29
Figure 8 – Voltage test procedures	70
Figure 9 – Circuit for high-current arcing test	80
Figure 10 – Test fixture for hot-wire ignition test.....	81
Figure 11 – Example of short-circuit test between <i>CDM/BDM</i> motor power output and protective earth (motor separately earthed).....	75

Figure 12 – Example of short-circuit test between CDM/BDM motor power output and protective earth (motor earthed through CDM/BDM)	75
Figure 13 – Example of short-circuit test between CDM/BDM d.c. link power output and protective earth	76
Figure A.1 – Protection by DVC A, with protective separation	98
Figure A.2 – Protection by means of protective impedance	99
Figure A.3 – Protection by using limited voltages	99
Figure B.1 – Basic insulation evaluation for circuits connected directly to the origin of the installation supply mains	100
Figure B.2 – Basic insulation evaluation for circuits connected directly to the supply mains	101
Figure B.3 – Basic insulation evaluation for equipment not permanently connected to the supply mains	101
Figure B.4 – Basic insulation evaluation for circuits connected directly to the origin of the installation supply mains where internal SPDs are used	101
Figure B.5 - Basic insulation evaluation for circuits connected directly to the supply mains where internal SPDs are used.....	102
Figure B.6 – Example of protective separation evaluation for circuits connected directly to the supply mains where internal SPDs are used	102
Figure B.7 – Example of protective separation evaluation for circuits connected directly to the supply mains where internal SPDs are used	102
Figure B.8 Example of protective separation evaluation for circuits connected directly to the supply mains where internal SPDs are used	103
Figure B.9 – Basic insulation evaluation for circuits not connected directly to the supply mains	103
Figure B.10 – Basic insulation evaluation for circuits not connected directly to the supply mains	103
Figure B.11 – Functional insulation evaluation within circuits affected by external transients	104
Figure B.12 – Basic insulation evaluation for circuits both connected and not connected directly to the supply mains.....	104
Figure B.13 – Insulation evaluation for accessible circuit of DVC A.....	105
Figure E.1 – Determination of clearance for frequencies greater than 30 kHz	114
Figure E.2 – Determination of creepage for frequencies greater than 30 kHz	115
Figure G.1 – Flow chart leading to selection of the RCD/RCM type upstream of a PDS.....	118
Figure G.2 – Fault current waveforms in connections with semiconductor devices	119
Table 1 – Alphabetical list of terms	10
Table 2 – Relevance of requirements to PDS/CDM/BDM	18
Table 3 – Summary of the limits of the decisive voltage classes	19
Table 4 – Protection requirements for considered circuit	20
Table 5 – Protective earthing conductor cross-section.....	29
Table 6 – Definitions of pollution degrees.....	32
Table 7 – Insulation voltage for low voltage circuits	34
Table 8 – Insulation voltage for high voltage circuits	34
Table 9 – Clearance distances	38
Table 10 – Creepage distances (mm).....	40

Table 11 – Thickness of sheet metal for enclosures: carbon steel or stainless steel.....	46
Table 12 – Thickness of sheet metal for enclosures: aluminium, copper or brass.....	47
Table 13 – Wire bending space from terminals to enclosure	50
Table 14 – Generic materials for the direct support of uninsulated <i>live parts</i>	54
Table 15 – Maximum measured temperatures for internal materials and components.....	55
Table 16 – Maximum measured temperatures for external parts of the <i>CDM</i>	56
Table 17 – Test overview.....	61
Table 18 – Impulse voltage test	65
Table 19 – Impulse test voltage for <i>low-voltage PDS</i>	66
Table 20 – Impulse test voltage for <i>high-voltage PDS</i>	66
Table 21 – A.C. or d.c. test voltage for circuits connected directly to low voltage mains	67
Table 22 – A.C. or d.c. test voltage for circuits connected directly to high voltage mains	68
Table 23 – A.C. or d.c. test voltage for circuits not connected directly to the mains.....	69
Table 24 – Partial discharge test.....	72
Table 25 – Dry heat test (steady state)	83
Table 26 – Damp heat test (steady state).....	84
Table 27 – Vibration test.....	84
Table 28 – Information requirements.....	89
Table 29 – Maximum tripping time for <i>electronic motor overload protection test</i>	86
Table C.1 – Width of grooves by pollution degree.....	106
Table D.1 – Correction factor for clearances at altitudes between 2 000 m and 20 000 m (see 4.3.6.4.1).....	112
Table D.2 – Test voltages for verifying clearances at different altitudes	113
Table E.1 – Minimum values of clearances in air at atmospheric pressure for inhomogeneous field conditions (Table 1 of IEC 60664-4)	115
Table E.2 – Minimum values of creepage distances for different frequency ranges (Table 2 of IEC 60664-4)	116
Table F.1 – Standard cross-sections of round conductors.....	117
Table H.1 – Symbols used	121

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ADJUSTABLE SPEED ELECTRICAL POWER DRIVE SYSTEMS –

**Part 5-1: Safety requirements –
Electrical, thermal and energy**

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This Consolidated version of IEC 61800-5-1 bears the edition number 2.1. It consists of the second edition (2007-07) [documents 22G/178/FDIS and 22G/181/RVD] and its amendment 1 (2016-08) [documents 22G/338/FDIS and 22G/342/RVD]. The technical content is identical to the base edition and its amendment.

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 61800-5-1 has been prepared by subcommittee 22G: Semiconductor power converters for adjustable speed electric drive systems, of IEC technical committee 22: Power electronic systems and equipment.

This second edition constitutes a technical revision.

The major areas of change in this edition are the following:

- a) addition of alphabetical Table 1 in Clause 3;
- b) addition of Table 2 in 4.1 for relevance to PDS/CDM/BDM;
- c) addition of Table 4 summary of decisive voltage class requirements;
- d) expansion of subclause on protective bonding (4.3.5.3);
- e) clarification of distinction between touch current and protective conductor current;
- f) revision of section on insulation (now 4.3.6) to include solid insulation;
- g) addition of overvoltage categories I and II to HV insulation voltage;
- h) revision of section on Solid insulation (now 4.3.6.8)
- i) addition of high-frequency insulation requirements (4.3.6.9, Annex E);
- j) addition of requirements for liquid-cooled PDS (4.4.5);
- k) addition of climatic and vibration tests (5.2.6);
- l) clarification of voltage test procedure to avoid over-stress of basic insulation (5.2.3.2.3);
- m) revision of short-circuit test requirement for large, high-voltage and one-off PDS (now 5.2.3.6);
- n) addition of informative Annex B for overvoltage category reduction.

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

A list of all parts of the IEC 61800 series, published under the general title *Adjustable speed electrical power drive systems*, can be found on the IEC website.

Terms in *italics* in the text are defined in Clause 3.

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ADJUSTABLE SPEED ELECTRICAL POWER DRIVE SYSTEMS –

Part 5-1: Safety requirements – Electrical, thermal and energy

1 Scope

This part of IEC 61800 specifies requirements for adjustable speed *power drive systems*, or their elements, with respect to electrical, thermal and energy safety considerations. It does not cover the driven equipment except for interface requirements. It applies to adjustable speed electric drive systems which include the power conversion, drive control, and motor or motors. Excluded are traction and electric vehicle drives. It applies to d.c. drive systems connected to line voltages up to 1 kV a.c., 50 Hz or 60 Hz and a.c. drive systems with converter input voltages up to 35 kV, 50 Hz or 60 Hz and output voltages up to 35 kV.

Other parts of IEC 61800 cover rating specifications, EMC, functional safety, etc.

The scope of this part of IEC 61800 does not include devices used as component parts of a *PDS* if they comply with the safety requirements of a relevant product standard for the same environment. For example, motors used in *PDS* shall comply with the relevant parts of IEC 60034.

Unless specifically stated, the requirements of this International Standard apply to all parts of the *PDS*, including the *CDM/BDM* (see Figure 1).

NOTE In some cases, safety requirements of the *PDS* (for example, protection against direct contact) can necessitate the use of special components and/or additional measures.

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.

NOTE This does not mean that compliance is required with all clauses of the referenced documents, but rather that this international standard makes a reference that cannot be understood in the absence of the referenced document.

IEC 60034 (all parts), *Rotating electrical machines*

IEC 60034-1, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-5, *Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) - Classification*

IEC 60050-111, *International Electrotechnical Vocabulary (IEV) – Chapter 111: Physics and chemistry*