

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Safety of machinery – Electrical equipment of machines –  
Part 1: General requirements**

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**Sécurité des machines – Équipement électrique des machines –  
Partie 1: Exigences générales**

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INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 13.110; 29.020

ISBN 978-2-8322-3621-5

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## CONTENTS

FOREWORD.....	10
INTRODUCTION.....	13
1 Scope.....	15
2 Normative references.....	16
3 Terms, definitions and abbreviated terms .....	17
3.1 Terms and definitions .....	17
3.2 Abbreviated terms .....	26
4 General requirements .....	26
4.1 General.....	26
4.2 Selection of equipment.....	27
4.2.1 General .....	27
4.2.2 Switchgear.....	27
4.3 Electrical supply.....	28
4.3.1 General .....	28
4.3.2 AC supplies .....	28
4.3.3 DC supplies .....	28
4.3.4 Special supply systems .....	28
4.4 Physical environment and operating conditions.....	28
4.4.1 General .....	28
4.4.2 Electromagnetic compatibility (EMC) .....	29
4.4.3 Ambient air temperature .....	29
4.4.4 Humidity.....	29
4.4.5 Altitude .....	29
4.4.6 Contaminants.....	29
4.4.7 Ionizing and non-ionizing radiation .....	30
4.4.8 Vibration, shock, and bump .....	30
4.5 Transportation and storage.....	30
4.6 Provisions for handling.....	30
5 Incoming supply conductor terminations and devices for disconnecting and switching off .....	30
5.1 Incoming supply conductor terminations .....	30
5.2 Terminal for connection of the external protective conductor .....	31
5.3 Supply disconnecting (isolating) device.....	31
5.3.1 General .....	31
5.3.2 Type .....	31
5.3.3 Requirements .....	32
5.3.4 Operating means of the supply disconnecting device .....	32
5.3.5 Excepted circuits.....	33
5.4 Devices for removal of power for prevention of unexpected start-up .....	34
5.5 Devices for isolating electrical equipment .....	34
5.6 Protection against unauthorized, inadvertent and/or mistaken connection.....	35
6 Protection against electric shock.....	35
6.1 General.....	35
6.2 Basic protection .....	35
6.2.1 General .....	35
6.2.2 Protection by enclosures .....	36

6.2.3	Protection by insulation of live parts .....	37
6.2.4	Protection against residual voltages .....	37
6.2.5	Protection by barriers .....	37
6.2.6	Protection by placing out of reach or protection by obstacles .....	37
6.3	Fault protection .....	37
6.3.1	General .....	37
6.3.2	Prevention of the occurrence of a touch voltage .....	38
6.3.3	Protection by automatic disconnection of supply .....	38
6.4	Protection by the use of PELV .....	39
6.4.1	General requirements .....	39
6.4.2	Sources for PELV .....	40
7	Protection of equipment .....	40
7.1	General .....	40
7.2	Overcurrent protection .....	40
7.2.1	General .....	40
7.2.2	Supply conductors .....	40
7.2.3	Power circuits .....	41
7.2.4	Control circuits .....	41
7.2.5	Socket outlets and their associated conductors .....	41
7.2.6	Lighting circuits .....	41
7.2.7	Transformers .....	42
7.2.8	Location of overcurrent protective devices .....	42
7.2.9	Overcurrent protective devices .....	42
7.2.10	Rating and setting of overcurrent protective devices .....	42
7.3	Protection of motors against overheating .....	42
7.3.1	General .....	42
7.3.2	Overload protection .....	43
7.3.3	Over-temperature protection .....	43
7.4	Protection against abnormal temperature .....	43
7.5	Protection against the effects of supply interruption or voltage reduction and subsequent restoration .....	44
7.6	Motor overspeed protection .....	44
7.7	Additional earth fault/residual current protection .....	44
7.8	Phase sequence protection .....	44
7.9	Protection against overvoltages due to lightning and to switching surges .....	44
7.10	Short-circuit current rating .....	45
8	Equipotential bonding .....	45
8.1	General .....	45
8.2	Protective bonding circuit .....	47
8.2.1	General .....	47
8.2.2	Protective conductors .....	47
8.2.3	Continuity of the protective bonding circuit .....	48
8.2.4	Protective conductor connecting points .....	49
8.2.5	Mobile machines .....	49
8.2.6	Additional requirements for electrical equipment having earth leakage currents higher than 10 mA .....	49
8.3	Measures to restrict the effects of high leakage current .....	50
8.4	Functional bonding .....	50
9	Control circuits and control functions .....	50

9.1	Control circuits	50
9.1.1	Control circuit supply	50
9.1.2	Control circuit voltages	51
9.1.3	Protection	51
9.2	Control functions	51
9.2.1	General	51
9.2.2	Categories of stop functions	51
9.2.3	Operation	51
9.2.4	Cableless control system (CCS)	55
9.3	Protective interlocks	57
9.3.1	Reclosing or resetting of an interlocking safeguard	57
9.3.2	Exceeding operating limits	57
9.3.3	Operation of auxiliary functions	57
9.3.4	Interlocks between different operations and for contrary motions	57
9.3.5	Reverse current braking	57
9.3.6	Suspension of safety functions and/or protective measures	58
9.4	Control functions in the event of failure	58
9.4.1	General requirements	58
9.4.2	Measures to minimize risk in the event of failure	59
9.4.3	Protection against malfunction of control circuits	60
10	Operator interface and machine-mounted control devices	66
10.1	General	66
10.1.1	General requirements	66
10.1.2	Location and mounting	66
10.1.3	Protection	66
10.1.4	Position sensors	66
10.1.5	Portable and pendant control stations	67
10.2	Actuators	67
10.2.1	Colours	67
10.2.2	Markings	67
10.3	Indicator lights and displays	68
10.3.1	General	68
10.3.2	Colours	68
10.3.3	Flashing lights and displays	69
10.4	Illuminated push-buttons	69
10.5	Rotary control devices	69
10.6	Start devices	69
10.7	Emergency stop devices	70
10.7.1	Location of emergency stop devices	70
10.7.2	Types of emergency stop device	70
10.7.3	Operation of the supply disconnecting device to effect emergency stop	70
10.8	Emergency switching off devices	70
10.8.1	Location of emergency switching off devices	70
10.8.2	Types of emergency switching off device	70
10.8.3	Local operation of the supply disconnecting device to effect emergency switching off	71
10.9	Enabling control device	71
11	Controlgear: location, mounting, and enclosures	71
11.1	General requirements	71

11.2	Location and mounting .....	71
11.2.1	Accessibility and maintenance .....	71
11.2.2	Physical separation or grouping .....	72
11.2.3	Heating effects .....	72
11.3	Degrees of protection .....	73
11.4	Enclosures, doors and openings .....	73
11.5	Access to electrical equipment .....	74
12	Conductors and cables .....	74
12.1	General requirements .....	74
12.2	Conductors .....	74
12.3	Insulation .....	75
12.4	Current-carrying capacity in normal service .....	75
12.5	Conductor and cable voltage drop .....	76
12.6	Flexible cables .....	77
12.6.1	General .....	77
12.6.2	Mechanical rating .....	77
12.6.3	Current-carrying capacity of cables wound on drums .....	77
12.7	Conductor wires, conductor bars and slip-ring assemblies .....	78
12.7.1	Basic protection .....	78
12.7.2	Protective conductors .....	78
12.7.3	Protective conductor current collectors .....	78
12.7.4	Removable current collectors with a disconnecter function .....	79
12.7.5	Clearances in air .....	79
12.7.6	Creepage distances .....	79
12.7.7	Conductor system sectioning .....	79
12.7.8	Construction and installation of conductor wire, conductor bar systems and slip-ring assemblies .....	79
13	Wiring practices .....	80
13.1	Connections and routing .....	80
13.1.1	General requirements .....	80
13.1.2	Conductor and cable runs .....	80
13.1.3	Conductors of different circuits .....	81
13.1.4	AC circuits – Electromagnetic effects (prevention of eddy currents) .....	81
13.1.5	Connection between pick-up and pick-up converter of an inductive power supply system .....	81
13.2	Identification of conductors .....	81
13.2.1	General requirements .....	81
13.2.2	Identification of the protective conductor / protective bonding conductor .....	82
13.2.3	Identification of the neutral conductor .....	82
13.2.4	Identification by colour .....	83
13.3	Wiring inside enclosures .....	83
13.4	Wiring outside enclosures .....	84
13.4.1	General requirements .....	84
13.4.2	External ducts .....	84
13.4.3	Connection to moving elements of the machine .....	84
13.4.4	Interconnection of devices on the machine .....	85
13.4.5	Plug/socket combinations .....	85
13.4.6	Dismantling for shipment .....	86
13.4.7	Additional conductors .....	86



13.5	Ducts, connection boxes and other boxes .....	86
13.5.1	General requirements.....	86
13.5.2	Rigid metal conduit and fittings.....	87
13.5.3	Flexible metal conduit and fittings.....	87
13.5.4	Flexible non-metallic conduit and fittings .....	87
13.5.5	Cable trunking systems .....	87
13.5.6	Machine compartments and cable trunking systems .....	88
13.5.7	Connection boxes and other boxes .....	88
13.5.8	Motor connection boxes .....	88
14	Electric motors and associated equipment.....	88
14.1	General requirements.....	88
14.2	Motor enclosures .....	88
14.3	Motor dimensions.....	89
14.4	Motor mounting and compartments .....	89
14.5	Criteria for motor selection .....	89
14.6	Protective devices for mechanical brakes .....	89
15	Socket-outlets and lighting.....	90
15.1	Socket-outlets for accessories .....	90
15.2	Local lighting of the machine and of the equipment .....	90
15.2.1	General.....	90
15.2.2	Supply.....	90
15.2.3	Protection .....	91
15.2.4	Fittings .....	91
16	Marking, warning signs and reference designations .....	91
16.1	General.....	91
16.2	Warning signs .....	91
16.2.1	Electric shock hazard .....	91
16.2.2	Hot surfaces hazard .....	92
16.3	Functional identification.....	92
16.4	Marking of enclosures of electrical equipment.....	92
16.5	Reference designations .....	92
17	Technical documentation .....	92
17.1	General.....	92
17.2	Information related to the electrical equipment.....	93
18	Verification .....	94
18.1	General.....	94
18.2	Verification of conditions for protection by automatic disconnection of supply .....	94
18.2.1	General .....	94
18.2.2	Test 1 – Verification of the continuity of the protective bonding circuit .....	95
18.2.3	Test 2 – Fault loop impedance verification and suitability of the associated overcurrent protective device .....	95
18.2.4	Application of the test methods for TN-systems.....	95
18.3	Insulation resistance tests .....	97
18.4	Voltage tests .....	98
18.5	Protection against residual voltages .....	98
18.6	Functional tests.....	98
18.7	Retesting .....	98
Annex A	(normative) Fault protection by automatic disconnection of supply.....	99

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A.1	Fault protection for machines supplied from TN-systems .....	99
A.1.1	General .....	99
A.1.2	Conditions for protection by automatic disconnection of the supply by overcurrent protective devices.....	99
A.1.3	Condition for protection by reducing the touch voltage below 50 V .....	100
A.1.4	Verification of conditions for protection by automatic disconnection of the supply .....	101
A.2	Fault protection for machines supplied from TT-systems .....	103
A.2.1	Connection to earth.....	103
A.2.2	Fault protection for TT systems .....	103
A.2.3	Verification of protection by automatic disconnection of supply using a residual current protective device .....	104
A.2.4	Measurement of the fault loop impedance ( $Z_S$ ).....	105
Annex B (informative)	Enquiry form for the electrical equipment of machines .....	107
Annex C (informative)	Examples of machines covered by this part of IEC 60204 .....	111
Annex D (informative)	Current-carrying capacity and overcurrent protection of conductors and cables in the electrical equipment of machines .....	113
D.1	General.....	113
D.2	General operating conditions .....	113
D.2.1	Ambient air temperature .....	113
D.2.2	Methods of installation .....	113
D.2.3	Grouping.....	115
D.2.4	Classification of conductors.....	116
D.3	Co-ordination between conductors and protective devices providing overload protection.....	116
D.4	Overcurrent protection of conductors.....	117
D.5	Effect of harmonic currents on balanced three-phase systems.....	118
Annex E (informative)	Explanation of emergency operation functions .....	119
Annex F (informative)	Guide for the use of this part of IEC 60204 .....	120
Annex G (informative)	Comparison of typical conductor cross-sectional areas .....	122
Annex H (informative)	Measures to reduce the effects of electromagnetic influences .....	124
H.1	Definitions.....	124
H.1.1	apparatus .....	124
H.1.2	fixed installation .....	124
H.2	General.....	124
H.3	Mitigation of electromagnetic interference (EMI).....	124
H.3.1	General .....	124
H.3.2	Measures to reduce EMI .....	125
H.4	Separation and segregation of cables .....	125
H.5	Power supply of a machine by parallel sources .....	129
H.6	Supply impedance where a Power Drive System (PDS) is used .....	129
Annex I (informative)	Documentation / Information .....	130
Bibliography	.....	132
Figure 1	– Block diagram of a typical machine .....	14
Figure 2	– Disconnecter isolator .....	33
Figure 3	– Disconnecting circuit breaker .....	33
Figure 4	– Example of equipotential bonding for electrical equipment of a machine .....	46

Figure 5 – Symbol IEC 60417-5019: Protective earth .....	49
Figure 6 – Symbol IEC 60417-5020: Frame or chassis .....	50
Figure 7 – Method a) Earthed control circuit fed by a transformer .....	60
Figure 8 – Method b1) Non-earthed control circuit fed by transformer .....	61
Figure 9 – Method b2) Non-earthed control circuit fed by transformer .....	62
Figure 10 – Method b3) Non-earthed control circuit fed by transformer .....	62
Figure 11 – Method c) Control circuits fed by transformer with an earthed centre-tap winding .....	63
Figure 12 – Method d1a) Control circuit without transformer connected between a phase and the neutral of an earthed supply system .....	64
Figure 13 – Method d1b) Control circuit without transformer connected between two phases of an earthed supply system .....	64
Figure 14 – Method d2a) Control circuit without transformer connected between phase and neutral of a non-earthed supply system .....	65
Figure 15 – Method d2b) control circuit without transformer connected between two phases of a non-earthed supply system .....	65
Figure 16 – Symbol IEC 60417-5019 .....	82
Figure 17 – Symbol IEC 60417-5021 .....	82
Figure 18 – Symbol ISO 7010-W012 .....	91
Figure 19 – Symbol ISO 7010-W017 .....	92
Figure A.1 – Typical arrangement for fault loop impedance ( $Z_S$ ) measurement in TN systems .....	102
Figure A.2 – Typical arrangement for fault loop impedance ( $Z_S$ ) measurement for power drive system circuits in TN systems .....	102
Figure A.3 – Typical arrangement for fault loop impedance ( $Z_S$ ) measurement in TT systems .....	105
Figure A.4 – Typical arrangement for fault loop impedance ( $Z_S$ ) measurement for power drive system circuits in TT systems .....	106
Figure D.1 – Methods of conductor and cable installation independent of number of conductors/cables .....	114
Figure D.2 – Parameters of conductors and protective devices .....	116
Figure H.1 – By-pass conductor for screen reinforcement .....	125
Figure H.2 – Examples of vertical separation and segregation .....	127
Figure H.3 – Examples of horizontal separation and segregation .....	127
Figure H.4 – Cable arrangements in metal cable trays .....	128
Figure H.5 – Connections between metal cable trays or cable trunking systems .....	128
Figure H.6 – Interruption of metal cable trays at fire barriers .....	129
Table 1 – Minimum cross-sectional area of copper protective conductors .....	31
Table 2 – Symbols for actuators (Power) .....	68
Table 3 – Symbols for actuators (Machine operation) .....	68
Table 4 – Colours for indicator lights and their meanings with respect to the condition of the machine .....	69
Table 5 – Minimum cross-sectional areas of copper conductors .....	75

Table 6 – Examples of current-carrying capacity ( $I_Z$ ) of PVC insulated copper conductors or cables under steady-state conditions in an ambient air temperature of +40 °C for different methods of installation .....	76
Table 7 – Derating factors for cables wound on drums .....	78
Table 8 – Minimum permitted bending radii for the forced guiding of flexible cables.....	85
Table 9 – Application of the test methods for TN-systems .....	96
Table 10 – Examples of maximum cable lengths from protective devices to their loads for TN-systems .....	97
Table A.1 – Maximum disconnecting times for TN systems .....	99
Table A.2 – Maximum disconnecting time for TT-systems .....	104
Table D.1 – Correction factors.....	113
Table D.2 – Derating factors for $I_Z$ for grouping .....	115
Table D.3 – Derating factors for $I_Z$ for multicore cables up to 10 mm <sup>2</sup> .....	115
Table D.4 – Classification of conductors .....	116
Table D.5 – Maximum allowable conductor temperatures under normal and short-circuit conditions.....	117
Table F.1 – Application options .....	121
Table G.1 – Comparison of conductor sizes.....	122
Table H.1 – Minimum separation distances using metallic containment as illustrated in Figure H.2 .....	126
Table I.1 – Documentation / Information that can be applicable.....	130

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY OF MACHINERY –  
ELECTRICAL EQUIPMENT OF MACHINES –****Part 1: General requirements**

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This sixth edition cancels and replaces the fifth edition published in 2005. It constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) added requirements to address applications involving power drive systems (PDS);
- b) revised electromagnetic compatibility (EMC) requirements;
- c) clarified overcurrent protection requirements;
- d) requirements for determination of the short circuit current rating of the electrical equipment;

- e) revised protective bonding requirements and terminology;
- f) reorganization and revision to Clause 9, including requirements pertaining to safe torque off of PDS, emergency stop, and control circuit protection;
- g) revised symbols for actuators of control devices;
- h) revised technical documentation requirements;
- i) general updating to current special national conditions, normative standards, and bibliographical references.

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

FDIS	Report on voting
44/765/FDIS	44/771/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.

A list of all parts in the IEC 60204 series, published under the general title *Safety of machinery – Electrical equipment of machines*, can be found on the IEC website.

The following differing practices of a less permanent nature exist in the countries indicated below.

- ITeH STANDARD PREVIEW  
(standards.iteh.ai)
- 4.3.1: The voltage characteristics of electricity supplied by public distribution systems in Europe are given in EN 50160:2010.
- 5.1: Exception is not allowed (USA).  
<https://standards.iteh.ai/catalog/standards/sist/ce9c4b09-1552-4cae-a57f-01652c9052ca/iec-60204-1-2016>
- 5.1: TN-C systems are not permitted in low-voltage installations in buildings (Norway).
- 5.2: Terminals for the connection of the protective earthing conductors may be identified by the colour green, the letters “G” or “GR” or “GRD” or “GND”, or the word “ground” or “grounding”, or with the graphical symbol IEC 60417-5019:2006-08 or any combination (USA).
- 6.3.3 b), 13.4.5 b), 18.2.1: TT power systems are not allowed (USA).
- 6.3.3, 18.2, Annex A: TN systems are not used. TT systems are the national standard (Japan).
- 6.3.3 b): The use of residual current protective devices with a rated residual operating current not exceeding 1 A is mandatory in TT systems as a means for fault protection by automatic disconnection of supply (Italy).
- 7.2.3: Disconnection of the neutral conductor is mandatory in a TN-S system (France and Norway).
- 7.2.3: Third paragraph: distribution of a neutral conductor with an IT system is not allowed (USA and Norway).
- 7.10: For evaluation of short circuit ratings the requirements of UL 508A Supplement SB, may be used (USA).
- 8.2.2: See IEC 60364-5-54:2011, Annex E List of notes concerning certain countries.
- 9.1.2: Maximum nominal AC control circuit voltage is 120 V (USA).
- 12.2: Only stranded conductors are allowed on machines, except for 0,2 mm<sup>2</sup> solid conductors within enclosures (USA).
- 12.2: The smallest power circuit conductor allowed on machines is 0,82 mm<sup>2</sup> (AWG 18) in multiconductor cables or in enclosures (USA).
- Table 5: Cross-sectional area is specified in NFPA 79 using American Wire Gauge (AWG) (USA). See Annex G.

- 13.2.2: For the protective conductor, the colour identification GREEN (with or without YELLOW stripes) is used as equivalent to the bicolour combination GREEN-AND-YELLOW (USA and Canada).
- 13.2.3: The colour identification WHITE or GREY is used for earthed neutral conductors instead of the colour identification BLUE (USA and Canada).
- 15.2.2: First paragraph: Maximum value between conductors 150 V (USA).
- 15.2.2: Second paragraph, 5<sup>th</sup> bullet: The full load current rating of lighting circuits does not exceed 15 A (USA).
- 16.4: Nameplate marking requirements (USA).
- A.2.2.2: The permissible maximum value of  $R_A$  is regulated (e.g. when  $U_o \geq 300V$ ,  $R_A$  shall be less than  $10 \Omega$ , when  $U_o < 300 V$ ,  $R_A$  shall be less than  $100 \Omega$ ,  $U_o$  is the nominal AC line to earth voltage in volts (V) (Japan).
- A.2.2.2: The maximum permissible value of  $R_A$  is  $83 \Omega$  (Netherlands).

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.

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**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 document using a colour printer.**

<http://standards.iteh.ai/catalog/standards/sist/60204-1-2016/iec-60204-1-2016>  
b1652e9052ea/iec-60204-1-2016

## INTRODUCTION

This part of IEC 60204 provides requirements and recommendations relating to the electrical equipment of machines so as to promote:

- safety of persons and property;
- consistency of control response;
- ease of operation and maintenance.

More guidance on the use of this part of IEC 60204 is given in Annex F.

Figure 1 has been provided as an aid to the understanding of the inter-relationship of the various elements of a machine and its associated equipment. Figure 1 is a block diagram of a typical machine and associated equipment showing the various elements of the electrical equipment addressed in this part of IEC 60204. Numbers in parentheses ( ) refer to Clauses and Subclauses in this part of IEC 60204. It is understood in Figure 1 that all of the elements taken together including the safeguards, tooling/fixturing, software, and the documentation, constitute the machine, and that one or more machines working together with usually at least one level of supervisory control constitute a manufacturing cell or system.

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