MASINATE OHUTUS. MASINATE ELEKTRISEADMED. OSA 11: KÕRGEPINGESEADMETELE ESITATAVAD NÕUDED VAHELDUVPINGEL ÜLE 1000 V KUNI 36 KV VÕI ALALISPINGEL ÜLE 1500 V KUNI 36 KV

Safety of machinery - Electrical equipment of machines - Part 11: Requirements for equipment for voltages above 1 000 V AC or 1 500 V DC and not exceeding 36 kV

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 60204-11:2019 sisaldab Euroopa standardi EN IEC 60204-11:2019 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 60204-11:2019 consists of the English text of the European standard EN IEC 60204-11:2019.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 25.01.2019.	Date of Availability of the European standard is 25.01.2019.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 13.110, 29.020

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60204-11

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ICS 13.110; 29.020

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English Version

Safety of machinery - Electrical equipment of machines – Part 11: Requirements for equipment for voltages above 1 000 V AC or 1 500 V DC and not exceeding 36 kV (IEC 60204-11:2018)

Sécurité des machines - Équipement électrique des machines - Partie 11: Exigences pour les équipements fonctionnant à des tensions supérieures à 1 000 V en courant alternatif ou 1 500 V en courant continu et ne dépassant pas 36 kV
(IEC 60204-11:2018)

Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen - Teil 11: Anforderungen an Hochspannungsausrüstung für Spannungen über 1000 V Wechselspannung oder 1500 V Gleichspannung aber nicht über 36 kV
(IEC 60204-11:2018)

This European Standard was approved by CENELEC on 2019-01-09. 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 44/819/FDIS, future edition 2 of IEC 60204-11, prepared by IEC/TC 44 "Safety of machinery - Electrotechnical aspects" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60204-11:2019.

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) 2019-10-09
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-01-09

This document supersedes EN 60204-11:2000.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

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.

Endorsement notice

The text of the International Standard IEC 60204-11:2018 was approved by CENELEC as a European Standard without any modification.

IEC 60038	NOTE	Harmonized as EN 60038
IEC 60034 (series)	NOTE	Harmonized as EN 60034 (series)
IEC 60034-1:2017	NOTE	Harmonized as EN 60034-1 (not modified)[1]
IEC 60034-15	NOTE	Harmonized as EN 60034-15
IEC 60071-1	NOTE	Harmonized as EN 60071-1
IEC 60273	NOTE	Harmonized as HD 578 S1
IEC 60364-4-41	NOTE	Harmonized as HD 60364-4-41
IEC 60364-4-42	NOTE	Harmonized as HD 60364-4-42
IEC 60660	NOTE	Harmonized as EN 60660
IEC 61230	NOTE	Harmonized as EN 61230
IEC 61800-5-2	NOTE	Harmonized as EN 61800-5-2
IEC 62271-1	NOTE	Harmonized as EN 62271-1
IEC 62271-100	NOTE	Harmonized as EN 62271-100
IEC 62271-200	NOTE	Harmonized as EN 62271-200
IEC 62305 (series)	NOTE	H armonized as EN 62305 (series)

[1] To be published. Stage at time of publication: FprEN 60034-1:2017.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60071-2	1996	Insulation co-ordination - Part 2: Application guide	EN 60071-2	1997
IEC 60076-5	-	Power transformers - Part 5: Ability to withstand short circuit	EN 60076-5	2006
IEC 60204-1 (mod)	2016	Safety of machinery - Electrical equipment of machines - Part 1: General requirements	EN 60204-1	2018
IEC 60364-5-54	2011	Low-voltage electrical installations - Part 5-54: Selection and erection of electrical equipment - Earthing arrangements and protective conductors	HD 60364-5-54	2011
-	-		+ A11	2017
IEC 60417	1973[2]	Graphical symbols for use on equipment. Index, survey and compilation of the single sheets.	-	-
IEC 60445	-	Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals, conductor terminations and conductors	EN 60445	2010
IEC 60529	2001[2]	Degrees of protection provided by enclosures (IP Code)	-	-
IEC 60865-1	-	Short-circuit currents - Calculation of effects - Part 1: Definitions and calculation methods	EN 60865-1	2012
IEC 61800	series	Adjustable speed electrical power drive systems - Part 1: General requirments - Rating specifications for low voltage adjustables speed d.c. power drive systems	EN 61800	series

[2] Dated as no equivalent European Standard exists.

Publication	Year	Title	EN/HD	Year
IEC 61936-1 (mod)	2010	Power installations exceeding 1 kV a.c. - Part 1: Common rules	EN 61936-1	2010
-	-		+ AC	2013
+ A1	2014		+ A1	2014
IEC 62061	-	Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems	EN 62061	2005
			+A1	2013
			+A2	2015
IEC 62271-102	-	High-voltage switchgear and controlgear - Part 102: Alternating current disconnectors and earthing switches	EN IEC 62271-102	2018
IEC 62271-103	-	High-voltage switchgear and controlgear - Part 103: Switches for rated voltages above 1 kV up to and including 52 kV	EN 62271-103	2011
IEC 62271-105	-	High-voltage switchgear and controlgear - Part 105: Alternating current switch-fuse combinations for rated voltages above 1 kV up to and including 52 kV	EN 62271-105	2012
IEC 62271-107	-	High-voltage switchgear and controlgear - Part 107: Alternating current fused circuit-switchers for rated voltages above 1 kV up to and including 52 kV	EN 62271-107	2012
IEC 62271-200	2011	High-voltage switchgear and controlgear - Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV	EN 62271-200	2012
IEC 62271-201	-	High-voltage switchgear and controlgear - Part 201: AC solid-insulation enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV	EN 62271-201	2014
IEC 62745	-	Safety of machinery - Requirements for cableless control systems of machinery	EN 62745	2017
ISO 3864-1	2011	Graphical symbols - Safety colours and safety signs - Part 1: Design principles for safety signs and safety markings	-	-
ISO 3864-2	2016	Graphical symbols_- Safety colours and safety signs_- Part_2: Design principles for product safety labels	-	-
ISO 7010	2011	Graphical symbols - Safety colours and safety signs - Registered safety signs	EN ISO 7010	2012
ISO 12100		Safety of machinery_- General principles for design_- Risk assessment and risk reduction	EN ISO 12100	2010
ISO 13849-1	-	Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design	EN ISO 13849-1	2016

Annex ZZ
(informative)

Relationship between this European standard and the essential health and safety requirements of Directive 2006/42/EC aimed to be covered

This European Standard has been prepared under a Commission's standardization request in the field of machinery "M/396" to provide one voluntary means of conforming to Essential health and safety requirements relating to the design and construction of machinery of Directive 2006/42/EC.

Once this standard is cited in the Official Journal of the European Union under that Directive 2006/42/EC, compliance with the normative clauses of this standard given in Table ZZ.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding health and safety requirements of that Directive 2006/42/EC, and associated EFTA regulations.

Table ZZ.1 – Correspondence between this European standard and *Annex I of Directive 2006/42/EC* [OJ No L 157, 9 June 2006]

Essential health and safety requirements of Directive 2006/42/EC	Clause(s) / sub-clause(s) of this EN	Remarks / Notes
1.1.3	7.10	By reference to EN 61936-1
1.1.4	4.7; 18	By reference to sub-clauses 7.2.6 and 15.2 of EN 60204-1.
1.1.5	4.6	
1.1.6	4.7; 18	Ergonomics refers to installation of HV equipment. HV equipment is not for frequent handling by operators; ergonomics must be considered at installation.
1.2.1	5.3 to 5.6, 6, 7, 9	Amended by references to IEC 61936-1 and IEC 60204-1.
1.2.2	5.3, 5.4, 5.5, 5.6, 10, 11	
1.2.4	9	In conjunction with clause 9 of Part 1, IEC 60204
1.2.4.1	5.3 to 5.6, 9	
1.2.4.2	5.3 to 5.6, 9	
1.2.4.3	9	
1.2.4.4	9	
1.2.5	9	
1.2.6	7.5, 9	
1.3.1	18	
1.3.2	18	This requirement is covered by maintenance instructions on ageing materials.
1.3.3	7.9	
1.3.7	4.2, 6.2, 12.3, 13.8.1	HV equipment provides protection against hazardous mechanical (moving) and electrical parts.
1.4.1	4.2, 6.2, 12.3, 13.8.1	With HV equipment the protection against hazardous mechanical (moving) electrical parts is

Essential health and safety requirements of Directive 2006/42/EC	Clause(s) / sub-clause(s) of this EN	Remarks / Notes
1.4.2 1.4.2.1 1.4.2.2		combined.
1.5.1	4.2; 4.3; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15;16	Protection against electrical hazards is essential subject of the entire document.
1.5.2	4.1, 5.5	
1.5.5	12.4	
1.5.6	7.11	
1.5.7	7.10; 7.11	
1.5.11	4.4.2	
1.5.16	7.8	
1.6.1	12	
1.6.2	12	
1.6.3	5	
1.7.1	17	
1.7.1.1	18	
1.7.1.2	9; 10	
1.7.2	17; 18	
1.7.3	17.1	
1.7.4	18	

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

CONTENTS

INTRODUCTION

This part of IEC 60204 provides requirements and recommendations relating to the high-voltage electrical equipment (HV equipment) of machines together with its associated low-voltage electrical equipment (LV equipment) so as to promote

– safety of persons and property,

– consistency of control response,

– maintainability.

Figure 1 is a block diagram of a machine and associated equipment showing the various elements of the electrical equipment addressed in this document. Numbers in parentheses (…) refer to clauses and subclauses in this document. It is understood that all of the elements taken together including the safeguards, software and the documentation constitute the machine or group of machines working together with usually at least one level of supervisory control.

This document should be used in conjunction with IEC 60204-1. HV equipment can include LV control parts in the same general enclosure or in separate compartments.

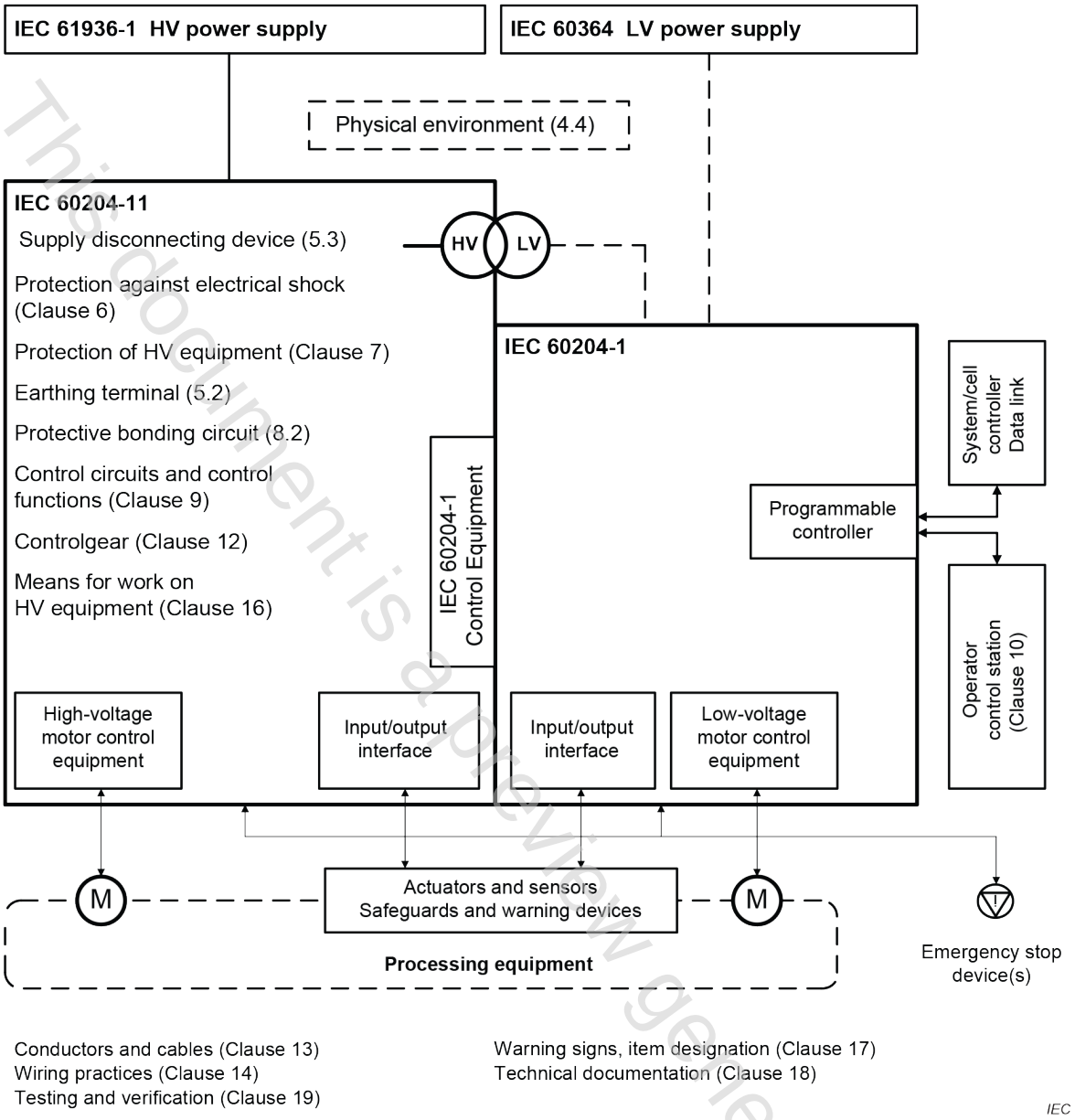

Figure 1 – Block diagram of a machine containing HV equipment

SAFETY OF MACHINERY – ELECTRICAL EQUIPMENT OF MACHINES –

Part 11: Requirements for equipment for voltages above 1 000 V AC or 1 500 V DC and not exceeding 36 kV

1 Scope

This part of IEC 60204 applies to electrical and electronic equipment and systems to machines, including a group of machines working together in a co-ordinated manner, which operate at nominal voltages above 1 000 V AC or 1 500 V DC and not exceeding 36 kV AC or DC with nominal frequencies not exceeding 60 Hz.

In this document, the term HV equipment also covers the LV equipment forming an integral part of the equipment operating at high voltage. The requirements in this document primarily cover the parts operating at high-voltage except where explicitly stated otherwise.

NOTE 1 LV equipment not forming part of the HV equipment is covered by IEC 60204-1:2016.

NOTE 2 In this document, the term "electrical" includes both electrical and electronic matters (i.e. electrical equipment means both the electrical and the electronic equipment).

NOTE 3 This document does not apply to independent high-voltage power supply installations for which separate IEC standards exist.

The electrical equipment covered by this document commences at the point of connection of the supply to the electrical equipment of the machine (see 5.1).

NOTE 4 For the requirements for high-voltage power supply installations, see IEC 61936-1.

This document is a generic safety standard. It does not cover all the requirements (e.g. guarding, interlocking or control) which are needed or required by other standards or regulations in order to safeguard personnel from hazards other than electrical hazards. Each type of machine has unique requirements to be accommodated to provide adequate safety.

NOTE 5 In some machines the high-voltage power supply can be produced by a step-up transformer (autotransformer), supplied by a low-voltage system (e.g. by a LV generator).

NOTE 6 In the context of this document, the term "person" refers to any individual; "personnel" are those persons who are assigned and instructed by the user or his agent(s) in the use and care of the machine in question.

This part of IEC 60204 specifically includes, but is not limited to, machines as defined in 3.29 (Annex A lists examples of machines whose electrical equipment can be covered by this document).

For protection against electric shock from high-voltage equipment, this document refers to IEC 61936-1. When it comes to low-voltage equipment, this document refers to IEC 60204-1:2016.

NOTE 7 High- and low-voltage standards use different terms regarding protection against electric shock. Whereas high-voltage standards use the terms “direct contact” and “indirect contact”, low-voltage standards correspondingly use “basic protection” and “fault protection”.

Additional and special requirements can apply to the electrical equipment of machines that

– are used in the open air (i.e. outside buildings or other protective structures);
– use, process or produce potentially explosive material (e.g. paint or sawdust);
– are used in potentially explosive and/or flammable atmospheres;

– have special risks when producing or using certain materials;
– are used in mines.

Hazards as a result of noise and vibration are excluded from the scope of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

IEC 60071-2:1996, *Insulation co-ordination – Part 2: Application guide*

IEC 60076-5, *Power transformers – Part 5: Ability to withstand short-circuit*

IEC 60204-1:2016, *Safety of machinery – Electrical equipment of machines – Part 1: General requirements*

IEC 60364-5-54:2011, Low-voltage *electrical installations – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective conductors*

IEC 60417, *Graphical symbols for use on equipment* (available at http://www.graphical-symbols.info/equipment)

IEC 60445, *Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals, conductor terminations and conductors.*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60865-1, *Short-circuit currents – Calculation of effects – Part 1: Definitions and calculation methods*

IEC 61800 (all parts), *Adjustable speed electrical power drive systems*

IEC 61936-1:2010, *Power installations exceeding 1 kV a.c. – Part 1: Common rules*
IEC 61936-1:2010/AMD1:2014

IEC 62061, *Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems*

IEC 62271-102, *High-voltage switchgear and controlgear – Part 102: Alternating current disconnectors and earthing switches*

IEC 62271-103, *High-voltage switchgear and controlgear – Part 103: Switches for rated voltages above 1 kV up to and including 52 kV*

IEC 62271-105, *High-voltage switchgear and controlgear – Part 105: Alternating current switch-fuse combinations for rated voltages above 1 kV up to and including 52 kV*

IEC 62271-107, *High-voltage switchgear and controlgear – Part 107: Alternating current fused circuit-switchers for rated voltages above 1 kV up to and including 52 kV*

IEC 62271-200:2011, *High-voltage switchgear and controlgear – Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

IEC 62271-201, *High-voltage switchgear and controlgear – Part 201: AC solid-insulation enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

IEC 62745, *Safety of machinery – Requirements for cableless control systems of machinery*

ISO 13849-1, *Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design*

ISO 3864-1:2011, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs and safety markings*

ISO 3864-2:2016, *Graphical symbols –Safety colours and safety signs – Part 2: Design principles for product safety labels*

ISO 7010:2011, *Graphical symbols – Safety colours and safety signs – Registered safety signs*

ISO 12100, *Safety of machinery –General principles for design – Risk assessment and risk reduction*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
ambient temperature
temperature of the air or other medium where the equipment is to be used

3.2
barrier
part providing protection against contact with live parts from any usual direction of access

3.3
basic protection
protection against electric shock under fault-free conditions

Note 1 to entry: Previously referred to as “protection against direct contact”.

[SOURCE: IEC 60050-195:1998, 195-06-01, modified – The note has been added.]

3.4
cable tray
cable support consisting of a continuous base with raised edges but no covering

Note 1 to entry: A cable tray may be perforated or mesh.

[SOURCE: IEC 60050-826:2004, 826-15-08]