

**SLOVENSKI  
STANDARD**

**SIST EN 60204-1:1999**

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julij 1999

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**Safety of machinery - Electrical equipment of machines -- Part 1: General requirements (IEC 60204-1:1997+corrigendum Sep.1998)**

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EUROPEAN STANDARD

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December 1997

ICS 13.110

Supersedes EN 60204-1:1992 and its corrigendum

Descriptors: Electrical equipment, machines, control and operation, requirements, testing, definitions, electrical safety requirements

English version

**Safety of machinery - Electrical equipment of machines  
Part 1: General requirements  
(IEC 60204-1:1997)**

**Sécurité des machines - Equipement  
électrique des machines  
Partie 1: Règles générales  
(CEI 60204-1:1997)**

**Sicherheit von Maschinen - Elektrische  
Ausrüstung von Maschinen  
Teil 1: Allgemeine Anforderungen  
(IEC 60204-1:1997)**

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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**CENELEC**

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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## Foreword

The text of document 44/205/FDIS, future edition 4 of IEC 60204-1, prepared by IEC TC 44, Safety of machinery: Electrotechnical aspects, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60204-1 on 1997-10-01.

This standard has been prepared under a mandate given to CEN/CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of the following EC Directives:

- Low Voltage Directive (73/23/EEC);
- Machinery Directive (89/392/EEC).

This European Standard supersedes EN 60204-1:1992 and its corrigendum December 1993. Significant technical differences have resulted from the amendments to the Machinery Safety Directive in 1991 covering mobility and lifting, and in 1993 covering safety components.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1998-11-01
- latest date by which national standards conflicting with the EN have to be withdrawn (dow) 2000-07-01

NOTE: EN 60204-1:1985 remains applicable for use with EN 60204-3-1:1990.

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annex ZA is normative and annexes A, B, C, D and E are informative.

Annex ZA has been added by CENELEC.

This standard has the status of a horizontal standard (type B in CEN) and may be used as a reference standard by technical committees in CEN and in CENELEC in the preparation of product family standards or dedicated product standards (type C in CEN as defined in EN 414:1992, 3.1) for machines. The requirements of this standard can also be applied by the supplier of a machine for which no product family or dedicated product standard exists.

Where a product family or dedicated product standard exists, its requirements take precedence over the requirements of this standard.

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EN 60204-1 gives a large number of general requirements that may or may not be applicable to the electrical equipment of a particular machine. A simple reference without any qualification to the complete standard EN 60204-1 is therefore not sufficient. Choices need to be made to cover all requirements of EN 60204-1. A technical committee preparing a product family or a dedicated product standard (type C in CEN) and the supplier of a machine for which no product family or dedicated product standard exists, should use this standard;

- a) by reference; and
- b) by selection of the most appropriate option(s) from the requirements given in the relevant clauses; and
- c) by modification of certain clauses as necessary where the particular requirements for the equipment of the machine are adequately covered by other relevant standards,

providing the options selected and the modifications made do not adversely affect the level of protection required for that machine according to the risk assessment.

When applying the three principles a), b) and c) listed above, it is recommended that;

- reference be made to the relevant clauses and subclauses of this standard
  - 1) that are complied with, indicating where relevant the applicable option;
  - 2) that have been modified or extended for the specific machine or equipment requirements; and
- reference be made directly to the relevant standard, for the requirements for the electrical equipment that are adequately covered by that standard.

In all cases expertise is essential to be able to:

- perform the necessary risk assessment of the machine;
- read and understand all of the requirements of EN 60204-1;
- choose the applicable requirements from EN 60204-1 where alternatives are given;
- identify alternative or additional particular requirements that differ from or are not included in the requirements of EN 60204-1, and that are determined by the machine and its use; and
- specify precisely those particular requirements.

Figure 2 of EN 60204-1 is a block diagram of a typical machine and can be used as the starting point of this task. It indicates the clauses and subclauses dealing with particular requirements/equipment. However EN 60204-1 is a complex document and the use of the following table will give help in the finding of a required area in this standard and gives reference to other relevant standards.



<b>Clauses and subclauses of EN 60204-1 where action should be considered (shown by X) with respect to:</b> a) selection from the measures given; b) additional requirements; c) different requirements; d) other standards that can be relevant					
Subject	Clause or subclause	a)	b)	c)	d)*
Scope	1		X		EN 50014 to EN 50020
General requirements	4	X	X	X	EN 292, EN 1050
Supply disconnecting (isolating) device	5.3	X			
Excepted circuits	5.3.5	X		X	
Prevention of unexpected start up, isolation	5.4 5.5 5.6	X	X	X	EN 1037
Protection against electric shock	6	X			HD 384.4.41 S2
Emergency operations	9.2.5.4	X		X	EN 418, EN 1050, EN 954-1, (IEC 61508)
Two-hand control	9.2.5.7	X	X		EN 574, EN 954-1
Cableless control	9.2.7	X	X	X	
Control functions in the event of failure	9.4	X	X	X	EN 1050, EN 954-1 (IEC 61508)
Position sensors	10.1.4	X	X	X	EN 1088, EN 954-1
Colours and markings of control devices, indicators	10.2, 10.3 & 10.4	X	X		EN 61310
Emergency stop devices	10.7	X	X		EN 418, EN 1050
Emergency switching off devices	10.8	X			
Electronic equipment	11	X		X	(IEC 61508)
Controlgear - protection against contamination, etc.	12.3, 10.1.3	X	X	X	
Identification of conductors	14.2	X	X		
Testing	19	X	X	X	
Additional user requirements	Annex B		X	X	

\* The standards listed under d) do not include those to which reference is made in the requirements of this standard.

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## 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 maintenance.

High performance is not to be obtained at the expense of the essential factors mentioned above.

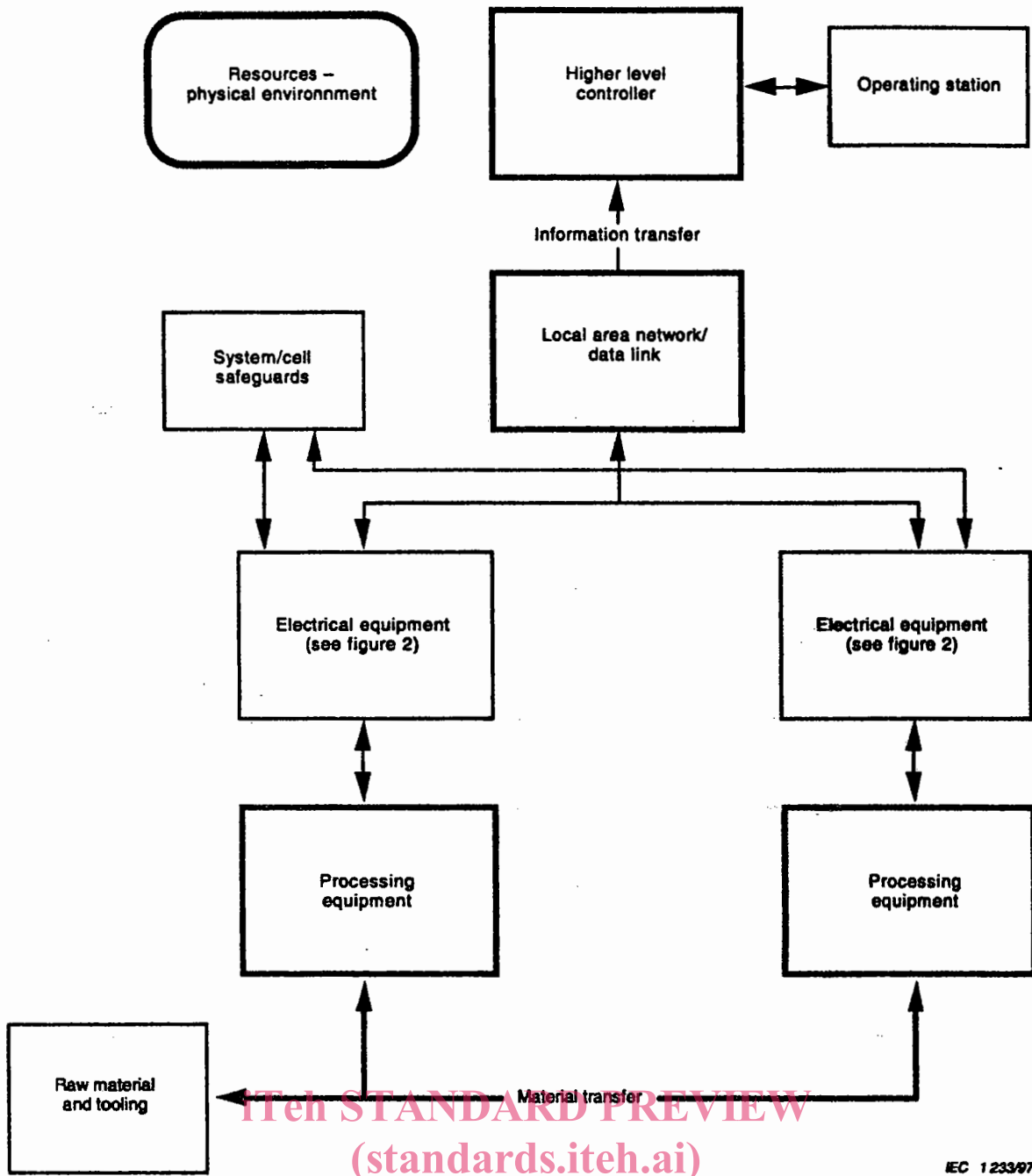
An example of a possible application of these requirements is a group of machines used in the production of discrete parts where a failure in such production machines or manufacturing systems or cells can have serious economic consequences.

Figures 1 and 2 have 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 an overall block diagram of a typical manufacturing system (a group of machines working together in a co-ordinated manner) and figure 2 is a block diagram of a typical machine and associated equipment showing the various elements of the electrical equipment addressed in this standard. Numbers in parentheses ( ) refer to clauses and subclauses in this standard. It is understood in figures 1 and 2 that all of the elements taken together including the safeguards, tooling/fixtures, 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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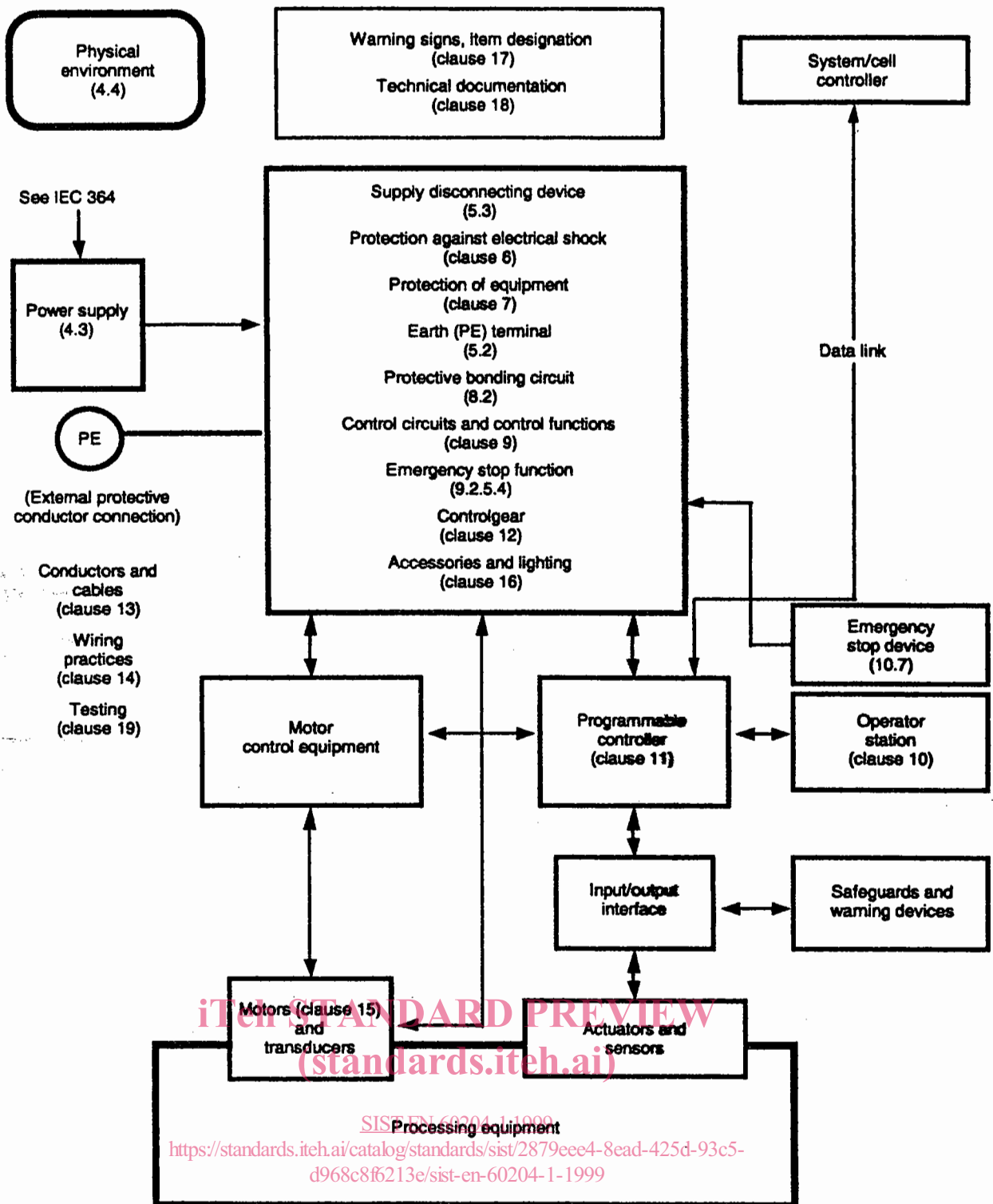
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Figure 1 - Block diagram of a typical manufacturing system

IEC 1233/97



IEC 1234/97

Figure 2 – Block diagram of a typical machine



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

### 1 Scope

This part of IEC 60204 applies to the application of electrical and electronic equipment and systems to machines not portable by hand while working, including a group of machines working together in a co-ordinated manner but excluding higher level systems aspects (i.e. communications between systems).

#### NOTES

- 1 In this standard, the term *electrical* includes both electrical and electronic matters (i.e. *electrical equipment* means both the electrical and the electronic equipment).
- 2 In the context of this standard, the term *person* refers to any individual and includes those persons who are assigned and instructed by the user or his agent(s) in the use and care of the machine in question.

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

NOTE 3 –For the requirements for the electrical supply installation in buildings, see IEC 60364.

This part is applicable to the electrical equipment or parts of the electrical equipment that operate with nominal supply voltages not exceeding 1 000 V for alternating current and not exceeding 1 500 V for direct current, and with nominal frequencies not exceeding 200 Hz. For higher voltages or frequencies, special requirements may be needed.

This part is an application standard and is not intended to limit or inhibit technological advancement. It does not cover all the requirements (e.g. guarding, interlocking, or control) that are needed or required by other standards or regulations in order to safeguard persons from hazards other than electrical hazards. Each type of machine has unique requirements to be accommodated to provide adequate safety.

This part specifically includes, but is not limited to, the electrical equipment of machines as defined in 3.33 (annex A lists examples of machines whose electrical equipment may be covered by this standard).

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

- are used in 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;
- are sewing machines, units, and systems (which are covered by IEC 60204-31);
- are hoisting machines (which are covered by 60204-32).

Power circuits where electrical energy is directly used as a working tool are excluded from this part of IEC 60204.

## 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60204. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 60204 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid normative documents.

IEC 60034-1: 1996, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-5: 1991, *Rotating electrical machines – Part 5: Classification of degrees of protection provided by enclosures of rotating electrical machines (IP code)*

IEC 60034-11: 1978, *Rotating electrical machines – Part 11: Built-in thermal protection – Chapter 1: Rules for protection of rotating electrical machines*

IEC 60050(191): 1990, *International Electrotechnical Vocabulary (IEV) – Chapter 191: Dependability and quality of service*

IEC 60050(441): 1984, *International Electrotechnical Vocabulary (IEV) – Chapter 441: Switchgear, controlgear, and fuses*

IEC 60050(826): 1982, *International Electrotechnical Vocabulary (IEV) – Chapter 826: Electrical installations of buildings*

IEC 60072-1: 1991, *Dimensions and output series for rotating electrical machines – Frame numbers 56 to 400 and flange numbers 55 to 1 080*

IEC 60072-2: 1990, *Dimensions and output series for rotating electrical machines – Part 2: Frame numbers 355 to 1 000 and flange numbers 1 180 to 2 360*

IEC 60073: 1996, *Basic and safety principles for man-machine interface, marking and identification – Coding principles for indication devices and actuators*

IEC 60076-5: 1976, *Power transformers – Part 5: Ability to withstand short circuit*

IEC 60146-1-1: 1991, *General requirements and line commutated connectors – Part 1-1: Specifications of basic requirements*

IEC 60204-31: 1996, *Electrical equipment of industrial machines – Part 31: Particular requirements for sewing machines, units, and systems*

IEC 60309-1: 1988, *Plugs, socket-outlets, and couplers for industrial purposes – Part 1: General requirements*

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

IEC 60364-4-41: 1992, *Electrical installations of buildings – Part 4: Protection for safety – Chapter 41: Protection against electric shock*

IEC 60364-4-46: 1981, *Electrical installations of buildings – Part 4: Protection for safety – Chapter 46: Isolation and switching*

IEC 60364-4-47: 1981, *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*

IEC 60364-4-473: 1977, *Electrical installations of buildings – Part 4: Protection for safety – Chapter 47: Application of protective measures for safety – Section 473: Measures of protection against overcurrent*