

# NEK EN 60204-1:2006

## Safety of machinery

*Electrical equipment of machines  
Part 1: General requirements*

Norwegian electrotechnical standard

### Maskinsikkerhet

*Elektrisk utstyr i maskiner  
Del 1: Generelle krav*

Withdrawn



Engelsk versjon

English version

**Safety of machinery –  
Electrical equipment of machines  
Part 1: General requirements  
(IEC 60204-1:2005, modified)**

Sécurité des machines –  
Équipement électrique des machines  
Partie 1: Règles générales  
(CEI 60204-1:2005, modifiée)

Sicherheit von Maschinen –  
Elektrische Ausrüstung von Maschinen  
Teil 1: Allgemeine Anforderungen  
(IEC 60204-1:2005, modifiziert)

This European Standard was approved by CENELEC on 2006-06-01. 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 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**

## Foreword

The text of the International Standard IEC 60204-1:2005, prepared by IEC TC 44, Safety of machinery – Electrotechnical aspects, together with common modifications prepared by the Technical Committee CENELEC TC 44X, Safety of machinery – Electrotechnical aspects, was approved by CENELEC as EN 60204-1 on 2006-06-01.

This European Standard supersedes EN 60204-1:1997.

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) 2007-06-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2009-06-01

NOTE The application of this standard can involve the selection of components and/or parts that are to be integrated with the electrical equipment of a machine in accordance with the instructions and/or specifications of the manufacturers of the components and/or parts.

Also, in the context of legislative duties that are applicable to machinery manufacturers within the European Union it is important to recognise that the safety of electrical equipment can involve the use of equipment and services provided by other parties (see 3.54).

To assist manufacturers in satisfying these duties it can be necessary for the supplier of the equipment to obtain information about its intended use. This can be facilitated by establishing an agreement between the user and supplier on basic conditions and additional user requirements to enable proper design, application and utilization of the electrical equipment of the machine. An enquiry form that can be used for this purpose is provided in Annex B. Such an agreement is not intended to reduce the level of safety of the electrical equipment provided by this standard.

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## Endorsement notice

The text of the International Standard IEC 60204-1:2005 was approved by CENELEC as a European Standard with agreed common modifications as given below.

### COMMON MODIFICATIONS

#### 1 Scope

**Replace** the sixth paragraph with:

This part of EN 60204 does not specify additional and special requirements that can apply to the electrical equipment of machines including those that

- are intended for use in open air (i.e. outside buildings or other protective structures);
- use, process, or produce potentially explosive material (for example paint or sawdust);
- are intended for use in potentially explosive and/or flammable atmospheres;
- have special risks when producing or using certain materials;
- are intended for use in mines;
- are sewing machines, units, and systems;

NOTE 7 For sewing machines, see EN 60204-31.

- are hoisting machines.

NOTE 8 For hoisting machines, see EN 60204-32.

#### 3 Terms and definitions

##### 3.56 uncontrolled stop

**Replace** the note with:

NOTE This definition does not imply any particular state of other (for example, non-electrical) stopping devices, for example mechanical or hydraulic brakes that are outside the scope of this standard.

#### 4 General requirements

##### 4.1 General

In the third paragraph **delete**:

- audible noise at levels that cause health problems to persons;

## 4.2 Selection of equipment

Replace 4.2.2 with:

### 4.2.2 Electrical equipment in compliance with the EN 60439 series

The electrical equipment of the machine shall satisfy the safety requirements identified by the risk assessment of the machine. Depending upon the machine, its intended use and its electrical equipment, the designer may select parts of the electrical equipment of the machine that are in compliance with EN 60439-1 and, as necessary, other relevant parts of the EN 60439 series (see also Annex F).

## 4.4 Physical environment and operating conditions

Replace 4.4.1 with:

### 4.4.1 General

The electrical equipment shall be suitable for the physical environment and operating conditions of its intended use. The requirements of 4.4.2 to 4.4.8 cover the physical environment and operating conditions of the majority of machines covered by this part of EN 60204. When special conditions apply or the limits specified are exceeded, an agreement between user and supplier (see 4.1) is recommended (see Annex B).

Replace 4.4.3 with:

### 4.4.3 Ambient air temperature

Electrical equipment shall be capable of operating correctly in the intended ambient air temperature. The minimum requirement for all electrical equipment is correct operation between air temperatures of +5 °C and +40 °C. For very hot environments (for example hot climates, steel mills, paper mills) and for cold environments, additional measures are recommended (see Annex B).

Replace 4.4.7 with:

### 4.4.7 Ionizing and non-ionizing radiation

When equipment is subject to radiation (for example microwave, ultraviolet, lasers, X-rays), additional measures shall be taken to avoid malfunctioning of the equipment and accelerated deterioration of the insulation. A special agreement is recommended between the supplier and the user (see Annex B).

Replace 4.4.8 with:

### 4.4.8 Vibration, shock, and bump

Undesirable effects of vibration, shock and bump (including those generated by the machine and its associated equipment and those created by the physical environment) shall be avoided by the selection of suitable equipment, by mounting it away from the machine, or by provision of anti-vibration mountings. A special agreement is recommended between the supplier and the user (see Annex B).

## 5 Incoming supply conductor terminations and devices for disconnecting and switching off

### 5.1 Incoming supply conductor terminations

**Add** the following paragraph:

See 17.8 for the provision of instructions for maintenance.

### 5.4 Devices for switching off for prevention of unexpected start-up

**Add** the following note to the third paragraph:

NOTE 2 Further information on the location and actuation of devices such as those used for the prevention of unexpected start-up is provided in EN 60447.

After the fifth paragraph, **replace** note 2 with:

NOTE 3 The selection of a device should take into account, for example, information derived from the risk assessment, intended use and foreseeable misuse of the device. For example, the use of disconnectors, withdrawable fuse links or withdrawable links located in enclosed electrical operating areas can be inappropriate for use by cleaners (see 17.2 b)12)).

## 9 Control circuits and control functions

### 9.2.6.3 Enabling control

**Replace** with:

Enabling control (see also 10.9) is a manually activated control function interlock that:

- a) when activated allows a machine operation to be initiated by a separate start control, and
- b) when de-activated
  - initiates a stop function in accordance with 9.2.5.3, and
  - prevents initiation of machine operation.

Enabling control shall be so arranged as to minimize the possibility of defeating, for example by requiring the de-activation of the enabling control device before machine operation may be reinitiated. It should not be possible to defeat the enabling function by simple means.

### 9.2.7.3 Stop

**Replace** the first paragraph with:

Cableless control stations shall include a separate and clearly identifiable means to initiate the stop function of the machine or of all the operations that can cause a hazardous situation. The actuating means to initiate this stop function shall not be marked or labelled as an emergency stop device (see 10.7).

## 10 Operator interface and machine-mounted control devices

### 10.2.1 Colours

Replace Table 2 with:

**Table 2 – Colour coding for push-button actuators and their meanings**

Colour	Meaning	Explanation	Examples of application
RED	Emergency	Actuate in the event of a hazardous situation or emergency	Emergency stop Initiation of emergency function (see also 10.2.1)
YELLOW	Abnormal	Actuate in the event of an abnormal condition	Intervention to suppress abnormal condition Intervention to restart an interrupted automatic cycle
BLUE	Mandatory	Actuate for a condition requiring mandatory action	Reset function
GREEN	Normal	Actuate to initiate normal conditions	(See 10.2.1)
WHITE	No specific meaning assigned	For general initiation of functions except for emergency stop	START/ON (preferred) STOP/OFF
GREY			START/ON STOP/OFF
BLACK			START/ON STOP/OFF (preferred)

## 12 Conductors and cables

### 12.7.8 Construction and installation of conductor wire, conductor bar systems and slip-ring assemblies

Replace the note with:

The protective bonding circuit shall include the covers or cover plates of metal enclosures or underfloor ducts. Where metal hinges form a part of the bonding circuit, their continuity shall be verified (see Clause 18).

## 17 Technical documentation

### 17.2 Information to be provided

Replace b) 3) with:

- 3) information on the physical environment (for example lighting, vibration, atmospheric contaminants) where appropriate;

## 18 Verification

### 18.1 General

**Replace** the fifth paragraph with:

For tests in accordance with 18.2 and 18.3, measuring equipment in accordance with the EN 61557 series is applicable.

NOTE For other tests as required by this standard measuring equipment in accordance with relevant IEC or European Standards should be used.

### Annexes

After Annex G, **add** the following Annexes ZA and ZZ:

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## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60034-1	- <sup>1)</sup>	Rotating electrical machines Part 1: Rating and performance	EN 60034-1	2004 <sup>2)</sup>
IEC 60034-5	- <sup>1)</sup>	Rotating electrical machines Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) - Classification	EN 60034-5	2001 <sup>2)</sup>
IEC 60034-11	- <sup>1)</sup>	Rotating electrical machines Part 11: Thermal protection	EN 60034-11	2004 <sup>2)</sup>
IEC 60072-1	- <sup>1)</sup>	Dimensions and output series for rotating electrical machines - Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1 080	-	-
IEC 60072-2	- <sup>1)</sup>	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	2002	Basic and safety principles for man-machine interface, marking and identification - Coding principles for indicators and actuators	EN 60073	2002
IEC 60309-1	1999	Plugs, socket-outlets and couplers for industrial purposes Part 1: General requirements	EN 60309-1 + A11	1999 2004
IEC 60364-4-41	2001	Electrical installations of buildings Part 4-41: Protection for safety - Protection against electric shock	-	-
IEC 60364-4-43 + corr. August	2001 2002	Electrical installations of buildings Part 4-43: Protection for safety - Protection against overcurrent	-	-
IEC 60364-5-52	2001	Electrical installations of buildings Part 5-52: Selection and erection of electrical equipment - Wiring systems	-	-

<sup>1)</sup> Undated reference.

<sup>2)</sup> Valid edition at date of issue.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60364-5-53 + A1	2001 2002	Electrical installations of buildings Part 5-53: Selection and erection of electrical equipment - Isolation, switching and control	-	-
IEC 60364-5-54 (mod)	2002	Electrical installations of buildings Part 5-54: Selection and erection of electrical equipment - Earthing arrangements, protective conductors and protective bonding conductors	HD 60364-5-54	2006
IEC 60364-6-61	2001	Electrical installations of buildings Part 6-61: Verification - Initial verification	-	-
IEC 60417	data- base	Graphical symbols for use on equipment	-	-
IEC 60439-1	1999	Low-voltage switchgear and controlgear assemblies Part 1: Type-tested and partially type-tested assemblies	EN 60439-1	1999
IEC 60445 + corr. July	1999 2002	Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals and of terminations of certain designated conductors, including general rules for an alphanumeric system	EN 60445	2000
IEC 60446 + corr. July	1999 2002	Basic and safety principles for man-machine interface, marking and identification - Identification of conductors by colours or numerals	EN 60446	1999
IEC 60447	2004	Basic and safety principles for man-machine interface, marking and identification - Actuating principles	EN 60447	2004
IEC 60529 + A1	1989 1999	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May + A1	1991 1993 2000
IEC 60617	data- base	Graphical symbols for diagrams	-	-
IEC 60621-3	1979	Electrical installations for outdoor sites under heavy conditions (including open-cast mines and quarries) Part 3: General requirements for equipment and ancillaries	-	-
IEC 60664-1 (mod)	1992	Insulation coordination for equipment within low-voltage systems Part 1: Principles, requirements and tests	EN 60664-1 <sup>3)</sup>	2003
IEC 60947-1	2004	Low-voltage switchgear and controlgear Part 1: General rules	EN 60947-1 + corr. November	2004 2004
IEC 60947-2	2003	Low-voltage switchgear and controlgear Part 2: Circuit-breakers	EN 60947-2	2003

<sup>3)</sup> EN 60664-1 includes A1:2000 + A2:2002 to IEC 60664-1 (mod).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60947-3 + corr. July	1999 1999	Low-voltage switchgear and controlgear Part 3: Switches, disconnectors, switch- disconnectors and fuse-combination units	EN 60947-3	1999
IEC 60947-5-1	2003	Low-voltage switchgear and controlgear Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices	EN 60947-5-1 + corr. July	2004 2005
IEC 60947-7-1 + corr. March	2002 2003	Low-voltage switchgear and controlgear Part 7-1: Ancillary equipment - Terminal blocks for copper conductors	EN 60947-7-1	2002
IEC 61082-1 + corr. November	1991 1993	Preparation of documents used in electrotechnology Part 1: General requirements	EN 61082-1	1993
IEC 61082-2	1993	Preparation of documents used in electrotechnology Part 2: Function-oriented diagrams	EN 61082-2	1994
IEC 61082-3	1993	Preparation of documents used in electrotechnology Part 3: Connection diagrams, tables and lists	EN 61082-3	1994
IEC 61082-4	1996	Preparation of documents used in electrotechnology Part 4: Location and installation documents	EN 61082-4	1996
IEC 61140	2001	Protection against electric shock - Common aspects for installation and equipment	EN 61140	2002
IEC 61310	Series	Safety of machinery - Indication, marking and - actuation	-	-
IEC 61346	Series	Industrial systems, installations and equipment and industrial products - Structuring principles and reference designations	EN 61346	Series
IEC 61557-3	1997	Electrical safety in low voltage distribution systems up to 1 kV a.c. and 1,5 kV d.c. - Equipment for testing, measuring or monitoring of protective measures Part 3: Loop impedance	EN 61557-3	1997
IEC 61558-1 (mod) + A1	1997 1998	Safety of power transformers, power supply units and similar Part 1: General requirements and tests	EN 61558-1 + corr. April + A1 + A11 <sup>4)</sup>	1997 2003 1998 2003
IEC 61558-2-6	- <sup>1)</sup>	Safety of power transformers, power supply units and similar Part 2-6: Particular requirements for safety isolating transformers for general use	EN 61558-2-6	1997 <sup>2)</sup>
IEC 61984	2001	Connectors - Safety requirements and tests	EN 61984	2001

<sup>4)</sup> EN 61558-1 is superseded by EN 61558-1:2005, which is based on IEC 61558-1:2005.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 62023	2000	Structuring of technical information and documentation	EN 62023	2000
IEC 62027	2000	Preparation of parts lists	EN 62027	2000
IEC 62061 + corr. July	2005 2005	Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems	EN 62061	2005
IEC 62079	2001	Preparation of instructions - Structuring, content and presentation	EN 62079	2001
ISO 7000	2004	Graphical symbols for use on equipment - Index and synopsis	-	-
ISO 12100-1	2003	Safety of machinery - Basic concepts, general principles for design Part 1: Basic terminology, methodology	EN ISO 12100-1	2003
ISO 12100-2	2003	Safety of machinery - Basic concepts, general principles for design Part 2: Technical principles	EN ISO 12100-2	2003
ISO 13849-1	1999	Safety of machinery - Safety-related parts of control systems Part 1: General principles for design	-	-
ISO 13849-2	2003	Safety of machinery - Safety-related parts of control systems Part 2: Validation	EN ISO 13849-2	2003
ISO 13850	1996	Safety of machinery - Emergency stop - Principles for design	-	-

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## **Annex ZZ** (informative)

### **Coverage of Essential Requirements of EC Directives**

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers only the following essential requirements out of those given in Annex I of the EC Directive 98/37/EC:

- 1.1.2
- 1.2
- 1.5.1
- 1.5.4
- 1.6.3 (for isolation of electrical supplies of machinery)
- 1.6.4 (for access to electrical equipment)
- 1.7.0
- 1.7.1
- 1.7.2 (for residual risks of an electrical nature)
- 1.7.4(c)

Compliance with this standard provides one means of conformity with the specified essential requirements of the Directive concerned.

**WARNING:** Other requirements and other EC Directives may be applicable to the products falling within the scope of this standard.

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