

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Safety of machinery – Electrical equipment of machines –  
Part 31: Particular safety and EMC requirements for sewing machines, units and  
systems**

**Sécurité des machines – Équipement électrique des machines –  
Partie 31: Exigences particulières de sécurité et de CEM pour machines à  
coudre, unités et systèmes de couture**



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IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**SAFETY OF MACHINERY –  
ELECTRICAL EQUIPMENT OF MACHINES –****Part 31: Particular safety and EMC requirements  
for sewing machines, units and systems**

## FOREWORD

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International Standard IEC 60204-31 has been prepared by IEC technical committee 44: Safety of machinery – Electrotechnical aspects.

This fourth edition cancels and replaces the third edition, published in 2001. This edition constitutes a technical revision.

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

- a) Alignment of the normative references;
- b) Alignment of titles and subtitles to the IEC 60204-1;
- c) Revision of Annex AA to align this annex with the relevant IEC standards.

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

FDIS	Report on voting
44/685/FDIS	44/687/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.

This International Standard is to be used in conjunction with IEC 60204-1:2005 and its Amendment 1:2008.

This part supplements or modifies the corresponding clauses in IEC 60204-1 so as to convert that publication into the IEC standard dealing with requirements for the electrical equipment of sewing machines, units and systems.

Where a particular subclause of Part 1 is not mentioned in this part, that subclause applies as far as is reasonable. Where this part states "addition", "modification" or "replacement" the relevant text in Part 1 is adapted accordingly.

The Annex which is additional to those in Part 1 is lettered AA.

A list of all the 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 committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site 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.

## SAFETY OF MACHINERY – ELECTRICAL EQUIPMENT OF MACHINES –

### Part 31: Particular safety and EMC requirements for sewing machines, units and systems

#### 1 Scope

*This clause of Part 1 is replaced by:*

This part of IEC 60204 applies to the application of electrical and electronic equipment to sewing machines, units and systems, designed specifically for professional use in the sewing industry.

NOTE The requirements for sewing machines for household and similar use can be found in IEC 60335-2-28.

The equipment covered by this part commences at the point of connection of the supply to the electrical equipment of the machine (see 5.1). This part is applicable to the electrical equipment or parts of the electrical equipment which 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.

It does not cover all the requirements (e.g. guarding, interlocking, control) that are necessary to safeguard persons from hazards other than electrical hazards and which are specified in other standards.

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This part applies to sewing units and systems which are installed in dry and well-kept clean locations and which process dry sewing material, as in the clothing industry. Where sewing units and systems are used in other than dry and well-kept clean locations, more stringent measures can be necessary, which need to be agreed between manufacturer and customer.

The noise emission of electrical and electronic equipment for sewing machines is not considered to be a relevant hazard. Therefore this standard does not contain any specific requirements on noise.

#### 2 Normative references

*This clause of Part 1 is applicable except as follows:*

*Additional references:*

IEC 60204-1:2005, *Safety of machinery – Electrical equipment of machines – Part 1: General requirements*  
Amendment 1:2008

IEC 60364-4-41, *Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock*

IEC 60664-1:2007, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60721-3-3, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 3: Stationary use at weatherprotected locations*

IEC 60947-1:2007, *Low-voltage switchgear and controlgear – Part 1: General rules*  
Amendment 1:2010

IEC 61000-3-2, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current  $\leq 16$  A per phase)*

IEC 61000-3-3, *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current  $\leq 16$  A per phase and not subject to conditional connection*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2005, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

<https://standards.iteh.ai/catalog/standards/sist/14de9c06-4f0f-44e1-89cd->

IEC 61000-4-11, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

IEC 61058-1, *Switches for appliances – Part 1: General requirements*

IEC 61558-1, *Safety of power transformers, power supplies, reactors and similar products – Part 1: General requirements and tests*

CISPR 11:2009, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*  
Amendment 1:2010

ENV 50204, *Radiated electromagnetic field from digital radio telephones – Immunity test*

### 3 Terms and definitions

*This clause of Part 1 is applicable except as follows:*

*Additional definitions:*

#### 3.101

##### **sewing machine**

machine designed to produce one or more stitch types with one or more sewing threads

Note 1 to entry: Previously, the term “sewing machine head” was used instead of “sewing machine”.

Note 2 to entry: Stitch types are defined in ISO 4915.



Note 3 to entry: Seam types are defined in ISO 4916.

Note 4 to entry: In producing a seam, the machine can perform one or more sewing functions.

### 3.102

#### **sewing machine stand**

item, for example designed as a table, on which the sewing machine is arranged to enable optimum operation

### 3.103

#### **sewing machine drive**

equipment that drives a sewing machine, such as an electric motor, which is speed-controlled by electrical and/or mechanical means with or without a positioning device and with or without control of machine functions

### 3.104

#### **sewing unit**

equipment consisting of at least a sewing machine, a sewing machine stand and a sewing machine drive

Note 1 to entry: One or several devices incorporated in and/or attached to the sewing machine or sewing unit, for example for sewing, cutting, feeding, etc. the sewing material, as well as the sewing machine itself, are controlled by the operator or automatically.

### 3.105

#### **sewing system**

equipment consisting of at least two sewing units or parts of them, which are functionally interlinked

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## 4 General requirements

[IEC 60204-31:2013](#)

<https://standards.iteh.ai/catalog/standards/sist/14de9c06-4f0f-44e1-89cd->

*This clause of Part 1 is applicable except as follows:*

### 4.4.2 Electromagnetic compatibility (EMC)

*Replacement:*

*Replace this subclause with Annex AA.*

### 4.4.4 Humidity

*Modification:*

*Instead of the first paragraph, the following applies:*

The electrical equipment shall be capable of operating in the intended manner in the humidity conditions covered by class 3K3 as specified in IEC 60721-3-3.

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

*This clause of Part 1 is applicable except as follows:*

### 5.1 Incoming supply conductor terminations

*Modification:*

*Add after the first sentence of the first paragraph:*

Each sewing unit shall have only one incoming supply connection.

Each sewing system consisting of at least two sewing units that are not interlinked by means of control systems may have its own incoming supply connection for each sewing unit; however, if a failure of one sewing unit can cause a hazard, the sewing system shall have only one incoming supply connection.

### **5.3 Supply disconnecting (isolating) device**

#### **5.3.1 General**

*Addition:*

When sewing units are interconnected by means of control systems to form a sewing system, only one supply disconnecting device shall be provided.

#### **5.3.2 Type**

*Addition to item d):*

On sewing units and systems which are started and stopped by actuating a hold-to-run control device (e.g. pedal), an isolating switch according to IEC 60947-3 for utilization categories AC-3 or DC-3, or a incorporated switch according to IEC 61058-1, shall be used.

#### **5.3.4 Operating means**

*Addition:*

[IEC 60204-31:2013](https://standards.iteh.ai/catalog/standards/sist/14de9c06-4f0f-44e1-89cd-831566117623/iec-60204-31-2013)

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For seated positions the operating handle of the ON/OFF switch shall be mounted between 0,5 m and 1,5 m above the servicing level.

## **6 Protection against electric shock**

*This clause of Part 1 is applicable except as follows:*

### **6.1 General**

*Addition:*

This can also be achieved by the application of SELV according to IEC 60364-4-41.

## **7 Protection of equipment**

*This clause of Part 1 is applicable except as follows:*

### **7.5 Protection against supply interruption or voltage reduction and subsequent restoration**

*Addition:*

On sewing units and systems, which are started by actuating a hold-to-run control device (such as a pedal), and stopped by releasing it, the provision of a device for avoiding an unintentional restart after a supply interruption or voltage reduction and subsequent restoration is not necessary.

## 8 Equipotential bonding

*This clause of Part 1 is applicable except as follows:*

### 8.2.5 Parts that need not be connected to the protective bonding circuit

*Addition:*

It is not necessary to connect sewing machine stands or their accessible conducting parts when:

- they do not carry electrical equipment; or
- they carry electrical equipment operated at SELV and/or PELV only (see IEC 60364-4-41).

## 9 Control circuits and control functions

*This clause of Part 1 is applicable except as follows:*

### 9.1.1 Control circuit supply

*Replacement:*

Control circuits of sewing units and systems shall meet requirements for PELV (see 6.4) or SELV (see IEC 60364-4-41). The transformers supplying these circuits shall meet the requirements of IEC 61558-1.

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### 9.2.5.2 Start

[IEC 60204-31:2013](https://standards.iteh.ai/catalog/standards/sist/14de9c06-4f0f-44e1-89cd-cf8b566bb763/iec-60204-31-2013)

*Addition:* <https://standards.iteh.ai/catalog/standards/sist/14de9c06-4f0f-44e1-89cd-cf8b566bb763/iec-60204-31-2013>

The requirements of 9.2.5.2 do not apply to:

- sewing units and systems, which are started by actuating a hold-to-run control device (such as a pedal).

### 9.2.5.3 Stop

*Addition:*

The stop function required for sewing units and systems is met by a hold-to-run control devices (such as a pedal). On sewing units and systems for automatic bar tacking, sewing of buttonholes, fastening of buttons, etc., which have a short sewing cycle, the required function is met by an ON/OFF switch according to IEC 60947-3 or IEC 61058-1.

## 9.4 Control functions in the event of failure

### 9.4.1 General requirements

*Addition:*

NOTE On sewing units and systems on which the hazardous movement of parts is protected by fixed guards, interlocking of the guard with the electrical circuit is not necessary.

### 9.4.2.2 Provisions of partial or complete redundancy

*Addition:*

NOTE On sewing units and systems on which the hazardous movement of parts is limited to parts of the sewing machine itself, for example stitch forming elements, feed, etc., use of redundancy is not necessary.

### 9.4.2.3 Provision of diversity

*Addition:*

NOTE On sewing units and systems on which the hazardous movement of parts is limited to parts of the sewing machine itself, for example stitch forming elements, feed, etc., use of diversity is not necessary.

### 9.4.3.1 Earth faults

*Addition:*

On sewing units and systems, a particularly safe installation of those conductors that in the case of an earth fault could cause unintended starting, or hazardous movement of a machine, or could prevent its stopping, may be used instead of connecting the control circuits to the protective bonding circuit or providing an insulation monitoring device.

A particularly safe installation can be achieved, for example, by:

- enclosure of insulated conductors in ducts of insulating material;
- use of double insulation techniques; or
- encapsulation of components and devices.

## 10 Operator interface and machine mounted control devices

*This clause of Part 1 is applicable except as follows:*

### 10.1.2 Location and mounting

*Modification:*

[IEC 60204-31:2013](https://standards.iteh.ai/catalog/standards/sist/14de9c06-4f0f-44e1-89cd-27b566bb763/iec-60204-31-2013)

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*Replace the first dashed indent of the second paragraph by the following:*

- those used for normal operation are not less than 0,5 m above the servicing level and are within easy reach from the normal working position of the operator (but see also 5.3.4 of this part);
- those used for adjustment and maintenance are not less than 0,3 m above the servicing level and so installed that they cannot be actuated during normal operation for example by position, locking, etc.

### 10.1.3 Protection

*Replacement:*

Where mounted as intended, operator interface and machine mounted control devices shall withstand the stresses of the expected use and shall have a minimum degree of protection of at least IP40 (see IEC 60529). IP40 is considered to be sufficient when sewing units and sewing systems are operated in an environment in which the effects of aggressive fluids, vapours and contamination by coarse dust and chips are not to be expected.

## 10.2 Push-buttons

### 10.2.1 Colours

*Modification:*

*Instead of the first paragraph, the following applies:*

As far as is practicable, push-button actuators shall be colour-coded in accordance with Table 2; limitations of the practicability are sizes of actuators, built-in casing and design of actuators.

### 10.3 Indicator lights and displays

#### 10.3.2 Colours

*Modification:*

*Instead of the first sentence, the following applies:*

As far as is practicable, indicator light lenses shall be colour-coded, with respect to the condition (status) of the machine in accordance with Table 4; limitations of the practicability are sizes of actuators, built-in casing and design of actuators.

### 10.4 Illuminated push-buttons

*Modification:*

*Instead of the first sentence, the following applies:*

As far as is practicable, illuminated push-buttons shall be colour-coded in accordance with Tables 2 and 4; limitations of the practicability are sizes of actuators, built-in casing and design of actuators.

#### 10.7.4 Local operation of the supply disconnecting device to effect emergency stop

*Addition:*

[IEC 60204-31:2013](https://standards.iteh.ai/catalog/standards/sist/14de9c06-4f0f-44e1-89cd-83b5661b763/iec-60204-31-2013)

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On automatically controlled sewing units and systems for which emergency stop devices according to 10.7.2 are considered to be unnecessary, the supply disconnecting device shall fulfil the function of the emergency stop device.

On sewing units and systems which are started by actuating a hold-to-run control device (such as a pedal), an emergency stop device is not required. Moreover, an emergency stop device is not necessary on automatically controlled sewing units and systems for automatic bar tacking, sewing of buttonholes, fastening of buttons, etc., which have only a short automatic sewing process.

These sewing units and systems may be equipped with a device according to IEC 60947-3 or IEC 61058-1 for switching ON and OFF.

## 11 Controlgear: location, mounting and enclosures

*This clause of Part 1 is applicable except as follows:*

### 11.2 Location and mounting

#### 11.2.1 Accessibility and maintenance

*Modification:*

*Instead of the second paragraph, the following applies:*

Where access is required for regular maintenance or adjustment, the relevant devices shall be arranged between 0,3 m and 2,0 m above the servicing level.

### 11.2.2 Physical separation or grouping

*Addition:*

In enclosures according to 6.2.1, the distances between the protective enclosure and live parts shall be not less than the clearance and creepage distances given in Table 13 Case A and Table 15 of IEC 60947-1:2007, Amendment 1:2010, pollution degree 2 shall apply.

For printed circuit assemblies and all other electrical equipment and devices (such as switches, motors), IEC 60664-1:2007, Table F.4, pollution degree 2 shall apply.

### 11.3 Degrees of protection

*Replacement:*

The minimum degree of protection shall be IP40 for enclosures of switching devices of sewing units and systems. **Exception:** if all the circuits used in and with the devices meet the requirements of 6.1 of this part of IEC 60204, IP20 is permitted as the minimum degree of protection.

## 12 Conductors and cables

*This clause of Part 1 is applicable.*

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## 13 Wiring practices (standards.iteh.ai)

*This clause of Part 1 is applicable except as follows:*

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### 13.2.4 Identification by colour [cf8b566bb763/iec-60204-31-2013](https://standards.iteh.ai/catalog/standards/sist/14de9c06-4f0f-44e1-89cd-cf8b566bb763/iec-60204-31-2013)

*Addition:*

Conductors used for functional earthing shall be identified by the colour GREY.

Common conductors, for example for eliminating static charges, shall be identified by the colour GREY.

### 13.5.8 Connection boxes and other boxes

*Modification:*

*Instead of the second sentence of the first paragraph, the following applies:*

IP40 (see IEC 60529) shall be the minimum degree of protection for connection and through boxes of sewing units and systems. **Exception:** if all the circuits used in and with the devices meet the requirements of 6.1 of this part of IEC 60204, IP20 is permitted as the minimum degree of protection.

## 14 Electric motors and associated equipment

*This clause of Part 1 is applicable except as follows:*

### 14.1 General requirements

*Addition:*

Voltage transformation for the purpose of feeding external consumers (loads) by tapping the stator winding of motors is not permitted.

## 14.2 Motor enclosures

*Addition:*

The minimum degree of protection of the sewing machine drive (including the control device possibly attached to it) shall be IP40.

## 14.3 Motor dimensions

*Addition:*

The dimensions of sewing machine drives need not correspond to IEC 60072-1 and IEC 60072-2.

## 15 Accessories and lighting

*This clause of Part 1 is applicable except as follows:*

### 15.2 Local lighting of the machine and equipment

#### 15.2.1 General

*Addition:*

For local lighting (sewing lamps) of sewing units and systems up to a rated voltage of 50 V a.c., the ON/OFF switch may be incorporated in the flexible connecting cords.

#### 15.2.2 Supply

*Addition:*

Low-voltage sewing lamps shall be supplied either by built-in transformers or by external extra-low voltage transformers according to IEC 61558-1.

Circuits for local lighting (sewing lamps) intended for use, for example threading, replacing sewing implements, maintenance work, shall be connected to the incoming supply side of the device for switching ON and OFF the sewing unit or system.

## 16 Marking, warning signs and reference designations

*This clause of Part 1 is applicable.*

## 17 Technical documentation

*This clause of Part 1 is applicable except as follows:*

### 17.7 Operating manual

*Addition:*