



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS B 9960-31 : 2004

(IEC 60204-31 : 2001)

(JMF)

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

ICS 13.110; 61.080

Reference number : JIS B 9960-31 : 2004 (E)

PROTECTED BY COPYRIGHT

Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Health, Labour and Welfare, and the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal of establishing a Japanese Industrial Standard from the Japan Machinery Federation (JMF) with a draft of Industrial Standard based on the provision of Article 12 Clause 1 of Industrial Standardization Law.

This Standard has been made based on IEC 60204-31:2001, *Safety of machinery – Electrical equipment of machines – Part 31: Particular safety and EMC requirements for sewing machines, units and systems* for the purposes of making it easier to compare this Standard with International Standard; to prepare Japanese Industrial Standard conforming with International Standard; and to propose a draft of an International Standard which is based on Japanese Industrial Standard.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Ministers and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

JIS B 9960 consists of the following 4 parts under the general title *Safety of machinery – Electrical equipment of machines*:

Part 1 : General requirements

Part 11: Requirements for HV equipment for voltages above 1 000 V a.c. or 1 500 V d.c. and not exceeding 36 kV

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

Part 32: Requirements for hoisting machines.

Date of Establishment: 2004-03-25

Date of Public Notice in Official Gazette: 2004-03-25

Investigated by: Japanese Industrial Standards Committee
Standards Board

Technical Committee on Industrial Machinery

JIS B 9660-31 : 2004, First English edition published in 2004-11

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

© JSA 2004

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

PROTECTED BY COPYRIGHT

Contents

	Page
Foreword	
Introduction	1
1 Scope	2
2 Normative references	2
3 Definitions	5
4 General requirements	5
5 Incoming supply conductor terminations and devices for disconnecting and switching off	5
6 Protection against electric shock	6
7 Protection of equipment	6
8 Equipotential bonding	7
9 Control circuits and control functions	7
10 Operator interface and machine mounted control devices	8
11 Control interfaces	10
12 Electronic equipment	10
13 Controlgear: location, mounting and enclosures	10
14 Conductors and cables	10
15 Wiring practices	11
16 Electric motors and associated equipment	11
17 Accessories and lighting	11
18 Warning signs and item designations	12
19 Technical documentation	12
20 Testing	12
Annexes AA (normative) Electromagnetic compatibility requirements	13
Annexes BB (informative) Bibliography	21
Annex 1 (informative) Comparison table of related standards	22

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

Introduction This Japanese Industrial Standard has been prepared based on the third edition of IEC 60204-31, *Safety of machinery—Electrical equipment of machines—Part 31: particular safety and EMC requirements for sewing machines, unit and systems* published in 2001 without modifying the technical contents.

Portions given sidelines or dotted underlines are the matters not stated in the original International Standard.

This Standard is intended to be used in conjunction with IEC 60204-1: *Safety of machinery—Electrical equipment of machines—Part 1: General requirements* (Edition 3, 1992).

This Standard supplements or modifies the corresponding clauses in IEC 60204-1 so as to specify requirements for the electrical equipment of sewing machines, units and systems.

Annexes which are additional to those in IEC 60204-1:1992 are lettered AA and BB.

Information 1 IEC 60204-1 (Edition 4) was published in 1997, and the corresponding JIS B 9960-1 has come into effect in 1999. But the original International Standard of this Standard IEC 60204-31, refers IEC 60204-1:1992 edition, not that 1997 edition. JIS identical with IEC 60204-1:1992 does not exist, therefore, this Standard specifies supplements to or modifications from IEC 60204-1:1992, but not JIS B 9960-1.

Since difference between IEC 60204-1:1992 and IEC 60204-1:1997 is small, it is possible to understand outlines of this Standard by referring JIS B 9960-1. Annex 1 (informative) shows comparison between IEC 60204-1:1992 and IEC 60204-1:1997 (JIS B 9960-1).

- 2 The original International Standard of this Standard, IEC 60204-31:1992 is practically the same as EN 60204-31:1998, which conforms to this Standard.
- 3 Annex AA (normative) specifies concrete requirements of EMC and constitutes part of provisions. Annex BB (informative) gives information only. Annex 1 (informative) is the matters not stated in the original International Standard.

1 Scope This part of **JIS B 9960** applies to the application of electrical and electronic equipment to sewing machines, units and systems, designed specifically for professional use in the sewing industry.

The equipment covered by this part of **JIS B 9960** commences at the point of connection of the supply to the electrical equipment of the machine (see 5.1). This part of **JIS B 9960** 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.

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 may be necessary, which need to be agreed.

Note 1 See **IEC 60335-2-28 (JIS C 9335-2-28)** for requirements for sewing machines for household and similar use.

2 The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

IEC 60204-31:2001, *Safety of machinery—Electrical equipment of machines—Part 31: Particular safety and EMC requirements for sewing machines, unit and systems* (IDT)

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. If the indication of the year of coming into effect or the year of publication is given to these referred standards, only the edition of the indicated year constitutes the provision of this Standard but the revision and amendment made thereafter do not apply.

JIS C 0364-4-41:1997 *Electrical installations of buildings Part 4: Protection for safety Chapter 41: Protection against electric shock*

Note : **IEC 60364-41:1992**, *Electrical installation of buildings—Part 4: Protection for safety—Chapter 41: Protection against electric shock* is identical with the said standard.

JIS C 0704:1995 *Insulation test for control gear*

Note : **IEC 60664-1:1992**, *Insulation coordination for equipment within low-voltage systems—Part 1: Principles, requirements and tests* is equivalent

to the said standard.

JIS C 0920:1993 *Tests to prove protection against ingress of water and degrees of protection against ingress of solid objects for electrical equipment*

Note : IEC 60592:1989, *Degrees of protection provided by enclosures (IP code)* is identical with the said standard.

JIS C 4203:1983 *Single phase induction motors for general purpose*

Note : IEC 60072-1:1991, *Dimension and output series of rotating electrical machines—Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1 080* is equivalent to the said standard.

JIS C 4210:1983 *Low-voltage three-phase squirrel-cage induction motors for general purpose*

Note : IEC 60072-2:1991, *Dimension and output series of rotating electrical machines—Part 2: Frame numbers 355 to 1 000 and flange numbers 1 180 to 2 360* is equivalent to the said standard.

JIS C 4526-1:1999 *Switches for appliances—Part 1: General requirements*

Note : IEC 61058-1:1996, *Switches for appliances—Part 1: General requirements* is equivalent to the said standard.

JIS C 8201-3:2001 *Low-voltage switchgear and controlgear—Part 3: Switches, disconnectors, switch—disconnectors and fuse-combination units*

Note : IEC 60947-3:1990, *Low voltage switchgear and controlgear—Part 3: Switches, disconnectors and fuse-combination units* is equivalent to the said standard.

JIS C 8201-4-1:1999 *Low-voltage switchgear and controlgear—Part 4: Contactors and motor-starters Section 1: Electromechanical contactors and motor-starters*

Note : IEC 60947-4-1:1990, *Low voltage switchgear and controlgear—Part 4: Contactors and motor-starters—Section One: Electrotechnical contactors and motor-starters* is equivalent to the said standard

JIS C 9742:2000 *Isolating transformers and safety isolating transformers—Requirements* is equivalent to the said standard.

Note : IEC 60742:1983 *Isolating transformers and safety isolating transformers. Requirements* is equivalent to the said standard

JIS C 60721-3-3:1997 *Classification of environmental conditions Part 3: Classification of groups of environmental parameters and their severities Section 3: Stationary use at weatherprotected locations*

Note : IEC 60721-3-3, *Classification of environmental conditions—Part 3: Classification of groups of environmental parameters and their severities—Section 3: Stationary use at weather-protected locations* is identical with the said standard.

JIS C 61000-4-2:1999 *Electromagnetic compatibility (EMC)—Part 4: Testing and*

measurement techniques—Section 2: Electrostatic discharge immunity test

Note : **IEC 61000-4-2:1995** *Electromagnetic compatibility (EMC)—Part 4: Testing and measurement techniques—Section 2: Electrostatic discharge immunity test. Basic EMC publication* is identical with the said standard.

JIS C 61000-4-3:1997 *Electromagnetic compatibility (EMC)—Part 4: Testing and measurement techniques—Section 3: Radiated, radio-frequency, electromagnetic field immunity test*

Note : **IEC 61000-4-3:1995**, *Electromagnetic compatibility (EMC)—Part 4: Testing and measurement techniques—Section 3: Radiated radio-frequency, electromagnetic immunity test* is identical with the said standard.

JIS C 61000-4-4:1999 *Electromagnetic compatibility (EMC)—Part 4: Testing and measurement techniques—Section 4: Electrical fast transient/burst immunity test*

Note : **IEC 61000-4-4:1995**, *Electromagnetic compatibility (EMC)—Part 4: Testing and measurement techniques—Section 4: Electrical fast transient/burst immunity test. Basic EMC Publication* is equivalent to the said standard.

JIS C 61000-4-6:1999 *Electromagnetic compatibility (EMC)—Part 4: Testing and measurement techniques—Section 6: Immunity to conducted disturbances, induced by radio-frequency fields*

Note : **IEC 61000-4-6:1996**, *Electromagnetic compatibility (EMC)—Part 6: Testing and measurement techniques—Section 6: Immunity to conducted disturbances, induced by radio-frequency fields* is equivalent to the said standard.

IEC 60034-1:1997, *Rotating electrical machines—Part 1: Rating and performance*

Note : **JIS C 4034-1:1999** *Rotating electrical machines Part 1: Rating and performance* is based on the said standard, but is not equivalent.

IEC 60204-1:1992, *Electrical equipment of industrial machines—Part 1: General requirements*

ISO 4915:1991, *Textiles—Stitch types—Classification and terminology*

ISO 4916:1991, *Textiles—Seam types—Classification and terminology*

CISPR 11:1999, Ed.3.1, *Industrial, scientific and medical (ISM) radio frequency equipment—Electromagnetic disturbance characteristics—Limits and methods of measurement*

ENV 50204:1995 *Radiated electromagnetic field from digital radio telephones—Immunity test*

3 Definitions For the purposes of this Standard, the definitions given in IEC 60204-1:1992 and the following definitions apply.

3.101 sewing machine machine designed to produce one or more stitch type (see ISO 4915) with one or more sewing threads. In producing a seam (see ISO 4916) the machine can perform one or more sewing functions.

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

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. 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.

4 General requirements Given in clause 4 of IEC 60204-1:1992 and the following apply.

4.4.1 Electromagnetic compatibility Annex AA shall apply instead of 4.4.1 of IEC 60204-1:1992.

4.4.3 Humidity Given in 4.4.3 of IEC 60204-1:1992, however, 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 JIS C 60721-3-3.

5 Incoming supply conductor terminations and devices for disconnecting and switching off Given in clause 5 of IEC 60204-1:1992 and the following apply.

Information : The conductor means mainly cables or electric wires. In some cases, it means bare conductors.

5.1 Incoming supply conductor terminations Given is 5.1 of IEC 60204-1:1992 and the following apply.

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 may have its own incom-

ing 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.

Further, the first sentence of the third paragraph is replaced by the following:

A neutral conductor may be used.

5.3 Supply disconnecting (isolating) device

5.3.1 General Given in 5.3.1 of IEC 60204-1:1992 and the following apply.

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

5.3.2 Type Given in 5.3.1 of IEC 60204-1:1992 and the following apply.

Addition to items d):

On sewing units and systems which are started and stopped by a actuating a hold-to-run control device (e.g. pedal), an isolating switch according to **JIS C 8201-3** for utilization categories AC-3 or DC-3, or a built-in switch according to **JIS C 4526-1**, shall be used.

5.3.3 Requirements

5.3.3.1 General Given in 5.3.3.1 of IEC 60204-1:1992 and the following apply.

This implies that in the case of 5.3.2 d), the requirements of 5.3.3.1 of IEC 60204-1:1992 do not apply.

5.3.4 Operating handle Given in 5.3.4 of IEC 60204-1:1992 and the following apply.

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 Given in clause 6 of IEC 60204-1:1992 and the following apply.

6.1 General Given in 6.1 of IEC 60204-1:1992 and the following apply.

This can also be achieved by the application of SELV according to **JIS C 0364-4-41**, particularly the last paragraph of 411.1.4.3.

6.4 Protection by the use of PELV (Protective Extra-Low Voltage) Item b) of 6.4 of IEC 60204-1:1992 is not applicable.

7 Protection of equipment Given in clause 7 of IEC 60204-1:1992 and the following apply.

7.5 Protection against supply interruption or voltage reduction and subsequent restoration Given in 7.5 of IEC 60204-1:1992 and the following apply.

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 Given in clause 8 of IEC 60204-1:1992 and following apply.

8.2.5 Parts which need not be connected to the protective bonding circuit Given in 8.2.5 of IEC 60204-1:1992 and the following apply.

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 **JIS C 0364-4-41**).

9 Control circuits and control functions Given in clause 9 of IEC 60204-1:1992 and the following apply.

9.1.1 Control circuit supply Instead of 9.11 of IEC 60204-1:1992, the following apply:

Control circuits of sewing units and systems shall meet requirements for PELV (see 6.4) or SELV (see **JIS C 0364-4-41**). The transformers supplying these circuits shall meet the requirements of **JIS C 9742**.

9.1.4 Connection of control devices The requirements of 9.1.4 of IEC 60204-1:1992 does not apply to controls of sewing machine drives with positioning devices.

9.2.5.2 Start The requirements of 9.2.5.2 of IEC 60204-1:1992 do not apply to:

- sewing units and systems, which are started by actuating a hold-run control device (such as a pedal);
- sewing units and systems for automatic bar tacking, sewing of buttonholes, fastening of buttons, etc., which have a short sewing cycle.

9.2.5.3 Stop Given in 9.2.5.3 of IEC 60204-1:1992 and the following apply.

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 **JIS C 8201-3** or **JIS C 4526-1**.

9.4 Control functions in case of failure Given in 9.4 of IEC 60204-1:1992 and the following apply.

9.4.1 General requirements Given in 9.4.1 of IEC 60204-1:1992, and following note is added.

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., in general a single failure cannot give rise to hazardous conditions because the mechanical guards. Therefore, for these machines protective interlocking of the electrical circuit is not necessary.

9.4.2 Measures to minimize risk in case of failure

9.4.2.1 Use of proven circuit techniques and components Given in 9.4.2.1 of IEC 60204-1:1992, however, at the end of the second indent, replace “(see 9.1.4)” by the following:

Note : See 9.1.4 of this Standard.

9.4.2.2 Provision for redundancy Given in 9.4.2.2 of IEC 60204-1:1992, and following note is added.

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., provision of redundancy is not necessary.

9.4.2.3 Use of diversity Given in 9.4.2.3 of IEC 60204-1:1992, and following note is added.

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 Given in 9.4.3.1 of IEC 6024-1:1992 and the following apply.

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 Given in clause 10 of IEC 60204-1:1992 and the following apply.

10.1.1 Location and mounting Given in 10.1.1 of IEC 60204-1:1992, however, the first dashed indent the second paragraph is replaced by the following:

- those used for normal operation are not less than 0.6 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 normal operation for example by position, locking, etc.