

JIS

JAPANESE INDUSTRIAL STANDARD

Electrically heated area rugs

JIS C 9216—1992

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by

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In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

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Electrically heated area rugs

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1. Scope

This Japanese Industrial Standard specifies electrically heated area rugs by single phase a.c. supply with a rated voltage 100 V and a rated power consumption exceeding 100 W, having a front area of 1.5 m² or more, employing a heat sensitive wire or heat sensitive area for temperature detection (hereafter referred to as "area rugs").

Remarks 1. The following standards are cited in this Standard:

JIS C 3301-Rubber Insulated Flexible Cords

JIS C 3306-Polyvinyl Chloride Insulated Flexible Cords

JIS C 8303-Plugs and Receptacles for Domestic and Similar
General Use

JIS C 8304-Small Switches for Indoor Use

JIS C 8358-Appliance Couplers for Domestic and Similar Use

JIS K 2240-Liquefied Petroleum Gases

JIS K 5400-Testing Methods for Paints

JIS K 7202-Method of Rockwell Hardness Test for Plastics

JIS L 0801-General Principles of Testing Method for Colour
Fastness

JIS L 0842-Testing Methods for Colour Fastness to Carbon Arc
Lamp Light

JIS L 0849-Testing Method for Colour Fastness to Rubbing

JIS L 1021-Testing Methods for Textile Floorcoverings

JIS L 1023-Testing Methods for Several Characteristics of Textile
Floor Coverings

JIS L 2001-Cotton Wadding

JIS L 4405-Tufted Carpets

JIS S 6006-Pencils and Coloured Pencils

2. The units and numerical values given in { } in this Standard are based on the traditional unit system and are appended for informative reference.

2. Definitions

For the purpose of this Standard, the following principal definitions apply:

- (1) main body The part of area rug which is fundamentally flat, contains the heating elements inside and is used for providing warmth. In general, the integrated type has surface cloth with piles portion, and the separate type has surface cloth without piles portion.
- (2) controller A device which carries out the on-off of the power supply and/or controls or changes the temperature. There are two types i.e. the one attached to the cord and the one attached to the main body.
- (3) functional body The generic name of main body and controller.
- (4) heating element The heating wire or heating area covered with insulating materials.
- (5) heat sensitive wire The wire arranged continuously inside the main body to detect the temperature, to convert the detected temperature characteristic to the electric characteristic and to transmit it to the control device.
- (6) heat sensitive area The sheet arranged inside the main body to detect the temperature, to convert the detected temperature characteristic to the electric characteristic and to transmit it to the control device.
- (7) set temperature The temperature at the temperature guarantee point assigned by the manufacturer.
- (8) warming surface cloth This is the cloth which comes in contact with the user at warming and which has generally a piled portion. It means the upper surface of main body in the integrated type one, and the exclusive cover in the separate type one.
- (9) starting current The power consumption at the start of passing current divided by the rated voltage.
- (10) clean water City water of waterworks.
- (11) type permitting joint use with KOTATSU (Japanese type framed foot warmer) An area rug which permits joint use (simultaneous current passing) of table type KOTATSU on its main body.
- (12) exclusive cover The cover which is used for separate type ones, assigned by the manufacturer and has piled portion in general.
- (13) dirt preventive cover The cover used for integrated type ones having no piled portion in general.
- (14) rated current The rated power consumption divided by the rated voltage.
- (15) connector Plug and receptacle, and appliance coupler for domestic and similar use which are engaged and disengaged by the user.

- (16) internal wiring connector The connector which is used for connection of wiring inside the functional body by the manufacturer.
- (17) automatic switch A switch which opens automatically the circuit when the set temperature is attained and which is closed manually.
- (18) pile yarn The yarn which is used for the surface cloth for warming to improve feeling of touch, keeping of warmth, etc. and inserted or woven into the ground fabric.
- (19) label for flame retardant product The authorization label which is given to the products which comply with the Flame Retardancy Requirement, Order of Ministry of Home Affairs based on the Fire Service Law.

Remarks: It is issued from the Japan Fire Retardant Association (A Foundational Juridical Person)

- (20) tufted carpet Such fabric that the pile is formed by inserting the pile yarn into the ground fabric by means of a tufting machine or the like and the pile is fixed to the rear face by using adhesive.
- (21) woven carpet The fabric with piles which is woven by using a loom equipped with a wire beating device, double pile loom or Axminster loom.

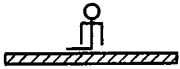
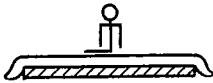
3. Rated voltage and rated frequency

The rated voltage shall be single phase a.c. 100 V, and the rated frequency shall be 50/60 Hz in common.

4. Classification

Area rugs shall be classified according to the service state as shown in Table 1.

Table 1. Classification of area rugs

Classification	Service state	Drawing of service state
Integrated type	In general user gets warm by sitting directly on surface cloth of main body	
Separate type	In general an exclusive cover is spread over surface cloth of main body and user gets warm by sitting on the exclusive cover.	

Remarks: Ones which are usually used without cover, but covered to avoid dirt are included in the integrated type.

5. Performance

5.1 Voltage fluctuation The area rug shall be capable of being used without any trouble when tested for the voltage fluctuation in accordance with 8.2.

5.2 Power consumption The power consumption shall comply with the following requirements when the test of 8.3 is carried out.

- (1) The power consumption shall comply with the requirement corresponding to the rated power consumption given in Table 2. However, area rugs specified in (2) are excluded.

Table 2. Tolerance on power consumption

Power consumption W	Tolerance %
1000 or under	$\pm 10 \begin{pmatrix} + 10 \\ - 15 \end{pmatrix}$
Over 1000	$\begin{matrix} + 5 \\ - 10 \end{matrix} \begin{pmatrix} + 5 \\ - 12 \end{pmatrix}$

Remarks: The numerical values in parentheses apply to such a case that thyristers or similar elements are connected in series to the heating element.

- (2) For the area rug which employs a thyristor or similar control mechanism, the power consumption of which varies correlating with the change of service state and in which the indication of rated value is unavoidably made by the range from the minimum to the maximum, the power consumption shall fall within the said range.

5.3 Insulation

5.3.1 Insulation resistance The insulation resistance shall be not less than 1 M Ω when measured as specified in 8.4.1.

5.3.2 Insulation resistance at immersion in water When the test of 8.4.2 is carried out, the insulation resistance during immersion in water shall be not less than 0.3 M Ω and the insulation resistance after drying shall be not less than 1 M Ω .

5.3.3 Insulation resistance under damp, heat When the test of 8.4.3 is carried out, the insulation resistance after the damp heat test shall be not less than 0.3 M Ω and the insulation resistance after drying shall be not less than 1 M Ω .

5.3.4 Dielectric withstand voltage When the test of 8.4.4 is carried out, the specimen shall withstand the test voltage.

5.3.5 Leakage current When the test of 8.4.5 is carried out, the leakage current shall be not more than 1 mA.

5.4 Temperature

5.4.1 Normal temperature When the normal temperature test is carried out as specified in 8.5.2, the temperature of each part shall not exceed the appropriate value in Table 3.

Table 3. Temperature

Unit: °C

Point of measurement		Temperature
Surface of heating element		120
Surface of main body enclosure		90
Winding	Made of class A insulation	100
	Made of class E insulation	115
	Made of class B insulation	125
	Made of class F insulation	150
	Made of class H insulation	170
Rectifier (only that used in power supply circuit of a.c. side), made of silicon		135
Contact of fuse clip		90
Knob and push button of switch or the like	Made of metal, ceramics or glass	60
	Made of others	75
Enclosure of controller	Made of metal, ceramics or glass	55
	Made of others	70
Surface of wooden base on which controller is placed		70

Remarks 1. The reference ambient temperature is 20°C.

2. The surface of wooden base on which controller is placed are used for the controller separated from the main body but connected through a cord.

5.4.2 Temperature when table type KOTATSU is jointly used When an area rug marked with "permit joint use with KOTATSU" is tested in accordance with 8.5.3, the temperature at the surface of main body enclosure inside the KOTATSU shall not exceed 110°C.

5.4.3 Abnormal temperature The abnormal temperature shall comply with the following requirements when measured in the test of 8.5.4.

- (1) The surface temperature of heating element shall not exceed 120°C, when measured as specified in 8.5.4 (1).
- (2) The temperature of heating element shall not exceed 150°C, when measured as specified in 8.5.4 (2), on the one marked with "Permit joint use with KOTATSU".
- (3) The surface temperature of main body enclosure shall not exceed 150°C, when measured as specified in 8.5.4 (3).
- (4) The surface temperature of heating element shall not exceed 150°C, when measured as specified in 8.5.4 (4).
- (5) The insulation resistance shall be not less than 0.1 MΩ when measured as specified in 8.5.4 (5).

5.4.4 Tolerance on temperature at temperature guarantee point When the test is made according to the method of 8.5.5, the difference between the temperature at the temperature guarantee point and the set temperature shall fall within a range of $\pm 8^\circ\text{C}$.

5.4.5 Temperature distribution When the test of 8.5.6 is carried out, the difference between overall average value on the average temperatures at every point and the value of average temperature at each point shall be not more than 5°C.

5.5 Folding performance When the main body is tested according to the method of 8.6, such abnormalities as breaking of heating wire, heat sensitive wire and heat sensitive area and damage of cloth shall not occur at each part.

5.6 Uniform characteristic of heat sensitive wire When an area rug employing heat sensitive wires is tested according to 8.7, the deviation of each operating temperature from the average operating temperature shall fall within the appropriate deviation of Table 4.

Table 4. Deviation of operating temperature from average value

Unit: °C

Average value of operating temperature	Deviation
120 or under	± 7
Over 120	± 10

5.7 Mechanical strength

5.7.1 Static loading When the test is made according to the method of 8.8.1, the functional body shall not cause fissures, or cracks at each part and shall comply with the provision of 5.4.1 after the test.

5.7.2 Falling of controller When a controller connected by a cord to main body is tested according to the method of 8.8.2, it may be impossible to pass the current, but shall not expose its live parts and the insulation resistance between the live parts and the surface of controller shall be not less than 0.1 MΩ.

Further, the controller which can pass the current shall comply with the provision of 5.4.3 (1).

5.7.3 Static loading for long period When the main body excluding the controller, is tested as specified in 8.8.3, it shall not cause fissures or cracks at each part and shall comply with the provision of 5.4.1 after the test.

5.8 Endurance of relay (for switching) When an area rug equipped with a relay connected in series to the heating element is tested as specified in 8.9, no abnormalities such as welding and burning of relay contacts shall appear.

5.9 Endurance of cord

5.9.1 Flexure of joint of cord with functional body When the test is carried out in accordance with 8.10.1, the cord shall not cause short circuit or other hazards, and the rate of broken component wires shall not exceed 20 %.

5.9.2 Flexure of joint of cord with power supply plug When an area rug equipped with a power supply plug is tested as specified in 8.10.2, the cord shall not cause short circuit or other hazards, and the rate of broken component wires shall not exceed 20 %.

5.10 Color fastness of warming surface cloth

5.10.1 Color fastness to rubbing of warming surface cloth When the test of 8.11 (1) is carried out, the specimen shall be the staining criterion of grade 4 or better specified in JIS L 0801. If the color fastness to light stated in 5.10.2 is grade 4 or better, this performance may be grade 3 or better.

5.10.2 Color fastness to light of warming surface cloth When the test of 8.11 (2) is carried out, the specimen shall be the criterion of change in color of grade 4 or better specified in JIS L 0801. If the color fastness to rubbing stated in 5.10.1 is grade 4 or better, this performance may be grade 3 or better.

5.11 Pull-out strength of pile yarn When an area rug employing pile yarns for its warming surface cloth is tested in accordance with 8.12, the pull-out strength of pile yarn shall comply with Table 5.

Table 5. Pull-out strength of pile yarn

Unit: N {gf}

Kind of warming surface cloth	Pull-out strength
Tufted carpet	7 { 700 }
Woven carpet	3 { 300 }

5.12 Flame retardance The area rug on which the label for flame retardant product is attached based on the Fire Service Law or that marked with "flame retardant" is tested in accordance with 8.13, the carbonized distance and duration of residual flame shall comply with Table 6.

Table 6. Carbonized distance and duration of residual flame

Item	Carbonized distance cm	Duration of residual flame s
Longitudinal direction	10 max.	20 max.
Lateral direction		

5.13 External dimensions of main body When the external dimensions of main body is measured as specified in 8.14 on area rugs of rectangular main body, the dimensions shall be as stated in Table 7 referring to the marked dimensions.

Table 7. Tolerance on external dimensions

Item	Tolerance %
Marked dimensions of main body (longitudinal, lateral)	+ 2 - 1

6. Construction

6.1 Construction in general The construction of area rugs shall comply with the following requirements:

- (1) The functional body shall not cause any danger under its normal service conditions, shall have enough endurance and correct style, shall be assembled well and be operated smoothly.
- (2) The area rug which has remote operation mechanism shall be such that closing of the power supply circuit is not possible by operations other than those of the switch on functional body or the controller. If there is no risk of hazards, such a case is an exception.
- (3) The part of metal cover or box to which the arc is liable to reach when the switch is opened or closed shall be lined with an arc resistant insulating material.
- (4) An area rug which may cause danger by temperature rise shall be equipped with a temperature limiter (including a thermal fuse) and that may cause danger by overcurrent shall be equipped with an overcurrent protector. This temperature limiter and overcurrent protector shall not operate under normal service conditions.
- (5) When a connector is used for connection of main body and cord, the connecting operation can be made easily, surely and safely.

- (6) In an area rug equipped with a switch operated by the user, operation of open or closing or, open or closed state of the switch shall be indicated by letters, symbols, color or light at an easily visible place.
- (7) In an area rug to which a fuse is attached, the rated current of current fuse or the rated operating temperature of thermal fuse shall be indelibly marked on the nameplate of the functional body or in the vicinity of the fuse mount. If the fuse is not replaceable, such a case is an exception.
- (8) The enclosure shall not cause fissures, cracks, or other abnormalities which result in such danger as electrical shock and fire when a weight 250 g in mass, having a spherical surface of 10 mm radius finished with polyamide to have Rockwell hardness HRR 100 specified in JIS K 7202 is dropped vertically from the height of 20 cm once or when an impact force of $0.5 \pm 0.05 \text{ N}\cdot\text{m}$ $\{0.05 \pm 0.005 \text{ kgf}\cdot\text{m}\}$ is applied with the impact testing apparatus given in Attached Fig. 2, once. However, the indicator lamp, fuse holder or the like exposed on the outside of functional body and their protective covers, each of which has a surface area not exceeding 4 cm^2 , and does not project by 10 mm or more from the surface of functional body, are excluded.
- (9) The area rug which controls the temperature by means of semiconductor elements shall comply with the following requirements when the elements lose control ability:
 - (9.1) Components connected to the control circuit shall not burn. However, there is no possibility of burning of other components even if a component connected to the circuit burns, such a case is an exception.
 - (9.2) Dead metal parts liable to be earthed or the exposed live parts shall comply with either of the following requirements:
 - (a) The voltage to earth and the line voltage shall not exceed 30 V for a.c. or 45 V for d.c.
 - (b) When $1 \text{ k}\Omega$ resistors are connected between the live parts and the earth, between lines and between dead metal parts and live parts, the current flows through the $1 \text{ k}\Omega$ resistors shall be not more than 1 mA. If there is no risk of electric shock at frequencies not less than the power frequency, such a case is an exception.
 - (9.3) After the test the insulation resistance between the surface of functional body and the live parts measured by a d.c. 500 V insulation resistance tester shall be not less than $0.1 \text{ M}\Omega$. However, the insulation resistance between the surface and such live parts that the voltage to ground and the line voltage are not exceeding 30 V in the case of a.c. and 45 V in the case of d.c. and the current flows through $1 \text{ k}\Omega$ resistors connected between the live parts and the ground, and between the lines does not exceed 1 mA (it is not necessarily 1 mA or less if there is no risk of electric shock at frequencies not less than the power frequency) is an exception.

- (10) The area rug with an enclosure made of synthetic resin (except the portion which needs translucency or transparency or that which needs flexibility, mechanical strength, etc. due to its function) shall not burn when tested in such a manner, that a flat square part of 9 cm² or more on the external surface of enclosure (a square test piece with a side length of 3 cm and original thickness cut out of the same material if there is no flat part of 9 cm² or more on the enclosure) is inclined about 45 degrees from the horizontal plane, a flame of about 20 mm long is produced by burning the gas of class 1 and No. 1 specified in JIS K 2240 or at least equivalent gas using a burner having an inside nozzle diameter 0.5 mm with the air inlet closed, the tip of the flame is applied, from the bottom, to the center of the said plane for 5 s and then removed.
- (11) The heat sensitive wire or heat sensitive area shall be attached within 30 cm from the heating element.
- (12) The heating element shall comply with the following requirements:
- (12.1) The heating elements shall not break easily, and they shall be so attached that they do not intersect or come in contact with each other. If the heat elements intersecting or contacting do not exceed 100°C in the test of 8.5.2, such a case is an exception.
- (12.2) The heating element shall be structured flexible, and shall be insulated through the overall length.
- (13) The strength of noise shall comply with the following requirements:
- (13.1) The noise power when measured with an absorption clamp shall not exceed 55 dB in the frequency range of 30 MHz (incl.) to 300 MHz (incl.). The decibel (dB) means the value calculated based on 1 pW = 0 dB.
- (13.2) The noise terminal voltage measured between one line and the earth shall comply with the following requirements:
- (a) The continuous noise terminal voltage shall not exceed the value shown in the right column of Table 8 in correlation with the frequency range given in the left column of the same table. The decibel (dB) means the value calculated based on 1 μ V = 0 dB [the same applies in (b) below].

Table 8. Continuous noise terminal voltage

Range of frequency	Continuous noise terminal voltage dB
526.5 kHz or over up to and incl. 5 MHz	56
Over 5 MHz up to and incl. 30 MHz	60