

JIS

JAPANESE INDUSTRIAL STANDARD

Electrically heated blankets

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In the event of any doubt arising,
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Electrically heated blankets

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1. Scope

This Japanese Industrial Standard specifies electrically heated blankets of electronic control system employing heating elements and heat sensing wire of separate wire system or those integrated in composite elements (hereafter referred to as blankets).

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 C 9606-Electric Washing Machine

JIS K 2240-Liquefied Petroleum Gases

JIS K 5400-Testing Methods for Paints

JIS K 6301-Physical Testing Methods for Vulcanized Rubber

JIS K 7202-Method of Rockwell Hardness Test for Plastics

JIS L 0217-Care Labelling of Textile Goods

JIS L 2001-Cotton Wadding

JIS S 6006-Pencils and Colored 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 shall apply:

- (1) main body The part of blanket that is fundamentally flat, consists of such flexible materials as blanket cloth and quilting cloth, accommodates heat elements in its inside and used for providing warmth.
- (2) controller A device which carries out the on-off of the power supply and (or) controls or changes the temperature.

Remarks: This is usually provided in the middle of the cord.
- (3) functional body The generic name of main body and controller.
- (4) heating element The heating wire covered with insulating materials.
- (5) heat sensitive wire The wire arranged continuously inside the main body to detect the temperature and to transmit the detected temperature characteristic in the form of electric characteristic.
- (6) electronic control system Such a control system that a semiconductor element like a thyristor is connected in series with the heating element and the temperature of the heating element is controlled by the action of this semiconductor element.
- (7) rated current The power consumption divided by the rated voltage.
- (8) starting current The power consumption at the start of passing the current divided by the rated voltage.
- (9) set temperature The temperature at the temperature guarantee point in Fig. 2 of 8.5.5 that is assigned by the manufacturer.
- (10) washable This means that the main body can be washed by water together with the heating element.
- (11) clean water City water of waterworks.
- (12) connector Plugs and receptacles, and appliance coupler for domestic and similar use which are attached and detached by the user.
- (13) internal wiring connector The connector which is used for connection of wiring inside the functional body by the manufacturer.
- (14) automatic switch A switch which opens the circuit automatically when the set temperature is attained and the closing of the circuit is done manually.

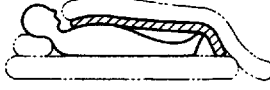
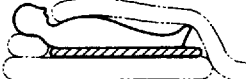
3. Rated voltage and rated frequency

The rated voltage shall be single phase a.c. 100 V, and the rated frequency of blanket equipped with transformer shall be 50 Hz, 60 Hz or 50/60 Hz.

4. Classification

Blankets are classified according to the service as shown in Table 1.

Table 1. Classification of blankets

Classification	Service	Schematic drawing of service state
Over-blanket	Blanket which is spread over human body in sleep	
Under-blanket	Blanket which is spread under human body in sleep	

5. Performances

5.1 Voltage fluctuation The blanket 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, blankets specified in (2) are excluded.

Table 2. Tolerance on power consumption

Rated power consumption W	Tolerance %
Up to and including 100	+ 15 - 20
Over 100 up to and including 1000	+ 10 - 15

- (2) For the blanket 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 Dielectric withstand voltage When the test of 8.4 (2) is carried out the specimen shall withstand the test voltage.

5.3.3 Insulation resistance at immersion in water When the test of 8.4 (3) 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 .

5.3.4 Insulation resistance under damp, heat When the test of 8.4 (4) 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 .

5.3.5 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 of blanket shall not exceed the appropriate value in Table 3.

Table 3. Temperature

Unit: °C

Point of measurement		Temperature
Surface of heating element		100
Surface of main body enclosure	Over-blanket	65
	Under-blanket	70
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 controller 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: The reference ambient temperature is 20°C.

5.4.2 Temperature at folded state When the test of 8.5.3 is carried out on the specimen under folded state, the temperature of each part of the main body shall not exceed 100°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 surface temperature of heating element shall not exceed 120°C, when measured as specified in 8.5.4 (2).
- (3) The surface temperature of heating element shall not exceed 135°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 $\pm 10^\circ\text{C}$.

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

5.6 Washing When blankets marked with "washable" are tested in accordance with 8.7, the results shall comply with 5.3, 5.4 and 5.5, and also the following requirements:

- (1) The heating element, heat sensitive wire and lead wire shall not be remarkably exposed due to damage of enclosure.
- (2) The heating element, heat sensitive wire and lead wire shall not show breaking of wire or dissolution of covering.
- (3) No remarkable fray, break, or loosening shall appear on the main body.
- (4) No damage or deformation shall appear on the joint of cord to the main body.
- (5) No rust or other abnormalities shall appear on the blade, blade receptacle, etc. at the joint of cord to the main body.
- (6) The marking such as the nameplate shall be easily read.

5.7 Characteristics of heat sensitive wire When the test is carried out as specified in 8.8, the deviation of each operating temperature from the average value of operating temperature shall fall within the appropriate tolerance given in Table 4.

Table 4. Tolerance on operating temperature
based on average value

Unit: °C

Operating temperature	Tolerance
Up to and including 120	± 7
Over 120	± 10

5.8 Mechanical strength

5.8.1 Static loading When the test is made according to the method of 8.9.1, 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.

5.8.2 Falling of controller When a controller independent of main body is tested according to the method of 8.9.2, 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).

5.9 Endurance When the test is made according to the method of 8.10, the specimen shall comply with the following requirements:

- (1) The heating element, heat sensitive element and lead wire shall not be exposed due to damage of the enclosure.
- (2) The heating wire, heat sensing wire and lead wire shall not break.
- (3) The specimen shall comply with the provisions of 5.4.3 (1), (2) and (3) after the test.
- (4) No damage or loosening shall appear on the joint of cord with the main body.
- (5) The seam shall not be raveled by 100 mm or more per one position.

5.10 Endurance of cord

- (1) Flexure of joint of cord with functional body When the test is carried out in accordance with 8.11.1, the cord shall not cause short circuit or other hazards, and the rate of broken component wires shall not exceed 20 %.
- (2) Flexure of joint of cord with power supply plug When the test is carried out in accordance with 8.11.2, the cord shall not cause short circuit or other hazards, and the rate of broken component wires shall not exceed 20 %.

6. Construction

6.1 Construction in general The construction of blankets 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 part of metal cover and 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.
- (3) A blanket 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.
- (4) When a connector is used for connection of main body and cord, the connecting operation can be made easily, surely and safely.
- (5) In a blanket equipped with a switch operated by the user, open or closed state of the switch shall be indicated by letters, symbols, color or light at an easily visible place.
- (6) In a blanket 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 or on the fuse mount. If the fuse is not replaceable, such a case is an exception.
- (7) 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 $0.5 \pm 0.05 \text{ N}\cdot\text{m}$ ($0.051 \pm 0.005 \text{ kgf}\cdot\text{m}$) 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 cover, 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 enclosure, are excluded.
- (8) The blanket which controls the temperature by means of semi-conductor elements shall comply with the following requirements when the elements lose control ability:
 - (8.1) Components connected to the control circuit shall not burn. If there is no possibility of burning other components when a component connected to the circuit in question burns, such a case is an exception.

(8.2) 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 k Ω 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 k Ω resistor 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.

(8.3) 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 M Ω .

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 k Ω 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.

(9) When a circuit on the secondary side of insulating transformer or beyond a rectifier containing electron tubes, capacitors, semiconductor elements, resistors or the like, is subjected to the following tests, the component connected to that circuit shall not burn. However, there is no possibility of burning of other parts even if a component connected to the circuit burns, such a case is an exception.

- (9.1) For electron tubes, display lamps, etc., the heater or filament terminal shall be opened and for other components the terminals shall be short-circuited.
- (9.2) For capacitors, semiconductor elements, resistors, transformers, coils or the similar components, the terminals shall be short-circuited or opened.
- (9.3) When the circuit is shorted or opened in the tests of (9.1) and (9.2), the following requirements shall be complied with:
 - (a) The dead metal parts liable to be earthed or exposed live parts shall be such that the voltage to earth and the line voltage is not exceeding 30 V for a.c. or 45 V for d.c. or that when 1 k Ω resistors are connected between the current flows through the resistor does not exceed 1 mA unless there is no risk of electric shock at frequencies not less than the power frequency.

- (b) 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 M Ω .

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 k Ω resistors connected between the live parts and the ground, and between the lines does not exceed 1 mA (it is not necessarily be 1 mA or less if there is no risk of electric shock at frequencies not less than the power frequency) is an exception.

- (10) For a blanket having a capacitor which is connected to the power supply by plug blades, the voltage between the blades after one second from withdrawal of blades from the receptacle shall not exceed 45 V. If the total capacitance of the circuit viewed from the side of plug blades is not more than 0.1 μ F, such a case is an exception.
- (11) The appliance 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 the 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.
- (12) The heat sensitive wire shall be attached within 30 cm from the heating element.
- (13) The heating element shall comply with the following requirements.
- (13.1) 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.
- (13.2) The heating element shall be structured flexible, and shall be insulated through the overall length.
- (14) The strength of noise shall comply with the following requirements:
- (14.1) 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.

(14.2) 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 5 in correlation with the frequency range given in the left column of the same table. The decibel (dB) means the value calculated based on $1 \mu\text{V} = 0 \text{ dB}$ [the same applies in (b) below].

Table 5. Continuous noise terminal voltage

Range of frequency (f)	Continuous noise terminal voltage dB
$526.5 \text{ kHz} \leq f \leq 5 \text{ MHz}$	56
$5 \text{ MHz} \leq f \leq 30 \text{ MHz}$	60

- (b) The intermittent noise terminal voltage shall not exceed the appropriate value given in Table 5 plus the correction value given in the right column of Table 6 in correlation with the click factor given in the left column of the same Table.

Table 6. Correction value

Click factor N	Correction value dB
$N < 0.2$	44
$0.2 \leq N \leq 30$	$20 \log_{10} (30/N)$
$30 < N$	0

Remarks: N means the click factor and the unit is times/min.

- (15) The temperature controller shall be capable of being placed at such a position as the vicinity to pillar where it is easily operated.
- (16) The blanket to which a fuse is attached shall comply with the following requirements:
- (a) The circuit protected shall be completely interrupted by melting of the fuse.
 - (b) There shall be no risk of short circuit or earth fault caused by the arc when fuse melts.
 - (c) The box, cover or base accommodating the fuse shall not be damaged when the fuse melts.