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Electric Heating Garments

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Electric Heating Garments

1 Scope

This Standard specifies the terms and definitions, requirements, test methods, inspection rules, marking, packaging, transportation and storage of electric heating garments.

This Standard applies to electric heating garments whose surface layer is textile fabrics and which are heated by flexible resistive heating elements.

Products such as electric heating belts and electric heating knee pads can be implemented by reference.

This Standard does not apply to garments for infants aged 36 months and below.

2 Normative References

The following documents are essential to the application of this Document. For the dated documents, only the versions with the dates indicated are applicable to this Document; for the undated documents, only the latest version (including all the amendments) is applicable to this Document.

GB/T 1002 Single Phase Plugs and Socket-Outlets for Household and Similar Purposes - Types, Basic Parameters and Dimensions

GB/T 1003 Three Phases Plugs and Socket-Outlets for Household and Similar Purposes - Types，Basic Parameters and Dimensions

GB/T 1335 (all parts) Size Designation of Clothes

GB/T 2668 Sizes for Coats and Suits

GB/T 3883.1-2014 Safety of Motor-Operated Hand-Held, Transportable Electric Tools and Lawn and Garden Tools - Part 1: General Requirements

GB/T 4208 Degrees of Protection Provided by Enclosure (IP Code)

GB 4706.8-2008 Household and Similar Electrical Appliances - Safety - Particular Requirements for Blankets Pads and Similar Flexible Heating Appliances

GB 4943.1 Information Technology Equipment - Safety - Part 1: General Requirements

GB/T 5169.11-2017 Fire Hazard Testing for Electric and Electronic Products - Part 11:

Glowing/Hot-Wire Based Test Methods - Glow-Wire Flammability Test Method for End-Products (GWEPT)

GB/T 5169.21-2017 Fire Hazard Testing for Electric and Electronic Products - Part 21: Abnormal Heat - Ball Pressure Test Method

GB/T 5296.4 Instructions for Use of Products of Consumer Interest - Part 4: Textiles and Apparel

GB/T 6411 A Series of Size of Knitted Underwear

GB/T 8878 Knitted Cotton Underwear

GB/T 9254 Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurement

GB/T 14272 Down Garments

GB/T 14536.1-2008 Automatic Electrical Controls for Household and Similar Use - Part 1: General Requirements

GB 15092.1-2009 Switches for Appliances - Part 1: General Requirements

GB/T 17465.1-2009 Appliance Couplers for Household and Similar General Purposes - Part 1: General Requirements

GB 17625.1 Electromagnetic Compatibility – Limits - Limits for Harmonic Current Emissions (Equipment Input Current≤16A Per Phase)

GB/T 17627.1 High-Voltage Test Techniques for Low-Voltage Equipment - Part 1: Definitions, Test and Procedure Requirements

GB/T 28164 Secondary Cells and Batteries Containing Alkaline or Other Non-Acid Electrolytes - Safety Requirements for Portable Sealed Secondary Cells, and for Batteries Made from Them, for Use in Portable Application

GB 31241-2014 Lithium Ion Cells and Batteries Used in Portable Electronic Equipment - Safety Requirements

GB 31701 Safety Technical Code for Infants and Children Textile Products

GB/T 32614 Outdoor Sportswear - Water Resistant Garment

GB/T 35590 Information Technology - General Specification for Portable Digital Equipment Used Power Bank

FZ/T 73020 Knitted Casual Wear

4 Requirements

4.1 Instructions for use

4.1.1 The instructions for use of garments shall be implemented in accordance with GB/T 5296.4 and GB 31701. Instructions for use shall also include the following:

--- finished products containing down filling shall indicate the amount of down filling;

--- instructions for normal clothing and clothing under rain and snow;

--- instructions on whether the electric heating element can be washed;

--- instructions for taking out and putting in the detachable electric heating element (when applicable);

--- instructions on charging (where applicable);

--- a description of the electrical characteristics and safe use of batteries and battery pack (when applicable);

--- a description of the positions of electrical parts, such as electric heating elements, control devices, batteries, etc. on the garments;

--- instructions on maintenance and after-sales service;

--- instructions for use by the specific groups such as children, the elderly, the sick, and the disabled;

--- warnings about avoiding sharp objects from scratching or piercing electric heating elements;

--- warnings about the prevention of acute burns and low temperature burns;

--- instructions for folded storage.

4.1.2 Garment durability labels shall indicate the production date and safe use period of the product. For garments with detachable electric heating elements, the garment durability label shall also indicate:

--- the name or trademark (identification mark) of the manufacturer or responsible distributor;

--- the model of the electric heating element applicable to the garment (see Appendix A for the model designation).

4.1.3 For the detachable electric heating element on the garment, the following content shall be

4.5 Garment quality

4.5.1 The product shall meet the basic safety technical requirements of GB 18401; and the electric heating garment worn by children shall also meet the requirements of GB 31701.

4.5.2 Electric heating woven down garments shall comply with GB/T 14272; and knitted down garments shall comply with FZ/T 73053.

4.5.3 Electric heating casual garments shall comply with FZ/T 81007.

4.5.4 Electric heating knitted casual garments shall comply with FZ/T 73020.

4.5.5 Electric heating water resistant garments shall comply with GB/T 32614.

4.5.6 Electric heating cotton knitted underwear shall comply with GB/T 8878; and chemical fiber knitted underwear shall comply with FZ/T 73024.

4.5.7 The consumption quality requirements of other electric heating products shall comply with relevant national standards or industry standards.

5 Test Methods

5.1 General conditions for electrical safety inspection

5.1.1 Unless otherwise specified, the electrical safety test shall be carried out in a place without forced convection air and at an ambient temperature of (20±5) °C, and the humidity be kept between 30% RH ~ 80% RH.

NOTE 1: When the air velocity is less than 0.4 m/s, it can be considered that there is no forced convection air.

5.1.2 Battery-powered electric heating garments: Conduct the test with a fully charged battery or battery pack, for the specimens provided with the battery or battery pack, test with the provided battery or battery pack; otherwise, use the battery or battery pack described in the instructions for use for test. If there is no relevant description in the instructions for use, the test shall be carried out with a battery or battery pack with a capacity of 20000 mAh ± 10% relative to its rated voltage value of no more than 10%.

5.1.3 Direct-powered electric heating garments: For specimens provided with a power supply device, the test shall be conducted with the power supply device at rated voltage and rated frequency. For specimens not marked with rated voltage or rated frequency, use 220 V, 50 Hz for the test. For the specimens that are not provided with a power supply device, use an AC or DC test power supply that meets its rated value for power supply.

NOTE: The voltage and frequency fluctuation range of the test power supply shall not exceed ±2% of its rated value.

5.1.4 For washable electric heating garment specimens, wash and dry twice according to the instructions for use before the test.

NOTE: The number of washes can also be increased according to the relevant agreement.

5.1.5 Electrical parts such as electric heating elements, control devices and batteries shall be placed in the positions required by the instructions for use. For specimens with a controller, it shall be adjusted to the highest temperature or maximum power level for testing.

5.2 Protection against electric shock

5.2.1 Measure the operating voltage of the electrical parts on the specimen.

5.2.2 Carry out the electric strength test according to the provisions of GB/T 17627.1. The test voltage is 500 V, the frequency is 50 Hz, and the duration is 1 min. For the heating element on the specimen, take two pieces of 0.1mm-thick the same metal foil to completely cover the heating element, one piece is above the heating element, and the other is below the heating element; connect the two metal foils together with conductors; and a uniformly distributed load of about 35 kg/m^2 is applied to the metal foil; and the test voltage is applied between the live parts and the metal foil. For control devices and other electrical parts on the specimen, the test voltage is applied between live parts and the accessible surface.

NOTE: The test shall be carried out separately between each pole of the power supply.

5.3 Heating

Carry out the test according to Appendix B.

5.4 Moisture resistance

5.4.1 For non-washable electric heating garment specimens, place them for 24 hours under the environmental conditions specified in 5.1.1, and then conduct moisture treatment and electric strength test.

5.4.2 Place the specimens treated in 5.4.1 in a humid chamber with a relative air humidity of (93±3) % for 48 hours; and keep the temperature in the chamber within 1K of any convenient value t between 20°C and 30°C. Before placing in the humid chamber, bring the specimen temperature to t ~ t+4°C.

NOTE 1: In most cases, the temperature can be reached by keeping the specimen at the specified temperature for at least 4 h before the humidity treatment.

NOTE 2: Place a saturated aqueous solution of sodium sulfate (Na_2SO_4) or potassium nitrate (KNO_3) in a humid chamber; and the container shall have a sufficient contact area between the solution and the air to obtain a relative humidity of (93±3)%.

The specimen is placed in the humid chamber for 48 hours, and then the electric strength test

B_{RL} - reference value of magnetic induction at 50 Hz;

$a_c(r_1)$ - coupling factor referring to Appendix C or Table D.3 of IEC 62233:2005;

W_{nc} - calculate the weighted result of a single measurement in the case of inhomogeneous field coupling by using $a_c(r_1)$.

5.8 Quality of use

The inspection of quality of use shall be carried out in accordance with the provisions of the corresponding national standards or industry standards in 4.5.

6 Inspection Rules

6.1 Sampling

The samples for electrical safety inspection of electric heating garments shall be taken in batches; the number of samples shall be 2 pieces; and the quality of garment shall be carried out in accordance with the provisions of the corresponding national standards or industry standards.

6.2 Judgment rules

6.2.1 If the safety of electrical appliances is unqualified, the batch of products will be judged as unqualified; if the safety of electrical appliances is qualified, the quality of garments will be judged according to the corresponding national standards or industry standards.

6.2.2 If the safety of electrical appliances and the quality of garments are both qualified, then this batch of products is qualified.

7 Labeling, Packaging, Transportation and Storage

The marking, packaging, transportation and storage of finished products shall be carried out according to FZ/T 80002.

Appendix B

(Normative)

Test Methods of Heating

B.1 Principle

Place the electric heating garments in a specific heat insulation layer to simulate the heat transfer conditions when the human body wears the garment. By measuring the temperature rise of the electric heating element and the temperature of the garment surface, it is determined whether the product has the risk of burns or fire.

B.2 Instruments and tools

B.2.1 Filament thermocouples, with a diameter not exceeding 0.3 mm;

B.2.2 Thermometer with an accuracy of 0.5 K or less;

B.2.3 Copper or brass sheet with a side length of 65 mm and a thickness of 0.5 mm;

B.2.4 Steel ruler, the division value is in mm;

B.2.5 For benches made of plywood with a thickness of 20 mm, the height of the bench top from the ground shall be at least 300 mm;

B.2.6 Thermal insulation material layer that meets the requirements of Appendix AA in GB 4706.8-2008;

B.2.7 Sewing thread.

B.3 Test conditions

It shall be carried out in a place without forced convection air and the ambient temperature is (5±2) ℃, and the humidity shall be kept between 30% RH and 80% RH. Other conditions shall comply with the general test conditions stipulated in Sub-clause 5.1 of this Standard.

NOTE 1: When the air velocity is less than 0.4 m/s, it can be considered that there is no forced convection air.

B.4 Sampling requirements

A complete and undamaged specimen of the electric heating garment shall be used for the test.

B.5 Test operation

measured object can be coated with insulating varnish. At this time, it shall be noted that the thickness of the coating layer shall not have a significant impact on the measurement.

B.5.1.7 For battery-powered electric heating garment specimens, the test continues until the temperature measured on the garment surface continuously drops.

B.5.1.8 For direct-powered electric heating garment specimens, the test continues until the fluctuation of the temperature measured on the garment surface within 1 h is within 2 K.

B.5.2 Continuous heating time (continuous heating time test under normal working conditions)

With the battery described in 5.1.2 as the power source, carry out the test according to the description in B.5.1.2~B.5.1.6.

Start timing when the electric heating garment is turned on for heating. At the end of the second hour, measure the voltage of the battery, which shall be no lower than 85% of its nominal rated voltage.

B.5.3 Heating (heating test under abnormal heat dissipation conditions)

The specimens and the thermal insulation material layer are first placed in the test environment for 24 hours; and then the electric heating element on the specimen is folded into two layers at the most unfavorable position; and the other parts are flattened and placed between the two thermal insulation material layers. The size of the thermal insulation material layer shall extend at least 100 mm beyond the perimeter of the garment. Then place a piece of thermal insulation material with a size of 300mm×450mm×36mm on the folded electric heating element at the most unfavorable position; and place a uniformly distributed ballast with a mass of 5 kg on top of the thermal insulation material layer.

NOTE 1: The most unfavorable position refers to the position where danger is most likely to occur, or where danger will cause the most serious injury. For example, a location where folding is most likely to occur, or a location where severe heat buildup will result in high temperatures after folding.

NOTE 2: The ballast can be a sandbag.

Then conduct the test according to the description in B.5.1.2~B.5.1.8, but it should be noted that when placing the copper sheet according to B.5.1.4, place it according to the size of the folded electric heating element.

B.6 Result judgment

B.6.1 The temperature rise of the electric heating element during the whole test process shall meet the limit value requirements of this Standard.

B.6.2 The temperature of the specimen surface during the first hour of the test and the temperature thereafter shall meet the limit requirements of this Standard.

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