APPLICATION FOR LOW VOLTAGE DIRECTIVE

On Behalf of

Renqiu Huansheng New Energy Technology Co., Ltd

Water heating blanket
HD-1902,HD-1801,HD-1802,HD-1901,HD-2004,HD-2005, HD-2010,HD-2103,HD2104,HD-2105,HD2106,HD-2205, HD-2206,HD-2208,HD-2304,HD-2305,HD-2311,HD-2312, HD-2313,HD-2314,HD-2310

Prepared for : Renqiu Huansheng New Energy Technology Co., Ltd
No. 59, West Side of Yucun Farm, Yucun Town, Renqiu City, Cangzhou City, Hebei Province

Prepared By : Shenzhen HTT Technology Co., Ltd.
1F, B Building, Huafeng International Robotics Industrial Park, Gushu, Xixiang Street, Bao'an District, Shenzhen

Date of Test: Jul. 02, 2024 ~ Jul. 08, 2024
Date of Report: Jul. 08, 2024
Report Number: HTT202407036LR-5

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TEST REPORT
UL 964
Standard for Electrically Heated Bedding

Report Number.....:	HTT202407036LR-5
Tested by (name + signature)..... :	Andy Shen
Approved by (name + signature)..:	Kevin Yang
Date of issue.....:	Jul. 08, 2024
Applicant's name.....:	Renqiu Huansheng New Energy Technology Co., Ltd
Address..... :	No. 59, West Side of Yucun Farm, Yucun Town, Renqiu City, Cangzhou City, Hebei Province
Test specification:	
Standard.....:	UL Standard for Safety for Electrically Heated Bedding, UL 964
Test procedure.....:	UL 964
Non-standard test method.....:	N/A
Test Report Form No.....:	/
Test Report Form(s) Originator..... :	HTT
Product..... :	Water heating blanket
Trade Mark..... :	Huadn环鼎
Manufacturer.....:	Renqiu Huansheng New Energy Technology Co., Ltd No. 59, West Side of Yucun Farm, Yucun Town, Renqiu City, Cangzhou City, Hebei Province
Model/Type reference.....:	HD-1902
Ratings .....:	Input: 110-120V~ 60Hz Power: 200-600W

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List of Attachments: - Appendix : Product photos
Summary of testing: The sample(s) tested complies with the requirements of UL 964.

Tests performed (name of test and test clause):	**Testing location:**
Refer to appended clause table for details	Shenzhen HTT Technology Co., Ltd. 1F, B Building, Huafeng International Robotics Industrial Park, Gushu, Xixiang Street, Bao'an District, Shenzhen

Copy of marking plate

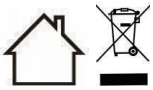
Huadn环鼎

Water heating blanket

Model: HD-1902

Input: 110-120V~ 60Hz

Power: 200-600W



Renqiu Huansheng New Energy Technology Co., Ltd

Note:

- The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
- Per client's requirement, the trade mark was not considered in this report.

Model List:	
Test Model	HD-1902
Other Model	HD-1801,HD-1802,HD-1901,HD-2004,HD-2005,HD-2010,HD-2103,HD2104, HD-2105,HD2106,HD-2205,HD-2206,HD-2208,HD-2304,HD-2305,HD-2311, HD-2312,HD-2313,HD-2314,HD-2310
1.All tests are carried out on HD-1902	

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Possible test case verdicts:	
- test case does not apply to the test object.....	N/A
- test object does meet the requirement.....	P (Pass)
- test object does not meet the requirement.....	F (Fail)
Testing.....	
Date of receipt of test item.....	Jul. 02, 2024
Date (s) of performance of tests.....	Jul. 02, 2024 ~ Jul. 08, 2024

GENERAL PRODUCT INFORMATION:

Product Description:

The apparatus covered in this report was Water heating blanket which was Class I apparatus.

The max. operating temperature was 25 ℃.

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UL 964			
Clause	Requirement + Test	Result - Remark	Verdict

INTRODUCTION			
1	Scope		--
2	Components		--
3	Units of Measurement		--
4	Undated References		--
5	Glossary		--
CONSTRUCTION			
6	**Covering of Electrical Parts**		**P**
6.1	Except for the connector attached to the bedding, all electrical parts of the bedding shall be enclosed in a shell or other covering of a fabric in which there are no openings. All stuffing, padding, springs, and similar nonelectrical components of bedding shall be outside this covering and shall not be detrimental to the covering or its electrical contents.		P
6.2	All seams in the fabric enclosing electrical parts shall be strongly stitched or otherwise equivalently secured.		P
7	**Insulation**		**P**
7.1	Electrical insulation is to be considered with respect to its acceptability for the particular application. If it is necessary to investigate a material to determine whether it is acceptable, consideration is to be given to its mechanical strength, dielectric properties, insulation resistance, heat-resistant qualities, the degree to which it is enclosed or protected, and any other features having a bearing on the risk of fire, electric shock, and injury to persons involved, in conjunction with conditions of actual service. All of these factors are to be considered with respect to thermal aging.		P

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UL 964			
Clause	Requirement + Test	Result - Remark	Verdict
7.2	Ordinary vulcanized fiber may be used for insulating bushings, washers, separators, and barriers, but not as the sole support for uninsulated live parts where shrinkage, current leakage, or warpage may introduce a risk of fire or electric shock. Thermoplastic materials are not considered to be acceptable for the sole support of uninsulated live parts, unless they have been found to have the necessary strength and rigidity, resistance to heat, resistance to flame propagation, dielectric properties, and other properties acceptable for the application. All of these factors are to be considered with respect to thermal aging.		N/A
7.3	An insulating liner shall be acceptable for the purpose. Vulcanized fiber or a similar material employed where spacings would otherwise be unacceptable shall be 1 /32 inch (0.8 mm) thick or thicker, and shall be so located or of such material that it cannot be adversely affected by arcing. However, 1 /64 inch (0.4 mm) or thicker vulcanized fiber is acceptable in conjunction with an additional air spacing of 50 percent or more of the spacing required for air alone. Barriers shall be secured in place by a means other than friction between surfaces. The elasticity of tubing shall not be depended upon to hold the tubing in place.		P
7.4	The heating element shall be electrically insulated for its entire length so that it is not in contact with the shell or other covering fabric at any point. The insulated heating element shall be appliance-wiring material acceptable for the application. The insulated heating element shall be so secured in position that there is no undue stress on it during use, handling, and cleaning of the bedding. At least 9 inches (229 mm) of the foot of a blanket, sheet, quilt or comforter that can be tucked in during normal use shall be devoid of all electrical parts other than the male half of the bedding connector and the portion of the insulated heating element leading to the connector.		P

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7.5	Heater wire, including semiconductor heater wire, shall comply with the Reference Standard for Electrical Wires, Cables, and Flexible Cords, UL 1 581 . Semiconductor heater wire shall additionally comply with the requirements for thermistor-type devices, UL 1 434.		P
7.6	Flexural relief shall be provided for the conductors that exit the male-connector body of a blanket, sheet, quilt, or comforter.		P
7.7	Each thermostat and other live part within the shell or other covering fabric shall not have any sharp edges and shall be electrically insulated with insulating tubing acceptable for the voltage and temperatureinvolved. The insulation on each part shall be: a) Bonded, a watertight seal is required, to the insulation on the heating element or other wiring connected to the part; and b) At least as thick at the bond and elsewhere as the insulation on the heating element or other wiring connected to the part.		N/A
7.8	A splice in wiring within a thermostat shall be insulated if permanence of spacing from the splice to other metal parts of the thermostat is not provided.		N/A
7.9	Polymeric electrical insulating materials and enclosures shall comply with the applicable requirements of the Standard for Polymeric Materials - Use in Electrical Equipment Evaluations, UL 746C.		P
7.10	The requirements for supplemental insulation (e.g. tape, sleeving or tubing) are not specified unless the insulation or device is required to fulfill 7.1 – 7.4 or a performance requirement of this standard. In such cases: a) Insulating tape shall comply with the Standard for Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape, UL 51 0; b) Sleeving shall comply with the Standard for Coated Electrical Sleeving, UL 1 441 ; c) Tubing shall comply with the Standard for Extruded Insulating Tubing, UL 224.		P
8	**Spacings**		**P**

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UL 964			
Clause	Requirement + Test	Result - Remark	Verdict
8.1	Except as indicated in 8.2 – 8.4, over surface and through-air spacings no smaller than 1 /1 6 inch (1 .6 mm) shall be maintained from uninsulated live parts to: a) Uninsulated live parts of opposite polarity; and b) Accessible metal parts.		P
8.2	Within a thermostat, except at the contacts, the spacings between uninsulated live parts on opposite sides of the contacts shall not be less than 1 /32 inch (0.8 mm) through air and 3/64 inch (1 .2 mm) over the surface of insulating material.		P
8.3	The spacings mentioned in 8.1 and 8.2 do not apply to the inherent spacings of a component. Such spacings are to be considered under the requirements for the component in question.		P
8.4	At closed-in points only, such as the screw-and-washer construction of an insulated terminal mounted in metal, a spacing of 3/64 inch (1 .2 mm) is acceptable.		P
9	**Temperature Limitation**		**P**
9.1	Bedding shall be provided with means to preclude the attainment of unacceptable temperatures, see 1 9.1 .1 – 1 9.1 .3 and 31 .1 .1 , on any part of the bedding.		P
9.2	Means to avert the attainment of unacceptable temperatures may be inherent in the construction of bedding – such as a low-wattage heating element – thus necessitating no thermostats or external control.		P
9.3	Thermostats shall be durable, reliable, uniform in operation, and sufficiently sensitive for their intended use as determined by compliance with Thermostats in Bedding, Section 37, and other applicable requirements.		P
9.4	If proper performance of a thermostat depends upon the integrity of a closed chamber, the construction shall preclude moisture leaks, which may affect the uniformity and reliability of operation.		P

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UL 964			
Clause	Requirement + Test	Result - Remark	Verdict
9.5	A thermostat in the bedding shall not be adjustable by the user of the bedding and shall be covered or sealed to preclude the entrance of dirt and lint.		P
9.6	Materials employed in a thermostat shall not be affected adversely by any operating conditions presented by the tests described in these requirements.		P
9.7	Plated steel, except that the bimetal need not be plated, may be used for a current-carrying part in a thermostat provided that the part is protected by supplementary means (such as sealed sleeving) against any conditions involving moisture to which the thermostat may be subjected during use and cleaning of the bedding.		P
9.8	If thermostats or other types of discrete temperature sensing devices are used in the bedding itself, they shall be sufficient in number in accordance with 9.1 0, and shall be appropriately located to enable the bedding to comply with 9.9, 1 9.1 .1 – 1 9.1 .3, 31 .1 .1 , 31 .4.1 – 31 .4.3, 31 .6.1 – 31 .6.4, 31 .6.6, and 31 .6.7. No section of the heating element shall be in series with fewer than two discrete sensing devices when thermostats or other types of discrete sensing devices are employed.		P
9.9	Compliance with the requirement in 9.8 is to be determined by appropriate testing that, in the case of a sheet, overblanket, quilt, or comforter, is to include the bunching test described in 31 .6.1 – 31 .6.4, 31 .6.6 and 31 .6.7.		P

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UL 964			
Clause	Requirement + Test	Result - Remark	Verdict
9.10	A blanket, sheet, quilt, or comforter incorporating discrete sensing devices and intended for use on a twin, double, queen or king-size bed shall comply with each of the following: a) At least 1 0 discrete sensing devices are to be used in a size intended for a twin bed and in each half of a king-size bed. Twelve or more devices are to be used in a size intended for a double or queen-size bed. Exception: A blanket, sheet, quilt, or comforter tested as specified in 31 .5.1 and 31 .6.5 may employ fewer sensors. b) The top row of discrete sensing devices in a size intended for a twin bed, in a size intended for a double or queen bed, and in each half of a size intended for a king-size bed is to be secured against migration during use, handling, and cleaning of the product.		P
9.11	When a product employing a temperature control system employs an electronic circuit intended to provide a degree of protection against the risk of fire, electric shock, or injury if a fault should occur in the wire, the circuit shall comply with the requirements for tests for Safety-Related Controls Employing Solid-State Devices, UL 991 . When the electronic circuit is provided with a fuse which is intended to open as a result of a fault in the wire, rendering the product inoperable, the fuse shall comply with the Standard for Low-Voltage Fuses - Part 1 : General Requirements, UL 248-1 , and the Standard for Low-Voltage Fuses - Part 1 4: Supplemental Fuses, UL 248-1 4. Exception: Controls complying with the Standard for Automatic Electrical Controls for Household and Similar Use, Part 1 : General Requirements, UL 60730-1 , including Annex H, fulfills the above requirements of the Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991 .		P

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UL 964			
Clause	Requirement + Test	Result - Remark	Verdict
9.12	Software relied on to comply with this standard shall comply with the Standard for Software in Programmable Components, UL 1 998. Exception: Controls complying with the Standard for Automatic Electrical Controls for Household and Similar Use, Part 1 : General Requirements, UL 60730-1 , including Annex H, fulfills the above requirements of the Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991 .		N/A
9.13	A thermal cutoff shall comply with the Standard for Thermal-Links (Thermal Cutoffs) for Use in Electrical Appliances and Components, UL 60691 .		P

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UL 964			
Clause	Requirement + Test	Result - Remark	Verdict
9.14	The following test parameters are to be used in the investigation of the circuit covered by 9.1 1 for compliance with the Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991 : a) With regard to electrical supervision of critical components, a controller shall not permit electric bedding from exceeding temperature limits specified in 1 9.1 .1 and 1 9.1 .2 of this standard. b) A field strength of 3 V per meter is to be used for the Radiated EMI Test. c) The Composite Operational and Cycling Test is to be conducted for 1 4 days at temperature extremes of 0° C (32° F) and 25° C (77° F). d) Exposure Class H3 is to be used for the Humidity Test. e) A vibration level of 5 g is to be used for the Vibration Test. f) When a Computational Investigation is conducted, λ p shall not be greater than 6 failures/106 hours for the entire system. The Operational Test is to be conducted for 1 4 days. g) When the Demonstrated Method Test is conducted, the multiplier is to be based on the continuous usage level for nonindustrial use with a minimum multiplier and test acceleration factor declared by the manufacturer. h) Compliance to the Overload and Endurance Test of the Standard for Temperature-Indicating and – Regulating Equipment, UL 873, satisfies this requirement. i) For the Electrical Fast Transient Burst Test, test level 3 is to be used.		P
9.15	When a product employing a temperature control system employs an software intended to provide a degree of protection against the risk of fire, electric shock, or injury if a fault should occur in the software programming or algorithm, the circuit shall comply with the requirements of Standard for Software in Programmable Components, UL 1 998.		P
10	**Control Units**		**P**

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UL 964			
Clause	Requirement + Test	Result - Remark	Verdict
10.1	The enclosure of a control unit shall be of material acceptable for the particular application and, except for ventilation openings, shall completely enclose all uninsulated live parts and film-coated wire.		P
10.2	A ventilation opening in a control unit is acceptable if the probe illustrated in Figure 1 0.1 – inserted point first as far as possible into the opening does not: a) Enter the opening farther than 1 /8 inch (3.2 mm); and b) Touch any uninsulated live part or film-coated wire.		P
10.3	The enclosure of a control unit shall have the strength and rigidity to resist the abuses (such as falling off a table) likely to be encountered during use. The degree of resistance inherent in the enclosureshall preclude total or partial collapse with the attendant reduction of spacings, loosening or displacement of parts, and other serious defects that alone or in combination constitute an increase in the risk of fire, electric shock, or injury to persons.		P
10.4	Among the factors to be taken into consideration when determining the acceptability of an enclosure are its: a) Physical strength; b) Resistance to impact; c) Moisture-absorptive properties; d) Combustibility; e) Resistance to corrosion; and f) Resistance to distortion. For a nonmetallic enclosure, all of these factors are to be considered with respect to thermal aging.		P
10.5	The temperature circuitry in a control unit shall be such that its calibration cannot be changed by the user unless he disassembles the control if such change could result in a condition involving risk of fire,electric shock, or injury to persons.		P

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UL 964			
Clause	Requirement + Test	Result - Remark	Verdict
10.6	A knob that is depended upon to maintain the control calibration may be secured by friction alone if the construction is such that: a) It cannot be removed by hand – fingers only, no tools; and b) No live parts are exposed when the knob is removed.		P
10.7	A control unit shall be capable of performing over the entire range of its adjustment, and shall not in itself constitute a risk of fire under any condition of operation.		P
10.8	A control unit shall comply with the Control Units Tests, Section 1 8, unless, with the control unit short-circuited, testing does not increase the risk of fire or shock.		P
10.9	Malfunction of any one component in the control unit shall not result in a condition involving risk of fire, electric shock, or injury to persons either in the bedding or in the control unit itself.		P
10.10	A current-carrying part of a control unit shall be of copper, a copper-base or other corrosion-resistant alloy, or plated steel.		P
10.11	A temperature control shall comply with the: a) Standard for Automatic Electrical Controls for Household and Similar Use; Part 1 : General Requirements, UL 60730-1 ; and the Standard for Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Temperature Sensing Controls, UL 60730-2-9; or b) Standard for Temperature-Indicating and – Regulating Equipment, UL 873.		P
10.12	A timer used to comply with the maximum temperature requirements of this standard shall be evaluated per 1 0.1 3.		P

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UL 964			
Clause	Requirement + Test	Result - Remark	Verdict
10.13	When a product employing a temperature control system employs an electronic circuit intended to provide a degree of protection against the risk of fire, electric shock, or injury if a fault should occur in the wire, the circuit shall comply with the requirements of the Standard for: a) Automatic Electrical Controls for Household and Similar Use, Part 1 : General Requirements, UL 60730-1 , including Annex H; or b) Tests for Safety-Related Controls Employing Solid-State Devices, UL 991 .		P
10.14	Software relied on to comply with this standard shall comply with the Standard for: a) Automatic Electrical Controls for Household and Similar Use, Part 1 : General Requirements, UL 60730-1 including Annex H, as software Class B; or b) Software in Programmable Components, UL 1 998.		N/A
10.16	When the electronic circuit is provided with a fuse which is intended to open as a result of a fault in the wire, rendering the product inoperable, the fuse shall comply with the Standard for Low-Voltage Fuses - Part 1 : General Requirements, UL 248-1 , and the Standard for Low-Voltage Fuses - Part 1 4: Supplemental Fuses, UL 248-1 4.		N/A
11	**Switches**		**P**
11.1	Bedding that is not provided with a control unit shall be provided with a through-cord switch having an 〃off〃 position. The switch shall be acceptable for the particular application, shall have current and voltage ratings at least equal to the load controlled, and, in the case of multiple-heat bedding, shall have positions that facilitate adjustment of the bedding temperature.		P
11.2	A splice in wiring within a switch shall be insulated if permanence of spacings from the splice to other metal parts is not provided.		N/A

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UL 964			
Clause	Requirement + Test	Result - Remark	Verdict
11.3	The switch or control unit mentioned in 1 1 .1 that is used for appliance on-off operation shall be connected to the ungrounded conductor of the power supply cord. Table 1 3.1 specifies the polarity identification of the power supply cord conductors.		N/A
11.4	Mechanical air-gap type switches shall comply with one of the following, as applicable: a) The Standard for Switches for Appliances - Part 1 : General Requirements, UL 61 058-1 ; or b) The Standard for Special-Use Switches, UL 1054; c) The Standard for General-Use Snap Switches, UL 20; or d) The Standard for Nonindustrial Photoelectric Switches for Lighting Control, UL 773A.		N/A
12	**Internal Wiring**		**P**
12.1	Internal wiring, including heater wire, composed of insulated conductors shall comply with the Standard for Appliance Wiring Material, UL 758.		P
13	**Supply, Control, Pigtail, and Interconnecting Cord**		**P**
13.1	For connection to the supply circuit, each appliance shall be provided with a length of two-conductor flexible cord, terminating in a polarized 2-wire attachment plug. The flexible cord shall be: a) Throw Blankets – Type SPT-2 or heavier. b) All other applications – Type SP-1 , SPE-1 , or SPT-1 or heavier.		P
13.2	This cord (supply cord) shall not be less than 6 feet (1 .8 m) long, when measured from the face of the plug to the point at which the cord enters the switch or control unit.		P
13.3	A cord set, power supply cord, or interconnecting cord shall comply with the Standard for Cord Sets and Power Supply Cords, UL 81 7.		P
13.4	The attachment plug connections shall comply with Figure 1 3.1 , and the polarity identification of the flexible cord shall comply with Table 1 3.1 .		P
13.5	The ampacity of the supply cord shall not be less than the current stated or implied in the ratings marked on the bedding.		P

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UL 964			
Clause	Requirement + Test	Result - Remark	Verdict
13.6	The wiring (control cord) between the switch or a control unit and the female half of the bedding connector and the wiring (pigtail cord), if any, between the male half of the bedding connector and the bedding itself shall be: a) Throw Blankets – Type SPT-2 or heavier flexible cord containing two or more circuit conductors with no grounding conductor, or shall be appliance-wiring material of the Type SPT-2 or the equivalent or heavier construction containing two or more circuit conductors- no grounding conductor; and b) All other appliances – Type SPT-1 , SPE-1 , SP-1 , or heavier flexible cord containing two or more circuit conductors with no grounding conductor, or shall be appliance-wiring material of the Type SPT-1 , SPE-1 , SP-1 or the equivalent or heavier construction containing two or more circuit conductors- no grounding conductor.		N/A
13.7	The female connector on the control cord shall not accommodate any attachment plug with an American National Standard Institute (ANSI) configuration of contacts.		P
13.8	The male connector attached (pigtail or other) to the bedding shall not fit into any receptacle, current tap, or cord-connector body with an American National Standard configuration of contacts.		P
13.9	The bedding connector shall be rated for 1 25 V, and shall have a current rating at least equal to the stated or implied current in the ratings marked on the bedding.		P
13.10	To reduce the likelihood of unintentional contact that may involve a risk of electric shock from uninsulated live parts, mating connectors shall be guarded or recessed so that live contacts are not exposed while the female and male connectors are fully mated or during engagement or withdrawal. The probe illustrated in Figure 1 3.2 is to be applied to any depth that the recessing will permit; and is to be rotated, changed in configuration or angled before, during and after application to any position that is necessary to examine the connectors.		N/A

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13.11	The probe mentioned in 1 3.1 0 is to be used as an instrument to judge accessibility and not as an instrument to judge the strength of a material; it is to be applied with a 3 lbf (1 3 N) to determine accessibility.		P
13.12	Wiring between two control units (interconnecting cord) shall be Type SPT-1 , SPE-1 , SP-1 , or heavier flexible cord containing two or more circuit conductors – no grounding conductor – or shall be appliance-wiring material of the Type SPT-1 , SPE-1 , SP-1 , the equivalent or heavier construction containing two or more circuit conductors – no grounding conductor.		P
13.13	Except as noted in 1 3.1 4, both ends of each supply, control, pigtail, and interconnecting cord shall be permanently attached. Strain relief shall be provided on all cords to reduce the possibility of mechanical stress on the cord being transmitted to any wiring connection. See 32.1 and 32.2.		P
13.14	A switch shall be provided with a means for strain relief unless all connections in the switch, except for a soldered joint in the slack portion of the through conductor, are riveted or welded, or unless such connections are made by means of eyelets, pressure wire connectors, closed-loop tangs, soldered loops in the conductor, or soldered joints where mechanical security is provided without depending upon the solder. Terminal binding screws shall not be able to unthread completely after the switch is assembled.		N/A
13.15	The supply and control cords shall be secured to a switch such that the conductor insulation and the braid, if any, are kept from slipping to the extent that the conductor is exposed or a short circuit might occur.		N/A
14	**Connections**		**P**

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14.1	All electrical connections shall be mechanically secure, shall provide necessary electrical continuity and conductivity, and shall be insulated in compliance with 7.5. A soldered connection shall be made mechanically secure before being soldered if breaking or loosening of the connection can result in any condition of risk of fire or electric shock. Consideration shall be given to flexure and other conditions of use when determining the acceptability of electrical connections. Mechanical splicing devices shall be acceptable for the application. Each connection to a thermostat shall be provided with a means for strain relief.		P
14.2	Connectors complying with any of the following fulfill 1 4.1 : a) Quick-connect terminals, both connectors and tabs, for use with one or two 22 - 1 0 AWG copper conductors, having nominal widths of 0.1 1 0, 0.1 25, 0.1 87, 0.205, and 0.250 inch (2.8,3.2, 4.8, 5.2, and 6.3 mm), intended for internal wiring connections in appliances, or for the field termination of conductors to the appliance, complying with the Standard for Electrical Quick- Connector Terminals, UL 31 0.		P
PERFORMANCE			
15	**General**		**P**
15.1	Electrically heated bedding shall be investigated by means of the tests described in Sections 1 6 – 38, performed on one representative bedding product, on three representative associated control units (ifany), and on each of six representative thermostats, if thermostats are employed. The Roller Flexing Test,Section 26, is able to be performed on a second representative foot warmer or mattress pad. See Note a of Table 1 5.2. Unless otherwise specified, all tests are to be made on unaged or otherwise untested representative products, and specimens of any external layer of fabric blends on the bedding. In general, bedding blends shall be tested as indicated in Table 1 5.1 . Unless otherwise specified, all tests are to be performed in a draft free location at a temperature of 25 ±5° C (77.0 ±9.0° F).		P

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15.2	The inch-thick felt mentioned in 1 9.2.2, 31 .2.1 , and 31 .6.4 is to be minimum 1 -inch thick (25 mm),1 00 percent standard-weight, all-cattle-hair, punched felt with center reinforcement consisting of burlap having a mass of 5 oz/yd 2 (1 70 g/m 2). The felt is to have a mass of 1 05 ±1 5 oz/yd 2 (3.56 ±0.51 kg/m 2). Exception: SAE J31 4, Grade F-1 1 , minimum one inch-thick wool felt is also acceptable.		P
15.3	The test mattress mentioned in 1 9.1 .4, 31 .1 .2, 31 .4.1 , and 31 .6.2 is to consist of two 1 -inch thick (25-mm thick) coarse hair pads as described in 1 5.2 that are to be attached to a nominal 1 /2-inch (1 2.7 mm) or thicker plywood sheet. The mattress is to be of a size that accommodates the blanket when laid out flat.		P
15.4	The test sequence for a complete product shall be in accordance with Table 1 5.2.		P
15.5	All tests are to be conducted with the sample connected to a 1 20 Vac source of supply, unless otherwise indicated.		P
16	**Input Test**		**P**
16.1	The wattage or current input to a product shall not be more than 1 05 percent of the rated wattage or current when the appliance is operated at 1 20 V ac while in a well-heated condition (see 41 .3).		P
17	**Control Impact and Calibration Tes**		**P**
17.1	The enclosure of each of three representative control units shall withstand the impact due to dropping without exposure of uninsulated live parts and, unless short-circuited during the normal temperature test, or unless the impact due to dropping results in a fail-safe condition, shall not show a plus variation of more than 1 0° C (1 8° F) in its maximum cut-off temperature when the control is tested in accordance with 1 7.2 – 1 7.4.		P

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17.2	Each of three representative control units is to be connected to the bedding with which it is associated. Each control is to be adjusted to its highest setting, and the cut-off temperature is to be measured by means of a thermocouple located immediately adjacent to the sensing element in the control unit itself. The location of the thermocouple must be positively marked so that it can be replaced after the dropping described in 1 7.3.		P
17.3	Each of the three control units, while energized, is then to be subjected to drops from a height of 3 ft (91 4 mm) onto a hardwood surface. Each unit is to be dropped three times in a manner such that the control will strike in three different positions. Following the dropping, a check is to be made for exposure of live parts with the probe mentioned in 1 0.2 while the control is de-energized, and then – unless the control is found to be in a fail-safe condition – the cut-off temperature of each control is to be measured again with the thermocouple located in exactly the original position.		P
17.4	For the control impact and calibration tests described in 1 7.1 , a controlled ambient temperature of 25.0 ± 2.0° C (77.0 ±3.6° F) is specified.		P
18	**Control Units Tests**		**P**
18.1	Unless short-circuited so that it will not cycle during the Normal Temperature Test, Section 1 9, the test sequence for the representative control units shall be: Calibration (1 8.2 – 1 8.4), Overload (1 8.5 and1 8.6), Endurance (1 8.7 and 1 8.8), Calibration (Repeated) (1 8.9 and 1 8.1 0), Dielectric Voltage-Withstand(1 8.1 1), and Short Circuit (1 8.1 2 – 1 8.1 4).		P
18.2	The cutoff temperature of each of the three control units shall be measured before any tests have been conducted.		P
18.3	In the temperature test mentioned in 1 8.2, a controlled ambient temperature of 25.0 ±2.0° C (77.0±3.6° F) is specified.		P

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18.4	The cutoff temperature is to be measured on each of the three units, described under the tests on the complete bedding, 1 8.1 – 1 8.4. The temperature may be measured by means of a thermocouple immediately adjacent to the bimetal inside each control unit.		P
18.5	A switch and a thermostat employed in a control unit shall be capable of performing successfully when three representative control units are subjected to an overload test as described in 1 8.6. There shall not be electrical or mechanical malfunction of the device.		N/A
18.6	The overload test on each of the three control units is to consist of 1 00 cycles of operation. For the test, each control unit and the bedding are to be connected together in the intended manner, and the assembly connected to a supply circuit having a voltage of 1 44 V ac.		N/A
18.7	A switch and a thermostat employed in a control unit shall be capable of performing successfully when three representative control units are subjected to an endurance test as described in 1 8.8. There shall not be electrical or mechanical malfunction of the device.		N/A
18.8	For each switch or thermostat, the endurance test is to consist of 6000 cycles of operation at rated load and 1 20 V ac.		N/A
18.9	Following the overload and endurance tests, the cutoff temperature of the control unit shall be measured again on each of the three control units. The cutoff temperature on each unit shall not show a plus variation of more than 1 0° C (1 8° F) from the original cutoff temperature on that unit.		P
18.10	In the temperature test mentioned in 1 8.9, a controlled ambient temperature of 25.0 ±2.0° C (77.0±3.6° F) is specified.		P
18.11	The control unit shall be capable of withstanding for 1 minute without breakdown the application of an essentially sinusoidal potential of 1 000 V plus twice rated voltage, between all live parts and all exposed dead metal parts, when three representative control units are tested in accordance with 24.2.		P

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18.12	There shall not be emission of flame or molten metal from the enclosure of any of three representative control units when the units are caused to interrupt a current resulting from the substitution of a short circuit for the normal bedding load.		P
18.13	To determine whether a control unit complies with the requirement in 1 8.1 2, the bedding load is to be disconnected and the output terminals of each control unit are to be short-circuited. The enclosure of each control unit is to be covered with loosely packed surgical cotton. Each control unit, in series with a 20 A plug fuse, is then to be connected to a supply circuit of 1 20 V ac. If the fuse is not opened, or if the control unit is still operative after the fuse has opened, the test is to be repeated with a 30 A plug fuse substituted for the 20 A fuse. The opening of either or both of the fuses is acceptable, but ignition of the cotton or emission of flame or molten material from the control unit is not acceptable.		P
18.14	This test is to be performed in accordance with 1 8.1 2 and 1 8.1 3 on three representatives of a control unit that is associated with a thermostat-type bedding appliance. For a product without a thermostat, where the protective circuit is dependent on the control, each of the three control units is to be short-circuited for each of the circuits involved in the control – all possible combinations of connections between the control and the bedding – and the end result in all cases is to be as noted in 1 8.1 3.		P
19	**Normal Temperature Test**		**P**
19.1	Blankets, sheets, quilts, and comforters		P
19.2	Mattresses, foot warmers, and mattress pads		P
20	**Flexing Test**		**P**
20.1	General		P
20.2	Flexing of mattresse	Tested and passed	P
21	**Connector Flexing Test**	**Tested and passed**	**P**
21.1	Each of 6 representative female cord connectors with cord attached shall be subjected to 900 cycles of the cord flexing test described in 21 .3. Noncompliance of any one sample of the set shall be considered noncompliance for the group.	Tested and passed	P

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21.2	After being subjected to the flexing test there shall be: a) No breakage of the cord or exposure of an uninsulated conductor strand; and b) No breakdown when each cord is subjected to a 1 000 V dielectric voltage-withstand test between the individual conductors of the flexible cord.		P
21.3	Each unit is to be mounted in a guide with a 1 /4 lb (1 1 3 g) doughnut-shaped weight attached to approximately 1 0 inches (254 mm) of cord, 8 inches (203 mm) from the point at which the cord enters the connector. The 1 0-inch length of cord is then to be spliced to a length of 28 AWG (0.082 mm 2) flexible wire, which is then to be connected to the flexing machine. The setup is to be such that the cord-connector can be rotated 540 degrees about the axial center of the cord. A typical setup is illustrated in Figure 21 .1 .The rate of flexing is to be at least 1 0 cycles per minute. Each cycle, starting with the connector in a vertical position, is to consist of 540 degrees of rotation in one direction and then 540 degrees in the reverse direction back to the starting point. During the test the supply cord is to carry the same current as it does in the electric product. The ambient air temperature is to be 25 ±2.0° C (77 ± 3.6° F) during the test.		P
22	**Throw Blanket Cord Flexing Test**		**P**
22.1	Each cord/bushing or cord/fitting interface of an in-line control assembly intended for use with electric throw blankets shall: a) Comply with 22.2 when tested as described in 22.3 – 22.8; b) Be supplied by a Class 2 source of supply, see 5.2; c) Operate at a current of less than that indicated in 23.1 when conductor insulation is removed; or d) Disconnect power in the event of any of the conditions noted in 22.2. The reliability of solid- state controls shall comply with the requirements of the Standard for Safety-Related Controls Employing Solid-State Devices, UL 991 .		P

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Clause	Requirement + Test	Result - Remark	Verdict
22.2	The test shall not result in: a) Breakage of internal conductors; b) Exposure of conductors through insulation; and c) Dielectric breakdown.		P
22.3	Six assemblies are subjected to the test. Noncompliance of any one sample of the set shall be considered noncompliance for the group.		P
22.4	Each sample is to be secured to the flexing apparatus so that the flexible cord assumes the natural bend permitted by the fitting construction. The major axis of any right cross section of the cord is to be parallel to the longitudinal axis of the rotation shaft of the test fixture shown in Figure 22.1 so as to allow the cord to flex without any twisting of the parallel conductors. The test weights are to be as follows: a) For Type HPN, 1 0 ounces (284 g); and b) For all other types, 4 ounces (1 1 3 g).		P
22.5	The control is to be secured in the jaws of the flexing machine so that the point of cord exit is at the center of rotation. The rotating jaws are to be adjusted to rotate to an angle of 90° to each side of the centered position. At the centered position, the cord is to hang vertically and the weight, selected in accordance with 22.4, attached to each cord approximately 1 2 inches (305 mm) from the point of rotation. See 22.1 .		P
22.6	Each sample is to be energized from its rated source of supply with a load adjusted to draw maximum rated current of the controller.		P
22.7	Each representative device is to be subjected to lexing cycles until a conductor in each device has opened (as determined by a continuously-monitoring detection circuit), or until 5000 cycles are completed, whichever comes first. A conductor that opens prior to completion of 5000 cycles shall be considered noncompliant. A flexing cycle consists of: rotation of the jaws from the vertical (centered) position 90° to one side; back past the vertical position 90° to the other side of vertical; and back to the vertical (centered) position. The rate of testing shall be maximum 1 0 cycles per minute.		P

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22.8	The dielectric test of 1 8.1 1 shall be conducted at the conclusion of 22.6 with the bushing and a minimum of 3 inches (76.3 mm) of the cord adjacent to the bushing or entry point wrapped in foil.		P
22.9	Each interconnection cord/bushing or cord/fitting interface located on the load side of an in-line control assembly intended for use with electric throw blankets shall: a) Comply with 22.1 ; b) Be supplied by a Class 2 source of supply, see 5.2; c) Operate at a current of less than that indicated in 23.1 when conductor insulation is removed; or d) Disconnect power in the event of any of the conditions noted in 22.2. The reliability of solid- state controls shall comply with the requirements of the Standard for Safety-Related Controls Employing Solid-State Devices, UL 991 .		P
23	**Leakage Current Test (All Products Except Mattresses)**		**P**
23.1	After immersion of the product proper – no controls, cord connectors and the like – for 1 hour in a salt solution as described in 23.2, the leakage current shall not be higher than 5.0 mA when an a-c potential of 1 20 V, or 0.5 mA when a d-c potential of 1 20 V, is applied between the solution and live parts of the product. The connections to the plug of the product and any associated controls shall remain dry and out of the solution throughout the test.		P
23.2	The salt solution is to consist of 8 g of sodium chloride (NaCl) per liter. A metal tub is to be employedas a container.		P
24	**Dielectric Voltage-Withstand Test (All Products Except Mattresses)**		**P**

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24.1	While still immersed in the salt solution mentioned in 23.1 and 23.2, the bedding shall be capable of withstanding for 1 minute without breakdown a 60 Hz essentially sinusoidal potential of 1 000 V plus twice its rated voltage applied between the solution and live parts of the product. The connections to the plug of the product and any associated controls shall remain dry and out of the solution throughout the test.		P
24.2	To determine whether a product complies with the requirement in 24.1 , the product is to be tested by means of a 500 VA or larger-capacity transformer whose output voltage is essentially sinusoidal and can be varied. The applied potential is to be increased at a uniform rate from zero until the required test level is reached, and is to be held at that level for 1 minute.		P
25	**Laundering (All Products Except Mattresses)**		**N/A**
25.1	A representative product shall be subjected to five consecutive washings and dryings in the most severe manner described in the manufacturer’s instructions for the bedding material employed or, if not specified in the manufacturer’s instructions, the product shall be laundered as indicated in 25.2, or according to the manufacturer’s instructions. In decreasing order of severity are considered to be home machine and hand washing.		N/A

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25.2	Unless otherwise specified by the manufacturer’s instructions the product is to be laundered as outlined in (a) or (b): A product to be laundered in an automatic washer shall be laundered as follows: The washer is to be filled with warm water and a minimum amount of all-purpose powdered detergent or mild soap chips is to be added and dissolved by agitation. The product is then to be placed in the washer and allowed to soak for 5 minutes followed by 2 minutes of slow agitation and spin drying at normal speed. The washer is then to be filled for a cool rinse, agitated for 1 minute, and spun at normal speed. A second, identical rinse is to be made. The product is then to be draped over a clothes line and allowed to dry until damp, or it may be damp-dried in an automatic dryer on high heat for 5 minutes. The product is then to be formed to its original shape and size on a flat surface until completely dry. This laundering process is to be repeated four times (a total of five launderings) before the product is immersed in the salt solution as required in 25.1 . b) A product permanently marked to be washed by hand only is to be laundered as follows: A large tub is to be filled with warm water and a minimum amount of all-purpose powdered detergent or mild soap chips is to be added and dissolved by agitation. The bedding is then to be placed in the tub and allowed to soak for 5 minutes followed by 1 5 minutes of vigorous scrubbing with a washboard, scrubbing brush, or similar scrubbing aid. The tub is then to be filled with cool water and rinsed until all cleaning agents are removed. A second identical rinse is then to be made. The product is then to be draped over a clothes line and allowed to dry until damp. The product is then to be formed to its original shape and size on a flat surface until completely dry. This laundering process is to be repeated four times (a total of five launderings) before the product is immersed in the salt solution as required in 25.1 .		N/A

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25.3	After the product is laundered as described in 25.1 and 25.2, there shall not be: a) Loosening of the male connector body; b) Unraveling, breakage or loosening of the stitching at the ends of the dividers for a distance greater than 3/4 inch (1 9 mm); c) Breakage or loosening of any wiring connections; d) Appreciable shifting of position of the heating element within the shell; or e) Breakage of the heating-element conductor or other interruption of the electrical circuit through the product; or water inside the seal around a thermostat.		N/A
26	**Roller Flexing Test (Mattresses, Mattress Pads, and Foot Warmers)**		**P**
26.1	The product shall comply with the requirement in 20.1 .1 when it is flexed in accordance with 26.2.		P
26.2	The flexing of a mattress, foot warmer, or mattress pad is to be conducted in the following manner. The product is to be connected to a supply circuit of 1 20 V ac, a mattress is to be laid out on a plane surface, and a mattress pad or foot warmer is to be laid out flat on a test mattress consisting of six 1 -inch thick (25-mm thick) coarse hair pads as described in 1 5.2. The flexing is to be done by means of a roller that exerts a force of 250 lbf (1112 N or 113.4kgf) and has a length of 34 inches (864 mm) and a hexagonal cross-section approximately 1 9 inches (483 mm) in diameter. The roller is to be moved back and forth for 3000 cycles lengthwise on the product, and its track is to be varied sufficiently so that the entire width of the bedding is affected. This flexing is then to be repeated with the roller being moved in a crosswise direction on the product.		P
27	**Leakage Current Test – Repeated (All Products Except Mattresses)**		**N/A**
27.1	After being laundered as described in 25.1 or 25.2, a blanket, sheet, quilt, or comforter shall comply with the requirement in 23.1 .		P
27.2	Following the Roller Flexing Test, Section 26, a mattress pad and a foot warmer shall comply with the requirements in 23.1 .		P

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28	**Dielectric Voltage-Withstand Test – Repeated (All Products Except Mattresses)**		**N/A**
28.1	After having been subjected to the Repeated Leakage-Current Test, Section 28, the product shall comply with the requirements in 24.1 and 24.2.		P
29	**Normal Temperature Test – Repeated (All Products)**		**P**
29.1	Following the Repeated Dielectric Voltage-Withstand Test, Section 28, or following the Roller Flexing Test, Section 26, in the case of a mattress, the normal temperature test shall be repeated, and the product shall comply with the applicable requirements in Section 1 9.		P
30	**Immersion Test (Blankets, Sheets, Quilts, and Comforters)**		**P**
30.1	A pendant control or similar device connected to bedding by means of a cord integral with the bedding shall comply with the leakage-current requirements of 23.1 and the dielectric voltage-withstand requirements of 24.1 immediately after being subjected to the immersion test described in 30.2.		P
30.2	Each of three representatives of the pendant control or other device is to be immersed for a period of 24 hours in a solution containing 8 g of common table salt per liter of distilled water at 22 – 25° C (72 – 77° F).		P
30.3	The test described in 30.2 shall not result in the entrance of water into the interior of the device as determined by examination following disassembly after the leakage current and dielectric voltage-withstand tests.		P
31	**Abnormal Temperature Tests**		**P**
31.1	General		P
31.2	First method of folding		P
31.3	Second and third method of folding		P
31.4	Three thickness and five thickness fold		P
31.5	Multi-thickness fol		P
31.6	Bunch test		P
31.7	Fully blanketed		P

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31.8	Disabled control		P
32	**Pull Out Test**		**P**
32.1	Except that the attachment plug is to be excluded, the attachment and strain relief provided at each end of each supply, control, interconnecting, and pigtail cord and the attachment of the half of each bedding connector attached to the bedding without a pigtail cord shall withstand for 1 minute the stress indicated in Table 32.1 .		P
32.2	To determine whether the complete product complies with the requirements in 32.1 , each cord andpigtailless bedding connector is to be subjected to the pull specified in Table 32.1 . An appropriate weight is to be gently applied to the cord or pigtailless connector to put the stress at the point of cord or pigtailless-connector attachment for a period of 1 minute while the control unit, switch, connector, or the bedding is securely immobilized – bedding other than a mattress is to be hung vertically across its full width with 1 foot (305 mm) of its length hanging free above the point of pigtail or connector attachment. In the case of each connector to which a cord is attached, each control unit, and each switch, the cord connections at terminals are to be severed or disconnected prior to the test. The strain relief is not acceptable if at the point of severance or disconnection: a) The ends of the conductors are seen to separate by any amount; b) The insulation on the conductors is seen to slip off of any conductor to any degree; or c) There is any other appreciable manifestation of stress having resulted on the connections. The attachment and strain relief of a pigtail cord or pigtailless connector to the bedding is not acceptable if: a) The pigtail cord or the connector becomes loose or detached; b) There is any displacement of the heating element or other wiring internal to the bedding; or c) There is any loosening or breaking of any electrical connection.		P

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32.3	The test shall be conducted with the pull force applied in the direction most likely to transmit strain to the strain relief and internal wiring. Tests in multiple directions, using separate samples, shall be conducted when there is uncertainty as to the most severe direction.		P
32.4	The cord and strain relief means shall not be in contact with the clamping or support means during the test.		P
33	**Final Mattress Tests**		**P**
33.1	Following the Abnormal Temperature Tests, Section 31 , and the Pull Out Test, Section 32, a mattress shall be disassembled and the heating-element carrier removed. This carrier, with the element still contained, shall then be subjected to the Leakage Current Test, Section 23, and the Dielectric Voltage-Withstand Test, Section 24.		P
34	**Flammability of Shells**		**P**
34.1	The shells of electrically heated bedding, and any external layer of fabric on the bedding, shall be tested as described in 34.18 - 34.25.		P
34.2	There shall not be charring or burning of the paper monitor as the result of ignition, surface flash, or burning of the bedding under test.		P
34.3	Representative bedding shall consist of a strip of fabric, from each product to be tested, whose width is approximately 45 inches across the product by 3 inches (1 1 40 by 76 mm). Fifteen individual specimens are then to be cut from this strip, each with the following dimensions: 2.75 ±0.1 3 by 2.75 ±0.1 3 inches(69.9 ±3.3 by 69.9 ±3.3 mm).		P
34.4	Five of the specimens are to be tested face up and designated Group A. Five of the specimens are to be tested face down and designated Group B. The remaining five specimens are to be tested either face up or face down as described in 34.5.		P

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34.5	If two or more specimens from either Groups A or B or any combination thereof do not pass, as described in 34.1 , this would constitute unacceptability for that product. If only one specimen does not pass, then the five additional specimens are to be tested, either face up or face down, whichever mode was used on the original specimen. All five of the new test specimens shall have acceptable results.		P
34.6	The test chamber shall be a metal cabinet with inside dimensions of 1 4-1 /2 inches (368 mm) wide, 8-1 /2 inches (21 6 mm) deep, and 1 3-3/4 inches (349 mm) high, and outside dimensions to suit. The front of the cabinet shall be a close-fitting door (sliding or hinged) with a transparent insert to permit observation of the entire test. Vent holes shall be distributed across the bottom portion of the front panel of the chamber and the rear portion of the cover of the test chamber as shown in Figure 34.1 .		P
34.7	The test cabinet shall be equipped with control elements that will control the time of flame impingement on the specimen to ±0.05 seconds. The control system shall consist of two parts: a) An adjustable timer that actuates the burner mechanism; and b) A counter that is actuated by the burner mechanism when the burner is in position to impinge the flame on the specimen.		P
34.8	The specimen holder shall consist of two rectangular aluminum plates held together with acceptable fastenings. See Figures 34.2 and 34.3.		P
34.9	The specimen holder base shall be made of metal as detailed in Figures 34.2 and 34.3 and shall maintain the specimen holder in a horizontal position in the approximate center of the test chamber floor. See Figure 34.4. The specimen holder base shall be rigidly held in place by an acceptable means, such as, screwed to the floor of the test cabinet or held by means of side guides.		P
34.10	The burner shall be as detailed in Figure 34.5. The gas input line to the burner shall be equipped with a needle valve that is used to control the flame length.		P

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34.11	There shall be a pressure regulator to furnish gas to the burner under a gauge pressure of 2-1 /2±1 /2 lbf/in 2 (1 29 ±26 mm mercury gauge or 1 7 ±3 kPa) at the needle valve inlet.		P
34.12	The gas shall be at least 97 percent pure technical grade methane.		P
34.13	A hood or an enclosure shall be used to provide a draft-protected environment surrounding the test chamber. This enclosure shall have a fan or equivalent means for exhausting smoke or toxic gases or both produced by testing.		P
34.14	White paper that conforms to the Federal Specification for Lens Paper, A-A-501 77, shall be used as a monitor to determine if ignition has occurred. This paper shall be cut into a 3-1 /2 by 3 inch (89 by 76 mm) rectangle with holes punched as shown in Figure 34.6.		P
34.15	A brushing device similar to the one shown in Figure 34.7 shall be used to brush up the nap or fiber on specimens that have raised fiber surfaces. The brush shall consist of two staggered rows of stiff nylon bristles, 0.01 6 inch (0.40 mm) diameter with 20 bristles per tuft and four tufts per inch (per 25 mm). The tufts shall be cut to a uniform length of 0.75 inch (1 9 mm). The downward force of the brush shall be 75.0±1 0 g.		P
34.16	A forced circulation drying oven capable of maintaining the specimens at 1 05 ±2.8° C (221 ± 5° F) shall be used to dry the specimens while mounted in the specimen holders.		P
34.17	An airtight and moisture-tight desiccating chamber shall be used for cooling mounted specimens after drying. Anhydrous silica gel with an indicator shall be used as the desiccant in the desiccating chamber. The desiccant shall be replaced or reactivated when it becomes inactive.		P
34.18	The specimens are to be washed in a neutral soap solution as indicated in 34.1 9. Neutral chip soap may be used.		P

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34.19	The specimens are to be put into a 3-US-gallon-capacity (1 1 L) right-circular cylindrical container having approximate dimensions 1 3 inches (330 mm) long by 8-3/4 inches (222 mm) in diameter, that is fitted with a watertight cover at one end, preferably of metal. The container is to be mounted on a shaft whose longitudinal axis is in the same plane as the longitudinal axis of the container, intersects the longitudinal axis of the container at an angle of 50 degrees, and intersects the outside surface of the container at a point equidistant from the ends of the container. The shaft is to be oriented so that the longitudinal axis of the container is vertical while the container is in one of the two positions of rotation in which the plane of the axes is vertical. Soft water at a temperature of 35.0 – 37.8° C (95.0 – 1 00.0° F) and into which 0.5 percent by weight of the neutral soap mentioned in 34.1 8 has been thoroughly mixed is to be poured into the container in an amount equal to 30 times the mass of the specimens dry. The specimens are to be worked gently in the solution for 5 minutes by rotating the shaft on which the container is mounted at a rate of 45 – 50 revolutions per minute, after which they are to be rinsed twice in 26.7° C (80.0° F) water, spun to remove most of the water, and then laid flat on a horizontal surface and allowed to dry completely at room temperature.		P

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Clause	Requirement + Test	Result - Remark	Verdict
34.20	After the washed specimens have dried thoroughly. They are to be individually brushed as follows: clamp the specimen on the carriage of the brushing device and pull the carriage with the specimen underneath the brush, brushing the specimen surface once in the direction which raises the nap or fibers as much as possible. Before brushing the next specimen, the tufts of the brush should be cleared of residual fibers. After brushing, with the bottom plate of the holder on a mounting plate, mount the specimen in the specimen holder. Avoid handling the specimens except on the edges. Mount the specimens and paper monitors in the following order: bottom plate, specimen, paper monitor, top plate. Place the paper monitor such that the two small holes fit over the guide pins on the bottom plate of the specimen holder. This shall set the large circular hole in the paper monitor concentric with the hole in the top plate of the specimen holder.		P
34.21	Place the mounted specimens in a drying oven in a manner that will permit free circulation of air at 105 ±2.8° C (221 ±5° F) around them for at least 30 minutes. Remove the mounted specimens from the oven and place them in a desiccator to cool, taking care that the brushed surface of each specimen is not touched. No more than five specimens shall be placed in each desiccator at one time. Specimens shall remain in the desiccator at least 30 minutes and no more than 60 minutes.		P
34.22	Adjust the burner actuating linkage so that the burner tip, in the actuated position, is 0.31 inch (7.9 mm) from the specimen surface. With the burner in the actuated position, move the base and holder assembly away from the burner tube so that the burner tip is 0.1 3 inch (3.3 mm) off center. Secure holder assembly to floor.		P
34.23	The timer shall be adjusted so that the burner, when actuated, remains in position to impinge the flame on the specimen for 1 ±0.05 seconds. This is accomplished by actuating the control elements thereby sweeping the burner forward, reading the time on the counter, and adjusting as necessary.		P

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Clause	Requirement + Test	Result - Remark	Verdict
34.24	With the hood fan turned off and the burner in the relaxed position, use the needle valve to adjust the flame length to 0.63 inch (1 6 mm) from the tip of the burner parallel to the floor of the cabinet measuring only the clearly visible, yellow portion of the flame. A gauge for this adjustment is shown in Figure 34.5.		P
34.25	Remove the mounted specimens from the desiccator one at a time and insert them in the cabinet for testing. Close the cabinet door and actuate the burner mechanism. The control equipment will automatically cause the flame to impinge on the surface of the specimen for 1 ±0.05 seconds. If more than 30 seconds elapse between removal of a specimen from the desiccator and the initial flame impingement, that specimen shall be reconditioned prior to testing. When combustion has stopped, as evidenced by absence of flame and afterglow, remove the mounted specimen from the cabinet and place it on a flat surface. The surface shall be a white paperboard sheet. Determine for each specimen whether or not the paper monitor is charred or burned at any point. See 34.2.		P
35	**Ease of Ignition Test**		**P**
35.1	Six specimens of the shell of electrically heated bedding, and any external layer of fabric on the bedding, each measuring 3.94 inches by 7.87 inches (1 00 mm by 200 mm), are to be tested in the apparatus shown in Figures 35.1 , 35.2, and 35.3.		P
35.2	The specimens are to be cut from the test product so that the short side is parallel to the run of the heating elements, and the specimens are taken from positions in the blanket such that as far as possible, no two specimens contain the same warp or the same weft threads. If this is not possible then the same warp or weft thread must not appear in more than two specimens.		P
35.3	After removal of the heating elements, wires, and the like, the specimens shall be conditioned in the oven with the test apparatus for a period of not less than 3 hours.		P

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Clause	Requirement + Test	Result - Remark	Verdict
35.4	At the end of the conditioning period each specimen is subjected to the following test, which is made once at one end of the specimen with one side uppermost and once at the other end with the other side uppermost.		P
35.5	The test apparatus has two 0.1 1 8 inch (3 mm) diameter brass electrodes, supported on a common axis by brass pillars mounted on an insulating base plate. The base plate also carries a platform of insulating material measuring 3.94 inches square (1 00 mm by 1 00 mm) that is mounted centrally between the brass pillars, with the mounting means such that the height of the platform can be adjusted. One electrode is fixed in position while the other is movable with an effective stop so that it can be withdrawn to enable the specimen to be mounted in a test apparatus and then returned in position so that there is a required gap between the two electrodes. The fixed electrode is cut so that the plane of the section is at an angle of 45 degrees to the axis of the electrodes and is mounted with the plane of the section such that the point furthest from the electrode support is at the top and at a distance of approximately 0.1 1 8 inch (3 mm) from the center of the platform. The movable electrode is flat-ended, the face being cut at 90 degrees to the axis of the electrode. The stop is so adjusted that when the electrode is at the operating position, the horizontal distance between the ends of the electrodes is 0.236 inch (6.0 mm).		P
35.6	The lower member of a two-part hardwood mask, as shown in Figures 35.1 and 35.2, is fixed to the adjustable table in the position indicated, and the whole assembly, together with the upper member of the mask, Figure 35.3, is placed in an oven with a glass inspection door, the door being heated by natural convection.		P
35.7	While in the oven, electrodes are connected in series with an acceptable noninductive resistance bank to the output terminals of an oil ignition or similar transformer having a sinusoidal output voltage rated at 1 0 kV (rms) and an output rating such that the output voltage does not fall by more than 1 00 V when a current of 1 mA is passing. The oven is maintained at a temperature of 65 ±2° C (1 49 ± 3.6° F).		P

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Clause	Requirement + Test	Result - Remark	Verdict
35.8	When steady temperatures are achieved the transformer primary voltage is adjusted if necessary, to give a terminal output voltage of 1 0 kV. The electrodes are then short-circuited and the resistance bank adjusted so that a current of 1 mA flows. The supply is then switched off without alteration to the circuit conditions.		P
35.9	Without removing the apparatus from the oven, the movable electrode is withdrawn and the specimen threaded over the fixed electrode, so that it lies centrally in one of the element pockets, with the end of the specimen approximately level with the edge of the adjustable platform. The movable electrode is then threaded into the same pocket and fixed in the position necessary to give the specified gap between the electrodes. The specimen is then smoothed out, care being taken that the material is not looped or caught between electrodes. After this, the platform height is adjusted so that the centerline of the electrodes lies approximately in the plane of the element pockets and the mask is placed in position.The oven door is then closed and 5 minutes is allowed for the conditions to stabilize.		P
35.10	The supply is then switched on and sparks allowed to pass between electrodes for a period of 2 minutes. If the specimen ignites, the time in seconds is recorded, from the instant of switch on until the flame reaches the edge of the mask. If the specimen does not ignite the result is recorded as 1 20 seconds. The ignition of surface hairs lasting not more than 3 seconds is ignored.		P
35.11	If any result is below 30 seconds, the test is repeated on a second batch of specimens. If the result for any specimen in the second batch falls below 30 seconds the material is not acceptable.		P
35.12	If no results are below 30 seconds, the mean of all 1 2 readings is calculated. All results different by more than ±30 seconds from the mean are then ignored and, if necessary, the average value for the remainder calculated.		P
35.13	The average figure for the specimens differing by not more than 30 seconds from the original mean shall not fall below 80 seconds.		P

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Clause	Requirement + Test	Result - Remark	Verdict

36	**Effect of Cleaning Solvents on Bedding Tests (All Products Except Mattresses)**		**N/A**
36.1	The test program described in 36.2 – 36.7 is to be employed to determine whether or not the marking requirement in 42.9 regarding dry cleaning, is applicable to a product.		N/A
36.2	Five representative products shall be processed as follows. Two products shall be dry cleaned ten times in petroleum solvent (Stoddard solvent or high-flash naphtha), and two products dry cleaned ten times in perchlorethylene. Regular commercial equipment shall be employed for cleaning, extracting, tumbling, and brushing the products; and each product shall be cleaned and processed by itself and not mixed in with other articles or products. The fifth product shall be subjected to five successive dry cleanings in five different local establishments picked at random.		N/A
36.3	Following the dry cleaning conditioning, the five products shall be examined visually and shall show none of the adverse features mentioned in 20.1 .1 , no deterioration such as, cracking or brittleness of the connector body or seals around the thermostats, and no mechanical damage to the male pins.		N/A
36.4	The five products shall be capable of performing in the intended manner when connected to a supply circuit of 1 20 V ac.		N/A
36.5	The insulated electrical parts shall be removed from each of the five processed products and the insulation compared with that of an untested product. Tensile-strength and elongation values determined on processed specimens shall not be less than 80 percent of values determined on otherwise untested specimens. The physical test procedure shall be as specified in the requirements for thermoplastic-insulated wires.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
36.6	Specimens of the insulating heating element from the processed products shall be capable of withstanding the standard 1 00,000-cycle flexing test for heater wire without breakage of the conductors or damage to the insulation. For this test, six U-shaped specimens, each having a total length of approximately 24 inches (61 0 mm), shall be mounted vertically (bottom of the U uppermost) between two 1 /2-inch (1 3-mm) diameter horizontal metal rods, with a slight clearance to either side of the wire, and with a weight that exerts a force of 3/4 ounce (0.21 N) attached to the lower end of each wire. There are thus to be 1 2 wire ends weighted and 1 2 points of flexure where the wires pass between the horizontal rods. While so mounted and carrying rated current, the specimens shall be bent back and forth from one horizontal position through 1 80 degrees to the opposite horizontal position.		N/A
36.7	Following the flexing test, the six wire specimens shall be immersed, except for approximately 4 inches (1 02 mm) at each end, in a salt solution as described in 23.2. Each specimen shall then comply with the Dielectric Voltage-Withstand Test, Section 24.		N/A
37	**Thermostats in Bedding**		**P**
37.1	A thermostat employed internally in bedding shall comply with the requirements for original calibration (37.2), overload (37.3), endurance (37.4, 37.6, and 37.7), recalibration (37.5 and 37.8), and thermostat tracking (37.9 – 37.1 5).		P
37.2	The cut-off temperature of each of six thermostats that are identical to the thermostats used in the complete bedding is to be measured by any method whereby the temperature can be effectively regulated and accurately measured.		P

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Clause	Requirement + Test	Result - Remark	Verdict
37.3	There shall not be electrical or mechanical malfunction or undue pitting or burning of the contacts in any of the six calibrated (see 37.2) thermostats as the result of their operating automatically on a supply circuit of 1 20 V ac for 1 00 cycles at a rate of no more than 6 cycles per minute making and breaking twice the maximum noninductive current that a thermostat normally carries in the bedding.		P
37.4	There shall not be electrical or mechanical malfunction or undue pitting or burning of the contacts in any of the six thermostats that performed acceptably in the overload test described in 37.3 as the result of their additional automatic operation on a 1 20 V alternating-current supply circuit for at least (see 37.7) 25,000 cycles at a rate of no more than 30 cycles per minute making and breaking the maximum noninductive current that a thermostat normally carries in bedding.		P
37.5	After the six thermostats that performed acceptably in the endurance test described in 37.4 have been kept at a temperature of 0° C (32° F) for an hour and then at a temperature of 1 25° C (257° F) for an additional hour, the cutoff temperature of each of the six thermostats shall be no more than 5° C (9° F) higher than when originally determined in accordance with 37.2.		P
37.6	There shall not be electrical or mechanical malfunction or undue pitting or burning of the contacts in any of the six thermostats that performed acceptably in the overload test described in 37.3, as the result of their additional automatic operation on a 1 20 V alternating-current supply circuit for at least 75,000 cycles at a rate of no more than 30 cycles per minute making and breaking the maximum noninductive current that a thermostat normally carries in the bedding.		P
37.7	The total endurance test is intended to represent at least 1 000 hours of service under conditions that produce the fastest operation of a thermostat in the bedding. The test is to be extended as far beyond 1 00,000 cycles as may be necessary to represent 1 000 hours of this rapid service.		P

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Clause	Requirement + Test	Result - Remark	Verdict
37.8	After the six thermostats that performed acceptably on the endurance test described in 37.6 and 37.7 have been kept at a temperature of 0° C (32° F) for an hour and then at a temperature of 1 25° C (257° F) for an additional hour, the average cutoff temperature of the six thermostats shall be no more than 5° C (9° F) higher than the average of the cutoff temperatures originally determined in accordance with 37.2. No thermostat shall have a cutoff temperature more than 1 0° C (1 8° F) higher than when originally determined in accordance with 37.2.		P
37.9	Each of six previously untested bedding thermostats shall be tested three times as specified in 37.10 37.15. As a result of the test, there shall not be a permanent carbon track (carbon path capable of carrying a portion of load current) formed across the surface of a thermostat’ s insulating material.		P
37.10	For the test, each thermostat is to be in its sealed envelope with leads approximately 6 inches (1 52 mm) long attached. A slit approximately 3/1 6 inch (4.8 mm) long is to be made at the top of the envelope by using a razor blade or similar thin-edge cutting tool.		P
37.11	A test fluid is to be injected into the envelope until the insulator plates are covered by 1 /1 6 – 1 /8 inch (1 .6 – 3.2 mm) of the fluid. The fluid is to consist of 1 gram of reagent grade ammonium chloride (NH 4Cl) dissolved in distilled water and diluted to 1 liter. The fluid is to have a resistivity of 385 ±5 ohm-centimeters at 23 ±1 ° C (73 ±2° F).		P
37.12	Each thermostat is to be positioned so as to create the most severe conditions for wet electrical tracking at critical surface spacings over insulating material. An example of an orientation to create such conditions is illustrated in Figure 37.1 . If more than one orientation is used, a separate group of thermostats is to be employed for each orientation.		P

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Clause	Requirement + Test	Result - Remark	Verdict
37.13	After each thermostat has been conditioned in the solution for 30 minutes, each is to be connected to a circuit as illustrated in Figure 37.2, with the supply voltage and variable resistor adjusted to provide open-contact voltage and closed-contact current values representative of maximum end-use conditions.		P
37.14	Following energization, an external forced hot-air heat source is to be applied to the thermostat until the contacts open. The test fluid is to be allowed to boil off by way of electrolytic conduction, and the thermostat is to remain energized for a minimum of 5 minutes after the boiling stops in order that the ultimate results of the conduction of current across the wet surfaces of insulating material is obtained.		P
37.15	An ammeter is to be connected into the circuit in order to aid in determining whether or not a permanent carbon track has formed.		P
38	**Abnormal Operation Test for Products Employing Semiconductor Heater Wire**		**P**
38.1	The breakdown of semiconductor heater wire employed in electrically heated bedding, as simulated by the tests described in 38.2 - 38.7, shall not result in the risk of fire as determined by glowing, charring, or flaming of the product.		P
38.2	The product is to be connected to a 60 Hz, 1 20 V supply source. The supply circuit is to have a minimum 20 A branch circuit overcurrent protection.		P
38.3	One conductor of the semiconductor heater wire of a previously untested product is to be opened to simulate a break in the wire.		P
38.4	The product is then to be operated as intended for 7 hours or until at least one of the following results are observed: a) A risk of fire develops; b) The branch-circuit overcurrent protection opens; c) The equipment protective device opens; d) Any other circuit component opens; or e) A minimum of one hour elapses, circuit conditions stabilize, and there is no further evidence of overheating of parts.		P

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Clause	Requirement + Test	Result - Remark	Verdict
38.5	With reference to 38.4(e), the overheating of parts is to be detected by an indicator such as an odor, smoke, discoloration, cracking of materials, charring, flaming, glowing, arcing, changes in circuit current through the applied fault, or any similar phenomenon.		P
38.6	If none of the results described in 38.4 (a) - (e) occurs, a second open is to be introduced in the same conductor of the semiconductor heater wire to simulate a second break. The product is then to be tested as described in 38.4.		P
38.7	A short is to be introduced between the two conductors of the semiconductor heater wire of a second, previously untested product. The product is then to be tested as described in 38.4.		P
39	**Push-Back Strain Relief Test**		**P**
39.1	The control of an appliance shall be tested in accordance with 39.2 without occurrence of any of the following conditions: a) Mechanical damage to the supply cord or lead; b) Exposure of the supply cord or lead to a temperature higher than that for which it is rated; c) Reduction of allowable spacings between live parts of opposite polarity or from live parts to dead-metal parts (for internal connections such as to a metal strain-relief clamp); or d) Damage to internal connections or components.		P
39.2	The supply cord or lead is to be held 1 inch (25 mm) from the point where the cord or lead emerges from the appliance and is then to be pushed back into the product. When a removable bushing which extends further than 1 inch (25 mm) is present, it is to be removed prior to the test. When the bushing is an integral part of the cord, the test is to be carried out by holding the bushing. The cord or lead is to be pushed back into the product in 1 inch (25 mm) increments until the cord buckles or the force to push the cord into the product exceeds 6 pounds-force (27 N). The supply cord or lead within the appliance is to be manipulated to determine compliance with 39.1 .		P
MANUFACTURING AND PRODUCTION LINE TESTS			

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Clause	Requirement + Test	Result - Remark	Verdict

40	**Polarization Continuity Check Test**		**N/A**
40.1	As a routine production-line verification, each appliance shall be examined or tested for electrical continuity between the ungrounded circuit supply conductor of the attachment plug (narrower blade of the 2-wire plug), and the line switch and the control unit (if provided). If the continuity cannot be readily determined by visual inspection and component checking, an electrical continuity test is to be conducted. Any indicating device, such as an ohmmeter, a battery and buzzer combination, or the like, may be used to determine continuity.		N/A
RATINGS			
41	**Details**		**P**
41.1	Electrically heated bedding shall be rated in watts, or amperes, and in volts.		P
41.2	A product shall be rated for use on alternating current. In addition the rating shall include the frequency, if necessary, due to any component or control devices.		P
41.3	The voltage rating shall not be higher than 1 25 V ac.		P
MARKINGS			
42	Details		P
42.1	The marking of electrically heated bedding shall be positioned near the connector where it is likely to be visible while the bedding is in position on the bed but without the stitching engaging any of the wiring. The marking shall be on one or more durable labels. At least two (opposite) edges of each label shall be securely attached to one side of the bedding, and each label shall remain legible after the five launderings required in 25.1 and 25.2.		P
42.2	The marking of electrically heated bedding shall include the manufacturer’ s name, trade name, trademark, or other descriptive marking by which the organization responsible for the product may be identified; the date or other dating period of manufacture not exceeding any three consecutive months, a distinctive (catalog) (model) number or the equivalent, and the electrical rating.		P

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Clause	Requirement + Test	Result - Remark	Verdict
42.3	The marking of electrically heated bedding shall provide good contrast between the lettering and background material and shall include the following warnings against common abuses in letters not less than: a) 1 /8 inch (3.2 mm) in height for letters shown in upper case. b) 1 /1 6 inch (1 .6 mm) in height for letters shown in lower case.		P
42.4	The following or equivalent permanent marking (see 25.2) shall appear on electrically heated bedding, except mattresses, provided with detachable cords and controls that are intended to be disconnected prior to washing. A flag-type label is not acceptable. Letters that meet the height requirements described in 42.3 shall be employed:		P
42.5	Bedding except mattresses, that is provided with an integral power-supply cord or that is intended to be hand washed only shall be permanently marked, Flag-type label not acceptable, with the following or equivalent wording. The letter height shall comply with the requirements in 42.3.		P
42.6	The marking of a heated mattress shall include also the statements, in letters that meet the height requirement in 42.3: a) “Place mattress on box spring with this label up”, b) “Cord should be at head of bed”, and c) “Let cord hang free – Do not place between mattress and spring”.		P
42.7	Other statements such as those mentioned in 42.8, may be included in the marking covered by 42.3.		P

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Clause	Requirement + Test	Result - Remark	Verdict
42.8	A warning shall be printed substantially as follows on the inside of the carton or container cover in which the bedding is packaged, except that this warning may be on a separate card, instruction sheet or instruction booklet as described in 42.1 1 . In either case, the height-of-lettering requirement in 42.3 applies: 〃 Be sure to read carefully the accompanying instruction booklet before using this bedding”. b) 〃 Do not use this bedding with an infant, an immobile person, or anyone insensitive to heat, such as a person with poor blood circulation” (this item may be omitted in the case of a mattress, mattress pad, or foot warmer). c) 〃 Do not tuck in the wired area of this bedding” (this item may be omitted in the case of a mattress). d) 〃 Do not route electrical cords between the mattress and box spring. Do not allow the cords to be pinched”. e) 〃 Keep the control away from drafty areas that may become damp or wet such as an open window.〃. f) 〃 Do not use pins – They may damage the electric wiring”. g) 〃 Be sure that this bedding is used on an alternating-current supply circuit of the proper voltage”. h) 〃 Turn off or unplug when not in use”. i) 〃 Excessive heating may result from folding bedding, other than a mattress, when in actual use”. j) 〃 If improper operation of this bedding is observed, discontinue its use immediately and consult the manufacturer or the dealer regarding its repair”. k) “For throw blankets only: Do not use with rocking chairs, recliners, chairs with casters or wheels, or other furniture subject to movement. ” l) “Do not tuck the blanket or supply cord in a sofa or other furniture. All portions of the blanket or controller should be visible at all times. 〃		P

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Clause	Requirement + Test	Result - Remark	Verdict
	m) “Wrapping of cord around the controller may damage the cord. Loop loosely when storing.”		
42.9	Unless investigation has shown that the bedding, other than a mattress, is not adversely affected by dry cleaning, see 36.2 and 36.3, the following warning shall also be included in the instructions: Do not dry-clean this bedding. Cleaning solvents may have a deteriorating effect on the insulation of the heating element 〃 or equally definitive wording. The height-of-letters requirement in 42.3 applies.		P
42.10	The following warning shall also be included in the instructions for a mattress: 〃 Do not use dry-cleaning fluid on this mattress, cleaning solvents may have deteriorating effect on the insulation of the heating element 〃 .The height-of-lettersrequirement in 42.3 applies.		P
42.11	The warnings enumerated in 42.8－42.10 may be printed on a card of durable material, instruction sheet or instruction booklet that is packed with the bedding, provided that the card also carries the legend IMPORTANT－INSTRUCTIONS－DO NOT DESTROY, or the equivalent, in letters not less than 3/8 inch (9.5 mm) high.		P
42.12	A control unit shall have a legible, readily visible marking that shall include the manufacturer’s name, trademark, or other equivalent identifying marking, the catalog number or the equivalent, and the electrical ratings － including the frequency if necessary.		P
42.13	If a manufacturer produces or assembles electrically heated bedding at more than one factory,each finished product shall have a distinctive marking － which may be in code － by which it may be identified as the product of a particular factory.		P
42.14	If in the case of bedding supplied with dual control units each control unit is not marked with the electrical ratings of the portion of the bedding that it controls, one of the control units shall be marked with the complete electrical ratings for the bedding.		P
42.15	A complete set of instructions explaining the care and use of the bedding and directions for laundering shall be furnished with the bedding.		P

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Clause	Requirement + Test	Result - Remark	Verdict
42.16	A through-cord switch as mentioned in 1 1 .1 shall have the ″ off ″ and each ″ low ″ , medium ″ , ″ high″ , and other position indicated by a marking on the switch in letters. If desired, the marking may also be in braille.		P
42.17	The instructions provided with each appliance shall include the following: ″ This appliance has a polarized plug (one blade is wider than the other) as a safety feature. This plug will fit into a polarized outlet only one way. If the plug does not fit fully into the outlet, reverse the plug. If it still does not fit, contact a qualified electrician. Do not attempt to defeat this safety feature.″		P

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16	Table: Input Test					P
U (V)	**P (W)**	**Prated (W)**	**Fuse #**	**Ifuse (A)**	**Condition/status**	
110VAC	196.87	200	--	--	normal working	
120VAC	597.69	600	--	--	normal working	
Supplementary information:						

25	TABLE: Normal Temperature Test			P
Maximum measured temperature T of part/at::	**Measured temperature rise (K)**		**Limit (K)**	
Power plug	7.6	--	45	
Input wire	7.0	--	55	
Internal wire	27.2	--	175	
Connection wire	15.9	--	55	
Control switch	5.9	--	45	
PCB boards	25.6	--	105	
Pump surface	27.5	--	Ref.	
Enclosure shell	3.7	--	60	
Ambient	24.5℃	--	--	
supplementary information:				

31	TABLE: Abnormal Temperature Tests			P
Maximum measured temperature T of part/at::	**Measured temperature rise (K)**		**Limit (K)**	
Power plug	8.3	--	45	
Input wire	7.9	--	55	
Internal wire	28.7	--	175	
Connection wire	16.8	--	55	
Control switch	6.3	--	45	
PCB boards	26.8	--	105	
Pump surface	28.1	--	Ref.	
Enclosure shell	4.0	--	60	
Ambient	24.5℃	--	--	

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supplementary information:

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Appendix 2: Photo-documentation

Photo 1



Photo 2

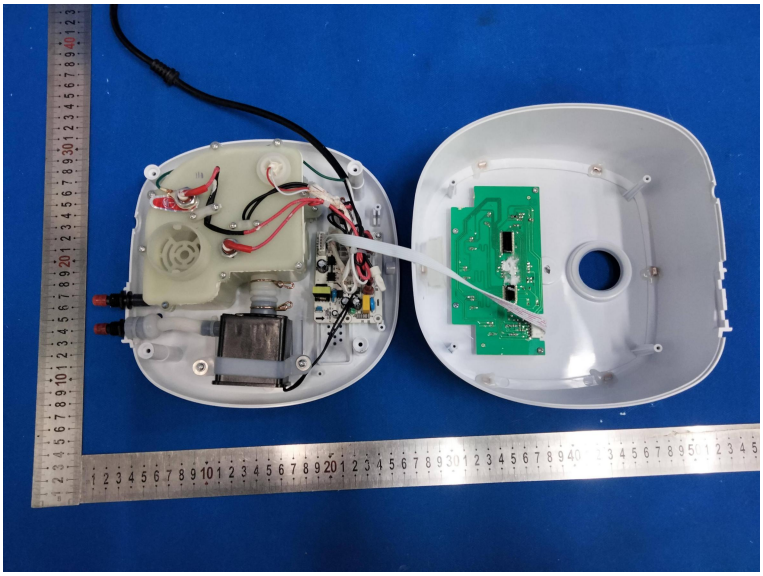


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Photo 3



Photo 4

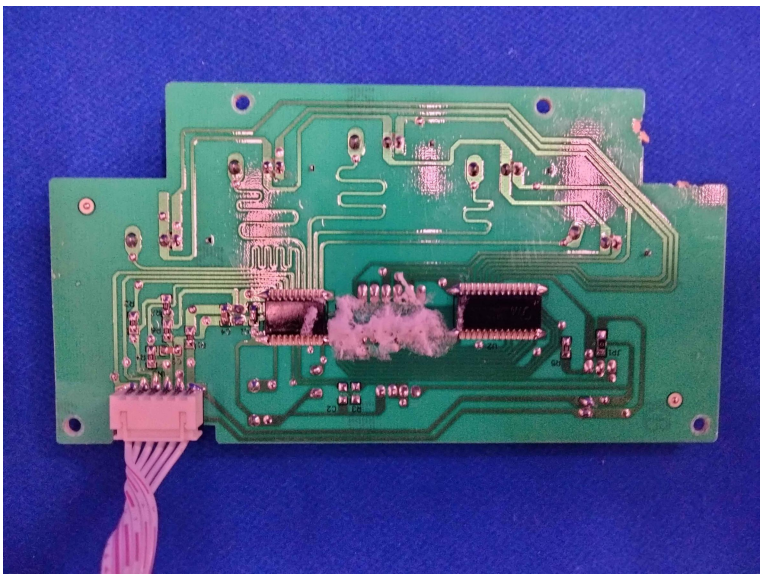


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Photo 5



Photo 6



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Photo 7



Photo 8



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Photo 9

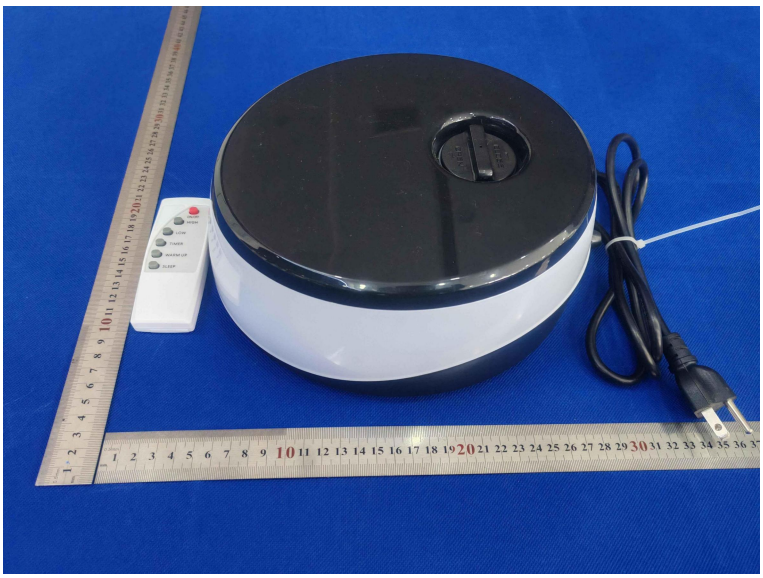
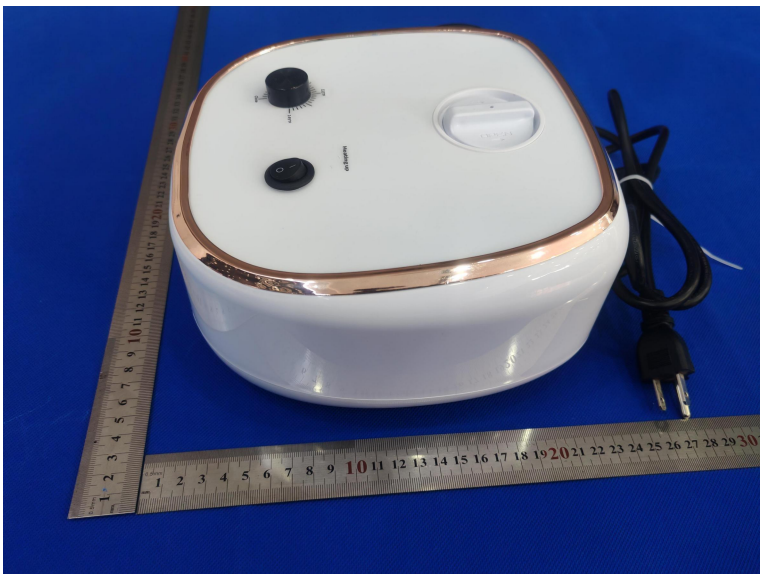


Photo 10



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Photo 11

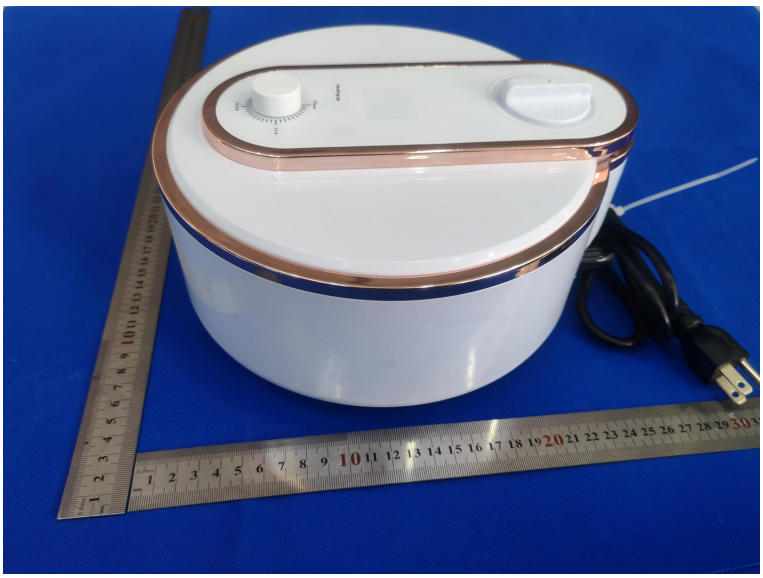
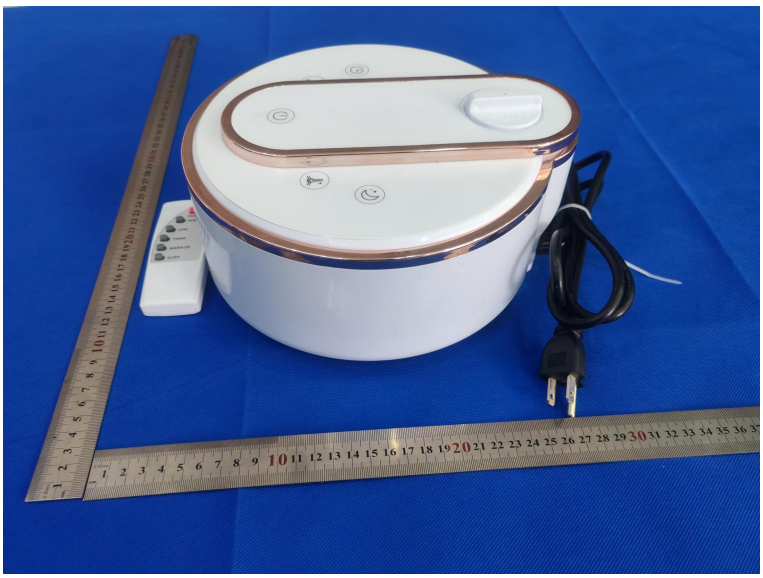


Photo 12



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Photo 13

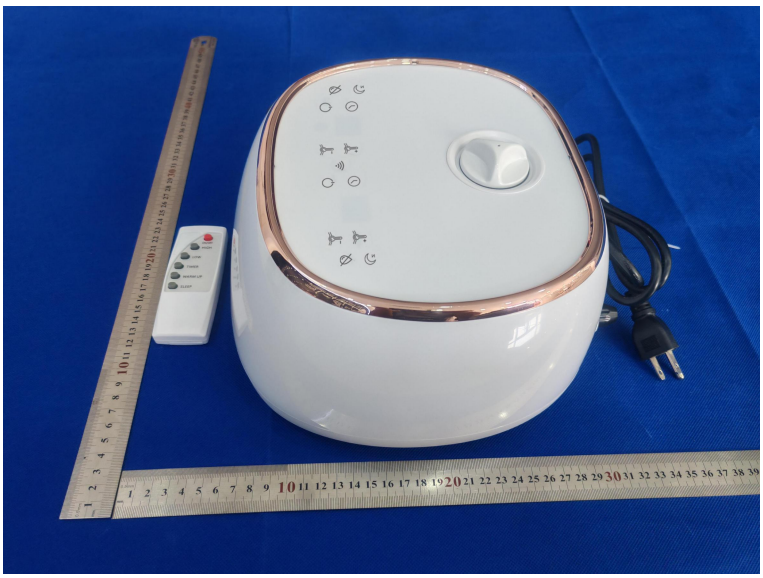


Photo 14



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Photo 15

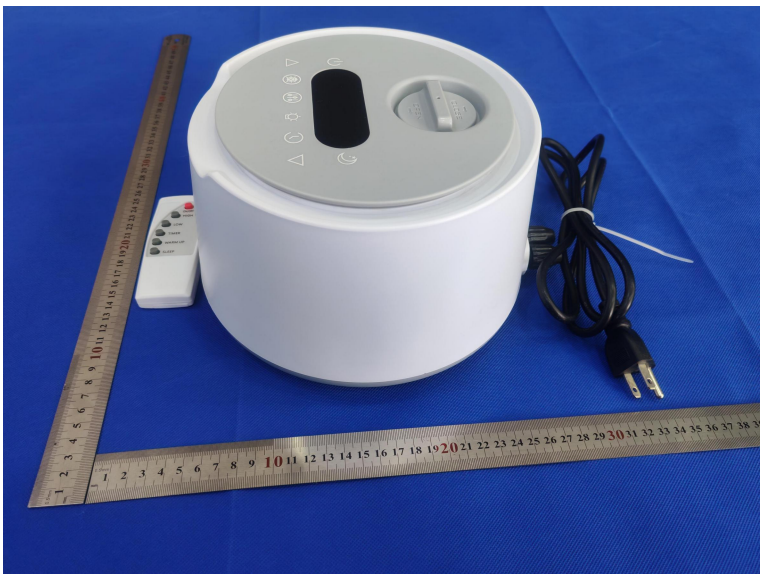
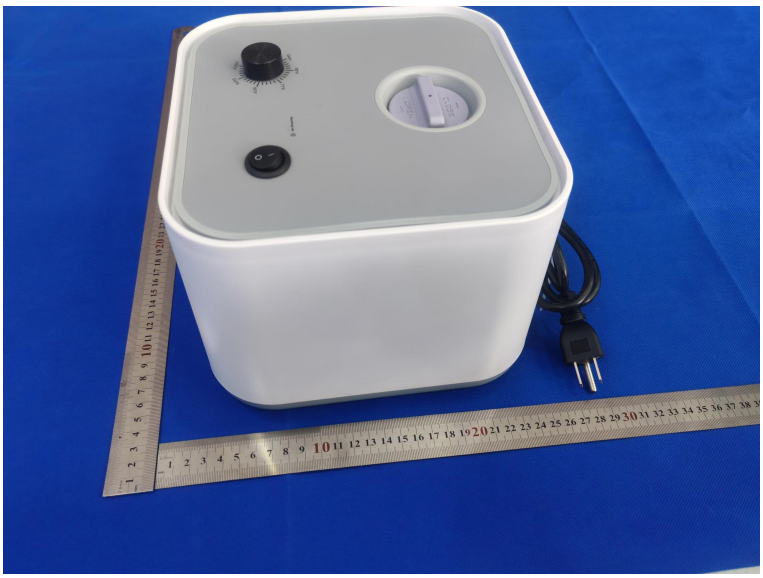


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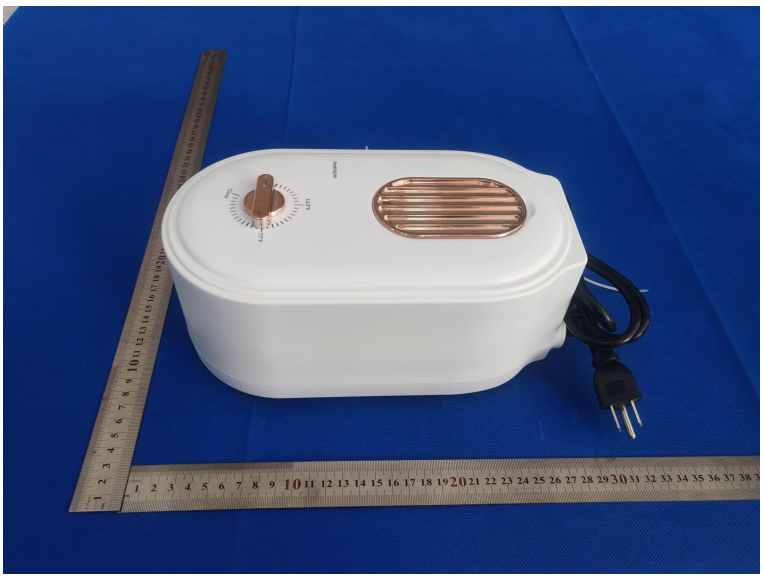


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Photo 17



Photo 18



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Photo 19

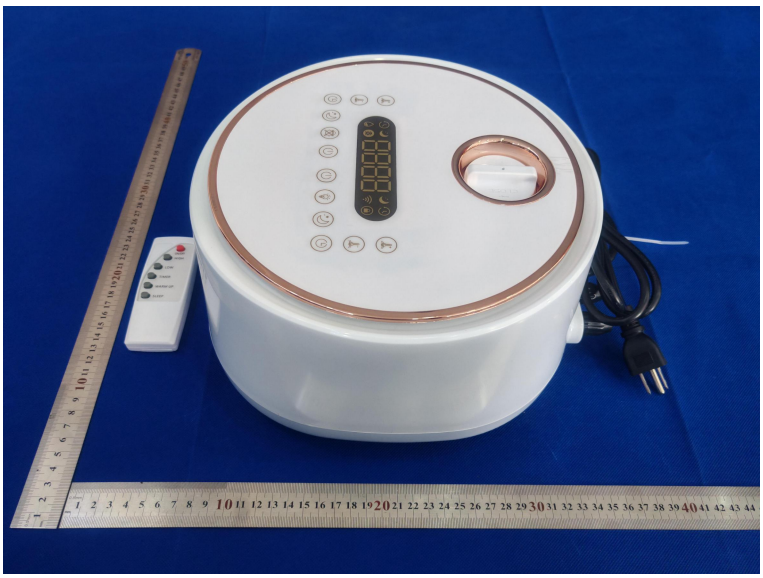
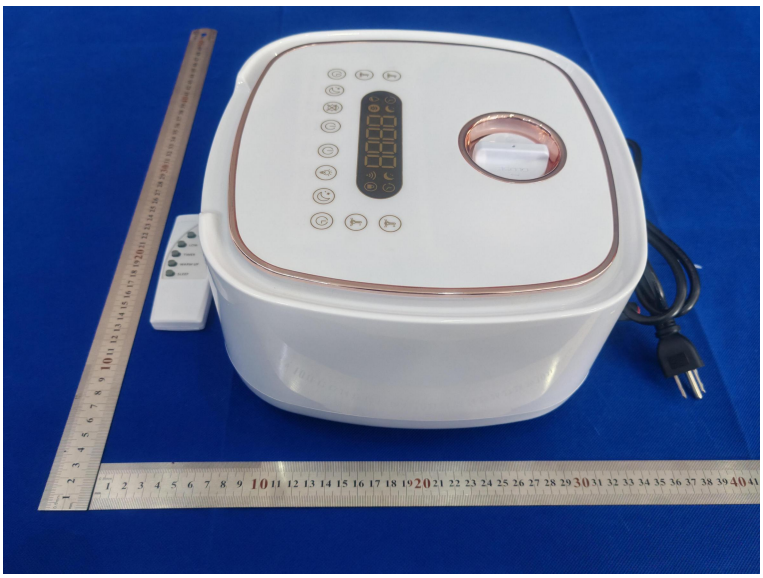


Photo 20



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Photo 21

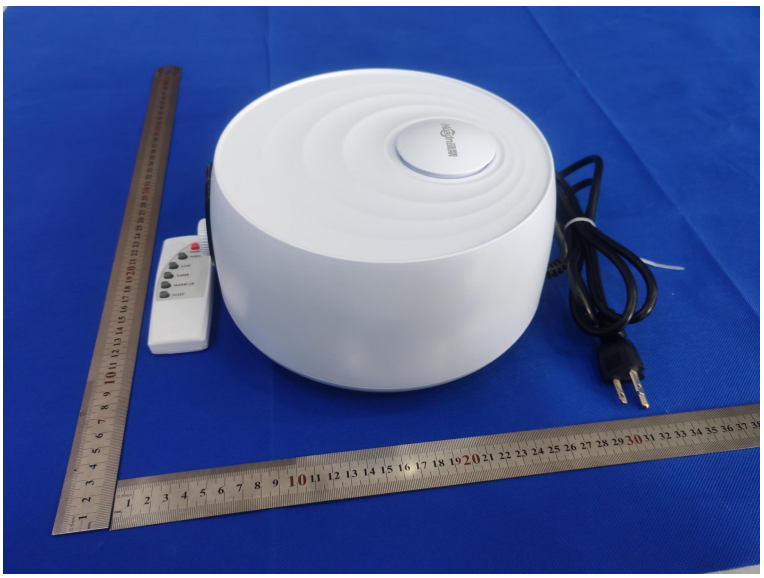


Photo 22



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Photo 23

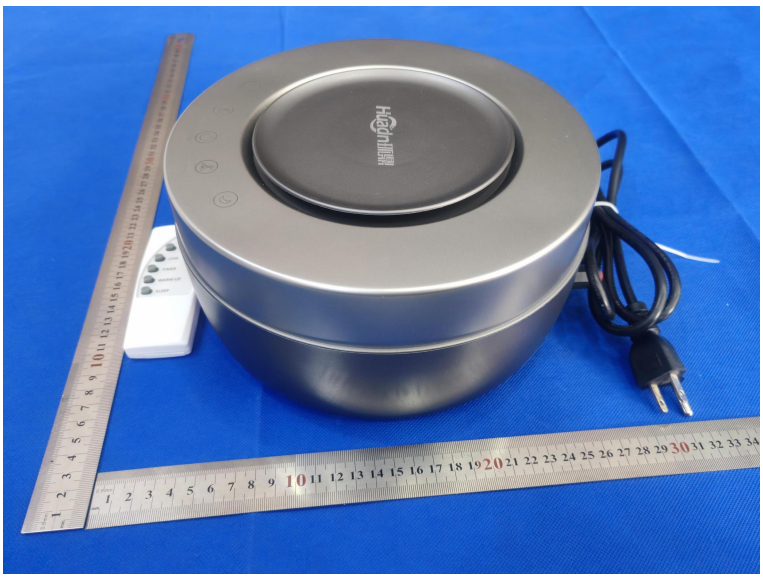
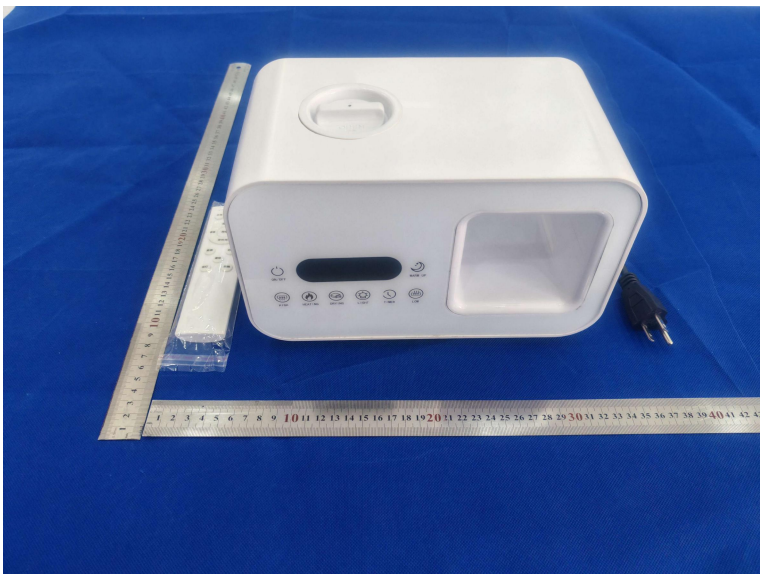


Photo 24



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Photo 25

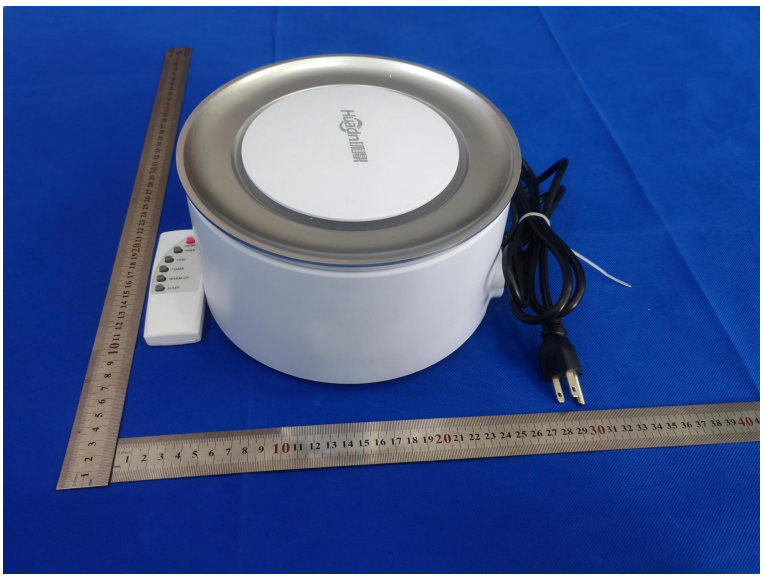
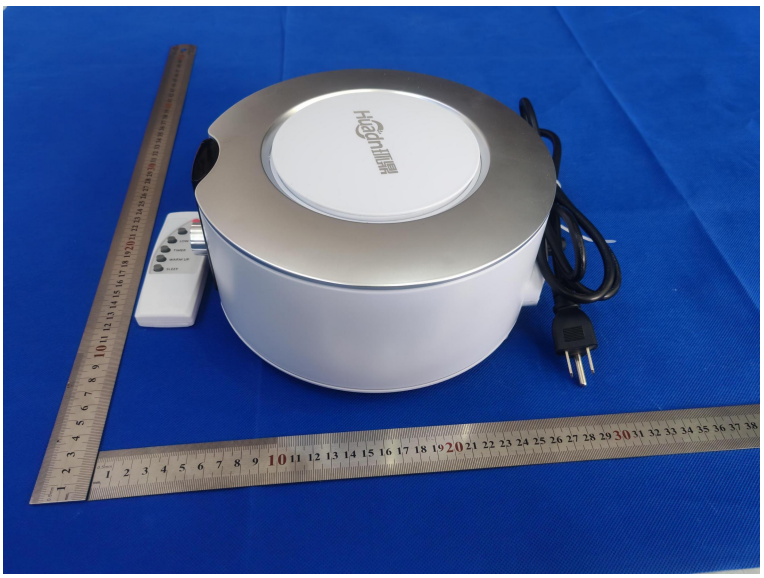
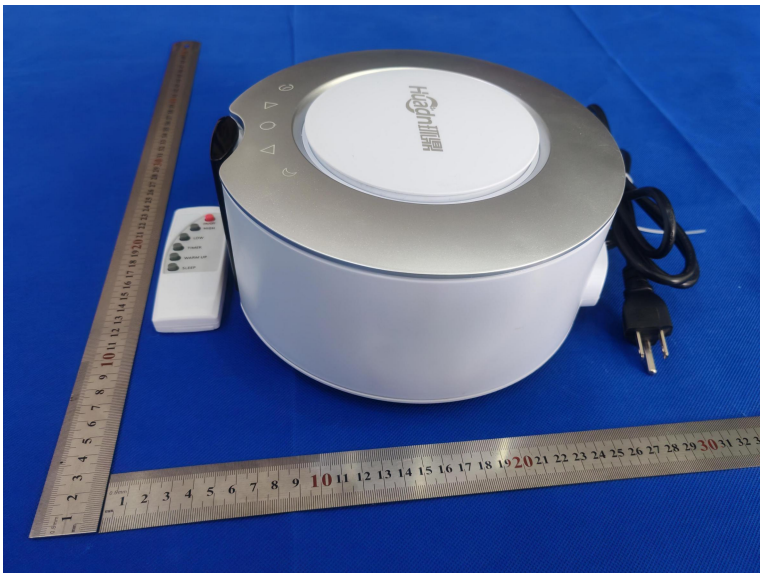


Photo 26



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Photo 27



End of Test Report

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