

Australian/New Zealand Standard™

Safety of household and similar electrical appliances

Part 2.17: Particular requirements— Blankets, pads and similar flexible heating appliances (IEC 60335-2-17:1998, MOD)



AS/NZS 3350.2.17:2000

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee EL-002, Safety of Household and Similar Electrical Appliances and Small Power Transformers. It was approved on behalf of the Council of Standards Australia on 15 February 2000 and on behalf of the Council of Standards New Zealand on 29 May 2000.

This Standard was published on 16 June 2000.

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Australian Electrical and Electronic Manufacturers Association
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This Standard was issued in draft form for comment as DR 99230.

Australian/New Zealand Standard™

Safety of household and similar electrical appliances

Part 2.17: Particular requirements— Blankets, pads and similar flexible heating appliances (IEC 60335-2-17:1998, MOD)

Originated in Australia as AS C164—1960.
Previous Australia edition AS 3164—1971.
Originated in New Zealand as NZS 1302—1962.
Previous New Zealand edition NZS 6137—1988.
Jointly revised and redesignated AS/NZS 3164:1994.
Jointly revised and redesignated in part as AS/NZS 3350.2.17:2000.
Reissued incorporating Amendment No. 1 (November 2001).
Reissued incorporating Amendment No. 2 (June 2005).
Reissued incorporating Amendment No. 3 (May 2007).

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Jointly published by Standards Australia, GPO Box 476, Sydney, NSW 2001 and Standards New Zealand, Private Bag 2439, Wellington 6020

ISBN 0 7337 3290 9

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AUSTRALIA/NEW ZEALAND STANDARD

SAFETY OF HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –

Part 2.17: Particular requirements for blankets, pads and similar flexible heating appliances

FOREWORD

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-002 - Safety of Household and Similar Electrical Appliances and Small Power Transformers to supersede AS/NZS 3164:1994, *Approval and test specification – Safety of electrically heated blankets, pads and similar flexible heating appliances for household use*, two years from publication. During this period it is anticipated that regulatory authorities will approve appliances to either Standard.

This Standard incorporates Amendment No. 1 (November 2001), Amendment No. 2 (June 2005) and Amendment No. 3 (May 2007). The changes required by the amendments are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected. Where an application date other than immediate is applicable to an amendment the date of application (DOA) is indicated by the marginal bar against the part affected or by a footnote relating to the part affected.

The objective of this Standard is to provide manufacturers, designers, regulatory authorities, testing laboratories and similar organizations with safety requirements designed to give the user protection against hazards that might occur during normal operation and abnormal operation of the appliance and which may be used as the basis for approval for sale or for connection to the electricity supply mains in Australia and New Zealand.

This Standard is an adoption with national modifications and contains the full text of the first edition of IEC 60335-2-17:1998, *Safety of Household and Similar Electrical Appliances – Part 2-17: Particular requirements for blankets, pads and similar flexible heating appliances* and has been varied as indicated to take account of Australian and New Zealand conditions. It is to be used in conjunction with the latest edition of AS/NZS 3350.1, *Safety of household and similar electrical appliances - Part 1: General requirements* and its Amendments. It was established on the basis of AS/NZS 3350.1:2002.

This part 2 supplements or modifies the corresponding clauses of AS/NZS 3350.1 (referred to as part 1 in this part 2) so as to convert it into the Australian/New Zealand Standard: Safety of drives for blankets, pads and similar flexible heating appliances.

NOTE 1 When "Part 1" is mentioned in this standard, it refers to AS/NZS 3350.1.

When a particular subclause of Part 1 is not mentioned in this Part 2, that subclause applies as far as is reasonable. When this standard states "addition", "modification", or "replacement", the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

- subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
- unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;
- additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

- requirements: in roman type;
- *test specifications: in italic type;*
- notes: in small roman type.

Words in **bold** in the text are defined in clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

The numbering of clauses, subclauses, notes, tables, figures and annexes follows that of IEC 60335-2-17:1998. To allow for the introduction of additional material by the IEC, the numbers 101 to 200 have been reserved. To allow for additional material to be introduced by Australia and New Zealand, the numbers 201 to 300 are used to number further clauses, subclauses, notes, tables and figures in part 1. The numbers 301 to 400 are used to number further clauses, subclauses, notes, tables and figures in this part 2. Additional annexes are lettered ZA, ZB and so on.

This scheme has been introduced to reduce the likelihood of the IEC and Australia and New Zealand using the same identifier for different purposes.

The use of the word VOID indicates that the IEC text is not used in Australia or New Zealand. The use of this word also avoids the need to renumber, clauses, notes, tables and figure if an earlier clause, note, table or figure is not used.

Annex A has been reformatted to indicate the Australia/New Zealand standard that is equivalent to the IEC standard or ISO standard to which normative reference is made.

As this Standard is reproduced from an International Standard, the following applies:

- (a) Its number does not appear on each page of text and its identity is shown on the cover and title page only.
- (b) In the source text "this International Standard" should read "this Australian/New Zealand Standard".

A full point substitutes for a comma when referring to a decimal marker.

Variations to IEC 60335-2-17:1998 are indicated at the appropriate places throughout this standard. Strikethrough (~~example~~) identifies IEC tables, figures and passages of text which, for the purposes of this Australian/New Zealand standard are deleted. Where Australian/New Zealand tables, figures or passages of text are added, each is set in its proper place and identified by shading (**example**). Added figures are not themselves shaded, but are identified by a shaded border.

Variations made to IEC 60335-2-17:1998 form the Australian variations for the purposes of the IECEE scheme for recognition of testing to standards for safety of electrical equipment (the CB scheme). These variations have been incorporated in the body of the standard. They are listed in Annex ZZ for easy reference.

INTRODUCTION

It has been assumed in the drafting of this Standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This Standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice.

This Standard takes into account the requirements of AS/NZS 3000 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains.

If an appliance within the scope of this Standard also incorporates functions that are covered by another part 2 of AS/NZS 3350, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

This Standard is a product family Standard dealing with the safety of appliances and takes precedence over horizontal and generic Standards covering the same subject.

An appliance that complies with the text of this Standard will not necessarily be considered to comply with the safety principles of the Standard if, when examined and tested, it is found to have other features that impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this Standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the Standard.

The essential safety requirements in AS/NZS 3820 that could be applicable to blankets, pads and similar flexible heating appliances are covered by this Standard.

SAFETY OF HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –

Part 2.17: Particular requirements – Blankets, pads and similar flexible heating appliances

1 Scope

This clause of part 1 is replaced by:

This standard deals with the safety of electric **blankets, pads** and other flexible appliances which heat the bed or human body, for household and similar purposes, their **rated voltage** being not more than 250 V. It also applies to **control units** supplied with the appliance.

So far as is practicable, this standard deals with the common hazards presented by appliances which are encountered by all persons in and around the home.

This standard does not in general take into account

- the use of appliances by young children or infirm persons without supervision;
- playing with the appliance by young children.

NOTE 1 – Children are considered to be old enough to use an appliance without supervision when they have been adequately instructed by a parent or guardian and are deemed competent to use the appliance safely.

NOTE 2 – Attention is drawn to the fact that

- for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary;
- ~~– for appliances intended to be used in tropical countries, special requirements may be necessary;~~
- for the purpose of this Standard, Australia and New Zealand are not considered to be tropical;
- in many countries additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour and similar authorities.

NOTE 3 – This standard does not apply to

- appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);
- rigid bed warmers, such as those of metal or ceramic material;
- appliances specifically intended for use under medical supervision (IEC 60601-2-35)¹⁾;
- heating appliances for breeding and rearing of animals (IEC 60335-2-71);
- ~~– water bed heaters (IEC 60335-2-66);~~
- water bed heater (AS/NZS 3350.2.66);
- foot warmers and heating mats (IEC 60335-2-81).

2 Definitions

This clause of part 1 is applicable except as follows.

2.2.9 Replacement:

normal operation

operation of the appliance under the following condition.

¹⁾ IEC 60601-2-35; *Medical electrical equipment – Part 2: Particular requirements for the safety of blankets, pads and mattresses intended for heating in medical use*

The **flexible part** is supported by a piece of plywood, 20 mm thick, situated not less than 300 mm above the floor.

Mattresses are covered by a sheet of thermal insulation.

Duvets are placed on a sheet of thermal insulation but not covered.

Other appliances are placed between sheets of thermal insulation.

The size of the plywood is such that the thermal insulation can be fully supported over its entire area. Unless otherwise specified, the size of the sheets of thermal insulation is such that the edges extend at least 100 mm beyond the outline of the **heated area**.

NOTE – The specification for the thermal insulation is given in annex AA.

2.10.4 *Replacement:*

PTC heating element

heating element consisting of two conductors separated by a conductive material which has a rapid non-linear increase in resistance when the temperature is raised through a particular range

2.101

flexible part

all layers of material forming the permanent enclosure of the appliance together with the **heating element**, **thermostats** and all other current-carrying parts contained within it

NOTE – The **flexible part** may be inside a **detachable cover**.

2.102

blanket

appliance comprising a substantially flat **flexible part**, which is intended to form part of the bedding, for heating the bed

2.103

underblanket

blanket intended to be used under the occupant of the bed

2.104

ruck-resistant blanket

underblanket which has sufficient rigidity to prevent rucking of the **flexible part**

2.105

overblanket

blanket intended to be used over the occupant of the bed

2.106

duvet

quilted **overblanket** intended to be used without additional bedding over the occupant of the bed and in which a **heating element** provides supplementary heat

2.107

pad

appliance comprising a **flexible part** having a **heated area** not exceeding 0,2 m² on each face and which is intended to heat part of the human body

2.108**mattress**

appliance for supporting the bedding and which incorporates an upholstered **flexible part** for heating the bed

2.109**controlled appliance**

appliance incorporating means in the **flexible part** for sensing changes in temperature when the appliance is operated under **normal operation**, thus automatically controlling the average power input

2.110**heating element**

heating conductor, including the core on which it is wound and the insulation, together with any other integrated conductor

2.111**heated area**

area of the **flexible part** enclosed within the outer perimeter of the **heating element**. It includes a margin outside the perimeter that has a width equal to 0,5 times the average distance between adjacent runs of the **heating element**

NOTE 1 – The **heated area** includes the return length of the **heating element** if the average distance between this part and the adjacent **heating element** does not exceed the average distance between adjacent runs of the **heating element**.

NOTE 2 – If a **blanket** or **mattress** has two separate **heated areas**, the surface between the two areas is considered to be part of the **heated areas**, if at any place the distance between the two **heating elements** does not exceed 1,5 times the average distance between adjacent runs of the **heating element**.

2.112**moisture-proof appliance**

appliance having a **flexible part** which is suitable for use under moist conditions

2.113**bonded enclosure**

enclosure of the **flexible part** which has the opposite faces joined together by means of an adhesive or by welding

NOTE – The bonded enclosure may include several bonded layers of material.

2.114**control unit**

device, external to the **flexible part**, by means of which the average power input of the appliance can be adjusted or regulated

NOTE 1 – **Control units** may be incorporated in the **supply cord** or at the end of an **interconnection cord**.

NOTE 2 – Multi-position cord switches are not considered to be **control units** unless they incorporate components for regulating the power input.

3 General requirement

This clause of part 1 is applicable.

4 General conditions for the tests

This clause of part 1 is applicable except as follows.

4.2 Modification:

The tests are carried out on two appliances which are named appliance A and appliance B.

*For appliances having a **bonded enclosure**, an additional appliance is required for the tests of 21.108 and 21.111. For other appliances, a length of 15 m of **heating element** is required for the tests of 21.111.*

*If heat-shrink material is used to insulate connections in the **flexible part**, a sample at least 150 mm in length is required for the test of 30.102.*

*For **moisture-proof pads** subjected to the tests of 21.110, five additional appliances and 1 m² of enclosure material are required.*

NOTE 1 – An additional appliance may be required for the test of 19.110.

NOTE 2 – Additional samples of **pads** may be required for the test of 30.101.

NOTE 3 – If a further appliance is required in order to continue testing after a test of clause 19, it has to be adequately preconditioned taking into account 21.102 to 21.107.

NOTE 4 – **Duvets** are tested as **overblankets**.

4.3 Replacement:

The order in which the tests are carried out is as follows:

Appliance A: 7, 22.11, 8, 22.112, 10, 11.101, 21.102 to 21.107, 22.108, 13, 15, 16, 17, 20, 25.15, 25.16, 19, 21.108, 22.18, 30, 31 and 32.

Appliance B: 10, 11 (remainder), 21 (remainder), 22 (remainder), 23, 24, 25 (remainder), 26, 27, 28 and 29.

*The **flexible part** of washable appliances is laundered twice in accordance with instructions for use before testing is started.*

If it is evident from the construction of the appliance that a particular test is not applicable, the test is not carried out.

4.5 Addition:

*If the **flexible part** of the appliance is provided with a **detachable cover**, the tests are carried out with or without this cover, whichever is more unfavourable.*

***Duvets** are tested without a **detachable cover**.*

*If the **heating element** can move in the channels, it is manipulated so that the individual runs are placed in the most unfavourable position.*

4.6 Addition:

When testing appliances for d.c. only, the possible influence of polarity on the operation of the appliance is taken into account.

4.7 Addition:

*The tests of clauses 10, 11 and 19 performed on **flexible parts** incorporating **PTC heating elements** are carried out at the most unfavourable ambient temperature within the range of 0 °C to 25 °C.*

For other **controlled blankets** and **mattresses**, the tests of clauses 10, 11 and 19 are carried out at the most unfavourable ambient temperature within the range of 0 °C to 15 °C.

4.8.1 Addition:

Appliances for d.c. only are tested with d.c.

4.8.2 Addition:

Controlled appliances are supplied as specified for **motor-operated appliances**.

NOTE – Appliances incorporating **PTC heating elements** within the **flexible part** are considered to be **controlled appliances**.

5 Void

6 Classification

This clause of part 1 is applicable except as follows.

6.1 Modification:

Appliances shall be of **class II** or **class III**. **Class III appliances** shall have a **rated voltage** not exceeding 24 V.

7 Marking and instructions

This clause of part 1 is applicable except as follows.

7.1 Modification:

Appliances shall be marked with the **rated power input**.

Addition:

Flexible parts and **detachable covers** shall be marked with the name, trademark or identification mark of the manufacturer or responsible vendor.

Detachable covers shall be marked with the model or type reference of the appliance with which they are intended to be used.

The **flexible part** of appliances to be used with a **detachable control unit** shall be marked with the reference of the **control unit** to be used.

The **flexible part** of appliances to be used with a **detachable transformer** shall be marked with the reference of the transformer to be used.

Flexible parts and **detachable covers** shall be marked with the substance of the following:

- read the instructions;

NOTE 1 – This marking may be replaced by symbol 1641 of ISO 7000 (see figure 101).

- do not use folded (this marking is not required for **duvets**, **mattresses** and appliances with **PTC heating elements**);

- do not use rucked (this marking is required only for **underblankets**, other than those with **PTC heating elements**);
- do not insert pins;

NOTE 2 – These markings may be replaced by the relevant symbols shown in figures 101 to 103 for which the rules of ISO 3864 apply.

- underblanket or overblanket, as appropriate;
- do not use if wet (this marking is not required for **moisture-proof appliances**);
- do not use with a helpless person, an infant or a person insensitive to heat;
- overlong application at high setting can result in skin burns (this marking is required only for **pads**, other than those having a timer which switches off the supply after a period not exceeding 1 h).

NOTE 3 – The words "at high setting" are not required on **pads** without temperature adjustment.

The **flexible part** of **blankets** and **detachable covers** shall be marked with the appropriate laundering symbols specified in ISO 3758.

Detachable control units shall be marked with a reference number or by other means of identification.

Parts of **class III construction** shall not be marked with the **rated voltage** of the appliance.

7.12 Addition:

The instructions for use shall contain the following:

Important instructions
Retain for future use

The instructions for use shall contain the substance of the instructions required in 7.1. If symbols are used, they shall be explained.

The instructions for use for **underblankets**, other than **blankets** having a ruck-resistance greater than 1,2 as determined in 22.106, shall state how the **blanket** is to be secured to the bed.

The instructions for use shall specify the appropriate settings of the control for all night use of the appliance.

The instructions for use for **pads** shall contain a warning that the user should not fall asleep when the appliance is in use.

NOTE – The requirement does not apply to **pads** fitted with a timer which switches off the supply after a period not exceeding 1 h.

The instructions for use for appliances provided with **detachable control units** or **detachable transformers** shall state that the appliance is only to be used with the types which are marked on the appliance.

The instructions for use for **duvets** shall state the length and width of the **detachable cover**.

The instructions for use for appliances containing a fuse link or **thermal link**, shall state that the appliance must be returned to the manufacturer or his agent if the link has ruptured.

The instructions for use shall state the substance of the following:

- when not in use, store as follows (quote necessary instructions);
- avoid creasing the appliance (for **blankets** and **pads** only);
- examine the appliance frequently for signs of wear or damage. If there are such signs or if the appliance has been misused, return it to the supplier prior to any further use;
- this appliance is not intended for medical use in hospitals.

The instructions for use for **blankets** shall state the substance of the following:

- do not tuck in;
- do not use on an adjustable bed, or if used on an adjustable bed, check that the blanket or cord cannot become trapped or rucked;
- this blanket is not to be used by young children unless the controls have been preset by a parent or guardian or unless the child has been adequately instructed on how to operate the controls safely.

7.14 Addition:

The height of lettering on the **flexible part** shall be at least 2,5 mm.

The words "Important instructions – Retain for future use" shall be in lettering having a height of at least 6 mm.

Modification:

*Instead of petroleum spirit, liquid detergent is used to check the marking on **flexible parts** and **detachable covers**.*

8 Protection against access to live parts

This clause of part 1 is applicable.

9 Starting of motor-operated appliances

This clause of part 1 is not applicable.

10 Power input and current

This clause of part 1 is applicable except as follows.

10.1 Addition:

The negative deviation is increased to 20 %.

10.101 The power input of appliances incorporating **PTC heating elements** shall significantly decrease with an increase in temperature.

Compliance is checked by the following test:

*The appliance is supplied at **rated voltage** and operated under **normal operation**. The power input shall have decreased by at least 50 % from the initial value when steady conditions are established, any control operating during this period being rendered inoperative.*

11 Heating

This clause of part 1 is applicable except as follows.

11.2 Modification:

The appliance is placed away from the walls of the test corner.

Control units held in the hand when they are actuated and cord switches are allowed to hang in still air, away from the test bed. Other **control units** are placed on a supporting surface.

Addition:

Duvets, other than those with **PTC heating elements**, are also tested folded. A single fold across the complete width of the **duvet** is made at a quarter of the length from one end. Controls are set to the maximum position intended for all night use.

11.3 Addition:

*Thermocouples used for determining the temperature of a **heating element** are tied to it with textile thread over a length of at least 10 mm.*

*Thermocouples used for determining the temperature of the surface of **pads** are soldered to plates of copper or brass measuring 65 mm × 65 mm × 0,5 mm. The plates are positioned to cover as many **heating element** runs as possible, with one side parallel to the direction of the run. The temperatures are determined at least at six places, three on each outer surface of the **flexible part**.*

11.4 Addition:

Controlled appliances and appliances having a **flexible part** of **class III construction** are supplied with the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

11.7 Replacement:

Appliances are operated until steady conditions are established.

11.8 Addition:

*For **controlled appliances**, the temperatures shall not exceed the values shown in table 101.*

Table 101 – Maximum temperatures

Part	Temperature °C
Heating element of blankets and mattresses	
– before second operation of the thermal control	115
– under steady conditions	95
Heating element of pads	
– before second operation of the thermal control	120 ¹⁾
– under steady conditions	100
Surface of pads	60 ²⁾
¹⁾ A maximum temperature of 140 °C is allowed for a period of 10 min. ²⁾ A maximum temperature of 85 °C is permitted if the surface temperature does not exceed 60 °C at a lower setting of the control.	

For other appliances, the temperature rises specified shall not exceed the values shown in table 102.

Table 102 – Maximum temperature rises

Part	Temperature rise K ¹⁾
Heating element	80
Surface of pads	45
¹⁾ These values are based on the normal ambient temperature of the appliance and take into consideration the maximum permitted ambient temperatures during the test.	

NOTE – If the ends of the **heating element of pads** are contained in a plastic sheath attached to the **flexible part**, the temperature or temperature rise specified for the surface also applies to the **accessible surface** of the sheath.

11.101 It shall be possible to operate **blankets** and **mattresses** without risk of heatstroke to the user.

Compliance is checked by the following test:

*The appliance is operated under **normal operation** supplied as specified in 11.4. The ambient temperature is maintained at the most unfavourable temperature in the range from 0 °C to 15 °C. Any **control unit** or cord switch is adjusted to the highest setting recommended for all night use.*

*When steady conditions are established, but at least 1 h after switching on the appliance, the temperature of the surface of the **flexible part** is measured. The measurements are made using the resistance method by means of the grid shown in figure 104. The grid is 300 mm wide and of sufficient length to cover four runs of the **heating element**, but not less than 300 mm. The grid is placed in contact with the **flexible part** so that the wires of the grid are perpendicular to the runs of the **heating element**. For **overblankets** the grid is placed under the **flexible part**. For **underblankets** and **mattresses**, the grid is placed over the **flexible part**.*

The temperature shall not exceed 37 °C.

NOTE – If the ends of the **heating element** are contained in a plastic sheath attached to the **flexible part**, the temperature limit specified also applies to the **accessible surface** of the sheath.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of part 1 is applicable except as follows.

13.1 Modification:

Controlled appliances are supplied at 1,06 times the **rated voltage**.

Addition:

*For **mattresses**, a sheet of metal foil, approximately 0,1 mm thick and of sufficient size to cover the area of that part of the **mattress** incorporating the current-carrying parts, is inserted between the **mattress** and the sheet of thermal insulation. For other appliances, two such sheets of metal foil are inserted, one above and one below the **flexible part**, these sheets being electrically connected together. A uniformly distributed load of approximately 35 kg/m² is placed on the top sheet of thermal insulation.*

The arrangement is shown in figure 105.

13.2 Modification:

*For the **flexible part**, the leakage current is measured between any pole of the supply and the sheets of metal foil.*

*Instead of the values specified, the leakage current for the **flexible part** shall not exceed:*

- for **pads** 0,5 mA
- for **blankets and mattresses** 1 mA/m² of the **heated area** with a maximum of 2,5 mA

13.3 Modification:

*For the **flexible part**, the test voltage is applied between **live parts** and the metal foil.*

14 Void

15 Moisture resistance

This clause of part 1 is applicable except as follows.

15.1 Addition:

*For the **flexible part**, compliance is checked without the appliance being connected to the supply as follows:*

- for **blankets and pads**, by the test of 15.101;