DRAFT TANZANIA STANDARD

Spring mattress — Specification

TANZANIA BUREAU OF STANDARDS

First Edition 2021

0 Foreword

This Draft Tanzania Standard is being developed by Plastic and Plastic Products Technical Committee under supervision of the Chemical Division Standards Committee and it is in accordance with the procedures of the Bureau

This Draft Tanzania Standard is the second edition of spring mattress – Specification.

This Draft Tanzania Standard has been prepared with assistance drawn from the following documents:

BS 3173: 1996, Specification for spring units for mattresses, published by British Standards Institution

BS 1877: Part 10: 2011, Specification for mattresses and bumpers for children's cots, perambulators and similar domestic articles, published by British Standards Institution
Various specifications of local spring mattresses manufacturing companies

TZS 360: 1996, Domestic Mattresses-Flexible polyurethane foam - Specification, published by Tanzania Bureau of Standards

BS 4637: 1970, Specification for carbon steel wire for coiled springs (bedding and seating), published by British Standards Institution

BS 3173:1996 Specification for spring units for mattresses, published by British Standards Institution

BS 1425-1:1999 Cleanliness of fillings and stuffing, upholstery and other domestic articles
Part 1: Specification for fillings and stuffings other than feather and/or down, published by British Standards Institution

SANS 1401-10:2004 Specification for woven cotton and similar household fabrics and articles
Part 10: Cotton ticking, published by South African Bureau of Standards

SANS 902:1971 Specification for hessian cloth, published by South African Bureau of Standards

The assistance obtained from the above source is hereby acknowledged with thanks.

For the purpose of deciding whether a particular requirement of this Tanzania Standard is complied with, the final value observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with TZS 4.

Spring mattress — Specification

1 Scope

This Draft Tanzania Standard specifies requirements, sampling and test methods of spring mattresses for general usage.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies."

TZS 4, *Rounding off numerical values*

TZS 20/ISO 13934-2, Textiles - Tensile properties of fabrics — Part 2: Determination of maximum force using the grab method

TZS 22/ ISO 13934-1, Textile - Tensile properties of fabrics - Part 1: Determination of maximum force and elongation at maximum force using the strip method

TZS 43/ ISO 105-C10, Methods for the determination of colour fastness of textile Materials to washing

TZS 138/ ISO 105-D01, Method for determination of colour fastness of textile materials to dry cleaning

TZS 359, Methods of test and sampling for Flexible polyurethane foam

TZS 360, *Flexible polyurethane foam mattresses — Specification*

BS EN 71-3, *Safety of toys; Part 3: Migration of certain elements*

ISO 11130, *Corrosion of metals and alloys — Alternate immersion test in salt solution*

BS 4637, *Specification for carbon steel wire for coiled springs (bedding and seating)*

TZS 21, *Textiles – Woven or knitted fabrics – Determination of mass per unit length and per unit area.*

3 Terms and definitions

For the purpose of this Draft Tanzania Standard, the following definitions shall apply:

3.1 basic filling
the filling adjacent to the spring unit

3.2 bursting strength
the force required to rupture a fabric by distending it with pressure applied at right angles to the plane of the fabric

3.3 breaking strength
the maximum load (or force) supported by a specimen in a tensile test carried to rupture

3.4 core
central part of spring mattress that provides support to the mattress, with the material being made of springs.

3.5 defective
a spring mattress that fails in one or more respects to comply with the appropriate requirements of the specification

3.6 spring unit
unit made up of either open coil or pocketed springs and the connecting elements between them including boarder wire.

3.7 open coil spring
spring mattress in which the springs are not enclosed in pockets but connected together by other suitable means

3.8 pocketed spring
spring mattress in which the springs are enclosed inside pockets and the pockets are connected together by suitable means.

3.9 insulation
suitable insulating material on both sides of the spring unit to prevent the spring from protruding

3.10 padding
any suitable material which can give comfort to the user

3.11 tick
a suitable outer cover that provides a comforting top layer of the mattress

3.12 warp
yarns / threads lying lengthways in a fabric as woven

3.13 weft
yarns / threads lying width ways in a fabric as woven (at right angles to the warp)

3.14 yarn
a generic term for a continuous strand of textile fibres or filaments without twisting, suitable for plying, knitting, braiding, weaving or otherwise intertwining to form a textile end product

4 Requirements

4.1 General requirement

4.1.1 Spring mattresses shall be manufactured in accordance with the best practice known in the manufacturing industry and shall be clean and free from defects in material and workmanship. Monofilament sewing thread shall not be used.

4.1.2 Each finished spring unit shall be regular in shape and size and when measured with the unit standing on a flat surface, the edges shall stand vertically, forming a right cylinder, with no point on a vertical side varying by more than about 10 mm from the sides of the right cylinder. All wire ends shall face inwards.

4.1.3 Each spring mattress shall be a rectangular unit of uniform thickness, length, and width, with straight borders and a neat finish. Unless made of an intrinsically corrosion-resistant metal, all metal parts of mattress shall have an acceptable corrosion-resistant finish. All sewing shall be securely and neatly finished off.

4.1.4 The material used for edge frames shall be high carbon steel strip of width at least 5 mm and thickness at least 1.60 mm or high carbon steel wire of diameter at least 3.75 mm.

4.1.5 The spring unit used shall be tempered with heat or electricity.

4.1.6 The spring mattresses shall have a prebuilt border (see 4.2.6) that covers the sides and ends of the mattresses.

4.1.7 All metal parts shall show no evidence of corrosion when assed in accordance with ISO 11130

4.1.8 The basic filling of spring mattresses shall consist of needled coir or sisal secured to a backing of polypropylene fabric, or of polyurethane foam, or of layers of these (or other acceptable material). It shall have a mass of at least 1520 g/m^2 of sleeping surface when determined in accordance with Annex E.

4.1.9 The bearing (sleeping) surfaces of the spring unit of mattresses shall be covered by an insulator unit to which the basic filling is securely stapled, or is so securely attached as to seal off the end openings of the spring.

4.1.10 The surface filling of a spring mattress shall consist of cotton felt (or other acceptable material) or of polyurethane foam or of layers of these and the mass per square meter of sleeping surface shall be determined in accordance with Annex E.

4.2 Specific requirement

4.2.1 Spring mattresses shall have a minimum thickness of 15 cm and width and length allowed shall comply with TZS 360 (see clause 2). However, the width and length may be customized.

4.2.2 When a spring mattress is subjected to endurance test in accordance with Annex A, there shall be no significant failure of any part (internal or external) of the mattress that could affect its fitness for use and the loss in height at any of the points tested shall not exceed 5 %.

4.2.3 ventilators If fitted, ventilators shall be made of plastics material or any other suitable material and shall not contain antimony, arsenic, barium, cadmium, chromium, lead, selenium, mercury or any soluble compound of any of these elements, exceeding the amounts given in table 1. Ventilators shall not be positioned on the sleeping surface of a mattress.

4.2.4 Ventilators shall conform to the specific requirements given in Table 1 when tested in accordance with the methods prescribed therein.

Table 1 — specific requirements, limit of heavy metals for ventilators

SL. No	Characteristic	Requirement	Test method
i)	Antimony, mg/kg, max	60	**Clause 8.2** of BS EN 71-3: 1995
ii)	Arsenic, mg/kg, max	25	
iii)	Barium, mg/kg, max	1000	
iv)	Cadmium, mg/kg, max	75	
v)	Chromium, mg/kg, max	60	
vi)	Lead, mg/kg, max	90	
vii)	Mercury, mg/kg, max	60	
viii)	Selenium, mg/kg, max	500	

4.2.5 The cover of spring mattresses shall be of a woven ticking, or a knitted ticking and shall conform to the specific requirements given in Table 2 when tested in accordance with the methods prescribed therein.

Table 2 - specific requirements for ticking

SL. No	Characteristic		Requirement	Test method
i)	Breaking strength (woven ticking) N, min.	Warp	980	TZS 22/ ISO 13934-1
		Weft	490	
ii)	Bursting strength (knitted ticking), KPa,min.		700	TZS 20/ ISO 13934-2
iii)	Colour fastness to washing	Change in colour, rating, min.	4	TZS 43/ ISO105-C10
		Staining of transfer cloths, rating, min		
iv)	Colour fastness to dry-cleaning	Change in colour, rating, min.	4	TZS 138/ ISO 105-D01
		Staining of transfer cloths, rating, min		
v)	Flammability		To comply with flammability requirements given in 4.3.5.1	Annex C

4.2.6 Prebuilt borders shall be firm and shall consist of one or more layers of wadding, polypropylene fabric, or other acceptable material (of total thickness in all cases, at least 5 mm) stitched to a backing of Hessian or other material of at least equal strength and of acceptable quality

4.2.7 Hessian used as the backing of the basic filling and for prebuilt borders shall conform to the specific requirements given in Table 3 when tested in accordance with the methods prescribed therein

Table 3 - specific requirements for hessian fabric

SL. No	Characteristic		Requirement	Test method
i)	Breaking strength N, min.	Warp	310	TZS 22/ISO 13934-1
		Weft	220	
ii)	Threads per 10 cm, min.	Warp	27	TZS 20/ ISO 13934-2
		Weft	21	
iii)	Mass per unit area, g/m^2 , min.		155	Annex E

4.2.8 Polypropylene fabric used as the backing of the basic filling shall be of split film polypropylene yarns. The weave shall be plain and the fabric shall conform to the specific requirements given in Table 4 when tested in accordance with the methods prescribed therein.

Table 4 - specific requirements for polypropylene fabric

SL. No	Characteristic		Requirement	Test method
i)	Threads per 10 cm, min.	Warp	27	TZS 20/ ISO 13934-2
		Weft	21	
ii)	Mass per unit area, g/m^2 , min.		155	TZS 21

4.3 Construction and material requirements

4.3.1 Padding

It shall consist of a layer of a minimum of 25 mm around the core in a composite structure with the sole purpose of equalizing the pressure on the human body.

4.3.2 Ticking

The tick can be fixed to the mattress by means of stitching or by tapes running through the mattress (tufting). Sometimes the tick is not fixed, and can be removed from the mattress by customer.

4.3.3 Spring unit

4.3.3.1 Unit made up of either open coil or pocketed springs**,** knotted-coil construction shall either consist of transverse rows of coils connected by helical running at right angles of the long axis of the unit in such a manner as to prevent a free hinge action, each unit to have helical or clipped border on both top and bottom perimeters with 4 mm minimum oil tempered border wire, where the corners of this unit have 63.5 mm or pocketed spring system in which the springs are enclosed inside pockets and the pockets are connected together by suitable means.

4.3.3.2 Springs distributed at the minimum densities given in clause 4.3.3.6 shall be made from wire with a nominal diameter not less than 1.9 mm. For springs distributed at greater densities than those given in clause 4.3.3.6 the minimum diameter of the wire shall be reduced by one standard metric size

as specified in BS 4637 for each 25 % increase in the spring density. The spring shall have the minimum height of 10 cm with at least 4 turns or convolutions.

4.3.3.3 Each finished spring unit shall be regular in shape and size and when measured with the unit standing on a flat surface, the edges shall stand vertically, forming a right cylinder, with no point on the vertical side varying by more than 10 mm from the sides of the right cylinder. The size of the inner spring shall have the minimum of 90 mm when tested according to annex D.

4.3.3.4 All wire ends shall face inwards and helical wires shall be clenched or crimped to ensure secure fixing.

NOTE 1 — The overall dimensions of the finished spring unit together with any ancillary components and methods of construction should be agreed between the purchaser and the supplier.

4.3.3.5 Number of springs

4.3.3.5.1 Each spring unit shall contain not less than the number of springs specified for the appropriate mattress size in tables 5 and 6.

Table 5 - Mattresses for adults' use

Nominal unit size (mm)	Minimum number of springs	
	Open coil	Pocketed
900 X 1900	192	300
1000 X 2000	225	338
1350 X 1900	288	450
1500 X 2000	325	520

The spring density for units of sizes other than those listed in tables 5 and 6 shall be at least the value shown in table 7.

Table 6 - Mattresses for children's use

Nominal unit size (mm)	Minimum number of springs	
	Open coil	Pocketed
540 X1150	54	105
690 X 1300	88	153

4.3.3.6 The spring density for units of sizes other than those listed in tables 5 and 6 shall be at least the value shown in table 7.

NOTE 2 — The values shown in table 7 are the minimum spring densities resulting from

Table 7 - Minimum spring density for units of other sizes

Use	Minimum number of springs	
	Open coil spring density (springs/m^2)	Pocketed spring density (springs/m^2)
Adults	108	169
Children	87	169

4.3.4 Steel Springs

4.3.4.1 The whole of the spring unit, including vertical springs and where applicable the helical wire used in lacing the springs together, shall be made from wire conforming to BS 4637.

4.3.5 Flammability test

4**.3.5.1** No foam specimen shall burn for 3 or more minutes nor shall burn beyond 75 mm gauge line if is tested as per Annex C.

5 Sampling

5.1 Representative samples shall be taken randomly from the factory, market or elsewhere and tested for compliance with the standard.

6 Packing and marking

6.1 Packing

6.1.1 Each mattress shall be packed in a suitable transparent material and in case; plastics coverings are used as packaging for a mattress, the plastic cover shall be conspicuously marked with a warning to the effect that the covering should be kept away from children.

NOTE 3 - An example of suitable wording is as follows: To avoid danger of suffocation, remove these plastics cover before using mattress. The cover should then be destroyed or kept away from children.

6.1.2 Plastics used for packaging shall be not less than 30 microns thick

6.2 Marking

6.2.1 Spring Mattress shall be indelibly and legibly marked in the outer upper waist of the mattress or a label attached on it, with the following descriptions:

a) the words “spring mattress,
b) Size range, name and type of the product,
c) Registered trade name of the product,
d) The nominal width and length,
e) Name or mark of the manufacturer,
f) Batch number and date of manufacture,
g) Country of origin,

NOTE - The TBS Certification Mark may be used by manufacturers only under license from TBS. Particulars of conditions under which the licenses are granted may be obtained from TBS offices.

Annex A

(normative)

Method of test for spring units

A.1 Principle

A flat, circular metal-faced indentor is repeatedly applied to the surface of a section of a spring unit.

NOTE - The hardness or softness of the spring unit is not determined and, therefore, no limits are specified for the strength (or load rating) of the springs. The test is designed to ensure durability of the spring unit, and that its initial height will not be unduly reduced in use. This Tanzania Standard is performance based therefore the test of the spring unit is done to ensure the durability of the spring and not the strength of the spring (or load rating) unit.

A.2 Apparatus

The apparatus shall comprise a test indentor, means for raising and lowering the indentor, and a measuring disc.

The indentor shall be mounted centrally at the base of a vertical square shaft. The test indentor shall be as shown in figure A.1 and shall be of diameter (200 ± 10) mm with a minimum thickness of 25 mm and a lower edge radius of (10 ± 1) mm. The test surface shall be smooth, rigid and flat.

The total mass of the indentor plus vertical square shaft (including any fixings) plus, if necessary, a suitable weight shall be 35 kg ± 0.5 %.

The measuring disc shall be as shown in figure A.2. The disc shall have a diameter of (100 ± 1) mm with no edge radius, a smooth, rigid and flat surface, and have a mass of (300 ± 10) g.

The disc shall be marked in four orthogonal positions, both on the face and at the edges. These positions shall be marked with the letters A, B, C and D or similar to enable the measurements to be taken at identical positions.

NOTE - A suitable apparatus is described in annex B.

A.3 Preparation of test sample

The test sample shall be prepared to a size as near as practicable to 900 mm 3 900 mm. Where the actual spring unit is shorter than the test sample size in any direction, then that dimension shall be the test size in that direction.

A.4 Procedure

A.4.1 Initial height measurements

Place the test sample on a rigid, flat, smooth surfaced platform. Place the measuring disc at the geometric centre of the top of the test sample. Mark the test sample at each of the four positions indicated on the measuring disc, as shown in figure A.2. Record the distance between the bottom of the measuring disc and the surface of the platform for all four positions.

A.4.2 Performance test

Place the test specimen centrally beneath the test indentor and prevent it from moving horizontally during the test. Release the test indentor from the drive mechanism and apply its total mass to the sample. Position the drive mechanism at its bottom position. Lock the indentor to the drive mechanism. If the distance between the bottom of the test indentor and the platform is less than 20 mm reset the drive mechanism to give a 20 mm clearance. Apply 5000 cycles at a rate of (60 ± 1) cycles/min.

A.4.3 Final height measurements

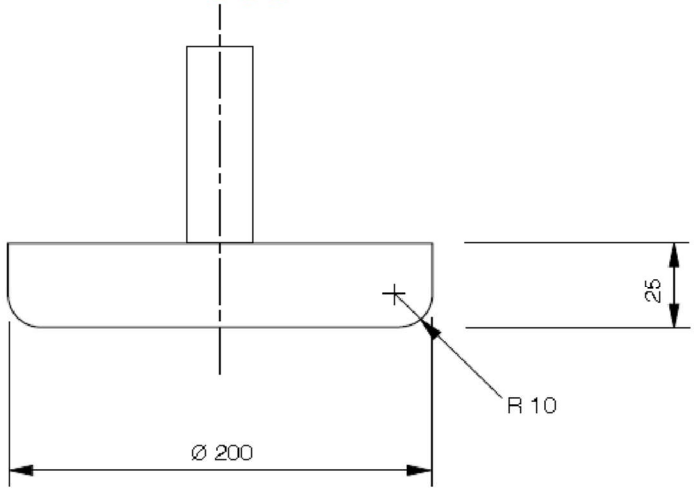
After completion of the test and removal of the indentor, re-measure the height of the test sample at each of the four positions indicated on the measuring disc. Ensure that the disc is placed in an identical position to that used for the initial measurements as in **A.4.1**.

A.4.4 Final examination

Record breakages or any other damage to the springs or connecting materials.

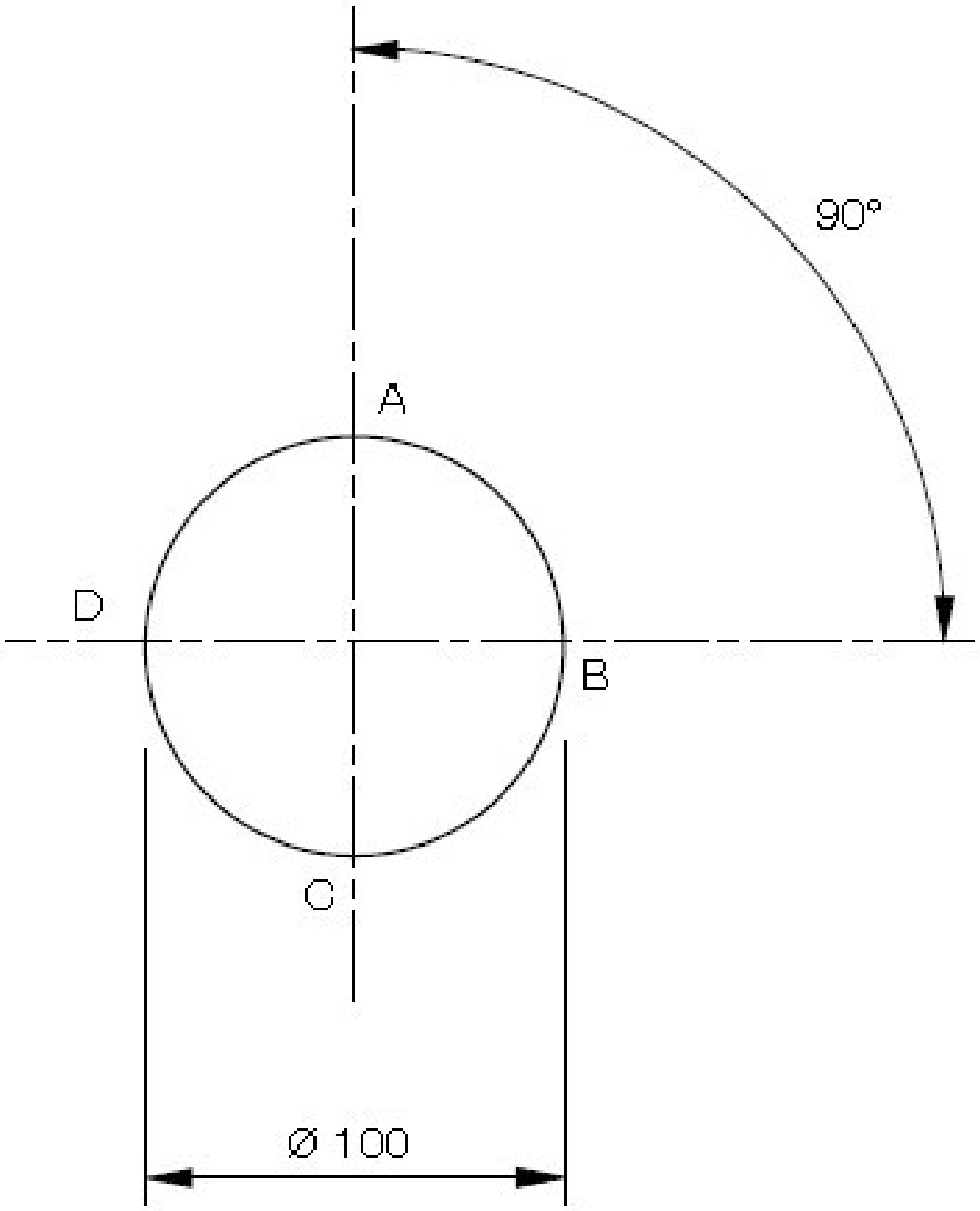
A.4.5 Calculation of results

Express the difference between the initial height measurements and the final height measurements as a percentage of the initial measurement for each of the four positions.



All dimensions are in millimetres.

Figure A.1 Test indentor



All linear dimensions are in millimetres.

Figure A.2 Measuring disc (300 g)

Annex B

(informative)

Apparatus for testing of spring units

B.1 The apparatus should have a base plate of approximately 1000 mm3 1000 mm. A suitable apparatus is shown in figures B.1, B.2 and B.3. The shaft should be mounted in bearings or rollers to enable it to move up and down freely. A suitable clamp should be attached to this shaft for connecting it to the driving rod, one end of which should be connected to a crank of stroke length (170 ± 10) mm. The crankshaft should be driven at a rate of (60 ± 1) r/min.

NOTE — A method of providing power for the drive is by means of an electric motor of the reduction gear type. (A motor of 2.2 kW rating is recommended.)

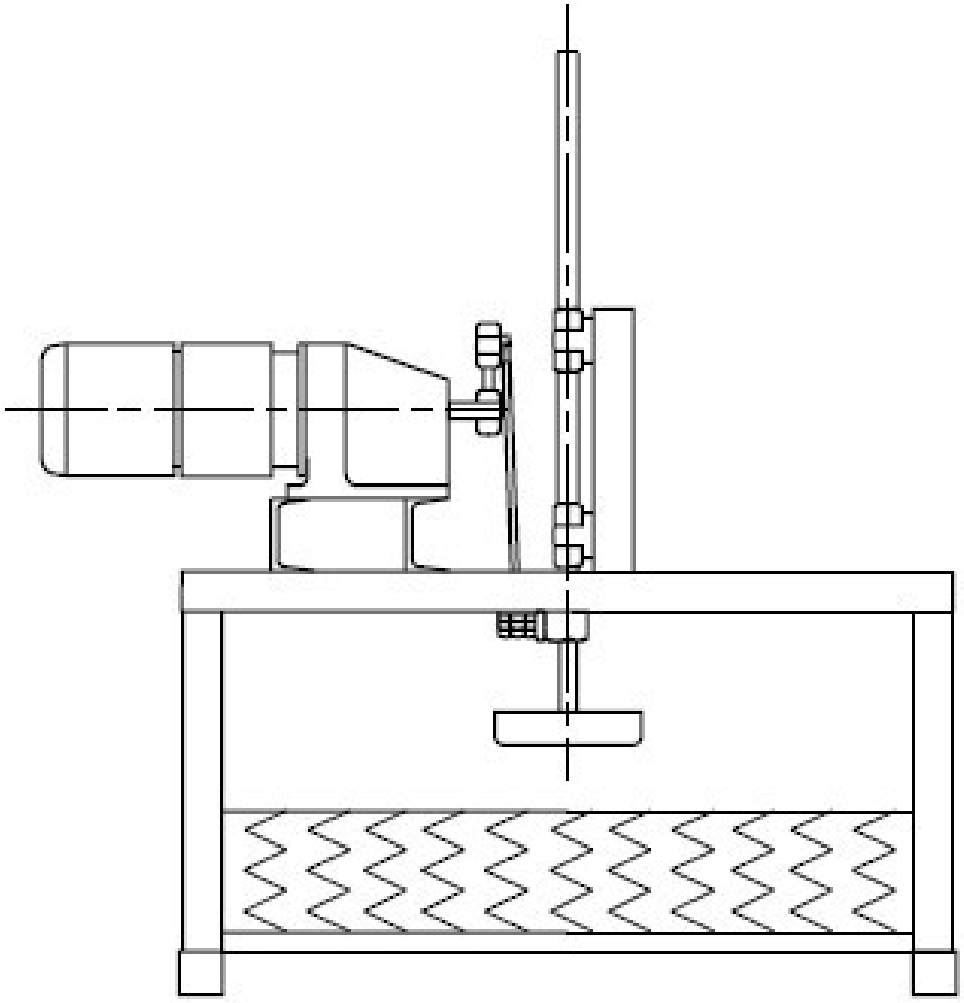


Figure B.1 Spring unit indentor and drive mechanism. Side view

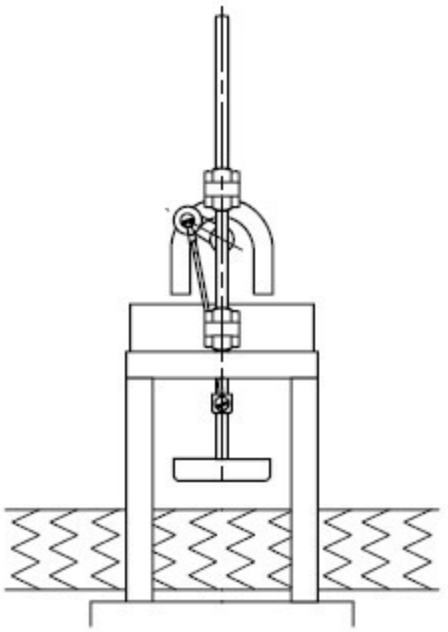


Figure B.2 Spring unit indentor and drive mechanism. End view

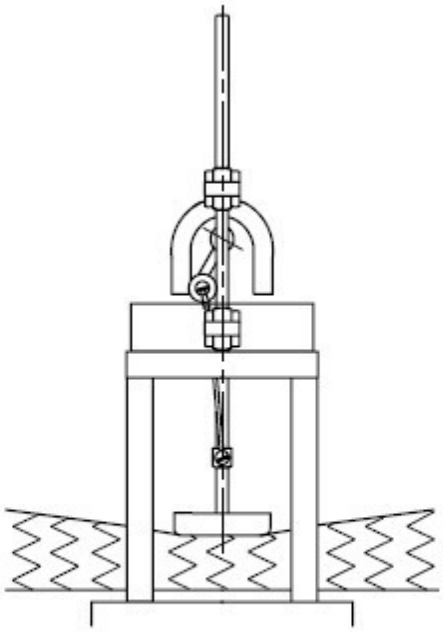


Figure B.3 View showing indentor acting on mattress sample.

Annex C

(normative)

Flammability

C.1 Apparatus

An apparatus as shown schematically in Figure C.1 and consisting of a heat-resistant glass tube (chimney) in which a test specimen can be mounted, the base of the tube being connected to metered supplies of oxygen and nitrogen. The glass tube shall have a diameter of at least 75 mm and a height of at least 450 mm, and shall have at its base a bed of glass beads (or other inert particles) that will mix and distribute the incoming gases. The tube shall also contain a clamp that is capable of holding a test specimen (vertically) that the top of the specimen is at least 100 mm below the top of the tube.

The oxygen and nitrogen used shall be of commercial grade (or better) and shall be supplied to the base of the glass tube through individual metering devices that enable the volumetric flow of each gas to be measured with an accuracy of 1 % or better.

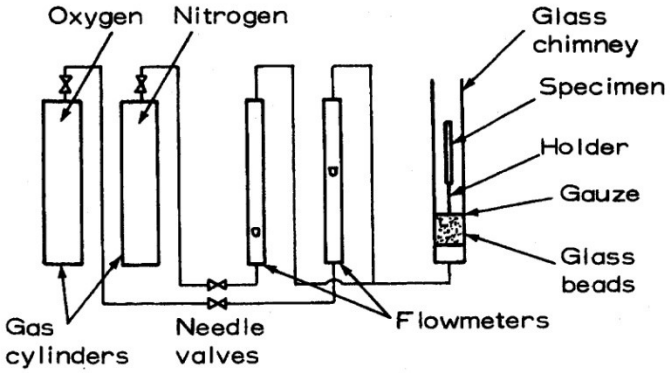
C.2 Test specimens

From the appropriate slab cut five specimens each of size 12.5 ± 0.5 mm x 12.5 ± 0.5 mm x 130 mm and draw a gauge line across each specimen 75 mm from the end that is to be positioned uppermost of the apparatus.

C.3 Procedure

Clamp a test specimen in the holder of the apparatus so that it is held vertically in the centre of the glass chimney. Open the valves of the gas cylinders and adjust the flow so that the oxygen content of the gas mixture is 20 ± 0.2 % and that the flow rate up the glass chimney (as calculated from the volumetric flow rate divided by the cross-sectional area of the chimney) is 40 ± 10 % mm/s. Allow the gas to flow for at least 30 s and then, using a small gas flame at the end of a tube, ignite the test specimen so that the whole of the upper surface is burning. Note whether the specimen burns for 3 min or longer and if not, whether or not the specimen has burned to below the 75 mm gauge line. Repeat the test with the remaining four specimens.

Figure C.1 — General arrangement of flammability test apparatus



Annex D

(normative)

Dimensions

D.1 Apparatus

D.1.1 Metre rule

A steel rule graduated in millimetres and accurate to 1 mm (or better).

D.1.2 Micrometer

A micrometer accurate to 0.01 mm (or better) with a presser foot of area at least 6.5 cm and capable of exerting a pressure of 100 ± 10 Pa.

D.2 Procedure

Measure the dimensions of each sample (using the steel rule for dimensions greater than 30 mm and the micrometer for dimensions not exceeding 30 mm).

Annex E

(Normative)

Test method for endurance

F.1 Apparatus

A compression apparatus capable of cyclically compressing (between parallel platens) the central part of the complete mattress to 67 % of its free height and then releasing it, at a rate of 60 ± 5 cycles/minute. The apparatus shall have a lower platen large enough to support the whole mattress, and an upper compressing platen with a corrugated contact surface of the size and shape shown in Figure F.1. The specified compression shall be measured at the positions of maximum compression caused by the corrugated platen.

F.2 Preparation of test specimens

a) Place the mattress to be tested and taken in accordance with 5.1, on a solid plane horizontal base for a period of at least 12 h.

b) Place a flat steel pressure plate (of diameter 300 ± 2 mm and mass 2 ± 0.2 kg) on each of the six measurement positions (in turn) shown in Figure F.2, and measure (to an accuracy of ± 2 mm) the height of the mattress at each of these positions. Ensure that the pressure plate is lowered slowly and without shock on to each of the measurement positions, and that each measurement is taken at least 10 s after application of the pressure plate.

F.3 Procedure

Position the upper platen of the apparatus with its longitudinal axis along the longitudinal axis of the mattress and its centre vertically above the midpoint, 0, of the measurement positions (see Figure F.2), secure the mattress against horizontal movement, and operate the apparatus for 60 000 compression cycles. Allow the mattress to recover for at least 12 h, again measure the height as described in F.2 (b), and calculate (for each of the six points) the loss in height as a percentage of the original height. Cut the mattress open and examine for compliance with 4.2.2

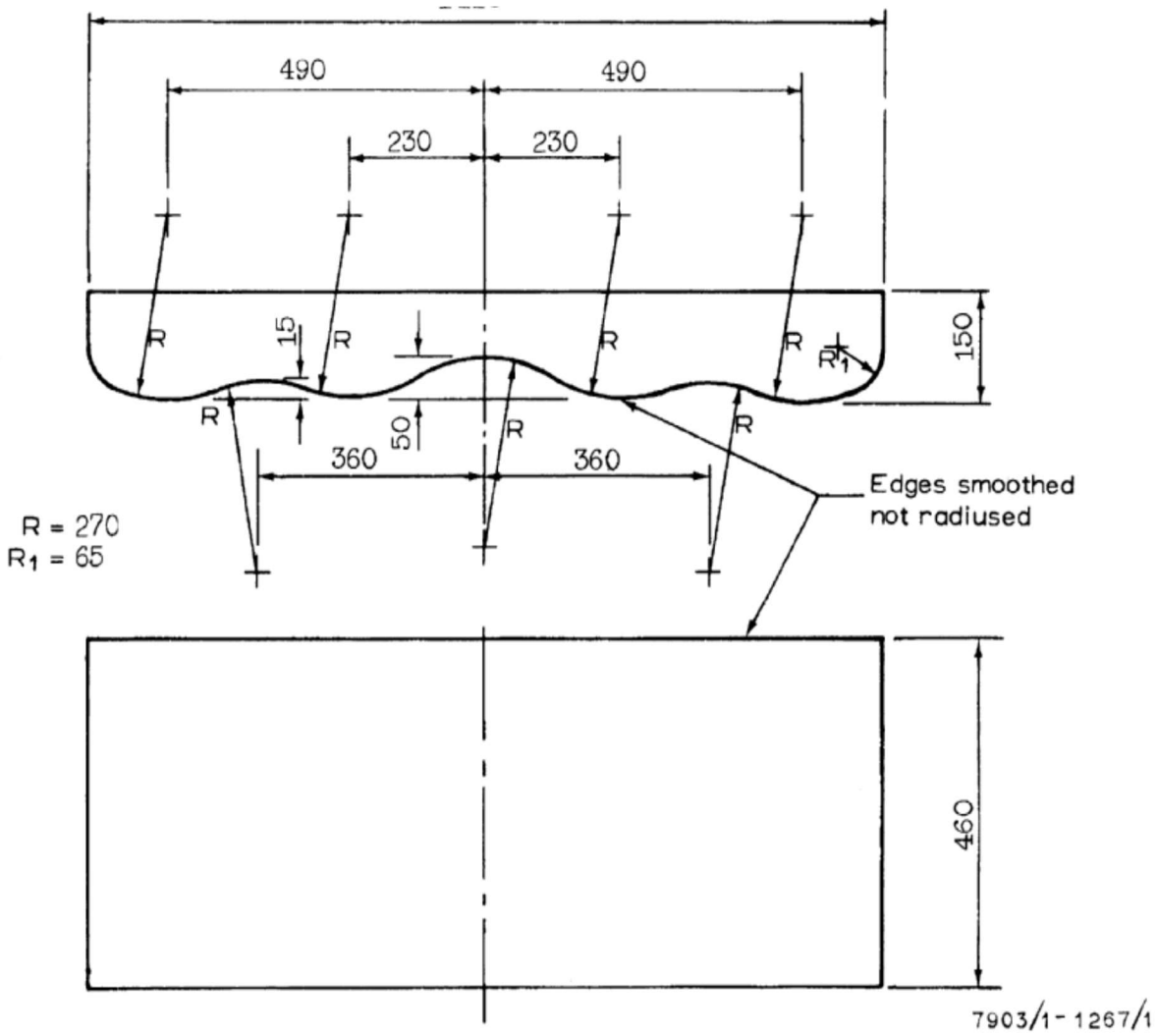


Figure F.1 - compressing platen for endurance test

Dimensions in millimetres

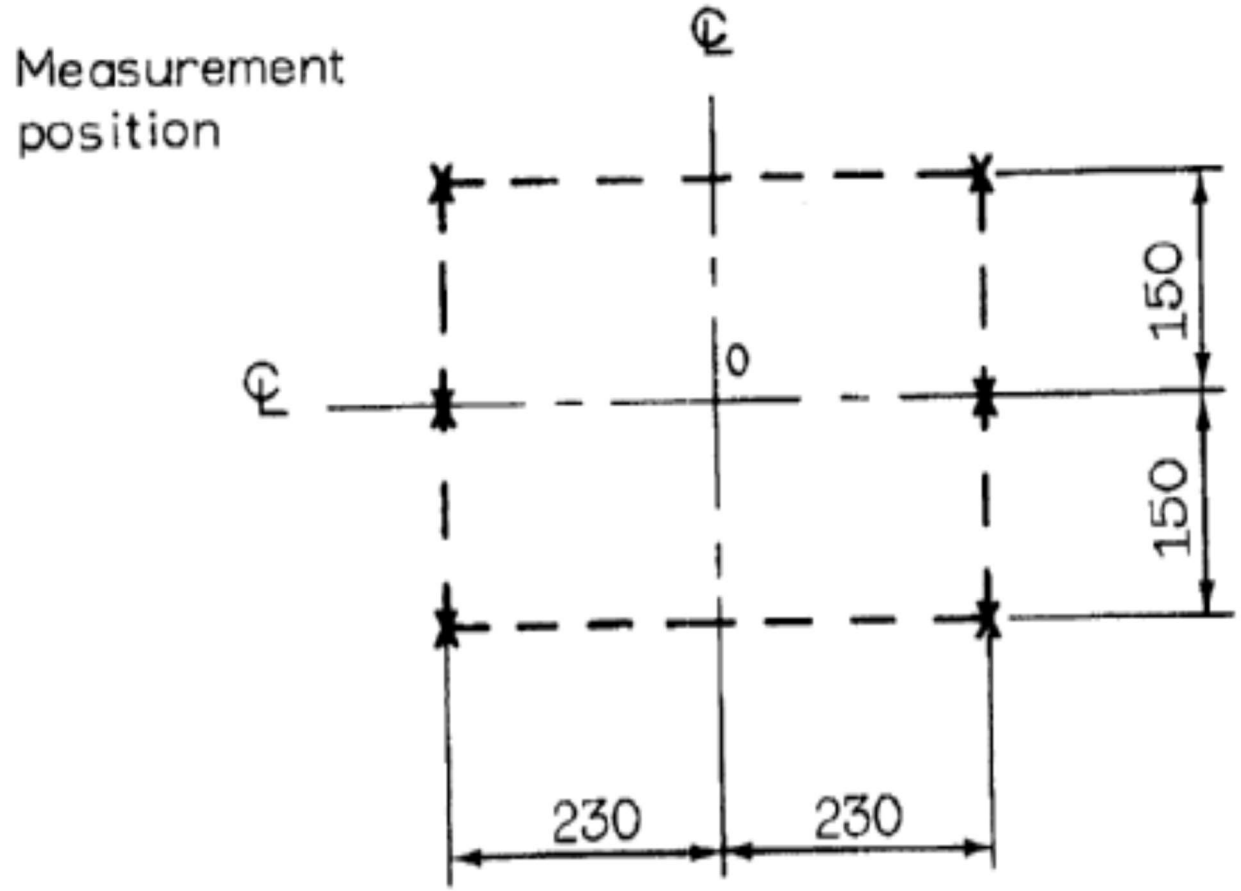


Figure F.2 -Measurement positions for endurance test