DUS 202

DRAFT UGANDA STANDARD

Second Edition
2020-mm-dd

Textiles — Mattress — Specification

Reference number
DUS 202: 2020

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The Executive Director
Uganda National Bureau of Standards
P.O. Box 6329
Kampala
Uganda
Tel: +256 414 333 250/1/2/3
Fax: +256 414 286 123
E-mail: info@unbs.go.ug
Web: www.unbs.go.ug

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Foreword

Uganda National Bureau of Standards (UNBS) is a parastatal under the Ministry of Trade, Industry and Cooperatives established under Cap 327, of the Laws of Uganda, as amended. UNBS is mandated to co-ordinate the elaboration of standards and is

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Draft Uganda Standards adopted by the Technical Committee are widely circulated to stakeholders and the general public for comments. The committee reviews the comments before recommending the draft standards for approval and declaration as Uganda Standards by the National Standards Council.

The committee responsible for this document is Technical Committee UNBS/TC 7, Textiles, Leather, Paper and Related Products, Subcommittee SC 1, Textiles and Related products.

This second edition cancels and replaces the following standards:

US 202-1:2015, Flexible polyurethane foams — Part 1: Polyether type — Specification

US 202-2:2015, Flexible polyurethane foams — Part 2: Mattresses — Specification

US 202-3:2015, Flexible polyurethane foams — Part 3: Reconstituted foams — Specification

US 202-4:2015, Flexible polyurethane foams — Part 4: Polyester type — Specification

Textiles — Mattress — Specification

1 Scope

This Draft Uganda Standard specifies the requirements, test methods and sampling of foam mattresses suitable for domestic and hotel use.

This standard does not apply to mattresses used for medical, purposes.

2 Normative references

The following referenced documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2439, *Flexible cellular polymeric materials — Determination of hardness (indentation technique)*

ISO 5077, *Textiles — Determination of dimensional change in washing and drying*

US ISO 105-B02, *Textiles — Tests for colour fastness — Part B02: Colour fastness to artificial light: Xenon arc fading lamp test*

US ISO 105-C10, *Textiles — Tests for colour fastness — Part C10: Colour fastness to washing with soap or soap and soda*

US ISO 105-D01, *Textiles — Tests for colour fastness — Part D01: Colour fastness to drycleaning using perchloroethylene solvent*

US ISO 105-E04, *Textiles — Tests for colour fastness — Part E04: Colour fastness to perspiration*

US ISO 105-X12, *Textiles — Tests for colour fastness — Part X12: Colour fastness to rubbing*

US ISO 845, *Cellular plastics and rubbers — Determination of apparent density*

US ISO 1798, *Flexible cellular polymeric materials — Determination of tensile strength and elongation at break*

US ISO 1856, *Flexible cellular polymeric materials — Determination of compression set*

US ISO 2439, *Flexible cellular polymeric materials — Determination of hardness (indentation technique)*

US ISO 3071, *Textiles — Determination of pH of aqueous extract*

US ISO 3385, *Flexible cellular polymeric materials — Determination of fatigue by constant-load pounding*

US ISO 3801, *Textiles — Woven fabrics — Determination of mass per unit length and mass per unit area*

US ISO 7771, *Textiles — Determination of dimensional changes of fabrics induced by cold-water immersion*

US ISO 8067, *Flexible cellular polymeric materials — Determination of tear strength*

US ISO 13934-1, *Textiles — Tensile properties of fabrics — Part 1: Determination of maximum force and elongation at maximum force using the strip method*

US ISO 13938-1, *Textiles — Bursting properties of fabrics — Part 1: Hydraulic method for determination of bursting strength and bursting distension*

US ISO 13938-2, *Textiles — Bursting properties of fabrics — Part 2: Pneumatic method for determination of bursting strength and bursting distension*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
mattress
product providing a surface to sleep or rest upon, that is fit for use by human beings for a long period of time, consisting of a strong cloth cover filled with materials, and that can be placed on an existing supporting bed structure

3.2
ticking
outermost layer of fabric or related material of a mattress or foundation

3.3
filling
inert substance introduced to a product to achieve desired characteristics

3.4
block
mass of foam formed by a free-rising foam process, in its original form prior to conversion

3.5
polyurethane foam
cellular material produced by the reaction of a polyol with an organic isocyanate in the presence of water and that may include catalysts, surface active agents, auxiliary blowing agents, fillers, plasticizers, colourants and any other additives that do not alter the properties of the foam

3.6
lot
not less than 1 m^3 and not more than 100 m^3 of foam of the same density and nominal dimensions, from one manufacturer, submitted at any one time for inspection and testing

3.7
ultimate elongation (elongation at break)
percentage strain produced in a specimen stretched to its breaking point

3.8
polyether foam
polyurethane foam formed by the reaction of a polyether polyol with a polyisocyanate

3.9
reconstituted foam
composite material that consists of chips of flexible polyurethane foam of the polyether or the polyester type (or of a mixture of these types) held together by means of a suitable binder

3.10
polyester foam
polyurethane foam formed by the reaction of a polyester resin with a polyisocyanate

4 Mattress Types

Depending upon the composition of their cores, mattresses are characterised as below:

4.1 Innerspring mattresses

Innerspring mattresses shall contain a series of metal springs joined together in sizes that correspond to the dimensions of mattresses (see US 1575)

4.2 Hybrid mattresses

Hybrid mattresses shall contain two or more support systems as the core, such as layers of both polyurethane foam and innerspring units

4.3 Non-innerspring mattresses

Non-innerspring mattresses shall not contain any innerspring units. These may be produced from foams such as polyurethane, latex, thermobonded polyester, polyethylene or any other resilient filling.

5 Requirements

5.1 Mattress Components

5.1.1 Core

The core shall consist of any of the following materials:

a) Springs

b) Polyurethane

c) Latex

d) Polyethylene

e) Horse hair

f) Coconut fibre

5.1.2 Shell (padding)

All mattresses with a spring interior shall contain a shell. Mattresses with other materials may contain a shell. The shell materials used shall include:

a) Polyether foam

b) Latex foam

c) Horse hair and camel hair

d) Coconut fibres

e) Polyester (PET or Polyethylene)

f) Cotton

g) Wool

h) Linen

i) Felt

j) Jute

k) Sisal

These materials shall be either glued and/or sewed to each other and on the core.

5.1.3 Ticking material

5.1.3.1 The ticking or covering material shall be new, clean and free from defects (including splits, tears and voids) that detract from the appearance or that may be detrimental to the performance of the mattress.

5.1.3.2 The ticking shall show no evidence of holes, tears, loose yarns, spots or odour.

5.1.3.3 The stitching shall not pucker or have open seams, or loose or untrimmed ends.

5.1.3.4 The fibre composition of the thread used for stitching the fabric on the mattress shall be compatible with the ticking material

5.1.3.5 Chemicals which are harmful to the skin or which can react with the rubber foam shall not be used in the finishing of the fabric. The pH of the finished fabric shall be as stated in Table 1.

5.1.3.6 The ticking material shall be made from any of the following materials or their blends: cotton, polyester, silk, wool, viscose and nylon. The ticking material may be fixed to the mattress or removable.

5.1.3.7 The fabric width for all sizes of mattresses shall be such that when stitched, not more than three seams shall be on one side of the width of the mattress. The width of the fabric roll shall be as declared subject to a tolerance of ± 2 %.

Table 1 — Requirements for Ticking material

Parameter	Requirement				Test Methods
	Polyester	Cellulosic (cotton, viscose)	Polyester cellulosic blend	Nylon	
Mass per unit area g/m^2, min.	63	115	70	63	ISO 3801
Breaking strength, N, min • Warp • Weft	 600 200	 300 160	 600 200	 600 200	ISO 13934-1
Bursting strength, kN/m^2, min.	202	157	160	202	ISO 13938-1
Dimensional changes, %, max. • Warp • Weft	 2 2	 4 4	 2 2	 2 2	ISO 5077
pH	6.0 — 8.5				US ISO 3071
Colour fastness to light	5	5	5	5	US ISO 105-B02

Colour fastness to washing, min. • Change • Staining	 4 4	 4 4	 4 4	 4 4	US ISO 105-C10
Colour fastness to rubbing, min. • Wet • Dry	 4 3	 4 3	 4 3	 4 3	US ISO 105-X12
Colour fastness to dry cleaning, min. • Change • Staining	 4 4	 4 4	 4 4	 4 4	US ISO 105-D01
Colour fastness to perspiration, min. • Change • Staining	 4 4	 4 4	 4 4	 4 4	US ISO 105-E04

5.2 Dimensions

When determined in accordance with US ISO 1923, foam mattresses shall conform to the requirements in Table 2. For top skin mattresses, the top skin shall have a minimum thickness of 1.5 mm. Mattresses of dimensions other than those indicated under Table 2 should be manufactured subject to tender agreement between purchaser and supplier. They shall be for purchasers' use only and shall not be sold in the market.

Table 2 — Dimensional requirements of mattresses

Length,* mm	**Width,*** mm	**Thickness,*** mm
1 219	610	76
1 219	610	102
1 372	610	76
1 372	610	102
1 524	762	76
1 524	762	102
1 880	762	51
1 880	762	76
1 880	762	102
1 880	915	51
1 880	915	76
1 880	915	102
1 880	915	152
1880	915	203
1880	915	254
1880	915	305
1 880	1 069	102
1 880	1 069	152
1 880	1 069	203
1 880	1 069	254
1 880	1 069	305
1 880	1 219	102
1 880	1 219	152

1 880	1 219	203
1 880	1 219	254
1 880	1 219	305
1 880	1 372	152
1 880	1 372	203
1 880	1 372	254
1 880	1 372	305
1 880	1 524	152
1 880	1 524	203
1 880	1 524	254
1 880	1 524	305
1 880	1 829	152
1 880	1 829	203
1 880	1 829	254
1 880	1 829	305
*Tolerances shall be as follows: length: + 25 mm; width: +10 mm; and thickness: +10 mm		

5.3 Flammability

When foam is tested in accordance with Annex A,

a) no specimen shall burn for 3 min or more; and

b) no specimen shall burn beyond the gauge line.

5.4 Foam

5.4.1 The foam shall:

a) be non-toxic;

b) be free from objectionable odour;

c) have surfaces that are smooth and practically free from cuts and tears

5.4.2 The structure of the foam used in the mattress shall be uniform in appearance.

5.4.3 The foam may be presented in form of full foam or trimmed blocks, slabs, laminated layers, sheets or shapes cut from any of these.

5.4.4 Contacting surfaces of mattress filling parts shall be uniformly and acceptably adhered to one another. The adhering edges shall not have any un-adhered length exceeding 10 mm.

6 Specific requirements

6.1 Flexible polyurethane mattresses

6.1.1 Polyether foam

6.1.1.1 The density of polyether foam mattresses, when determined in accordance with US ISO 845, shall be within the limits given in Table 3.

6.1.1.2 The hardness factor for mattresses, when determined in accordance with US ISO 2439, shall conform to the limits in Table 3.

6.1.1.3 The top skin mattress shall

a) have a hard skin on one side, consisting of a single piece formed through the chemical process of foaming with no sign of bondage or joints.

b) have a minimum density of 24 kg/m^3

c) be practically free from cracks.

6.1.2 Polyester foam

The density of polyester foam when determined in accordance with US ISO 845 and its hardness factor when determined in accordance with US ISO 2439, shall be within the appropriate limits given in Table 3

6.1.3 Reconstituted foam

6.1.3.1 The density of reconstituted foam when determined in accordance with US ISO 845 and its hardness factor when determined in accordance with US ISO 2439, shall be within the appropriate limits given in Table 3

6.1.3.2 The chip structure shall be acceptably uniform, and the largest dimension of any void between the chips shall not exceed 3 mm.

6.1.3.3 The upper and lower filling parts of a reconstituted foam shall be of a thickness not less than 25 mm.

6.1.3.4 The centre filling part of a reconstituted foam shall be a thickness not less than 75 mm.

Table 3 — Physical properties of Flexible polyurethane mattresses

Parameter		Requirement			Test method
		Polyether	Polyester	Reconstituted	
Density kg/m^3		19.5 – 48.1	21 – 37.1	56 - 160	US ISO 845
Hardness factor		0.9 – 6.3	17 - 30	7 - 77	US ISO 2439
Compression set, %, max.		12	17.5	25	US ISO 1856
Tensile strength	i) Original, kPa, min	69	80	40	US ISO 1798
	ii) After heat aging, retention of original, %, min	80	80	40	
	iii) After humid aging, retention of original, %, min.	80	80	40	
Elongation at break	i) Original, kPa, min.	100	200	50	
	ii) After heat aging, retention of original, %, min.	40	80	50	

	iii) After humid aging, retention of original, %, min.	40	80	50	
Tear resistance, N/mm of width, min		0.219	0.263	0.09	US ISO 8067
Permanent resistance to solvents	i) Visible deterioration (all solvents) *	Nil	Nil	Nil	Annex B
	ii) Swelling, %	Nil	Nil	Nil	
	iii) Tensile strength, retention of original, %, min	90	80		
Fatigue resistance	Retention of hardness factor, %, min	60		80	US ISO 3385
	Loss in height, %, min	5	5	5	
* A change in colour shall not be construed as evidence of deterioration					

6.2 Expanded Polyethylene Mattresses

The density of polyester foam when determined in accordance with US ISO 845 and its hardness factor when determined in accordance with US ISO 2439, shall be within the appropriate limits given in Table 4

Table 4 — Physical properties of expanded polyethylene mattresses

Parameter	Requirement	Test method
Density, kg/m^3	20-64	US ISO 845
Tensile Strength, kpa Transverse direction Machine direction	176 – 343 245 - 588	US ISO 1798
Elongation at break, % Transverse direction Machine direction	42 – 75 80 - 100	
Compression strength (at 10% deformation), kpa	4.9 – 19.6	
Compression set (%), max.	10	US ISO 1856
Tear strength, N/mm, min.	0.147	US ISO 8067
Water absorption (after 96 hours at 27^{0}C), % by vol.	0.10 – 0.05	

7 Packaging and labelling

7.1 Packaging

7.1.1 The foam mattresses shall be covered in clothing (ticking) complying with requirements given in 5.1.3.or any other suitable material as agreed between the purchaser and supplier. To avoid deterioration of foam mattresses during storage, it shall be kept in well-ventilated rooms otherwise away from direct sunlight

7.1.2 Mattresses shall be individually wrapped in sealed polyethylene bags or any other suitable material that are strong enough to prevent any damage to the contents during storage and transportation.

7.1.3 During dispatch, mattresses shall be packed and transported in manner to minimize damage due to rough or improper handling.

7.2 Labelling

7.2.1 Ticking material labelling

7.2.1.1 The following information shall appear in legible and indelible marking on a strong, durable label on the outside of the ticking or on the ticking of the mattress.

a) name and physical address of the manufacturer/ importer/ distributor and/ or trade mark if any; and

b) country of origin

7.2.1.2 Mattress dimensions shall be visible

7.2.2 Foam labelling

The following information shall appear in legible and indelible marking on an end or on a sleeping surface near an end of the foam of the mattress and shall be visible to the purchaser: Top skin mattresses shall have an indelible mark indicating that they are top skin in addition with the following:

a) manufacturer/ importer/distributor and/or trademark if any;

b) lot or batch number;

c) dimensions of the mattress;

d) type of mattress core; and

e) country of origin.

8 Sampling

To test the compliance of the foam mattresses to the requirements of this standard, samples shall be taken according to the sampling plan given in Table 5.

Table 5 — Sampling plan

Number of mattresses in the lot	Number of samples to be selected
2 - 8	2
9 - 15	3
16 - 25	5
26 - 50	8
51 – 90	13
91 - 150	20

8.2 Compliance with the specification

The lot shall be deemed to comply with the specification if after inspection and testing of the samples taken in accordance with Clauses 5 and 6, no defective is found.

Annex A
(normative)

Flammability

A.1 Apparatus

An apparatus as shown schematically in Figure A.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.

A.2 Test specimens

From the appropriate slab [see 6.1b)] cut five specimens each of size 12.5 mm + 0.5 mm x 12.5 mm + 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 in the apparatus.

A.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.

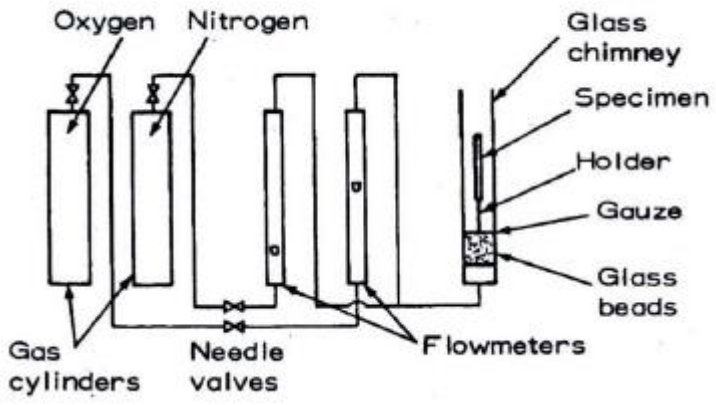

Figure A.1 — General arrangement of flammability test apparatus

Annex B
(normative)

Permanent resistance to solvents

B.1 Apparatus

B.1.1 Container, glass container large enough to allow complete immersion, without bending of a test specimen

B.1.2 Scoop, flat wire gauze scoop

B.1.3 Sinker, wire gauze sinker

B.1.4 Glass, square of plate glass

B.1.5 Equipment for measuring dimensions, as in US ISO 1923

B.2 Reagents

B.2.1 Petrol, complying with the requirements of US EAS 158

B.2.2 Light-naphtha

B.2.3 Denatured alcohol

B.2.4 Trichloroethylene

B.3 Test specimen

From the appropriate slab (see 6.1 b)), cut four specimens each of size at least 150 mm x 150 mm and of thickness approximately 10 mm.

B.4 Procedure

Measure the thickness, length, and width of a specimen using US ISO 1923, and immerse it in one of the reagents in the container ensuring that it is totally submerged by covering it with the wire gauze sinker. After 30 min, remove the sinker and, using the scoop, remove the specimen, and allow it to drain in the scoop for 5 min. Then carefully transfer the specimen on to the glass plate, ensuring that the specimen is not distorted in any way during the transfer.

Condition the assembly generally as in 7.2, but for at least 48 h or such longer period as may be necessary to ensure complete removal of the reagent, then re-measure the length, width, and thickness of the specimen and, disregarding any change in colour, inspect the specimen for signs of visible deterioration.

Then determine, as in US ISO 1798, its tensile strength. Repeat the test with the other reagents, using a different specimen in each test.

NOTE: To avoid damage to the specimen, its thickness after immersion may be determined by measuring the total thickness of the assembly and deducting the thickness of the glass plate.

B.5 Calculation and reporting

For each reagent, calculate the swelling of the sample as follows:

$$Swelling, \% = \frac{a_2 t_2 - a_1 t_1}{a_1 t_1} \times 100$$

Where,

a_1 is the original area, in square millimetres (mm^2)

a_2 is the area after immersion;

t_1 is the original thickness, in millimetres (mm); and

t_2 is the thickness after immersion, in millimetres (mm).

Bibliography

[1] ISO #####-#, *General title — Part #: Title of part*

[2] ISO #####-##:20##, *General title — Part ##: Title of part*

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