Specification for

Spring units for mattresses

ICS 21.160, 97.140

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee CCM/37, Beds, cots and mattresses, upon which the following bodies were represented:

Association of British Healthcare Industries
British Iron and Steel Producers Association
British Steel Industry (Wire Section)
Consumer Policy Committee of BSI
Department of Health
Furniture Industry Research Association
Institute of Trading Standards Administration
National Bed Federation Limited
National Fillings Trades Association
National Health Services (Procurement Group)
BSI Technical Committee PRI/71

This British Standard, having been prepared under the direction of the Consumer Products and Services Sector Board, was published under the authority of the Standards Board and comes into effect on 15 August 1996

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The following BSI references relate to the work on this standard:
Committee reference CCM/37
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Amendments issued since publication

Amd. No.	Date	Text affected

Contents

Foreword

This British Standard has been prepared by Technical Committee CCM/37, and supersedes BS 3173 : 1971 which is withdrawn.

This revision of BS 3173 : 1971 additionally includes the following:

(a) requirements for wire are now specified in terms of BS 4637 *Specification for carbon steel wire for coiled springs (bedding and seating)*;

(b) requirements relating to the number of springs for a given size of spring unit;

(c) requirements for pocketed springs hitherto excluded from the scope of this standard.

Conformity of a spring unit to this standard is an aid for manufacturers towards meeting the requirements of the finished product standards for mattresses, but is not a prerequisite for conformity of a mattress to the appropriate standard.

Relevant finished product standards include:

BS 1877 *Domestic bedding* Part 10 : 1981 *Specification for mattresses and bumpers for children's cots, perambulators and similar domestic articles*

BS 7397 : 1991 *Methods of test for mattresses, bed bases and bed sets*

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Specification

1 Scope

This British Standard specifies requirements for open coil and pocketed mattress spring units used for the construction of spring interior mattresses, and includes performance tests. Details of the test procedure are given in annex A and suitable test apparatus is described in annex B.

2 References

2.1 Normative reference

This British Standard incorporates, by undated reference, provisions from another publication. These normative references are made at the appropriate points in the text and the cited publication is listed on the inside back cover.

The latest edition of the cited publication applies, together with any amendments.

2.2 Informative references

This British Standard refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Definitions

For the purposes of this British Standard the following definitions apply.

3.1 spring unit

A unit made up of either open coil or pocketed springs and the connecting elements between them.

3.2 open coil spring

Mattress springing in which the springs are not enclosed in pockets but connected together by other suitable means.

3.3 pocketed spring

Mattress springing in which the springs are enclosed inside pockets and the pockets are connected together by suitable means.

4 Materials

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.

4.2 Springs distributed at the minimum densities given in clause **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 **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.

Helical wires shall have a nominal diameter not less than 1.25 mm.

5 Construction

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.

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

NOTE. 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.

6 Number of springs

6.1 Each spring unit shall contain not fewer than the number of springs specified for the appropriate mattress size in tables 1 and 2.

Table 1. Mattresses for adults' use

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

Table 2. Mattresses for children's use

Nominal unit size mm	Minimum number of springs	
	Open coil	Pocketed
540 × 1150	54	105
690 × 1300	88	153

6.2 The spring density for units of sizes other than those listed in tables 1 and 2 shall be at least the value shown in table 3.

NOTE. The values shown in table 3 are the minimum spring densities resulting from **6.1**.

Table 3. Minimum spring density for units of other sizes

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

7 Performance

7.1 When tested in accordance with annex A, each spring unit shall be such that the following requirements are met:

a) no spring or connecting material breakages shall have occurred in the section under test;

b) the loss in height in any position at the points of measurement defined in annex A shall not exceed 5 %.

8 Test report

The test report shall include the following items:

a) reference to this standard;

b) details of the unit tested;

c) any defects observed before testing;

d) the test results according to the applicable clause;

e) overall conformity or non-conformity to this standard;

f) the name and address of the test facility;

g) the date of test, test reference and the person who conducted the test.

NOTE. An example test report is shown in table 4.

Table 4. Example test report

TEST REPORT BS 3173 : 1996		
Test ref:	**Tested by:**	**Date:**
Sample details:		
Machine no.		
Test unit size (cm)		
Spring wire gauge diameter (mm)/supplier		
Helical wire gauge diameter (mm)/supplier (if applicable)		
Method of heat treatment (if any)		
Test cycles		5000

Test sample height (mm)	**Before test**	**After test**	**Actual loss** (mm)	**% loss**	**Pass/fail**
Position A					
Position B					
Position C					
Position D					

State conformity with clause 4, materials	
State conformity with clause 5, constructional requirements	
State conformity with clause 6, number of springs per unit	
COMMENTS:	

Annexes

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.

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 × 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*

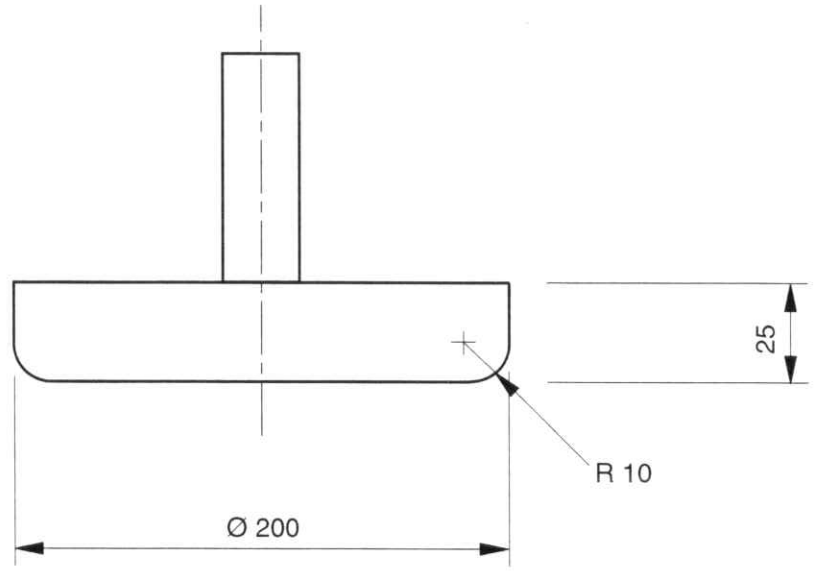
After completion of the test and removal of the indentor, remeasure the height of the test sample at each of the four positions indicated on the measuring disc. Ensure that the disc is placed in an identical position to that used for the initial measurements as in **A.4.1**.

A.4.4 *Final examination*

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

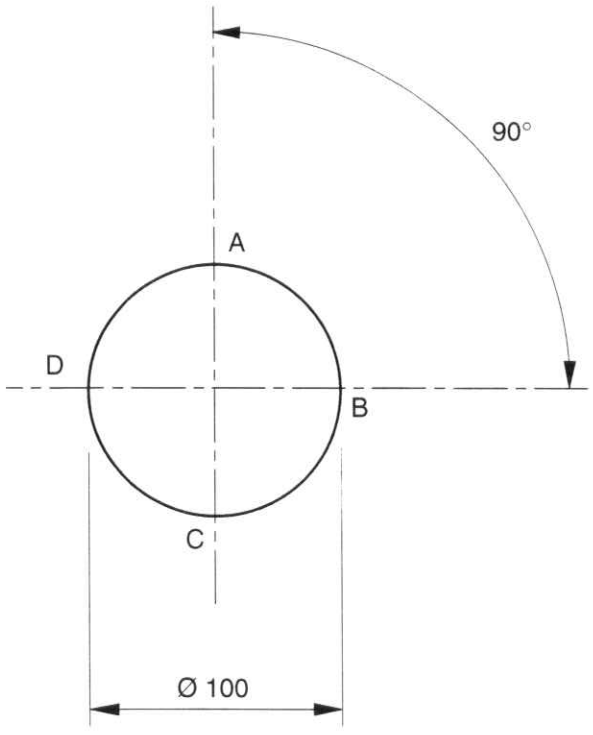
A.4.5 *Calculation of results*

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 mm × 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.)

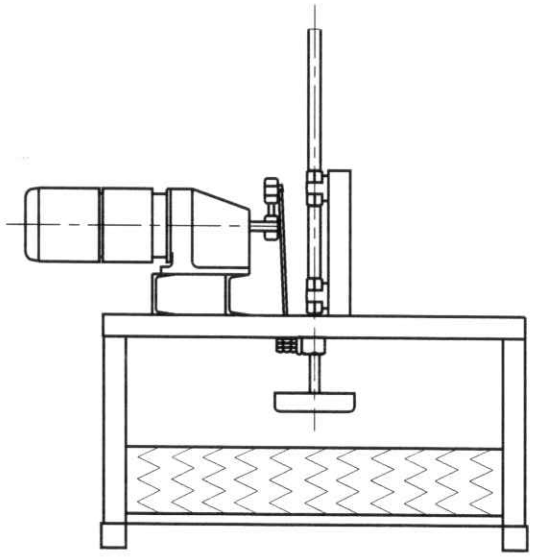


Figure B.1 Spring unit indentor and drive mechanism. Side view

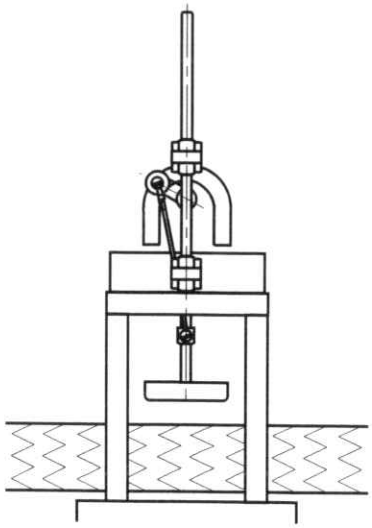


Figure B.2 Spring unit indentor and drive mechanism. End view

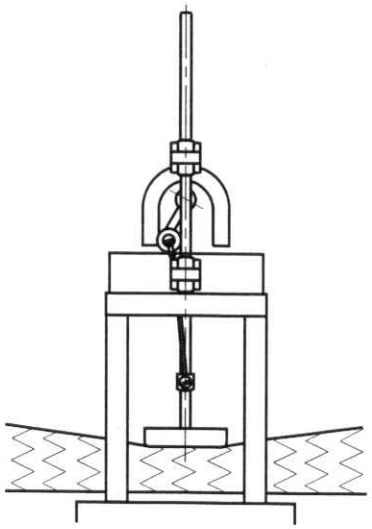


Figure B.3 View showing indentor acting on mattress sample.

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List of references

Normative references

BSI publications

BRITISH STANDARDS INSTITUTION, London

BS 4637 : 1970	*Specification for carbon steel wire for coiled springs (bedding and seating)*

Informative references

BSI publications

BRITISH STANDARDS INSTITUTION, London

BS 1877	*Domestic bedding*
BS 1877 : Part 10 : 1981[1)]	*Specification for mattresses and bumpers for children's cots, perambulators and similar domestic articles*
BS 7397 : 1991[1)]	*Methods of test for matteresses, bed bases and bed sets*

[1)]Referred to in foreword only.

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