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WOMEN'S CLOSED SHOES – SPECIFICATION

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B.P.: 14966 Yaoundé – CAMEROUN – Tél: 6992 257 777 / Fax.: (237) 222 22 64 96
E-mail : enquetepublique@anor.cm – www.anor.cm/enquetes-publiques

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Footwear — Women's closed shoes — Specification



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ARSO Central Secretariat
International House 3rd Floor
P. O. Box 57363 — 00200 City Square
NAIROBI, KENYA

Tel. +254-20-2224561, +254-20-3311641, +254-20-3311608

E-mail: arso@arso-aran.org

Web: www.arso-aran.org

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ARSO Central Secretariat
International House 3rd Floor
P.O. Box 57363 — 00200 City Square
NAIROBI, KENYA

Tel: +254-20-2224561, +254-20-3311641, +254-20-3311608

E-mail: arso@arso-oran.org
Web: www.arso-oran.org

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Footwear — Women's closed shoes — Specification

1 Scope

This African Standard specifies the requirements for ladies closed shoes made of all types of materials.

2 Normative references

The following referenced documents are indispensable for the application 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.

ASTM D6020, *Standard Practice for Calculation of (Non-Mineral) Combined Tanning Agents and Degree of Tannage*

ISO 105-B01, *Textiles — Tests for colour fastness — Part B01: Colour fastness to light: Daylight*

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

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

ISO 2418, *Leather — Chemical, physical and mechanical and fastness tests — Sampling location*

ISO 2419, *Leather — Physical and mechanical tests — Sample preparation and conditioning*

ISO 2588, *Leather — Sampling — Number of items for a gross sample*

ISO 2589, *Leather — Physical and mechanical tests — Determination of thickness*

ISO 2781, *Rubber, vulcanized or thermoplastic — Determination of density*

ISO 3376, *Leather — Physical and mechanical tests — Determination of tensile strength and percentage extension*

ISO 3377-1, *Leather — Physical and mechanical tests — Determination of tear load — Part 1: Single edge tear*

ISO 3377-2, *Leather — Physical and mechanical tests — Determination of tear load — Part 2: Double edge tear*

ISO 3378, *Leather — Physical and mechanical tests — Determination of resistance to grain cracking and grain crack index*

ISO 3380, *Leather — Physical and mechanical tests — Determination of shrinkage temperature up to 100 °C*

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

ISO 4045, *Leather — Chemical tests — Determination of pH*

ISO 4047, *Leather — Determination of sulphated total ash and sulphated water-insoluble ash*

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ISO 4048, *Leather — Chemical tests — Determination of matter soluble in dichloromethane and free fatty acid content*

ISO 4098, *Leather — Chemical tests — Determination of water-soluble matter, water-soluble inorganic matter and water-soluble organic matter*

ISO 4684, *Leather — Chemical tests — Determination of volatile matter*

ISO 5398-1, *Leather — Chemical determination of chromic oxide content — Part 1: Quantification by titration*

ISO 5402-1, *Leather — Determination of flex resistance — Part 1: Flexometer method*

ISO 5402-2, *Leather — Determination of flex resistance — Part 2: Vamp flex method*

ISO 5403-1, *Leather — Determination of water resistance of flexible leather — Part 1: Repeated linear compression (penetrometer)*

ISO 5403-2, *Leather — Determination of water resistance of flexible leather — Part 2: Repeated angular compression (Maeser)*

ISO 6123-1, *Rubber or plastics covered rollers — Specifications — Part 1: Requirements for hardness*

ISO 7769, *Textiles — Test method for assessing the appearance of creases in fabrics after cleansing*

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

ISO 9073-1, *Textiles — Test methods for nonwovens — Part 1: Determination of mass per unit area*

ISO 9407, *Shoe sizes — Mondopoint system of sizing and marking*

ISO 11640, *Leather — Tests for colour fastness — Colour fastness to cycles of to-and-fro rubbing*

ISO 11644, *Leather — Determination of adhesion to finish*

ISO 12947-2, *Textiles — Determination of abrasion resistance by Martindale method — Part 2: Determination of specimen breakdown*

ISO 13935-1, *Textiles — Seam tensile properties of fabrics and made-up textile articles — Part 1: Determination of maximum force to seam rupture using the strip method*

ISO 13935-2, *Textiles — Seam tensile properties of fabrics and made-up textile articles — Part 2: Determination of maximum force to seam rupture using the grab method*

ISO 13937-1, *Textiles — Tear properties of fabrics — Part 1: Determination of tear force using ballistic pendulum method (Elmendorf)*

ISO 17070, *Leather — Chemical tests — Determination of tetrachlorophenol-, trichlorophenol-, dichlorophenol-, monochlorophenol-isomers and pentachlorophenol content*

ISO 17072-1, *Leather — Chemical determination of metal content — Part 1: Extractable metals*

ISO 17072-2, *Leather — Chemical determination of metal content — Part 2: Total metal content*

ISO 17076-1, *Leather — Determination of abrasion resistance — Part 1: Taber method*

ISO 17076-2, *Leather — Determination of abrasion resistance — Part 2: Martindale ball plate method*

ISO 19952, *Footwear — Vocabulary*

ISO 19958, *Footwear — Test methods for heels and top pieces — Top piece retention strength*

ISO 20344, *Personal protective equipment — Test methods for footwear*

ISO/TR 20572, *Footwear — Performance requirements for components for footwear — Accessories*

ISO/TR 20883, *Footwear — Performance requirements for components for footwear — Shanks*

ISO 23910, *Leather — Physical and mechanical tests — Measurement of stitch tear resistance*

3 Terms and definitions

For the purpose of this standard, the terms and definitions in ISO 19952 and the following apply.

3.1

pu coated leather

leather with a coating of polyurethane

3.2

pvc coated textiles

textiles with a coating of polyvinylchloride

3.3

synthetic materials

materials made of PU, PVC and other synthetic materials which are used as natural leather substitute

3.4

lot

all footwear pairs in a consignment belonging to the same pattern/design and batch of manufactured shoes delivered or imported

3.5

defect

a fault or failure of a footwear pair to meet the requirements of this standard

3.6

defective footwear

a footwear pair with one or more defects as mentioned in this standard

3.7

shoe

a footwear having an outer covering for the entire feet not coming much above the ankle. It is built up or assembled on a last or appropriate mould to the required shape, size and fitting. The upper part of the shoe consists of number of components such as vamp, quarters, counter, etc. and the same are aligned and assembled together by various methods. The bottom part of the shoe consists of number of components, such as insole, sole heel, etc. and the same are aligned and assembled together by various methods. The assembled upper part and bottom parts are attached to each other by various methods

4 Requirements

4.1 General requirements

The method of construction shall follow the principle applicable for that type. The sizing and fitting shall be in accordance with ISO 9407.

4.2 Material requirements

4.2.1 Uppers

The upper characteristics shall comply with the requirements given in Table 1.

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4.2.2 Upper lining

The upper lining characteristics shall comply with the requirements given in Table 2.

4.2.3 Bottom/sole

The bottom/sole characteristics shall comply with the requirements given in Table 3.

4.2.4 Heel and top piece

The heel and top piece characteristics shall comply with the requirements given in Table 4.

4.2.5 Stiffener and toe puff

The stiffener and toe puff characteristics shall comply with the requirements given in Table 5.

4.2.6 Insole and insock

The insole and insock characteristics shall comply with the requirements given in Table 6.

4.2.7 Whole shoe assembly

The whole shoe assembly characteristics shall comply with the requirements given in Table 7.

5 Workmanship and finish

5.1 Workmanship

The footwear shall be manufactured in accordance with sound manufacturing practice.

5.2 Trimming

Unless the heel seats are of the extended type, heels shall be trimmed smooth to the heel seats.

5.3 Edge trimming

The sole edges (other than pre-moulded outsole and heel units) shall be trimmed smooth, stitched down construction, shall be so trimmed that the distance beyond the outside of the stitching on the flanged portion of the upper is not less than 1.5 mm.

5.4 Burnishing

In leather footwear, the leather exposed at the sides of the heels and at the edges of the bottom shall be stained, well waxed, set and polished.

5.5 Defects

Insoles, runners and linings shall be free from protruding grinders, roughness and pleats inside the shoe.

5.6 Laces

Each pair of lace-up shoes shall be provided with one pair of laces complying with ISO/TR 20572.

6 Marking

6.1 Footwear

- a) At the waist of the sole, the size and fitting number of footwear shall be legibly and indelibly marked.

- b) On the insock the following shall be legibly and indelibly marked:
 - i) manufacturer's name and/or registered trade mark;
 - ii) size and fitting number of footwear; and
 - iii) country of manufacture/origin.
- c) On the quarters or the tongue, the following shall be legibly and indelibly marked:
 - i) manufacturer's name and/or registered trade mark;
 - ii) batch number; and
 - iii) size and fitting number of footwear.
- d) On either side of the waist of the sole, the sock or the quarter, the manufacturer's name or registered trade mark shall be legibly and indelibly marked.

6.2 Box

Each box shall bear the following information legibly and indelibly marked:

- a) size of footwear;
- b) manufacturer's name or registered trade mark.

6.3 Bale

Each bale shall bear the following information legibly and indelibly marked:

- a) name of product;
- b) quantity;
- c) name of manufacturer or local supplier's name and/or registered trade mark;
- d) country of manufacture/origin

7 Sampling and criteria for conformity

The sampling and criteria for conformity shall be in accordance with Annex A.

8 Packing

Each pair of footwear shall be wrapped in a suitable polythene bag or any other suitable material and packed in a suitable box that will protect it from damage during normal transportation and storage.

Table 1 — Chemical and physical requirements — Upper material

Parameters	Materials and requirements									Test method
	Leather	PU coated leather	Textiles	PU coated textiles	PVC coated textiles	EV/MCR	PU	PVC	Other materials (include composite)	
1	2	3	4	5	6	7	8	9	10	11
Thickness (mm), min.	1.2	0.7	—	0.7	0.7	0.7	0.7	0.7	0.5	ISO 2589
Tensile strength (N/mm ²), min.	15	12	15	6	7.5	2	6	6	6	ISO 3376
Elongation at break, %, (min.)	30-80	30-80	15	10-50	10-50	80	200	250	40-50	ISO 3376
Tear strength (N), min.	55	55	-	28	25	20	25	30	20	ISO 3377-1/-2
Rub fastness (Gray scale), min.										ISO 11640
a) dry	3	3	3	3	3	3	3	3	3	
b) wet	3	3	3	3	3	3	3	3	3	
Adhesion to finish, N, min	1	0.8	-	-	-	-	-	-	-	ISO 11644
Break pipeness (Scale), max.	3	4	4	4	4	-	4	4	4	ISO 7769
Breaking load, N, min.	-	-	15	10	10	-	-	-	-	ISO 3377
Chrome content, %, max.	3	3	-	-	-	-	-	-	-	ISO 5398-1
Water vapour permeability, mg/cm ² h, min.	1	1	2	2	1	2	2	1	0.8	ISO 20344
Water vapour coefficient (mg/cm ²), min.	30	30	30	30	30	-	30	30	30	ISO 20344
Martindale abrasion (révolutions) min.										ISO 12947-1
a) dry	-	25600	25600	25600	25600	-	25600	25600	25600	
b) wet	-	6400	6400	6400	6400	-	6400	6400	6400	
pH value, min.	4	4	—	—	—	—	—	—	—	ISO 4045
pH différence, max.	0.7	0.7	-	-	-	-	-	-	-	ISO 4045
Fat content, (% m/m), min.	3	3	-	-	-	-	-	-	-	ISO 4048
Total ash, (%), max.	6	6	6	6	6	6	6	6	6	ISO 4047
Total water soluble, (%), max.	6	6	2	2	2	4	2	1	4	ISO 4098
Shrinkage (%), max.	5	5	5	5	5	5	5	5	5	ISO 3380
Light fastness, (blue wool standards), min.	6	6	6	6	6	6	6	6	6	ISO 105-B02
Wash fastness, (grey scale), min.	—	—	4	4	4	4	4	4	4	ISO 105-C10
KEY EVA — Ethyl vinyl, MCRC — Microcellular rubber, TPR — Thermoplastic rubber, PU — Polyurathane, PVC — Polyvinyl chloride										

Table 2 — Chemical and physical requirements — Lining material

Parameters	Materials and requirements				Test method
	Leather	PVC	Textile	PU	
(1)	(2)	(3)	(4)	(5)	(6)
Thickness (mm), min.	0.6	0.5	—	0.5	ISO 2589
Tensile strength (N/mm ²), min.	6	5	8	5	ISO 3376
Elongation at break (%), min.	30	—	7	—	ISO 3376
Tear strength (N), min.	20	8	10	5	ISO 3377
Rub fastness (gray scale), min.					ISO 11640
a) dry	4	4	4	4	
b) wet	4	4	4	4	
Break pipiness (Bp scale), max.	3	4	4	4	ISO 7769
Breaking load (N), min.	—	—	130	—	ISO 3377-1/-2
Chrome content (%), max.	3.5	—	—	—	ISO 5398-1
Water vapour permeability (mg/cm ² , h), min.	1	2	2	1	ISO 20344
Water vapour coefficient (mg/cm ² , min.	30	30	30	30	ISO 20344
Martindale abrasion (Revolutions), min.	—	—	dry 4 000 wet 2 000	—	ISO 12947-2
pH value, min.	4	—	—	—	ISO 4045
Fat content (% m/m), min.	3	—	—	—	ISO 4048
Total ash (%), max.	9	—	—	—	ISO 4047
Total water soluble (%), max.	6	1	2	1	ISO 4098
Shrinkage %, max.	5	—	5	—	ISO 7771
Light fastness (Blue wool standards), min.	4	4	4	4	ISO 105-B02

Table 3 — Chemical and physical requirements — Outsole material

Parameters	Materials and requirements										Test method
	Vulcanized rubber	PVC	PU	TPR	EVA/MCR	Leather	Resin rubber	Blown PU	Blown PVC	Other materials (including composite)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Hardness(IRHD)	60 - 85	50 – 85	45 – 90	45 – 80	30 – 55	-	85-98	30 – 55	50 - 60	40 – 90	ISO 6123-1
Specific gravity, max.	1.35	1.4	0.45-0.65	1.15	0.65	0.9	1.55	0.25-0.55	0.6-0.9	1.7	ISO 2781
Tensile strength (N/mm ²)	7	6	6	5	2	-	5.5	2	6	1.5	ISO 3376
Elongation at break %, min.											
a) Before ageing	300	250	200	400	80	-	120	80	100	60-120	ISO 3376
b) After ageing	110	-	500	-	-	-	110	-	-	-	
Flex resistance											
a) Initial crack (cycles), max.	50 000	30 000	50 000	30 000	25 000	50 000	5 000	25 000	25 000	25 000	ISO 5402-1/-2
b) Cut growth at 150 000 cycles (%), max.	600	600	600	600	800	-	500	800	800	800	
Compression set %, max.	25	25	25	25	50	25	25	35	35	25	ISO 5403-1/-2
Split tear strength (N), min.	10	7.5	7.5	10	7.5	-	7.5	6.0	6.0	6.0	ISO 3377-1/-2
Stitch tear strength (N/mm ²), min.	70	40	35	25	55	100	50	25	25	25	ISO 23910
Slip resistance (coefficient of friction), min.	0.5	0.5	0.5	0.5	0.5	-	0.5	0.5	0.5	0.5	ISO 20344
Abrasion loss (mm ³), max.	350	300	400	250	900	300	300	600	450	600	ISO 17076-1
Volatility (%), max.	-	2	-	-	-	-	-	-	2	-	ISO 4684
Lead Pb (ppm), max.	-	1	-	-	-	-	-	-	-	-	ISO 17072-1/-2
Total ash (%), max.	-	-	-	-	-	3	-	-	-	-	ISO 4047
Total water soluble (%), max.	-	-	-	-	-	21	-	-	-	-	ISO 4098
pH value, min.	-	-	-	-	-	4	-	-	-	-	ISO 4045
pH difference, max.	-	-	-	-	-	0.7	-	-	-	-	ISO 4045
Heat shrinkage (%), max.	4	4	4	4	4	4	4	4	4	4	ISO 3380
Degree of tannage, min.	-	-	-	-	-	60	-	-	-	-	ASTM D6020
Grain cracking on mandrel 3	-	-	-	-	-	No crack	-	-	-	-	ISO 3378
KEY											
EVA — Ethyl vinyl acetate, MCR — Micro cellular rubber, TPR — Thermoplastic rubber, PU — Polyurethane, PVC — Polyvinyl chloride											

Table 4 — Chemical and physical requirements — Heel and top piece material

Parameters	Materials and requirements						Test method
	Top piece			Heel			
	Rubber	Leather	PVC	Rubber	PVC	TPR	
Hardness (IRHD)	88–98	–	88–98	65–75	70–80	60 min	ISO 6123-1
Specific gravity, max.	1.55	0.9	1.45	1.4	1.3	1.1	ISO 2781
Tensile strength (N/mm ²)	6.0	—	17	15	10	7.0	ISO 3376
Elongation at break (%), min							
a) Before ageing	120	—	250	120	250	120	ISO 3376
b) After ageing	70–110	—	—	70–110	—	70–110	
Flex resistance							
Initial crack (cycles), max.	50 000	10 000	10 000	15 000	10 000	15 000	ISO 5402-1/-2
Compression set %, max.	20	20	20	20	20	30	ISO 5403-1/-2
Slip resistance (coefficient of friction), min.	0.5	0.5	0.5	0.5	0.5	0.5	ISO 20344
Abrasion loss (mm ³), max.	300	300	250	300	250	300	ISO 17076-1/-2
Volatility (%), max.	–	–	1	–	1	–	ISO 4684
Grain cracking on mandrel 3	–	No crack	–	–	–	–	ISO 3378
Total ash (%), max.	–	3	5	–	5	–	ISO 4047
Total water soluble (%), max.	–	21	–	–	–	–	ISO 4098
Degree of tannage (%), min.	–	60	–	–	–	–	ASTM D6020
Top piece-heel attachment, (N), min	150	150	150	150	150	150	ISO 19958

Table 5 — Physical requirements — Stiffener and toe puff

Parameters	Requirements		Test method
	Stiffener	Toe puff	
Hardness (IRHD), min.	70	50	ISO 6123-1
Flexibility (cycles), min.	50 000	50 000	ISO 5402-1/-2
Water absorption (%), min.	25	25	ISO 20344
Resilience (%), min.	35	35	Annex C
Thickness (mm)	1.0	0.6	ISO 2589

Table 6 — Chemical and physical requirements — Insoles and insock

Parameters	Requirements				Test method
	Insole		Sock		
	Leather board	Paper board	Leather	PVC/PU	
Thickness (mm), min.	1.5	1.5	1.0	0.8	ISO 2589
Water absorption (%), max.	35	35	–	–	ISO 20344
Desorption (%), max.	40	40			
Warp flexibility (cycles), min.	15 000	15 000	–	–	ISO 5402-1/-2
Shrinkage (%), max.	4	4	4	4	ISO 3380
Split tear strength (N/mm), min.	10	10	–	–	ISO 3377-1/-2
Insole/Insock adhesion (N/mm ²), min.	1.5	1.5	1.5	1.5	ISO 20344
Rub fastness (Grey scale), min.					ISO 11640
a) Wet	4	4	4	4	
b) Dry	4	4	4	4	
pH value, min	4	4	4	–	ISO 4045
pH difference, min.	0.7	0.7	0.7	–	ISO 4045
Water vapour permeability (mg/cm ² h), min.	0.8	0.8	1	–	ISO 20344
Coefficient of water vapour permeability g/cm ² , min.	30	30	30	30	ISO 20344

Table 7 — Physical requirements for the whole shoe assembly

Sl no	Parameters	Requirement		Test method
1	Sole Adhesion Strength, (N),minimum	Sole	Heel	ISO 20344
	a) Leather	140	250	
	b) PVC/PU	270	360	
	c) Rubber	140	230	
	d) EVA/MCR	110	200	
2	Seam strength (N/mm), min.	20		ISO 13935-1/-2
3	Water penetration			ISO 20344
	a) Water penetration after 80 min, max.	None		
	b) Mass change (%), max.	5		
4	Sole bond strength (N/mm), min.	4		ISO 20344
5	Finishes			ISO/TR 20572
	a) Buttons and trims attachment strength (N), min.	10		
	b) Buckle fastening strength (N), min.	110		
	c) Velcro attachment			
	1) Peel strength (N/cm), min.			
	i) Initial	2		
	ii) At 10 000 cycles	1		
	2) Shear strength (N/cm²), min.			
	i) Initial	10		
ii) At 10 000 cycles	5			
6	Shank			
	a) Accumulated impact strength (J), min.	40		ISO/TR 20883
	b) Bending modulus (N), min.	700		Annex B
	c) Resilience (%), min	80		Annex C

Annex A (normative)

Sampling and criteria for conformity

A.1 Scale of sampling

A.1.1 Samples shall be selected and examined for each lot separately for ascertaining the conformity of the footwear to the requirements of this standard.

A.1.2 Footwear shall be considered to be of different lots if they differ in shape and design.

A.1.3 The number of footwear pairs to be selected from any lot shall depend on the size of the lot and shall be in accordance with Columns 1 and 2 of Table A.1.

A.2 Method of selection

A.2.1 Footwear to be selected from the lot shall be chosen at random. To ensure randomness the procedure in A.2.2 shall be used.

A.2.2 When the footwear pairs in a lot are not packed in a number of cases (boxes), the sampling shall be as follows:

Starting from any footwear pair in the lot, count the pairs as 1, 2, etc. up to r and so on in one order. Every r^{th} pair thus counted shall be withdrawn to constitute a sample (r is the integral part of N/n where N is the lot size and n is the sample size). This procedure shall be stopped as soon as the required number of pairs is obtained.

For example if a sample of 125 pairs is to be selected from a lot of 3,000 pairs, compute r as equal to integral part of $3,000/125=24$. Starting from any pair, the footwear shall be counted in one order and every 24th pair shall be withdrawn.

A.2.3 When the footwear pairs in a lot are packed in different cases (boxes), a suitable number of boxes (not less than 30 % of the total boxes in the lot) shall be first chosen at random. For each of the boxes so chosen, an approximately equal number of pairs shall be picked up from its different parts so as to obtain the required number of pairs.

For example, if a lot consists of 1 000 pairs of footwear packed in 50 boxes, each containing 20 pairs, choose more than 15 boxes at random. If it is decided to open 20 boxes, then 4 pairs shall be picked up from different parts of each of the 20 boxes to give a total of 80 pairs as specified in Table A.1.

A.3 All randomly selected footwear pairs (Table A1, Column 2) shall be inspected for visually observed defects as follows.

- a) difference in shape, design and colour;
- b) odd pairing and incorrect size;
- c) distorted shapes;
- d) faulty jointing and adhesion of sole, heel, toe guard, toe cap and insole;
- e) insole cut short

- f) broken stitches and incorrect stitching;
- g) missing or defective eyelets/speed hooks or eyeleting/hooking;
- h) variations in positioning of eyelets/speed hooks;
- i) stiffener not centrally placed;
- j) unfit lace;
- k) finish not even and unpolished; and
- l) missing or defective buckles/buckling assembly.

Table A.1 — Scale of sampling and permissible number of defects

Number of footwear pairs in a lot	Samples for visually observed defects (pairs)	Permissible no. of defectives (pairs)	Sample size for laboratory testing (pairs)	Permissible no. of defectives (pairs)
(1)	(2)	(3)	(4)	(5)
Up to 50	13	0	2	0
51 to 100	20	1	3	0
101 to 300	32	1	3	0
301 to 500	50	2	5	1
501 to 1000	80	3	6	1
1001 to 3000	125	5	7	2
3001 and above	200	7	8	3

A.4 The number of defective footwear pairs shall not exceed the permissible number given in Table A.1, Column 3. If however, the number of defective pairs exceeds the permissible number of defectives, the lot shall be rejected.

A.5 In case the lot has been found satisfactory for visually observed defects, sample pairs for laboratory testing (Table A.1, Column 4) shall be taken from among those drawn (Table 1.A, Column 2). The pairs shall be chosen at random and tested for dimensional, physical and chemical characteristics.

If the number of defective footwear is less than or equal to the corresponding permissible number of defectives given in Table A.1, Column 5, the lot shall be declared to have met the requirements of this standard. Otherwise if the defective footwear pairs are more than the corresponding permissible numbers of defectives the lot shall be rejected.

Annex B (normative)

Bending modulus of steel shanks for footwear

B.1 Apparatus

B.1.1 A tensile testing machine, capable of moving at a uniform rate of traverse of 50 mm/min (Figure B.1)

B.1.2 A bridge, constructed of two parallel rods A and B, both of diameter of 10 mm. The axes of the two rods shall be 60 mm apart and held rigidly and horizontally in the tensile-strength testing machine. A third rod C (also of diameter of 10 mm) is also fixed in the moving cross-head of the machine such that the axis of the rod is parallel to the equidistant from the axes of the two moving rods that form the bridge.

B.2 Test specimen

The test specimen is five shanks from each batch to be tested.

B.3 Procedure

Place the shank specimen at the right angles across the two rods A and B of the bridge such that the fluting part of the shank is towards rod C (see Figure B.1).

Adjust the machine such that rod C is lowered until it just touches the surface of the shank. Set the machine in motion and record the force required to bend the shank a distance of 5.0 mm.

B.4 Results

Calculate the mean values the results from five shanks and report this as the bending modulus.

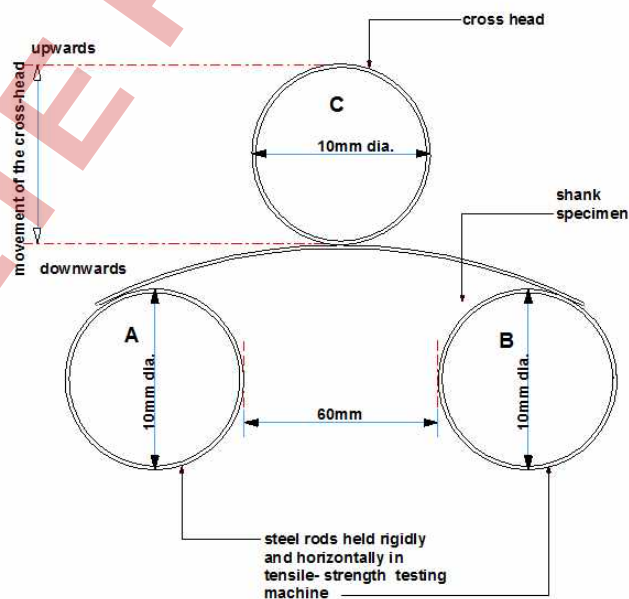


Figure B.1 — Clamping device for single pendulum ballistic tester

Annex C
(normative)

Resilience of steel shanks for footwear

C.1 Apparatus

C.1.1 A tensile-strength testing machine, equipped with a load cycling module, a chart recorded and a cross-head that is capable of moving at a uniform rate of traverse of 10mm/min in the compressed mode. The chart drive is set to follow upward and downward movement of the cross-head at a speed of 500mm/min (Figure C.1)

C.1.2 A bridge, constructed of two parallel rods A and B, both of diameter of 10 mm. The axes of the two rods shall be 60 mm apart and held rigidly and horizontally in the tensile-strength testing machine. A third rod C (also of diameter of 10 mm) is also fixed in the moving cross-head of the machine such that the axis of the rod is parallel to the equidistant from the axes of the two moving rods that form the bridge.

C.2 Test specimen

The test specimen is five shanks from each batch to be tested.

C.3 Procedure

C.3.1 Place the shank specimen to be tested across the two rods (of the bridge) A and B of the machine such that the fluting part of the shank is towards rod C (see Figure C.1)

C.3.2 Program the machine to perform a cycle as follows;

- a) To increase the compressive force on the shank under test and then;
- b) Immediately to reverse the direction of traverse at the same rate, to reduce the force to zero.

C.3.3 Set the machine to motion and allow it to perform a total of 10 cycles

C.4 Evaluation of results

C.4.1 Calculate the resilience as follows;

$$\text{Resilience, \%} = \frac{A - B}{A} \times 100$$

where,

A is the depression of the shank during the first cycle; and

B is the depression of the shank when the force is zero after the completion of 10 cycles.

C.4.2 Report the average of the results from five test specimens.

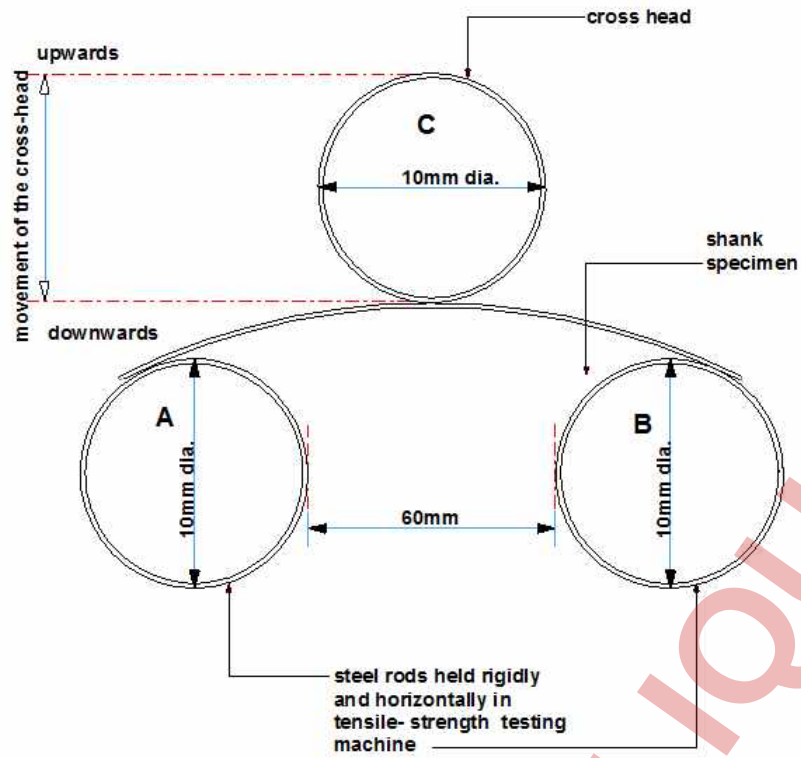


Figure C.1 — Clamping device for single pendulum ballistic tester

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