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Athletic Shoes

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Preface

Article 5.2 of this standard is mandatory while the rest are recommended.

Appendix A to this standard is a specification appendix.

This standard was proposed by the China Petroleum and Chemical Industry Association.

This standard is under the jurisdiction of the Rubber Footwear Technical Branch Committee of the National Rubber and Rubber Products Standardisation Technical Committee.

The main drafting units of this standard included Kunshan Entry-Exit Inspection and Quarantine Bureau of the People's Republic of China, Kunshan Duowei Sports Goods Ltd., the National Footwear Test Centre and China Sports Goods Federation.

The main drafters of this standard were Chen Qin, Sun Fengying, Tang Mingsheng, Wei Lin, Shen Jian, Tang Zhenhua, Zheng Zeyun, Zhang Xiaojing and Xu Honggang.

Athletic Shoes

1 Scope

This standard sets the related terms and definitions, requirements, test methods, inspection methods, markings, packaging, transportation and storage requirements for athletic shoes.

This standard applies to spiked shoes and non-spiked shoes used in athletic sports such as running, jumping, throwing and walking, etc.

2 Normative References

The provisions of the following documents become provisions of this Standard after being referenced. For dated reference documents, all later amendments (excluding corrigenda) and versions do not apply to this Standard; however, any parties that come to an agreement under this standard are encouraged to consider adopting the latest versions of these document. For undated reference documents, the latest versions apply to this Standard.

GB/T 191-2000	Packaging - Pictorial marking for handling of goods
GB/T 2912.1-1998	Textiles - Determination of formaldehyde - Part 1: Free and hydrolysed formaldehyde (water extraction method)
GB/T 3293.1-1998	Shoe sizes
GB/T 3903.1-1994	General test method for footwear - Test method of flexing resistance
GB/T 3920-1997	Textiles - Tests for colourfastness - Colourfastness to rubbing
GB/T 3922-1995	Textiles - Testing method for colourfastness to perspiration
GB/T 5713-1997	Textiles - Tests for colourfastness - Colourfastness to water
GB/T 7573 - 2002	Textiles - Determination of pH of the aqueous extract
GB/T 9867-1988	Rubber - Determination of abrasion resistance using a rotating cylindrical drum device
GB/T 17592 - 2006	Textiles - Determination of the banned azo colorants
GB 18401-2003	National general safety technical code for textile products
GB/T xxxx-xxxx	Footwear – Finished product test method – The upper and sole adhesion strength
HG/T 2489	Footwear - Determination of cellular material hardness
HG/T 2872 - 1997	Cellular material for rubber-plastics shoes - Determination of apparent density
HG/T 2876 - 1997	Cellular material for rubber-plastics shoes - Determination of compression deformation
HG/T 3780 - 2005	Test method of static slipping resistance for footwear
SN/T 1309.2 - 2003	Rules of footwear inspection - Rules for inspection of leather footwear

3 Terms and Definitions

The following terms and definitions apply to this standard.

3.1 Spike plate

A base on the sole used to fix the spikes in place.

3.2 Front plate

The front part of the sole used to fix the spike-plate in place and connect the spikes.

3.3 Spike bending strength

The force endured by the spike to its vertical axis.

4 Classification

4.1 Athletic shoes can be classified according to their product structure as either spiked athletic shoes or non-spiked athletic shoes.

4.2 Spiked athletic shoes include running shoes, high-jump shoes, long-jump shoes, triple-jump shoes, hurdle shoes and javelin shoes.

4.3 Non-spiked athletic shoes include marathon shoes, race walking shoes and throwing shoes.

5 Requirements**5.1 Shoe size**

Shoe size implementation should be carried out in accordance with GB/T 3293.1-1998.

5.2 Safety performance

The items and requirements for the safety performance inspection are outlined in Table 1.

Table 1 – Items and Requirements for Safety Performance Inspection

Item Inspected		Test Material	Requirements
Formaldehyde content		Textile material of outer and inner upper and insole	≤ 300 mg/kg
pH value		Textile material of outer and inner upper and insole	4.0 to 9.0
Colourfastness	to water (colour change, colour staining)	Textile material of outer and inner upper and insole	\geq Grade 3
	to perspiration (colour change, colour staining)	Textile material of outer and inner upper and insole	\geq Grade 3
	to rubbing	Textile material of outer and inner upper and insole	\geq Grade 3
Decomposable aromatic amine dye*		Textile material of outer and inner upper and insole	Banned
Abnormal odour		Textile material of outer and inner upper and insole	Nil
Spike bending strength		Spike, spike length < 7.5 mm	400N, no abnormal or slip-off spikes, no warping or cracking of spike plate
		Spike, spike length ≥ 7.5 mm	500N, no abnormal or slip-off spikes, no warping or cracking of spike plate

*Prohibited carcinogens from decomposed aromatic amine are listed in Appendix C of GB 18401-2003.

5.3 Physical performance

The items and requirements for the physical performance inspection are outlined in Table 2.

Table 2 – Items and Requirements for Physical Performance Inspection

Item Inspected	Requirements	
	Spiked athletic shoe	Non-spiked athletic shoe
Footwear flexing resistance*	50,000 times, no splits, no adhesion failure and no surface cracking	80,000 times, no splits, no adhesion failure and no surface cracking
Outer sole abrasion resistance	/	$\leq 130 \text{ mm}^3$
Outer sole slippery resistance	/	Marathon shoe and race walking shoe ≥ 0.70 ; Throwing shoe 0.55 to 0.75
Adhesion strength of upper and sole	$\geq 3.0 \text{ N/mm}$	$\geq 2.5 \text{ N/mm}$
Adhesion strength of outer sole and mid-sole	$\geq 2.0 \text{ N/mm}$, $\geq 1.5 \text{ N/mm}$ rip in cellular sole but without adhesion failure	
Cellular material hardness	50 to 75 degrees	40 to 55 degrees
Cellular material apparent density	$\leq 0.5 \text{ Mg/m}^3$	$\leq 0.4 \text{ Mg/m}^3$
Cellular material compression deformation	$\leq 15\%$	$\leq 20\%$
Footwear cold resistance	30,000 times, no splits, no adhesion failure and no surface cracking	
*No flexing resistance and cold resistance requirements for one-off use racing shoes		

6 Inspection Test Methods

- 6.1 Inspections for formaldehyde content should be carried out in accordance with the method stipulated in GB/T 2912.1-1998.
- 6.2 Inspections for pH values should be carried out in accordance with the method stipulated in GB/T 7573 – 2002.
- 6.3 Inspections for colourfastness to water should be carried out in accordance with the method stipulated in GB/T 5713-1997.
- 6.4 Inspections for colourfastness to perspiration should be carried out in accordance with the method stipulated in GB/T 3922-1995.
- 6.5 Inspections for colourfastness to rubbing should be carried out in accordance with the method stipulated in GB/T 3920-1997.
- 6.6 Inspections for prohibited carcinogens from decomposed aromatic amine should be carried out in accordance with the method stipulated in GB/T 17592 – 2006.
- 6.7 Inspections for abnormal odours should be carried out in accordance with the method stipulated in Article 6.7 of GB 18401-2003.

6.8 Spike bending strength test

- 6.8.1 For spikes of a length less than 7.5mm, spike bending strength should be tested according to the method stipulated in A.6.1 of Appendix A to this standard.
- 6.8.2 For spikes of a length longer than or equal to 7.5mm, spike bending strength should be tested according to the method stipulated in A.6.2 of Appendix A to this standard.

6.9 Shoe flexing resistance test

- With the exception of flexing angles of $60^{\circ} \pm 2^{\circ}$, shoes should be tested for flexing resistance in accordance with the rules stipulated in GB/T 3903.1-1994.
- 6.10 The outer sole abrasion resistance test should be carried out in accordance with the method stipulated in GB/T 9867-1988. The shape of the test sample should be cylindrical with a diameter of $16\text{mm} \pm 0.2\text{mm}$ and a minimum height of 6mm. If the thickness of the sample does not meet the requirement, a base sheet with a hardness of not less than 80 IRHD may be fastened to the outer sole test sheet so as to achieve the necessary thickness. The thickness of the outer sole test sheet should be no less than 2mm. A minimum of three samples are required.
- 6.11 The outer sole slipping resistance test should be carried out in accordance with the method stipulated in Article 8.2.1 of HG/T 3780—2005.
- 6.12 Upper and sole adhesion strength should be tested in accordance with the method stipulated in GB/T xxxx-xxxx.
- 6.13 Sole and mid-sole adhesion strength should be tested in accordance with the method stipulated in GB/T xxxx-xxxx.
- 6.14 The cellular material hardness test should be carried out in accordance with the method stipulated in HG/T 2489.
- 6.15 The apparent density test should be carried out in accordance with the method stipulated in HG/T 2872-1997.
- 6.16 The compression deformation test should be carried out in accordance with the method stipulated in HG/T 2876—1997.
- 6.17 The footwear cold resistance test
With the exception of ambient temperatures taken of $-20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and flexing angles changed to $60^{\circ} \pm 2^{\circ}$, the footwear cold resistance test should be carried out in accordance with the rules specified in Appendix B of SN 1309.2-2000.

7 Inspection rules

7.1 Finished product inspection

- 7.1.1 Rule for batches: no more than 20,000 pairs of the same model of footwear produced in the same basic production conditions within 1 to 15 days of each other may comprise an inspection batch.
- 7.1.2 Finished products that undergo inspection are inspected as regards their physical performance.
- 7.1.3 When conducting physical performance tests, the minimum number of samples necessary for the inspection should be taken from each inspection batch at random. If the first test result does not meet the requirements of this standard, twice the number of original samples should be taken from the same batch and the failed test should be repeated. If the above item still fails the test, this batch of footwear shall be considered as unqualified.

7.2 Model Inspection

- 7.2.1 Model inspections should be conducted under one of the following conditions:
- pilot production of a model; verification of a new or existing model transferred to another factory; after formal production in the case of major changes to a model's structure, materials or processes which could affect the its performance; follow-up of normal product once every 6 months; when resuming production after a long suspension of production; if the finished product inspection result is considerably different to the previous model inspection;

- defined by the clause in the contract;
- required by national quality supervision authorities.

7.2.2 Model inspection items: safety performance and physical performance

7.2.3 Take a minimum number of six pairs of shoes (or original supplementary material) at random in order to conduct the safety test inspection. If one item fails the test, this batch is considered as unqualified. If the first test results of the physical performance test do not meet the requirements of this standard, twice the number of original samples should be taken from the same batch and the failed test should be repeated. If the above item still fails the test, this batch of footwear shall be considered as unqualified.

8. Marks

8.1 Product Marks

Each shoe should be marked with the following:

- a) name of producer;
- b) shoe size;
- c) trade mark.

8.2 Packaging Marks

8.2.1 The inner packaging of the product should be marked with the following:

- a) product name;
- b) shoe size;
- c) main material's mark;
- d) trade mark;
- e) product colour indicator (with the exception of transparent packaging);
- f) producer's name, address and postcode;
- g) applicable standard numbers and names.

8.2.2 The outer packaging of the product should be marked with the following:

- 8.2.3 a) indication of the product's susceptibility to wetness and heat (implemented according to the stipulations of GB 191-2000);
- b) product name, colour or product number;
- c) shoe size;
- d) quantity;
- e) total weight;
- f) volume;
- g) manufacturing date;
- h) name and address of manufacturer.

9 Packaging

9.1 Inner packaging

The packaging of each pair of shoes shall be a cardboard box, paper bag or plastic bag.

9.2 Outer packaging

The outer packaging should be made of double-layered corrugated cardboard.

10 Transportation and Storage

10.1 During transportation, the product should be prevented from being squashed and kept away from rainwater. The product should be neither loaded nor

transported with any oil, acid or alkaline materials, or any volatile solvents or other corrosives, as these are strictly prohibited.

- 10.2 The footwear should be stored in a dry and well-ventilated store. Outdoor storage and exposure to direct sunlight are prohibited. The product should be stored at least 1 meter away from any source of heat and positioned at least 200mm from the ground and 200mm from the wall. Storing the product together with any oil, acid or alkaline materials, volatile solvents or other corrosives is strictly prohibited.
- 10.3 Storage time should not exceed 2 years. A sample inspection should be carried out once every six months, so as to check if any abnormalities are found with the product or its packaging.

Appendix A (specification appendix)

Spike Bending Strength – Test Method

A.1 Scope

This test method applies to the bending strength of spikes on athletic shoes.

A.2 Method

Place the shoe (or front plate) on its shoetree then secure it to the shoe spike bending strength test instrument. Apply a pushing force to the spike at a certain speed via a sensor device then observe any changes to the spike and spike plate.

A.3 Sample Preparation

A.3.1 Each sample group comprises three pairs of shoes (or front plates).

A.3.2 Mark the spike plate positions 1, 2, 3, 4, 5, 6 and 7 on each outer sole (or front plate) according to Figure A.1 and conduct the test on points 1, 2, 4 and 6. If the spike layout of the outer sole differs to Figure A.1, find 4 corresponding test points that correspond to the figure. This test does not apply to spikes located on the heel.

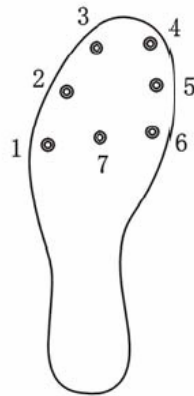


Figure A.1 – Shoe Spike Test Positions

A.4 Test environment: the test samples are placed for four hours at a temperature of $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ prior to conducting the test.

A.5 Test Equipment

A.5.1 Shoe spike bending strength test instrument with digital display, recorder and test head, range: 1000N, scaling: 1N, accuracy: $\leq \pm 1\%$.

A.6 Test procedure

A.6.1 Test procedure for spikes < 7.5mm

A.6.1.1 Firmly tie the sample-head down, near vertically to the corresponding shoetree.

A.6.1.2 Secure it to the fixing device of the shoe spike bending strength test instrument and adjust the clamp so as to make the axis of the spike vertical to the moving direction of the test head.

A.6.1.3 Adjust the claw so as to make the upper- and lower-clipping points 1mm from the spike plate's outer diameter, whilst pressing the outer sole tightly.

A.6.1.4 Adjust the moving block so as to position the test head exactly 10mm below the spike and make the outer edge of the test head 2mm parallel to the spike tip (see Figure 2 for pushing distance), and move the test head upwards at a speed of $5 \text{ mm/min} \pm 1 \text{ mm/min}$.

A.6.1.5 The value displayed on the recorder is the product's technical parameter. Stop the moving block's movement and release the drive. Observe the conditions of the spike and spike plate.

A.6.1.6 When the value displayed on the recorder is less than 400N, if any noticeable abnormalities are found on the spikes or if any spikes slip off, this test should be stopped.

A.6.2 Test procedure for spikes $\geq 7.5\text{mm}$

A.6.2.1 Firmly tie the sample head down, near vertically to the corresponding shoetree.

A.6.2.2 Secure it to the fixing device of the shoe spike bending strength test instrument and adjust the clamp so as to make the axis of the spike vertical to the moving direction of the test head.

A.6.2.3 Adjust the claw so as to make the upper- and lower-clipping points 1mm from the spike plate's outer diameter, whilst pressing the outer sole tightly.

A.6.2.4 Adjust the moving block so as to position the test head exactly 10mm below the spike and make the outer edge of the test head 4mm parallel to the spike tip (see Figure 2 for pushing distance), and move the test head upwards at a speed of $5\text{ mm/min} \pm 1\text{ mm/min}$.

A.6.2.5 The value displayed on the recorder is the product's technical parameter. Stop the moving block's movement and release the drive. Observe the conditions of the spike and spike plate.

A.6.2.6 When the value displayed on the recorder is less than 500N, if any noticeable abnormalities are found on the spikes or if any spikes slip off, this test should be stopped.

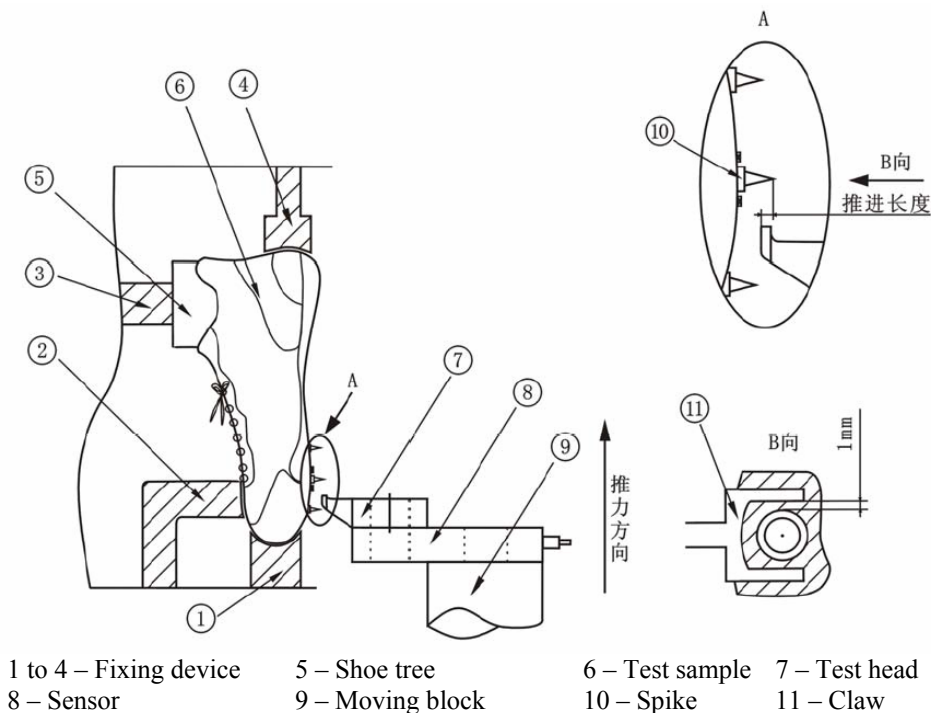


Figure A.2 – Illustration of Spike Bending Strength Test

A.7 Expression of Results

A.7.1 Unit of spike bending strength: N, significant digits to one digit.

A.7.2 The test results demonstrate the changing status, any spikes that slip off and spike plates at each spike position.

A.7.3 The lowest value at positions 1, 2, 4 and 6 shall be taken as the final result of the spike bending strength test.

A.8 Test report

The test report should include the following contents:

- names and code numbers of the applied standards;
- name of sample, specification and manufacturer;
- test method;
- test temperature;
- test result;
- test date;
- test personnel and others.