

Chemical Industry Standard of the People's Republic of China

HG/T 4906-2016

## Badminton shoes

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(English Translation)

(报批稿)

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## Foreword

SAC/TC35/SC9 is in charge of this English translation. In case of any doubt about the contents of English translation, the Chinese original shall be considered authoritative.

This standard is drafted in accordance with the rules given in the GB/T 1.1-2009.

This standard was proposed by China Petroleum and Chemical Industry Federation.

This standard was prepared by SAC/TC35/SC9 (Subcommittee on Rubber Shoes of China National Standardization Technical Committee on Rubber and rubber products).

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# Badminton shoes

## 1 Scope

This standard specifies requirements, test methods, inspection rules, marking, packaging, transportation and storage of badminton shoes.

This standard is applicable to badminton shoes used for professional competition and training.

## 2 Normative references

The following referenced documents are indispensable to the application of this document. For dated references, only the dated version is applicable to this document. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 251 Textiles - Tests for color fastness — Grey scale for assessing color staining

GB/T 2912.1-2009 Textiles - Determination of Formaldehyde - part 1: Free and hydrolyzed formaldehyde (water extraction method)

GB/T 2941 Rubber - General procedures for preparing and conditioning test pieces for physical test methods

GB/T 3293.1 Shoe size

GB/T 9867-2008 Rubber, vulcanized or thermoplastic - Determination of abrasion resistance using a rotating cylindrical drum device

GB/T 17592-2011 Textiles - Determination of the banned azo colorants

GB/T 20991-2007 Personal protective equipment--Test methods for footwear

GB/T 21396-2008 Footwear - Test method for whole shoe - Upper sole adhesion

GB/T 24129-2009 Testing method for the non-marking outsole of rubber shoes and sports shoes

GB 25038-2010 Rubber shoe health and safety specification

HG/T 2198 Vulcanized rubber – the general requirements for the physical test method

HG/T 2403-2007 Test rule, marking, packaging, transport, storage of rubber shoes

HG/T 2871-2008 Determination of flex resistance of whole rubber shoes

HG/T 3780-2005 Test method of static slip resistance for footwear

QB/T 2882-2007 Footwear - Test methods for uppers, linings and insock- Color fastness to rubbing

## 3 Requirements

### 3.1 Shoe size, shoe last size

Shoe size shall meet the requirements given in GB/T 3293.1. Shoe last size could be determined based upon the agreement between suppliers and buyers.

### 3.2 Appearance quality

Appearance quality shall meet the requirements given in table 1.

**Table 1 Appearance quality**

No.	Item	Requirement
1	Whole shoe	Upright and flat; flat insock; the corresponding parts of the same pair of shoe shall be basically same (excluding special design); clean inner & outer shoe; no missing bonding or delamination at the joint point of upper & sole (side-wall); no obviously visible defects.
2	Upper, lining and insock	No mixed yarn, skipping threads and obvious stains; no crack, coating peel-off or color-fading.
3	Outsole	Smooth surface; the corresponding parts of the same pair of shoe shall be basically same in pattern, color, hardness, thickness and side-wall inclination (excluding special design).
4	Decorative accessories	Firmly assembled, symmetrical (excluding special design); no significant appearance defects, no sharp points and sharp edges.

### 3.3 Physical properties

Physical properties shall meet the requirements given in table 2.

**Table 2 Physical properties**

Item	Requirement
Outsole abrasion resistance/mm <sup>3</sup>	≤130
Outsole slip resistance (static friction coefficient)	≥0.7
Outsole non-marking property/grade	≥4-5
Upper sole adhesion /(N/mm)	≥2.5
Whole shoe flex resistance	No upper cracks, total No. of outsole cracks less than 3 and max. crack length ≤5mm, upper sole delamination ≤5 mm
Whole shoe softness/N	≤23
Color fastness to rubbing of lining and insock/grade	Color staining ≥2-3

### 3.4 Health and safety properties

Health and safety properties shall meet the requirements given in table 3.

**Table 3 Health and safety properties**

Item	Requirement
Free formaldehyde existed in textile materials, artificial leather and synthetic leather used for upper, lining and insock/(mg/kg)	≤150
Decomposable aromatic amine dye existed in textile materials, artificial leather and synthetic leather used for upper, lining and insock <sup>a</sup> /(mg/kg)	≤30
<sup>a</sup> Annex A of GB 25038-2010 gives the list of carcinogenic aromatic amine which are forbidden to be decomposed from dyes under reducing condition.	

## 4 Test methods

#### 4.1 Test conditions

It shall follow HG/T 2198 and GB/T 2941.

#### 4.2 Appearance quality

Test shall be performed according to clause 3.1.3 of HG/T 2403-2007.

#### 4.3 Outsole abrasion resistance

Test shall be performed according to method A of GB/T 9867-2008, test is done on outsole force-bearing parts.

#### 4.4 Outsole slip resistance

Test shall be performed according to method 2 of HG/T 3780-2005.

#### 4.5 Outsole non-marking property

Test shall be performed according to GB/T 24129-2009.

#### 4.6 Upper sole adhesion

Test shall be performed according to GB/T 21396-2008.

#### 4.7 Whole shoe flex resistance

Test shall be performed according to method B of HG/T 2871-2008, flex 40000 cycles at flex angle of 50° and frequency of 100 cycles/min.

#### 4.8 Whole shoe softness

Test shall be performed according to 8.4.1.1 and 8.4.1.2 of GB/T 20991-2007, test procedure: clamp the forepart of the shoe to the rigid base using a solid block (corresponding to the forepart of the last) in such a way that the flex line AC is aligned with the hinge axis of the base plate (see 8.4.1.1 of GB/T 20991-2007), see Figure 54 of GB/T 20991-2007. The rear edge of the block should be positioned 10mm forward of the flex line (A-C as shown in Figure 55 of GB/T 20991-2007). Apply a force to the plane of the hinged plate at a distance of 315mm from the hinge center until the flex angle  $\alpha$  reaching to 45° (see Figure 56 of GB/T 20991-2007), record the applied force value, repeat 8 times every test, take the last three arithmetic mean value.

Note: when the front part of the shoe is fixed, the heel will not touch the plate.

#### 4.9 Color fastness to rubbing of lining and insock

Test shall be performed according to method A of QB/T 2882-2007. Use grey scale given in GB/T 251 to assess color staining after 50 cycles of wet rubbing with simulated perspiration solution.

#### 4.10 Free formaldehyde

Test shall be performed according to GB/T 2912.1-2009. Test upper, lining and insock separately if they are separatable. If upper and lining cannot be separated, test and assess them together by test method for lining.

#### 4.11 Decomposable aromatic amine dye

Test shall be performed according to GB/T 17592-2011. Test upper, lining and insock separately if they are separatable. If upper and lining cannot be separated, test and assess them together by test method for lining.

## 5 Inspection rules

### 5.1 Delivery inspection

#### 5.1.1 Lot

For products with same type, raw material, formula and production conditions, an inspection lot means 1 to 6 days outputs, and the maximum batch not exceeding 10,000 pairs.

#### 5.1.2 Inspection item and sample size

Products shall pass the inspection of appearance quality and physical properties before delivery. Appearance quality shall be performed on each pair of shoe, physical properties shall be performed on 3 pairs of shoes randomly sampled from each lot. Inspection items include all requirements given in table 1 and table 2 of this standard. Products can only be delivered after qualified from inspection and with a qualification label (or qualification mark).

### 5.2 Type inspection

#### 5.2.1 Circumstances requiring type inspection

Type inspection shall be performed in any of the following cases.

- a) When there are significant changes on product structure, technique and materials;
- b) When production is resumed after stop production for more than half year;
- c) When national quality supervision authorities require to do type inspection;
- d) Upon normal inspection, type inspection shall be performed at least every half year;
- e) When it is required in contracts.

#### 5.2.2 Inspection item and sample size

Type inspection items include all requirements given in this standard, randomly sample 3 pairs from each lot for inspection.

### 5.3 Qualification rules

The lot of products is determined as qualified if all required inspection items meet standard requirements. If there is one or more items failed to meet standard requirements, it is allowed to do double sampling and re-inspect failed items. The lot of products is determined as qualified if re-inspection results meet standard requirements, otherwise it is concluded as unqualified. The lot of products is determined as unqualified for health and safety property if any of free formaldehyde and decomposable aromatic amine dye does not meet standard requirements.

## 6 Marking, packaging, transportation and storage

Marking, packaging, transportation and storage shall meet the requirements given in HG/T 2403-2007.



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