



# SCIENTIFIC ANALYSIS OF THE REQUIREMENTS FOR SPECIAL SHOES FOR EQUESTRIAN SPORTS GAMES

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## ABSTRACT

*The article presents the requirements for shoes, development of a survey created for the purpose of studying the requirements for equestrian sports shoes, and the procedure for conducting them. The appearance and details of the special shoes for equestrian sports, the height of the heel part of the shoes, the analysis of the materials used for the upper part of shoes are described.*

## INTRODUCTION

The construction of shoes, the choice of materials for their manufacture depends to some extent on the structure of the foot and the state of its functioning. The shoe is worn in a dynamic environment unlike most leather footwear, the foot undergoes different movements when walking, running, and jumping at different amplitudes. When wearing shoes and walking, the heel, especially its front part, bends, hits the shoe. The heel releases sweat from itself (in the form of steam and in the form of a wet drop), which the shoe must expel. The functioning of the body is accompanied by the release of heat, which is partially transferred to the shoes and released into the environment through it. Normal functioning of the foot is possible when using shoes that are correctly selected in terms of size and fullness.

Requirements for footwear and materials for its manufacture depend on the climatic conditions in which it is worn. For regions with an average temperature of  $-20^{\circ}\text{C}$ , shoes designed for winter wear are characterized by closedness (boots, semi-boots), materials with low thermal conductivity are used (fur, porous rubber), thick details (first of all, soles) are used. Shoes worn for the summer season have an open construction (the top is made of straps) and they are made of thin fabrics.

Ergonomic properties are also called consumer properties of the product (or operational). This term refers to the operational characteristics of the product, which are determined by its weight, shape, structure and other properties. However, one should not forget the other consideration of the consumer value of the product - the presence of public needs, compatibility with the consumption structure, etc.

An item may have an excellent set of technical characteristics, but because it does not fit the fashion requirement, it may not be in demand, it may be abundant in the market, that is, it may lose its moral value.

These days it is very important to take into account the demand for the product, because the development of techniques and technology, the use of new materials slow

down the physical decay of the product, and the growth of the population and the improvement of material capabilities accelerate the moral decay. When designing a product and choosing fabrics for it, it is necessary to choose the optimal option. In this position, it is unreasonable to choose, for example, velour fabric, whose appearance deteriorates quickly, for the top, and polyurethane, which is resistant to warping, for the sole.

## MATERIALS AND METHODS

**Ergonomic indicators** include anthropometric, physiological, psychophysiological and hygienic. Anthropometric indicators describe the conformity of the product to the size and shape of the human body (shoes to feet, gloves to hands).

**Physiological and psychophysiological indicators** are assessed by matching the weight of an object to human strength, sensory and other capabilities (for example, shoes or a briefcase).

**Psychophysiological indicators** describe the arrangement of product elements according to human skills. For example, a bag zipper, a button on a glove, or an unusual position of a shoe zipper causes temporary difficulty when using the item.

**Indicators of hygienic properties** (heat conductivity, air, vapor and moisture permeability, etc.) are determined by the conformity of the product to the normal standards of human life. Among leather products, hygienic properties are more important for shoes and gloves, which should protect a person from the unpleasant effects of the surrounding environment (changes in temperature and humidity) and create conditions for normal functioning (must ensure the exchange of body temperature, moisture and air with the surrounding environment).

In recent years, when finding a solution to quantitatively supply the population with leather goods, the hygienic properties of fabrics have become an important criterion in the selection, as well as aesthetic properties.



Hygienic requirements for materials include the presence of a porous structure. Porous materials have low weight and thermal conductivity, and less raw materials are used for their production. Fabrics with a cross-linked pore structure (e.g. leather)

**Vapor, air and moisture permeable.** Non-porous materials (for example, porous rubber) do not swell, have good heat-insulating properties, but are not vapor-permeable. Materials for leather goods are hydrophilic and hydrophobic, in other words wettable and non-wettable. Hydrophilic materials have high water evaporation, moisture absorption and moisture repellency, while hydrophobic materials are water resistant. Hydrophilic materials (for example, leather) are used for the lining and pad for the shoe upper, which should evaporate the sweat released from the heel, and hydrophobic materials are used for the sole and heels and they should not swell in water. Many materials will have both properties. The leather surface layer for the shoe upper is hydrophobic because it is treated with polymer compositions, the main part of which is hydrophilic.

In order to ensure a normal microclimate inside shoes and gloves, first of all, the parameters of vapor permeability, moisture evaporation, moisture elasticity and moisture release should be high.

Under the influence of steam, moisture, heat, light, materials emit toxic mixtures of products or unbound components. They destroy the material, change its appearance, cause skin diseases in the wearer, therefore, materials for leather goods should have especially artificial, ecological properties, that is, different substances should be released in the amount specified in the normative document.

Several properties of the material are associated with ease of use and production technology. From the point of view of hygiene, the material should have the properties of expansion, compression and bending, should not hit the heel, should not compress the fingers when the size changes and when the configuration changes during operation.

At the same time, the materials should not change the shape given to the product during operation.

The materials have low stiffness depending on where they are used, meaning the heel and toe must be able to form.

**Mechanical requirements** determine the possibility of making a product from the given materials. Depending on the appearance of the details of the shoes, these requirements include properties such as deformability (flexibility or plasticity), resistance to tearing, 1-time or multiple bending, compression, seam breaking, adhesive absorption, paint and apprehension.

**Technological properties** are manifested during the manufacture of the product. These properties of materials depend on the nature of the manufacturing process. For example, depending on the structure and properties of materials, they are printed, pierced with a needle, glued, shaped, flowed in different ways. Changes in technology lead to changes in the requirements for materials. For example, in earlier leather goods, only natural leather was used and mechanical processing methods were used, so the main requirement was good cutting (cutting, punching) and good connection with nails and screws.

Currently, due to the wide use of synthetic and artificial materials (artificial leather, rubber, cardboard), easy forming when heated is important (casting, hot vulcanization), requirements such as welding and gluing in the field of high frequency current are imposed.

The technological requirements of the materials may differ from each other due to the fact that the processing methods for different parts are not the same.

**Technological requirements for materials** are imposed only in the sphere of production, consumers are not interested in these requirements. Their interest is to a certain extent embodied in these properties of materials in the sum of consumer properties of the product.

Great importance is attached to the economic indicators of the quality of materials. When choosing a material (in the given technology and equipment), it is necessary to predict the cost-effectiveness of its use, while weighing the cost of the fabric with its complex properties. For example, when preparing for the production, the following question is answered: should the part be cut from the rubber plate for the base, losing 30% of its area, or should the formed base be used, which does not require processing?

The details of leather goods require different materials with different character and characteristics. The same type of leather is used for the upper part of the shoe (per pair), and in some cases, two different types of materials are used in combination. When using chrome leather, the requirements for the details of the upper part of the shoe are different, taking into account its thickness, density and air permeability. The main part of the shoe is made from the leather part and the secondary detail is made from the edges.

The toe and the upper part are the parts that hold up the shoe, so aesthetic requirements are placed on the materials of these parts and they must be resistant to cracking.

When the outside air temperature is low, shoes mainly act as protection and transfer less heat from the body to the outside environment. The heat protection feature of the shoe is said to prevent the heat from the sole of the foot from escaping to the outside environment.

Heat protection properties of shoes are greatly influenced by the heat properties of the lining and insole materials. The construction of shoes with details made of porous materials will have high heat resistance. Therefore, it is possible to design shoes with the desired heat protection properties by choosing materials for the upper and sole details of the shoes. The heat protection properties of the shoes are greatly affected by the humidity of the shoes. Experiments (L.V. Kedrov) show that if the material absorbs 50-60 g of moisture from the air, the heat transfer resistance of shoes decreases by 33-43%. Thus, when designing shoes, it is necessary to choose constructions and materials that are suitable for the weather conditions and the season of the year, that prevent overheating in winter and overheating in summer.

When walking or running, the shoe bends many times. The number of bends reaches 3 million. As a result, the details of the shoes shrink and expand by 15-20%. This causes creases to appear on the shoe. The radius of folds can be from 1 to 10 mm, depending on the thickness of the material.



Requirements for footwear are divided into two groups: consumer and technical-economic. Consumer requirements are aimed at satisfying human needs, they include social, aesthetic, ergonomic and operational requirements.

**Social requirements** - determine the suitability of footwear to the needs of the population, the necessity of its production and sale.

**Functional requirements** - characterize the conformity of the footwear to the main function, psychological characteristics and appearance of the consumer. The main function of shoes is daily wear and a means of protecting the human heel from the effects of the external environment.

**Aesthetic requirements** - plays an important role in evaluating the quality of shoes and characterizes the decoration of the appearance of shoes, the compositional solution. Selected men's ankle boots are in line with the modern fashion trend, and its composite solution and decorative elements are suitable for everyday wear.

**Ergonomic requirements** - determine the characteristics of the shoe to create comfortable conditions for a person during wearing.

**Exploitative requirements** - during the use of shoes, i.e., during wearing, they determine whether their appearance will not change, they will not wear out quickly, and they will be able to serve for a certain period of time. The material of the set is soft and has a smooth texture, so it absorbs less dirt and dust.

**Technical-economic requirements** - characterize the technical improvement of the construction of shoes, the methods of its design and preparation, the costs of production.

**Technical-economic indicators** include unification and standardization indicators, technological convenience, economy indicators.

In the process of human movement, the foot is usually in various positions, and also its size and shape change. When determining the characteristics of shoes, it is necessary to take into account the specific characteristics of the foot as a supporting and movement organ. With the help of biomechanical analysis, it is possible to determine the reasonable shape of the inner surface of the shoe, the shape of the foot and the height of the heel, its stability, weight, flexibility, etc.

One of the most popular equestrian sports in Uzbekistan is the "Ko'pkari". Let's take a look at the requirements for footwear for the "Ko'pkari" equestrian sport. For this purpose, a survey was conducted among equestrian horse riders and amateurs.

## RESULTS AND DISCUSSION

As a result of the survey, the following was determined. In Uzbekistan, "Kopkari" equestrian sport is practiced from 12, 15 years old to adults. They buy special equestrian shoes from specialized stores or order them individually. For "Kopkari" horse sports, high-heeled shoes in the form of boots with natural leather uppers are preferred. The height of the boot covers the calf as well as the knee. The boots worn by typical horse riders have a widened upper part that wraps around the knee with a special detail to protect the knee.



The survey on the development of complex requirements for special shoes for "Ko'pkari" equestrian sport.

### 1. Your main measurements, cm

- A. Your heel size (size)
- B. Your height
- C. Your weight

### 2. Where do you usually get special shoes?

- A. From special stores
- B. from the online store



- C. to make an order from shoemaker
- 3. What kind of equestrian shoes do you prefer?**
- A. Half-length
  - B. Boots
  - C. Semi - boots
- 4. What is the most comfortable shoe height?**
- A. Must cover the ankle
  - B. Partially cover the calf
  - C. Cover the calf completely
  - D. Close the knee
- 5. What shape should the muzzle of shoe be?**
- A. Broad
  - B. Narrow
  - C. Average
- 6. What is the height of the heel?**
- A. High....mm
  - B. Average ....mm
  - C. Low....mm
- 7. What is the best fabric for equestrian shoes?**
- A. Natural leather
  - B. Artificial and synthetic leather
  - C. Mixed fabrics
- 8. Determine the sequence of the most important indicators for you when choosing horse sports shoes?**
- A. Quality of preparation
  - B. Upper fabric
  - C. Price
  - D. Design
- 9. What style of equestrian shoes do you prefer?**
- A. Classical style
  - B. Sports style
  - C. Elegant
  - D. Folklore
  - E. It does not matter
- 10. Which method do you prefer to attach upper details to lower details?**
- A. Using glue
  - B. Casting
  - C. Using nail
  - D. Using thread
- 11. How do you want the upper outer details to look?**
- A) Whole
  - B) Fragmented
  - C) Voluminous
  - D) Spatial

**Information about myself:**

- Full name ---
- Age -----
- My profession -----
- My information -----
- My connection to "Ko'pkari" equestrian sport:
  - Amateur
  - Horse rider

**CONCLUSION**

According to the results of the survey, 67% of "Ko'pkari" equestrians buy their shoes from specialized stores, 25% order from a shoemaker, and 8% go to online stores. All of the participants preferred that the footwear look like a boot, with 42% preferring to partially cover the calf and 58% preferring to cover the knee. 33% of the

participants defined the width of the muzzle as medium width, 67% of the participants defined it as narrow. 42% of riders consider the height of the heel to be high, and 58% consider the heel of average height to be acceptable. 78% of equestrians preferred natural leather as the fabric for the upper, while 75% of respondents chose natural leather and 25% rubber for the sole.



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