RESEARCH OF TYPES AND COMPOSITION OF ELECTRICAL INSULATING RUBBERS

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Abstract. The article studies the research of types and composition of electrical insulating rubbers intended for household services.

Keywords. Electrical insulation, rubber, product, electrical rubbers, rods, rubber, vulcanization, properties, gasoline, oil.

Introduction. It is known that rubber products are currently widely used as electrical insulating materials. They are used to produce rods, gloves, mats, and electrical insulating products (Figure 1).

Figure 1. Rubber electrical insulation products.

Electrical rubbers include electrically insulating and electrically conductive rubbers. Electrical insulating rubbers used for insulating conductors of wires and cables, for special gloves and shoes are made exclusively on the basis of non-polar TK, SKB, SKS, SKT rubbers and butyl rubber.

Methods. Rubber materials are a complex mixture of various components, the main of which is the vulcanization product of rubber. Properties of rubber materials:

- high elasticity in a wide temperature range;
- good vibration resistance;
- increased chemical resistance;
- good dielectric properties.

Disadvantages of rubber materials:

• low resistance to gasoline and oil;

• relatively low heat and cold resistance;

• tendency to age under the influence of heat, oxygen and light;

• contains free sulfur, which is released over time and causes corrosion of metals in contact with rubber.

The main components of rubber are rubber, vulcanizing agents, vulcanization accelerators, fillers, antioxidants, plasticizers, processing and dyes.

Rubber is the basis of rubber compounds and determines the main physical, chemical and mechanical properties of the rubber.

Vulcanization is a physicochemical process of interaction of rubber with a vulcanizing agent, as a result of which the properties of rubber change: it loses its plasticity, becomes elastic, and its durability and resistance to chemicals increase. The most important vulcanizing agent is sulfur.

In mixtures containing only sulfur, the vulcanization process proceeds slowly. To reduce the time, chemicals called vulcanization accelerators (altax, captax, thiuram) are introduced.

Fillers - powder materials: active (carbon black, kaolin, zinc white) - increase strength and wear resistance; inactive (chalk, talc) - to reduce the cost of rubber.

Softeners - substances designed to facilitate the mixing of rubber with powdered components and make rubber soft (vaseline oil, paraffin, stearin, rosin).

Antioxidants are used to protect rubber products from aging (aromatic amines and diamines).

Regenerators - a product of recycling old rubber products, replaces rubber and is cheaper. Dyes are used to color rubber (titanium oxide, red lead, ultramarine).

Result. Electrical rubbers include electrically insulating and electrically conductive rubbers. Electrical insulating rubbers used to isolate conductors of

wires and cables, for special gloves and shoes are made exclusively on the basis of non-polar rubbers TK, SKB SKS, SKT and butyl rubber.

Table 1

Main types of rubber and characteristics of rubber

Rubber types	Rubber type	Density, g/cm^3	Tensile strength, MPa	Relative density, %	Elongation at break, %	Operating temperature range, ^{0}C
Normal (general)	Natural (NK)	0,91	29	650	32	-50 to +130
	Butadiene synthetic (SKB)	0,91	17	470	60	-50 to +150
	Isoprene synthetic (SKI)	0,91	30	700	28	-50 to +130

Conclusion: When choosing electrical insulating rubber materials, it is advisable to choose mainly based on the type of rubber.

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