

**DESIGN AND RESEARCH OF BITUMINOUS COMPOSITIONS MODIFIED  
BY RUBBER BRITTLE WASTE**

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In recent years, due to the increase in traffic intensity and the number of vehicles on the road and the lack of quality of road binders, the road surface is rapidly deteriorating, so the funds allocated by the state are mainly spent on road maintenance. One of the effective ways to improve the performance properties of pavements is the modification of bitumen with polymer additives that have the ability to expand the temperature range of their work, improve durability and crack resistance. Unlike expensive polymer thermoelastoplastic modifiers, rubber crumb, which is a product of the process of processing worn-out tires, has a lower cost, which allows you to create an economical way to modify road binders. The expediency of this application can be explained not only by the possibility of reusing the specific properties (primarily – elasticity) of rubbers that are part of the rubber, but also the desire to dispose of large enough waste from recycling used tires. But today there is virtually no research on the use of rubber crumb waste to improve the complex of physico-chemical and operational characteristics of road bitumen. Thus, the accumulated scientific and industrial experience so far shows the advantages of asphalt concrete on polymer-modified bitumens compared to conventional asphalt concrete in terms of: strength and, in particular, shear strength; brittleness and crack resistance temperatures (with the appropriate polymer content); stability in the aquatic environment and, finally, durability of asphalt-polymer concrete coverings. At the same time, the provision of these advantages requires the complication of technological preparation of binders, which leads to more expensive binder due to the high cost of polymers.

The aim of the research is to create a bituminous-rubber composition with an increased complex of thermo-physical and physico-mechanical characteristics.

Preparation of modified bitumen compositions was performed by compounding human crumb and rubber powder with bitumen in mass ratios of 40:60, 30:70, 20:80, respectively, with stirring in a mixing vessel to obtain a homogeneous mass. When the temperature of this mixture reached 180 °C, evenly introduced into it a functional filler of taurite, in the amount of 5 % mass. of rubber used, and further mixing of the mixture at the same temperature for 1 hour to obtain a homogeneous composition.

Analysis of the experimental results showed that the studied quality indicators of the samples of compositions, which include waste rubber powder have an increased complex, both thermo-physical and physico-mechanical characteristics. This is obviously due to the fact that as a result of thermal destruction of rubber powder, the swelling process is faster compared to rubber crumbs with a size of 2.5–4.5 mm. However, the process of destruction and dispersion in both cases is, of course, not complete, and in the volume of swollen rubber particles are resins and polyaromatic components that affect the values of both thermo-physical and physico-mechanical characteristics.

Thus, it is established that the optimal composition for creating effective bituminous-rubber compositions with an increased complex of thermo-physical and physico-mechanical characteristics – 40 % by weight of rubber powder and 5 % mass. taurite. Thus developed a new bitumen-rubber composition in which significantly improved basic physical and mechanical properties and which can be recommended for use in construction.