ON THE EXPEDIENCY OF USING POLYMERIC SUBSTANCES IN THE CONSTRUCTION OF ROAD SURFACES

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ANNOTATION

The article discusses the above analysis of the feasibility of using polymers in the construction of road surfaces, shows the disadvantages of using bitumen, their negative impact on the environment.

Key words:: bitumen, polymer materials, components, asphalt concrete, road surfaces, adhesion, road construction, ecological system, polymer chips, highways, rubber, plastic.

INTRODUCTION

One of the most pressing problems in road construction today is obtaining a high-quality and durable road surface. The most effective solution to this problem is the transition to new technologies and materials. At present, in the Republic, the main component in the construction of roads is bitumen, which is used in asphalt concrete pavement. This universal binder has a low cost, therefore it is a popular and most versatile material for use as a binder in the construction of road surfaces. Now up to 90% of the commercial bitumen produced in the world is consumed by the road industry. But ordinary bitumen is not suitable for roads. Experiencing significant loads. Therefore, the quality of bitumen is increased by regulating its characteristics with the help of modifying additives. Among the new materials used as a coating, asphalt concrete, prepared on the basis of polymer-bitumen binders, is recognized as the best all over the world. In foreign countries, despite the high cost of polymers, the use of bitumen modifiers in road construction has long been considered economically justified. Improving the adhesion of bitumen to improve the quality of asphalt concrete as a whole - adhesion to the wheels of vehicles fatigue properties - this is what can be achieved when modifying bitumen with polymer materials. [2] The most commonly used bitumen additives in road construction are elastomers and thermoplastics. Elastomers are understood to be polymers with highly elastic properties in the range of exploitation. Elastomers used as modifiers include mainly synthetic rubbers of various physical forms (powder, granules, liquid). Rubber is used to modify both bitumen and asphalt concrete mixture. Elastomers are classified into styrene copolymers and rubbers. In turn, rubbers used for modifying road bitumen are classified into:

-butadiene rubbers;

- bituphin-washing rubbers;

- ethyl propylene.

MATERIAL AND METHODS

The introduction of rubber materials into bitumen leads to an increase in the elasticity of the road binder, which in turn reduces the formation of stones on the road surface. However, it does not increase the softening point. [5] Any construction needs modern materials and technologies, because they allow not only to make it cheaper, but also to make the structure stronger and more stable. A striking example that proves that new technologies work is (European roads) and they rarely have repair work. It's all about the use of polymeric materials in construction. Moreover, it is customary there to put not only a perforated geogrid under the canvas, but also add a large number of different components to the self-covering. At the same time, polymer materials began to be used even in the 70s, and the roads themselves were built taking into account the future growth of the load on them. During the construction of roads [7], it was not taken into account that the number of cars grows sharply every year. Today, millions of cars passing along the road destroy it over and over again. The fact

is that bitumen, which is the basis of asphalt concrete for road surfaces, is a rather fragile material in itself. It costs less, and 90% (percent) of all world production is consumed by road construction. In our country, you will not surprise anyone with a temperature of -40 -50, and yet this is exactly the temperature at which bitumen softens and decomposes and turns into a liquid state. Polymers added to road bitumen have a higher melting point than bitumen. [1] This also works in the opposite direction - ordinary bitumen melts at a temperature of about +60, and polymers at a temperature of + 80 or higher. Among other things, polymeric materials have become popular in road construction also because they have excellent resistance to deformation - whatever it is. In addition to adding special binders to asphalt concrete, special roll materials such as films, nets and perforated gratings are also used. The former are used for waterproofing roads - the roadway must be protected from moisture from below, from the ground. Also, the films are very elastic, so they will not tear even with a heavy load on the road. Such a film is glued using bituminous mastics. And before laying the top layers of asphalt concrete, it is advisable to use a reinforcing basalt mesh, which will strengthen the road surface. [5] This product is optimally placed at a depth of about seven centimeters and is perfect for the construction of runways, federal highways and other roads, which are often used by heavy vehicles. The road surface will deteriorate less thanks to the mesh, and the cost of repairing it will be significantly reduced, because it will have to be done much less often. Perforated geogrid is recommended to be used where the soil is often washed out by water, and not only in the road, but also in the construction of houses and fortifications of slopes. Since the material is perforated, water flows smoothly through it, which provides excellent drainage. In order for our roads to begin to resemble European ones, we need to seriously address the issue of introducing modern technologies and materials in construction. [1] The use of binding polymers, good quality films, nets and perforated geogrids, as well as conscientious work will allow our roads to approach the quality of European roads. Meanwhile, asphalt concrete pavements have a number of disadvantages typical for non-rigid road pavements, including the dependence of their physical, mechanical and deformation properties on the temperature of the outside air, which makes it necessary to introduce seasonal restrictions for the movement of vehicles with an increased axial load, a decrease in the carrying capacity of a static load to 10 with dynamic, which causes plastic deformation of the material in urban conditions, especially in the areas in front of intersections, as well as increased cracking in a sharply continental climate, characterized by a significant daily temperature drop. Therefore, the quality of bitumen is increased by regulating its characteristics with the help of modifying additives.

Polymer coatings are also more resistant to temperature fluctuations. This is also important in our country, where the temperature regime ranges from +40 to -6. Coatings of this type, even in high temperature conditions, keep the crushed stone in the roadbed and prevent it from collapsing, and when the temperature rises, it does not melt. Polymer coatings can also be repaired. Each highway is a strip of considerable length alienated from the natural environment. [2] The construction of a highway can significantly change the surrounding landscape and ecological system. The changes lead to an invasion of the world of animals and birds. They can destroy the habitats of the animal world. Technological processes during the construction of roads that have an impact on the environment also include the following activities:

- erection of a roadbed - movement of soil, arrangement of underlying layers, laying of a finishing road surface;
- production of building materials for road construction purposes.

The use of plastic when creating road surfaces is one of the most promising directions in road construction. Partial replacement of bitumen with recycled plastic will solve the problem of environmental pollution and improve the practical characteristics of the road surface. Even the addition of 10% polymer to the asphalt mix

improves the performance of the road surface. [7] The service life of roads created on the basis of this material is doubled. The main advantage of using plastic waste to create and add to the road surface is to improve the environmental situation in large cities. The great potential for the consumption of plastics by road companies is the sustainable and constant disposal of waste. Among the advantages of a road surface with plastic:

Externally, the pavement does not differ from traditional asphalt concrete. Asphalt roads based on plastic bottles and other waste will improve the ecology of the environment. [2]

Among the disadvantages of the coating are:

production requires a large volume of plastic waste - a separate waste disposal system is needed

Road pavements based on polymeric materials and recycled plastic waste are one of the most promising directions in the development of road construction. [3] The use of innovative materials will help reduce the cost of laying and maintaining highways, as well as rid cities of plastic waste. Despite the fact that the estimated service life of asphalt pavement pavements is 10-20 years, the physical service life often does not exceed 3-9 years. This indicates the need for additional research and development aimed at increasing the service life. The introduction of polymer crumbs into asphalt concrete improves the quality of building materials based on it.

CONCLUSION

1. Bitumen modified with polymer chips in a two-stage process has a higher adhesion quality compared to the original bitumen, regardless of the origin of the rock, which is due to increased mechanical and adsorption adhesion.

2. Particles of polymer chips impart increased thermal stability to the elasticity of modified bitumen by means of the smallest protuberances on the surface of the particles.

3. Asphalt concrete based on bitumen modified with polymer chips in a two-stage technological process has a high water resistance with long-term water saturation, a large coefficient of adhesion in comparison with bitumen-based asphalt concrete.

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