The problem of using waste from the production and use of polymer articles is a pressing one [1]. One way to use the grinding products of worn tyres is to create different elastomer materials [2]. The main problem when ground vulcanisate is introduced into an elastomer matrix is the creation of strong bonds at the rubber-vulcanisate particle interface. Many researchers have developed methods for solving this problem. It is well known that, in the surface treatment of ground vulcanisate with surfactants, including surfactants of an oligomer or polymer nature, additional grinding of the vulcanisate and reduction in its surface energy are possible [3]. This leads to an increase in the degree of interaction of the treated ground vulcanisate with the elastomer matrix, and there is also a considerable improvement in its distribution in the rubber mixes, especially with increase in the ground vulcanisate concentration.

The present authors [4, 5] showed the expediency of using for the surface treatment of ground vulcanisate different fatty acid esters (FAEs) obtained on the basis of products of vegetable and animal origin, in particular different oils such as sunflower, corn, rapeseed, soybean, and others, and also lard.

The task of this work was to examine the technological features of the process of surface treatment of general tyre ground vulcanisate on mill equipment. Use was made of ground vulcanisate with a particle size of ≤ 0.8 and ≤ 5 mm.

Treatment of the ground vulcanisate was conducted by the following methods:

- preliminary mixing of the ground vulcanisate with FAEs at temperatures of 25 ± 5°C, holding of the obtained composite for a certain time, and subsequent introduction into the composition of rubber mixes;
- preliminary mixing of the ground vulcanisate with FAEs at temperatures of 25 ± 5°C, holding of the obtained composite for a certain time, its treatment on mill equipment, and subsequent introduction into the composition of rubber mixes;
- treatment of the ground vulcanisate on mill equipment in the presence of FAEs and the subsequent introduction of the treated ground vulcanisate into the composition of rubber mixes.

The optimum parameters of the production process for each method of surface treatment of the ground vulcanisate were determined.

As a result of the conducted study it was established that the preliminary treatment with fatty acid esters of coarsely disperse vulcanisate is ineffective without additional milling, although it ensures a certain increase in the physicomechanical properties of elastomer composites containing it. However, the treatment on mill equipment of ground vulcanisate of the same type after its preliminary holding is more effective than the treatment of ground vulcanisate on mill equipment without preliminary mixing of the components. This is probably due to more complete penetration of the FAEs into the surface layer of the particles of ground vulcanisate in the case of preliminary mixing and holding on account of the good compatibility of the components. For finely disperse ground vulcanisate, no marked difference in effectiveness with the different treatment methods was found. However, taking into account the costs of
milling, we believe preliminary holding of the ground vulcanisate in FAEs and the subsequent introduction of the given system into rubber mixes to be economically more expedient.

Thus, an examination has been made of technological features of using fatty acid esters obtained on the basis of products of vegetable and animal origin for the surface treatment of ground vulcanisate, which make it possible both to control the properties of the obtained composites and to select the method of treatment with account taken of available equipment and energy consumption.

REFERENCES

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