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Effect of functional ingredients on the physico-mechanical and operational properties of rubber mixtures for sealing elements

© **Ivan S. Spiridonov**, **Nikolay F. Ushmarin**, **Sergei I. Sandalov**, **Evgeny N. Egorov**, and **Nikolay I. Koltsov***[+]
Department of Fhysical Chemistry and Macromolecular Compounds. Chuvash State University of I.N. Ulyanov. Moskovsky ave., 15. Cheboksary, 428015. Chuvash Republic. Russia.
Phone: +7 (8352) 45-24-68. E-mail: koltsovni@mail.ru

*Supervising author; [+]Corresponding author

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Abstract

Two rubber mixtures based on a combination of hydrogenated nitrile butadiene caoutchoucs (HNBC) and butadiene-nitrile caoutchoucs (BNC) with a hardness of 80±5 and 90±5 Shor A units are investigated in the article. The influence of nature of HNBC and the content of acrylonitrile in BNK, various functional ingredients (agents and co-agents of vulcanization, antioxidants, technological additives and fibrous fillers) on the physicomechanical and operational properties of rubber mixtures was studied. To evaluate the physico-mechanical properties, tensile strength, elongation at break, hardness, rebound elasticity, tear resistance and relative residual deformation after compression were determined. To assess the performance properties of rubbers, changes in the relative elongation at break and mass after the daily aging of vulcanizates in a standard liquid SZHR-1 and a mixture of isooctane + toluene were determined. It is shown that rubber mixtures containing HNBC mark ZN 35056 and butadiene-nitrile rubber with a minimum amount of acrylonitrile have better physico-mechanical and operational properties. Vulcanizates of both rubber compounds with a hardness of 80±5 and 90±5 units Shore A based on caoutchoucs *ZN 35056* and BNKS-18AMN at a ratio of 90:10 containing a vulcanizing agent Perkadox BC-FF, a co-agent for vulcanization of triallycyanurate, a triple combination of amine, phenolic antioxidants and nickel dibutyl dithiocarbamate and the technological additive Zincolet BB-222 are characterized by elevated physico-mechanical and operational properties. Rubber mixture with a hardness of 90±5 units Shore A also contains aramid fiber. The investigated rubber mixtures can be used for manufacturing thermo-aggressive resistant sealing elements of packer-anchoring equipment used in the oil and gas industry.

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