

Influence of technological additive TsD-12 on the properties of heat-aggressive resistant rubber for sealing elements

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Keywords: technological additive, thermo-aggressive persistent rubber, physical and mechanical properties, sealing elements, sealing ability.

Abstract

The article presents the results of a study of the effect of the technological active additive CD-12, which is a combination of zinc salts of fatty acids, on the physical and mechanical properties and resistance to aggressive media of rubber for sealing elements of packer-anchor equipment. The rubber mixture was prepared on the basis of hydrogenated nitrile-butadiene rubber Therban 3406, vulcanizing agent Novoperox BP-40, coagents for vulcanization of zinc monomethacrylate and oligoester acrylates MGF-9 and TGM-3, antioxidants Naugard 445 and agidol-2, fillers of technical carbon P 514 and T 900, filler dispersant stearic acid, rosin softener and other ingredients. To stabilize the physical and mechanical properties of vulcanizates, uniform dispersion of rubber components, reduce viscosity and improve vulcanization properties, a technological additive CD-12 was also introduced into the rubber mixture. The rubber mixture was prepared in a laboratory SKI-3L rubber mixer at a temperature not exceeding 70 °C for 7 min. The resulting mixture was vulcanized on a PV-100-2RT-2-PCD vulcanization press at a temperature of 150 °C for 60 minutes and then further vulcanized in a thermostat at a temperature of 160 °C for 6 hours. For the obtained vulcanizates, the physical and mechanical properties and resistance to the action of aggressive media were determined according to the standards existing in the rubber industry. On the basis of a rubber mixture heat-aggressive persistent sealing elements with a hardness of 70±5 Shore A units were made. These sealing elements as part of two sets of packer-anchor equipment were tested for tightness in a casing string simulator. The tests were carried out in an environment of PMS-200 polymethylsiloxane fluid at a temperature of 150 °C, an axial load of 6 tons and a pressure of 70 MPa. It is shown that both sets of packers have passed the tests and meet the requirements. The developed rubber mixture with a hardness of 70±5 Shore A units, containing the process additive CD-12, can be used for the manufacture of sealing elements for packers used in the oil and gas industry.

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