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Effect of functional ingredients on the tightness of rubber thermo-aging resistant sealing elements

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Abstract

The article presents the results of the investigation of the sealing ability of thermo-aggressive resistant elements (TARE) from two rubbers with different hardnesses of 75±5 and 90±5 units Shore A, designed for packer and anchor equipment. These rubbers are made on the basis of caoutchouc ZN 35056 and contain in certain quantities functional ingredients. Packers – sets of three TAREs of different hardness in the test stand (casing pipe simulator) were tested to evaluate the sealing properties. The two extreme TARE s had a hardness of 90±5 units. Shore A, and TARE in the middle – 75±5 units Shore A. According to the requirements of normative and technical documentation (NTD), the tests were carried out in a medium of polymethylsiloxane liquid PMS-200 at a temperature of 150 °C, an axial load of 6 tons and a pressure of 70 MPa. The test was considered positive while maintaining the tightness of the packer for 15 minutes and meeting the requirements of the geometric dimensions of the breaks on the TARE, which is in contact with the expanding petals of the packer. It is shown that the TAREs from both rubbers based on caoutchouc ZN 35056, the vulcanizing agent Perkadox BC-FF, the co-agents of the vulcanization of maleete F, triallylcuanurate and oligoether acrylate, the triple combination of amine, phenolic antioxidants and nickel dibutyldithiocarbamate, as well as the Zincolet BB-222 technological additive, provide a hermetic separation intervals of the casing string. TARE on the basis of these rubbers in appearance, geometric dimensions, as well as dimensions of breaks at the extreme TARE after the tests at the stand meet the requirements. The developed rubber can be used for the manufacture of TAREs in the packer-anchor equipment used in the oil and gas industry.

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