

GAS INCLUSIONS IN DRILLING CEMENTS

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This report is the result of experiments which had place in August-September 2005 at the laboratory of drilling cements, “RINKO ALJANS” Ltd. The aims of the research were to test the new technology of aluminum rings installing on a casing string, to find the interaction between aluminum rings and physical properties of a cement stone and to evaluate the role of gas inclusions in oil well cement.

Two laboratory installations were made: the models of a vertical well and of an angled one. It was allowed to create and maintain excess pressure inside. The five models were cemented and analyzed.

First of all we detected the gas channels trough all the length of the model. They had an elongate form in the vertical direction. The mean diameter of channels was 5 mm, the mean length – 150 mm. All the gas channels started at aluminum rings where we’d also found the traces of chemical reaction (bubbles and white substance).

We supplied the possible reaction of aluminum-cement interaction with hydrogen effervescence. The byproduct of the reaction is white insoluble substance, calcium hydroaluminates.

The cement stones from all the models had been tested we’ve done several conclusions. The advantages of the technology are:

- the element of casing string has a tight chemical contact with a cement stone;
- water from cement slurry is bounded trough the reaction into an insoluble substance.

But we may also notice the obvious disadvantages like the crumbly, porous and permeable structure of the stone opposite the rings, intrareservoir communications (crossflows between beds) caused by elongate gas channels.

Thus the technology of aluminum rings installing provides many advantages taking into account several disadvantages mostly depending on pressure and temperature in the well bore.

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