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Full-Service Package for Glass Reinforced Epoxy Casing: Cementing with Light-weight Systems and Perforating employing Acid-soluble Abrasives

Ideal für glasfaserverstärkte Kunststoffrohre: Zementieren mit Leichtsystemen und Perforieren mit säurelöslichem Abrasivmaterial

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In geothermal wells, the use of glass reinforced epoxy (GRE) casing has increased significantly during the last decade. Corrosion resistance, even under harsh borehole conditions is this material's main advantage when compared to steel. Reduced thermal conductivity resulting in less heat losses of thermal water to the formation and extremely smooth inner-pipe surfaces leading to an optimized flow profile are further characteristics which are ideal for geothermal projects. However, the reduced collapse resistance in contrast to steel tubular demands specially customized cement slurries.

The first part of this paper introduces a blast furnace slag cement-based, light-weight system specially adapted to such tubular via extensive lab testing. For the first field trial in a geothermal well, we cemented 7" GRE tubulars in old corroded 9 ⅝" carbon steel casings. The premium quality of the first application and hence the supreme adhesion efficiency of the new system onto GRE surfaces was verified by cement bond logging.

Abrasive perforating methods use high-volume flow of solid-laden fluid to erode through the target pipe employing shaped nozzles to focus the stream. Here, sand is the most commonly used abrasive. However, without appropriate countermeasures after perforation, this material may also damage downhole equipment (e.g., ESPs in geothermal wells) during flowback and testing.

The second part of this paper describes equipment and procedure for successful yard testing at our facilities. Here, we perforated GRE casing employing innovative abrasive particles which are easily removable trough acid treatment. In preparation, the acid-solubility of solids and fluid-compatibility of GRE material was confirmed via lab experiments.

Lab, yard, and field results impressively manifest the light-weight, blast furnace slag cement-based system presented here as an alternative to commonly used API Class G slurries. In combination with the perforation employing acid-soluble abrasive solids instead of sand, we can offer a full-service package specially customized for GRE materials.