

Engineered Placement of a Sealing Material for Refrac, Casing Perforations, Breaches and Leaks

Dhruwal Bhimani and Dr. Qiang Wang

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Abstract

Legacy wells with depleted reservoirs, failed casing, or undesirable open perforations present significant operational challenges for operators seeking to extend asset life or achieve regulatory compliance. This paper introduces InfuSeal, a water-based crosslinked gel system developed to address these challenges through engineered placement in vertical and horizontal wellbores. Pumped as a liquid at surface, InfuSeal transitions to a solid downhole, infiltrating fine fracture pathways and forming a durable seal resistant to formation water and acid. Laboratory testing validated the system's performance across temperatures from 85°F to 350°F and demonstrated sustained 5,000 psi differential pressure integrity over 35 days of cyclic loading and approximately five months at elevated temperature. Swelling characterization at 200°F confirmed consistent volumetric expansion, reaching a stable plateau within four hours. Three field case studies are presented: sealing legacy perforations on a depleted vertical well in Beaver County, OK; resolving annular casing leakage on a horizontal well in the Permian Basin; and an MIT1 compliance job in Kern County, CA under high-temperature steam flood conditions. Results demonstrate InfuSeal's versatility as a minimally invasive, drill-out-capable sealant compatible with existing refrac workflows, offering operators a practical solution for well integrity restoration across a wide range of downhole environments.