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钻井工程

早强低密度水泥浆体系提高低压易漏井固井质量

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摘要：

川西南部地区储层段地层压力系数低，采用常规密度水泥浆固井作业时易产生漏失，造成储层伤害，降低油气井产能，且固井质量难以保证，影响后期井筒完整性。为此，采用颗粒级配技术，利用不同密度不同粒径微硅（2.16 g/cm^3、0.1 μm）、漂珠（0.7 g/cm^3、45～300 μm）等外掺剂与水泥进行复配，研制了一套密度介于1.25～1.40 g/cm^{3}的早强低密度漂珠水泥浆体系。该水泥浆体沉降稳定性良好，上、下密度差小于0.03 g/cm^3，稠化时间可调，稠化过渡时间最长15 min，最短5 min，失水小于50 mL，48 h抗压强度大于10 MPa，有效地保障了低压气井的平衡压力固井作业，加入复合纤维的早强低密度漂珠水泥浆增加了水泥石的塑性，从而提高了低压易漏失产层段的固井质量。

关键词： 早强低密度水泥浆 漂珠 颗粒级配 低压 易漏 固井质量

A early strength and low density cement slurry system used to improve cementing in low pressure thief zones

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Abstract:

Due to the low formation pressure coefficient in the south of West Sichuan Basin, the regular density cement slurry will easily lead to lost circulation, resulting in formation damage and thus reducing well productivity and even having bad effect on the wellbore integrity. So grading of grains is performed, micro silicons (ρ2.16 g/cm^3 and 0.1μm) and beads (ρ0.7 g/cm^3 and 45~300 μm) with different densities and sizes are mixed with cement to prepare a low density and early strength cement slurry system. This system has a high settling stability, the density difference between the top and the bottom is less than 0.03 g/cm^3, and its thickening time can be adjusted between 5 and 15 minutes. And its water loss is less than 50 mL, its 48 h compression strength is over 10 MPa, providing guarantee for balanced pressure cementing in low pressure gas wells. The composite fibers added in the early strength and low density bead cement slurry can improve the plasticity of cement stones and ensure the cementing quality in low pressure thief zones.

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