

Solid Expandable Tubulars

Engineered cementing solutions for complex environments

APPLICATIONS

- Setting casing
- Complex drilling environments, including deep, high-temperature, or high-pressure wells

BENEFITS

- Less use of several casing sizes, saving time and money

FEATURES

- Slurry density range of 10 to 20 lbm/galUS [1,200 to 2,400 kg/m³]
- Temperatures up to 392 degF [200 degC]
- Static gel strength (SGS) less than 200 lbf/100 ft² [95.76 Pa]
- Free fluid value of 0 mL
- API fluid loss less than 50 mL/30 min
- Applicability for a wide range of cement densities
- Very low gel strength for the job duration, ensuring least resistance to expansion
- Quick compressive strength (CS) development once the system starts to set
- Thickening time (TT) designed for flexibility



Schlumberger has successfully cemented SET in locations around the world.

Today's complex drilling environment is deeper, hotter, and more prone to formation pressure uncertainties than ever before. Drilling contingencies—such as loss or high-pressure zones—may result in setting casing higher than planned and eventually using all casing sizes before the target depth is reached. Solid expandable tubulars (SETs), a proven alternative in this environment, can reach TDs with large, acceptable openhole sizes.

Successfully cementing an SET requires an appropriate cement slurry system. Schlumberger offers a wide portfolio of slurries that meet the stringent criteria and have been used by operators around the world. The

Schlumberger design process includes thorough slurry testing during the design phase and recommendations for proper hole cleaning and conditioning of drilling fluids. These measures are essential to prepare the zone for cementing.

ENGINEERED CEMENT SYSTEMS

After extensive laboratory testing and successful field applications of SET cementing, recommended robust cement systems include

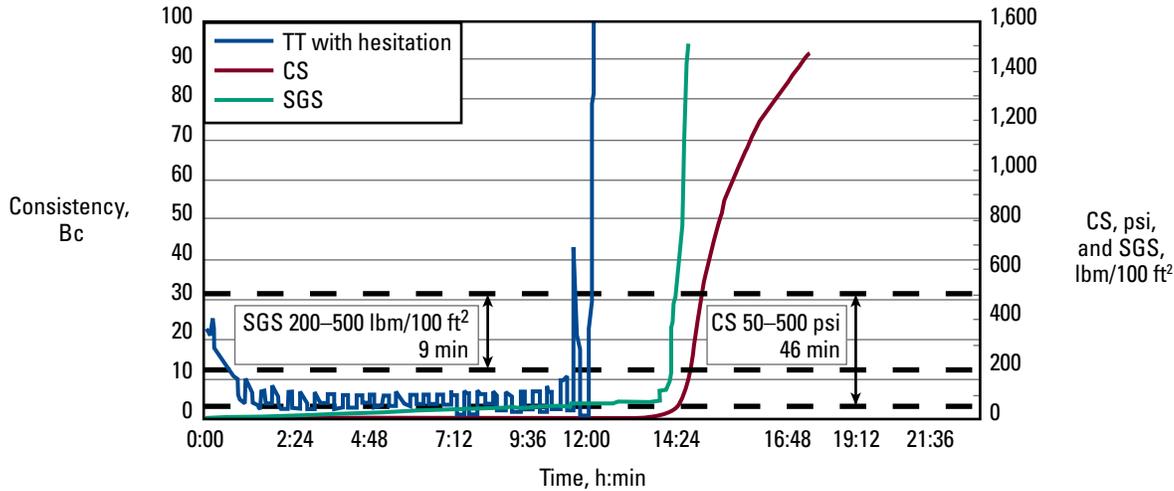
- UNIFLAC* slurry systems
- GASBLOK* family of slurries for gas migration control.

For all systems, the transition time from 50- to 500-psi [0.34- to 3.44-MPa] CS is short, yet not compromised by the long TT for the slurries. Schlumberger has performed successful cementing of SET world-wide using GASBLOK and UNIFLAC slurries.

Additionally, these systems exhibit zero free water and low fluid loss values (<50 mL/30 min).

In areas where cement flexibility is a special concern, FlexSTONE* flexible cement systems—which maintain cement sheath integrity in a dynamic stress environment—are used.

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Looking at pump time evaluation and SGS measurements shows cement slurry systems to have a long TT and very low SGS values for the job duration.

CEMENT SYSTEM REQUIREMENTS

It is important for an SET cementing system to have a TT that allows slurry placement and SET expansion. A hesitation technique is used for TT measurements. The technique replicates both dynamic and static conditions in which the cement is either moving while expansion is taking place or is static when a pipe is being disconnected.

Equally important is to keep SGS at less than 200 lbf/100 ft² [95.76 Pa]—as recommended by the SET manufacturer—for the entire duration of the job, including slurry placement and SET expansion. If the SGS becomes too high, there may be problems during extrusion because of too much resistance behind the pipe. The cement will be too viscous, resulting in either a stuck expansion cone, a fractured formation, or both.

Additionally, while the SET is expanding, the expanded end of the casing is repeatedly exposed to pressure fluctuations. There is a greater chance of a microannulus if gel strength development is not controlled. Having successfully applied this process many times in the field, Schlumberger has proven that SET cementing can be as effective as conventional cementing.

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