

FlexSTONE advanced flexible cement technology

Lifelong zone isolation for dynamic wellbore environments



Density range:

1,560 to 2,400 kg/m³
[13 to 20 lbm/galUS]



Temperature range:

4 to 150 degC
[40 to 302 degF]

Applications

- Wells with large variations in mud weight during drilling, potential microannulus development, or planned postplacement pressure and temperature variations
- Gas and oil wells or injector wells
- Fracture stimulation candidates
- Plug and abandonment candidates

How it improves wells

FlexSTONE* advanced flexible cement technology extends the lifetime of wells that undergo fluctuations in pressure and temperature, reducing the incidence of costly workovers and remedial intervention by virtue of superior mechanical properties.

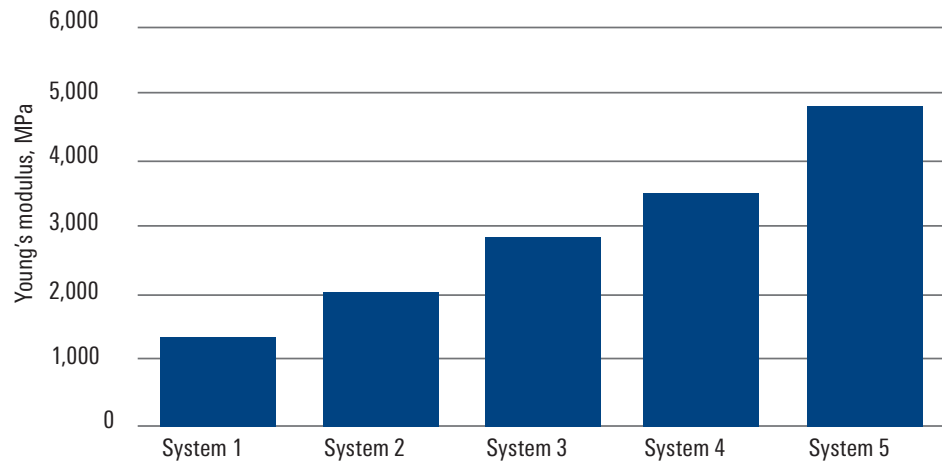
The technology improves production isolation by ensuring effective hydraulic sealing across low fracture gradients and improves long-term isolation and casing protection in corrosive environments. It also delivers a robust and long-term seal and barrier in high-temperature plug and abandonment scenarios.

How it works

FlexSTONE technology uses the optimized particle-packing concept from the field-proven CemCRETE* concrete-based cementing technology.

Long-term hydraulic isolation throughout a well's life cycle requires more than just a focus on compressive strength. Changes in downhole conditions can lead to mechanical damage of set cement behind the casing, either because of direct mechanical failure of the system or the creation of microannuli. Fluctuations in wellbore pressure and temperature from operations such as pressure or drawdown tests, stimulation treatments, or formation loading can all adversely affect the cement sheath. The combination of lower Young's modulus and higher tensile strength provides better resistance to failure caused by changing stresses.

Tailored Young's Modulus to Well Conditions



Engineered Young's modulus for a FlexSTONE system indicating the tailored flexibility achievable with special design considerations. As an illustration of the system versatility, all the systems shown are designed with the same density and solids volume fraction.

CemSTRESS* cement sheath stress analysis software models well integrity performance under changing well conditions, determining the optimal tailored Young's modulus to suit the formation and the pressure and temperature changes. With this information, FlexSTONE technology's Young's modulus can be customized so that the cement does not fail under the predicted level of stress.

The flexibility of FlexSTONE technology plays a critical role in the degree of expansion that can be obtained. FlexSTONE technology can readily achieve up to 2% linear expansion without matrix damage, a challenging goal with other cement systems.

What it replaces

Rigid conventional cement barriers can develop cracks and microannuli when exposed to pressure or temperature changes or other stresses, enabling formation and other wellbore fluids to potentially migrate between zones or even to surface.

Why it's ideal for plug and abandonment applications

Engineered with flexibility and enhanced sealing capability in mind, FlexSTONE technology boasts intrinsically low permeability that provides long-term resistance to aggressive wellbore fluids that may leach into an abandoned wellbore over time. Also, with superior expansion and flexible properties, it prevents potential leakage of fluids at the casing or openhole interface.