



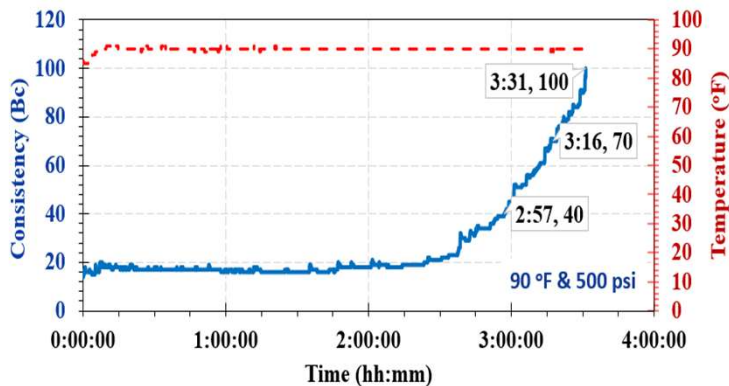
Case Study: Offshore Surface Casing Vent Stopped Using TSN-23 to Class H Cement – 16.2 ppg

TS-Nano, in partnership with Offshore Technical Solutions (OTS), a leading service company in the Gulf of America, **demonstrated the effectiveness of TSN-23 nano-modified polymer/Class H cement slurry in eliminating surface casing vent flow in offshore wells.**

The work took place in the annulus of **9 5/8-in inner casing and 13 3/8-in outer casing**, with a **bottomhole temperature of 90°F** and a buildup casing pressure of **110 psi/hour**. **123 gallons of TSN-23 were mixed with 120 ft³ of Class H (16.2 ppg) cement slurry and squeezed through at 3000 ft depth.** The TSN-23/Class H cement slurry was effectively pumped **to create a 300 ft plug** in the annulus above the inflatable packers in a section milled window. **A pressure of 1000 psi was applied** from the surface and maintained for 18 hours. The consistency curve for the TSN-23/Class H cement, performed prior to the field work, is shown below. **It is noted that no other additives are used with the slurry except TSN-23.**



After 18 hours, a **1000 psi test** was conducted through the 9 5/8” casing, followed by the 13-3/8” casing. **Both tests confirmed that the TSN-23/Class H cement slurry effectively sealed the well and eliminated the casing vent. No gas flow was observed after testing. Using TSN-23 alone, there was no necessity for additional cement additives or repeat cement squeeze jobs. This approach significantly reduced costs for the operator and facilitated a smooth abandonment process.**





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Performance Specification (32°C/90°F)

Characteristic*	TSN-23 + Class-H Blend
Density	16.2 ppg
Maximum dial reading (API RP 10B-2)	170
Fluid loss (API RP 10B-2)	33 ml
Thickening time (Controllable)	2:57 HR:MN
Gelation (transition) time from 40-70 BCs	19 minutes
Compressive strength (24 HR)	3,164 psi / 21.8 MPa
Shear bond strength with steel casing (24 HR)	571 psi / 3.9 MPa
Shrinkage strain (24 HR)	0.00
Free Fluid	0.00

*** No other additives are used with the cement slurry except TSN-23**

TS-Nano, specially formulated and patented nano-modified polymer (TSN-23), is used to modify all types of oil well cements, including **Class A, C, G, H, and slurries, including fly ash and silica flour blends, and was tested successfully for downhole temperatures 10-200 °C.** Performance specifications of the TSN-23/Class H – 16.2 ppg cement slurry are presented in the side Table.

The above case study represents the first well in an abandonment campaign for several offshore wells, where surface casing vent flow is **eliminated using a combined TSN-23/Class H cement slurry and inflatable packers deployed by OTS.**

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