QC/QA for Deepwater NeoFlex Operations

Deepwater NeoFlex Dump Bailer Cement kits are specially designed cement systems for varying depths and unique extended run time applications for deepwater projects.

Availability

- 17 ppg, 5-gallon Batch Kits for bailing operations
- Dump Bailer Cement Kits are custom made after required testing (QC/QA) is completed

QC/QA Process

- Well data collected from customer
- NeoFlex mixed on surface at NeoProducts' Cement Testing Lab per customer's run-in-hole times and bottom hole temperatures
- Dumpability tests completed at 4, 5, 6, 7 + hours of run-in-hole time, based on customer needs
- Curing times determined at 24+ hours for tagging and pressure testing capabilities

Unique Physical Attributes

- Ultra-low Permeability
- Flexible
- Post–Cure Expansion
- High Shear Bond
- Self-Healing
- Extended Run-in-Hole Times for Deepwater Operations

NeoFlex has unique physical properties that enhance fracture toughness, elasticity, and bonding to casing and formations, reducing the occurrence of micro-cracking and gas migration.

NeoFlex is used to Block Gas Migration and the Occurrence of Sustained Casing Pressure (SCP)

NeoProducts & HPI cement systems have been run in 100,000+ wells over the last 33 yrs.

NeoFlex plugs, anchors, seals, heals and re-heals over a lifetime of well production & abandonment.

See Next Page for a Sample Test Report and Sample Mixing Instructions on a Specially Designed Deepwater NeoFlex Cement System
(test reports included with all customer testing for specific deepwater projects)

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Sample Test Report and Mixing Instructions

The following test was completed specifically for _____ with a downhole temperature of ___°F.

The well parameters and RIH times provided to NeoProducts are as follows:

- Water depth - ____'
- Plug depth - ____'
- Est. BHT - ____°F
- Est. BHP - ____
- Fluid - ____ ppg ____

- Time spent at surface after cement slurry has been mixed: _____ min
- Open well run to water Depth: _____ min
- Open Downhole valve if necessary: N/A
- Run in hole with Wt. checks: _____ min
- On bottom tying in: _____ min
- Ready to fire 3 x's: 5 min
- Total time : _____ min
- Time to POOH: _____ min

The below steps were completed to analyze the Special Designed Extended Run Time NeoFlex for _____:

- NeoFlex mixed per below mixing instructions (page 3)
- NeoFlex samples placed outside at ambient temperature (~70°F) for 30 minutes
- NeoFlex samples placed in an ice bath (~40°F) for 30 minutes
- NeoFlex samples placed in an oil bath (~100°F) for 40 minutes to simulate the slow temperature ramp from 40°F when approaching _____°F
- Oil bath temperature increased to _____°F to continue simulation of the slow temperature ramp to _____°F over ____ minutes **(see Figure #1 for plot of Temperature vs Time)**
- NeoFlex samples continued to soak at _____°F for a minimum of _____ minutes

EXAMPLE of RESULTS:

- NeoFlex sample #1 tested at this time for dumpability. Results showed NeoFlex sample #1 as a smooth flowing cement slurry with no issues exiting the sample vessel.
- NeoFlex sample #2 soaked at 175°F for an additional hour. Results also showed NeoFlex sample #2 as a smooth flowing cement slurry with no issues exiting the sample vessel. Although this sample flowed well out of the sample, there was visible evidence of the sample being slightly thicker than sample #1. This shows that the sample is slowly thickening, as needed for the test parameters.
- NeoFlex sample #3 soaked at 175°F for 19-20 hours. Results shows NeoFlex sample #3 as a hard cement sample that can be tagged with no problems.
- NeoFlex sample #4 soaked at 175°F for 27-28 hours. Results showed NSS sample #4 as a fully set, cured sample able to be tested.
- Customer will be able to successfully dump the NeoFlex within the estimated timeframe needed for the _____ project (NeoFlex dumped within 3 hours of passing below the mudline). In addition, customer should have no problems tagging the NeoFlex at 18-20 hours after the last bailer run and pressure testing the NeoFlex at 28 hours after the last bailer run.)

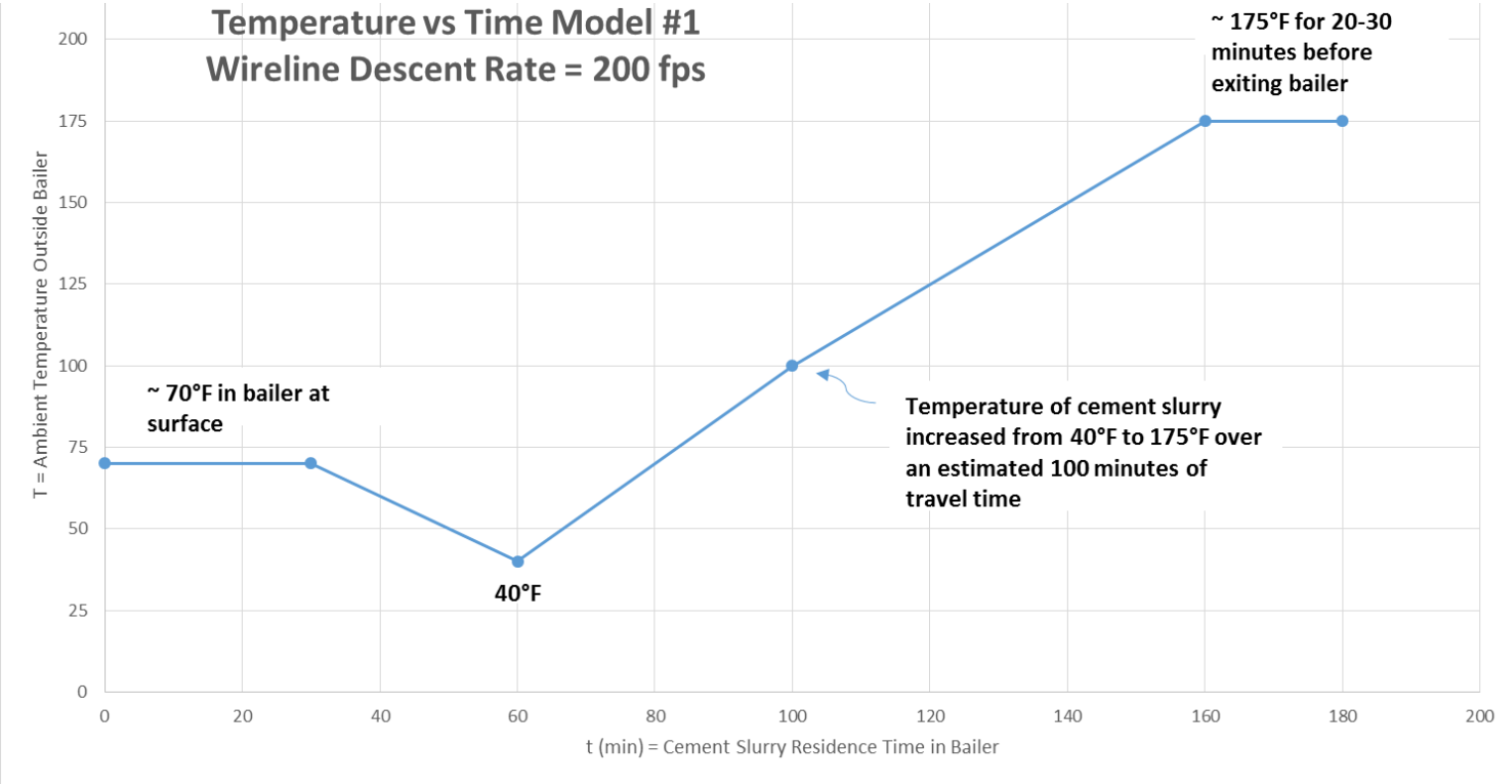

Figure #1: _____ Test of Temperature vs Time

SAMPLE Mixing Instructions

Use this Special Kit for _____ ONLY
(not to be used with any other project)

P/N 0104-350-017___

Salt Saturated NeoFlex

Each Kit yields 5 gallons of 17 ppg Salt Saturated NeoFlex

Noteworthy Information

- Please store in a climate controlled room with a temperature range of 60°F (16°C) to 100°F (32°C). Kits must not be stored outdoors in direct sunlight. All downhole cement slurries must be mixed at temperatures above 60°F.
- Flush dump bailers with fresh water between runs to eliminate deleterious residues in the bailers from previous runs.
- NeoProducts is your best Technical Resource for thru-tubing plug-back support. Do not hesitate to contact NeoProducts.

Mixing Instructions

1. Open the NeoSuperSlurry® Mix Water Kit, P/N 0105-000-000.
2. Pour the water into the provided empty 6-1/2 gallon pail. This will allow for easier mixing of the cement slurry.
3. Place a NeoSlurry Mixing Unit, P/N 0100-999-001, in the water. Adjust the mixing paddle speed to a moderate stirring rate. Avoid splashing water out of the pail.
4. Open the NeoFlex Dry Blend Kit, P/N 0104-350-017___, and retrieve the plastic bag in the pail that contains mixing instructions and admix bags.
5. Retrieve the one (1) admix #1 package, Suspension Agent Additive #1, Surfactant Agent Additive #2, and a 2 oz bottle containing a surfactant/shear bond enhancer.
6. Pour the contents of the 2 oz. bottle, Suspension Agent Additive #1, and Surfactant Agent Additive #2 to the water.
7. Pour the contents of the Admix #1 bag to the water. Mix the water/admix blend for 2 minutes. This admix bag #1 is being used for _____ only. The downhole temperature must be 175°F (+/- 5°F)

   Note: If the admix package that you are adding has clumps in the package, please break up the clumps through the bag with your hands before adding to the pail in order to ensure thorough mixing.

8. Slowly pour the contents of the gray dry blend kit into the water/admix mixture in the 6-½ gal pail. Maintain a moderate to high mixing speed for the mixing paddle. Avoid splashing slurry out of the mixing pail. Mix the slurry for 20 minutes.
9. Slowly pour the NaCl salt into the slurry **after** the slurry has been mixed in step #8. Mix for an additional 10 minutes.
10. Remove the mixing unit. Pour the slurry into the empty 6-½ gal gray pail. The slurry should pour evenly and smoothly. Inspect the mixing pail. There should not be any cement clumps in the pail.
11. Allow the slurry to sit still and de-air for 5 minutes.
12. 5 gallons of 17 ppg salt saturated cement slurry is now ready for service. Fill the bailer with slurry.
13. The slurry should be placed at depth within 3 hours of passing below the mudline.

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