



P-LFS

CEMENTING SERVICE BULLETIN

1/10/22

P-LFS (PETROCHEM – LAMINAR FLOW SPACER)

TECHNICAL DATA

P-LFS is a water based Laminar/Plug flow spacer fluid designed for use at bottom-hole temperatures below <250°F for spacer fluids used ahead of a cement slurry. The spacer separates the cement slurry from the drilling fluid and is designed to be compatible with both the slurry and the water/oil-based drilling fluid. The ~concentration range of P-LFS is between 0.1% -1.5% by weight of spacer and for the liquid version - P-LFSL use ~0.1 – ~3.5 gallons per barrel of spacer and for higher temperatures <450°F - use - P-LFS2 at ~2% - ~6% by weight of spacer ranging from 12PPG to 20 PPG respectfully.

P-LFS can be used in fresh water or salt/seawater spacers up to 37% salt BWOW. When P-LFS is pre-hydrated in salt water systems, the salt must be added after the complete hydration of the P-LFS. After hydration, add the weighting agent and/or loss circulation material if needed. Ideally, the spacer is designed to be of a higher density and viscosity than the drilling mud. The spacer is pumped in Laminar/Plug flow displacing the drilling fluid.

P-LFS is compatible with most water based muds. However, compatibility tests with the mud and cement are strongly recommended prior to the job. If the P-LFS is to be used with *oil base mud*, the addition of P-NSL2 (Petrochem non-ionic surfactant) is required at a concentration between one (1) to two (2) gallons per barrel of spacer, to render the spacer compatible with the oil base mud. A minimum of 500 feet of annular fill or 10 barrels of spacer, whichever is greater is recommended. A good guideline to use is 2 barrels per foot of depth. Increased temperature will thin the spacer fluid but will not cause the gel structure to break subsequently the system will continue to support solids at recommended temperatures. When weighting up the spacer use a course grind material to avoid excess viscosity, but at densities above 18 PPG consider using Hematite or a mixture of Barite and Ilmenite. The mixing equipment used for pre-hydrating must be clean, in particular, from mud contamination. Use P-DFL (Petrochem De-Foaming/Antifoam Liquid). If salt is to be used, it must be added after the complete hydration of the P-LFS. Do not pre-hydrate the P-LFS for more than a few hours before the job, otherwise a bactericide may be required.

FIELD MIXING PROCEDURES:

Mix the P-LFS thoroughly - especially in sea/salt water to complete the additive hydration. The sequence of the addition of the additives should be the same as that used in the laboratory.
The data given is to be used only as a guide. Subsequently, each job is to be designed and tested in the laboratory prior to the job.



PROPERTIES

| <u>PRODUCT</u> | <u>FORM</u> | <u>SP.GR.</u> | <u>PACKAGING</u> |
|----------------|--------------|---------------|------------------|
| P-LFS | WHITE POWDER | 2.53 | 50 LB. SACKS |
| P-LFS2 | WHITE POWDER | 2.53 | 50 LB. SACKS |
| P-LFSL | TAN LIQUID | 1.05 | 55 GALLON DRUMS |
| P-DFL | WHITE LIQUID | 1.00 | 55 GALLON DRUMS |
| P-NSL2 | CLEAR LIQUID | 1.06 | 55 GALLON DRUMS |

SAFETY

Please consult all SDS before using any and all materials.

The recommended spacer volume should be 500 ft. of annular fill (i.e., 12.5 - 9.625 annulus) is 31 bbl. Since this is less than the recommended minimum value of 60 bbl., use 60 bbl. as the required spacer volume.

For offshore operations, when mixing in the slug pit, the mud hopper can be used provided that lines and equipment have been cleaned.

To check if hydration of the spacer concentrate is complete, the viscosity of the P-LFS base fluid can be measured (either with a FANN viscometer or with a Marsh funnel) and compared with the viscosity of a sample prepared in the laboratory.

If needed, the required amount of salt is added to the spacer solution and thoroughly mixed to allow for complete dissolution of the salt. To minimize the formation of foam, the recirculation rate should be lowered before addition of the salt. If foaming occurs during the addition of salt then P-DFL can be added as P-DFL is an efficient defoamer.

Add the required amount of weighting agent and mix thoroughly. The weighting agent should be added directly into a point of agitation, i.e., into the hopper of the mixer or vortex of the paddle tank.

The best way is to directly blow the bulk barite into the spacer base fluid through the cement feed line. Never add the weighting agent before the base fluid is ready and fully hydrated with any salt completely dissolved.

At this point, the density of the spacer should be checked, because the actual density of the weighting agent used in the field can be somewhat lower than the theoretical density used for the calculations. If needed, add extra weighting agent.

JOB DESIGN DATA FOR THE P-LFS SPACER COMPATIBILITY:

Compatibility of the spacer and mud is the most important property of any spacer. There are many different ways of conducting compatibility tests. However the API developed a procedure described in API Specification 10, Appendix P, 4th edition (August 1988), for preparing and testing samples. This is a good method to use because it allows data to be compared from one area to another and leads to reproducible results. Above all, it is the nearest to a worldwide accepted technique.