WellLife® 684 Additive

WellLife® 684 additive is designed to increase the tensile strength of set cement without significantly decreasing the compressive strength. The carbon fibers are composed of 94% carbon and 5% nitrogen. As such, they are inert and will not react with cement. This additive is thermally stable and can be used at all temperatures.

The carbon fibers have an average length of 150 microns and a diameter of 7.2 microns, which means that they are only slightly larger than some cement grains. The small size allows a greater amount to be blended with the cement than when using glass fibers. WellLife 684 additive remains inert and will not react with cement at downhole conditions.

Fibers added to cement serve the same function as reinforcing bar added to concrete—to improve tensile strength. It is often desired to change the mechanical behavior of a cement system so that it can withstand the thermal and mechanical stresses placed on the cement during the functional life of a well. One improvement is to enhance the cement’s resistance to tensile stresses (a pulling effect). Testing experience has given the rule of thumb that the tensile strength of cement is approximately one tenth of the compressive strength (1:10 TS:CS). By adding fibers, this ratio of tensile strength to compressive strength can be increased to 25% (or 1:4) for some slurry designs.

**Application and Features**

The primary use of WellLife 684 additive is to increase the tensile strength of the set cement without significantly decreasing the compressive strength. WellLife 684 additive can be used in any cementing slurry application where tensile strength is needed.

WellLife 684 additive is part of the WellLife® III Cementing Service. Halliburton has scientifically investigated the potential damage to the cement sheath created by cumulative stresses.

The result is Halliburton’s WellLife® III Cementing Service, an engineered, proactive and intervention-less zonal isolation solution to extend wells’ economic life. WellLife III Cementing Service incorporates three synergistic components:

- Diagnostics modeling and design tools
- Engineered cement systems including WellLife 684 additive
- Back up device for reinforcing zonal isolation

**Benefits**

WellLife 684 additive can provide the following benefits:

- Increased tensile strength of the set cement to help prevent tensile failure
- No upper temperature limit
- Can be used in concentrations greater than 10% without affecting slurry mixing and rheology due to the small size of the fibers
- Will not react with the cement slurry, thus providing continued tensile strength during the life of the well

**Function**

Cement additive; tensile-strength enhancement

**Generic Chemical Description**

Carbon fiber

**Form**

Solid

**Color**

Black

**Specific Gravity**

1.80

**Absolute Volume, gal/lbm**

0.0666

**Average Bulk Density, lbm/ft³**

19

**Mean Fiber Length, micron**

150

**Fiber Diameter, micron**

7.2

**Fiber Tensile Strength, psi**

550,000

**Fiber Shrinkage at 1,800°F**

Nil

**Shelf Life**

60 Months

**Product**

**SAP No.**

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**Package**

1-lbm Sample

40-lbm Bag

For more information on WellLife® 684 Additive, please call your local Halliburton representative or email us at cementing@halliburton.com.

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