

COTTON SEAL™

A **Seal-AX** coated LCM.



Canadian Energy
SERVICES

History

Seal-AX™, a patented proprietary product line, has been developed and implemented over the last three years. Originally Seal-AX™ was developed as a seepage loss reduction agent in oil based drilling fluids and has since been expanded as an inhibitor in water based fluids and a variety of lost circulation materials (LCM's). Since introducing the product, additional grades have been developed to encompass various drilling parameters and fluids.

The product line includes Seal-AX™ Regular, Seal-AX™ HT, Seal-AX™ 3400P, WhiteFury™ and now CottonSeal™. Seal-AX™ Regular and Seal-AX™ HT are typically used in invert drilling fluids and as LCM additives. Seal-AX™ 3400P (anionically charged) and WhiteFury™ (micronized) are utilized to provide inhibition and increased wellbore integrity in water based fluids.

Technology / Application

CottonSeal™ was developed as a lost circulation additive specifically designed to combat high porosity seepage, fractured zones and whole mud losses. It is easily dispersible and is less susceptible to bacterial decomposition than untreated cotton seed hulls. Through strenuous lab testing, CottonSeal™ has proven to have excellent compaction and bridging properties.

Seepage Losses

The primary application is in high porosity and fractured zones where traditional LCM's are unable to effectively seal the loss zone. The Seal-AX™ coating provides the product with the unique ability to adhere to itself and other LCM making it an excellent bonding agent. This dynamic composition allows for increased wellbore adhesion and pressure sealing capacity.

Whole Mud Losses

CottonSeal™ makes an excellent addition to lost circulation pills due its natural malleability and adhesion properties. This increases fiber fixation and allows for a variety of LCM's to coalesce, creating a more stable pill and considerably increasing



Seal-AX™

Lab Testing

Permeability Plugging Testing (PPT) has been a major focus in the development of CottonSeal™. The apparatus tests a fluids ability to plug off a specifically sized slot under specific temperature and pressure. To compare CottonSeal™ to traditional cotton seed hulls, 40kg/m³ of each product was mixed in separate 6.67% solids Gel Slurries. The PPT was conducted under 1000 psi (6895 kPa) and the pressure was increased to determine the maximum pressure loading the plug could handle.

PPT Testing				
6.3/32" Slot, 0.0176 lb LCM/0.00126 bbl Gel Slurry				
LCM	Time Required to Seal Fracture at 1000 psi (s)	Volume Lost (cc)	Pressure Lost over 10 min (psi)	Avg. Max. Pressure (psi)
Cotton Seed Hulls	80	46	150	1850
CottonSeal™	21	15	200	3800

*Estimated 17% Seal-AX™ coating.

The PPT testing demonstrates that the CottonSeal™ sample was able to plug the slot four times faster and lost a third of the volume than regular Cotton Seed Hulls did. In addition, the CottonSeal™ sample was able to withstand more than double the pressure.

Cotton Seed Hull Slot



CottonSeal™ Slot



The pictures above are taken from the PPT. The CottonSeal™ slot illustrates a very tight, uniform compaction as compared to the cotton seed hull slot.

Uncoated cotton seeds are frequently the cause of bacterial growth in bentonite and polymer based drilling fluids. When lab tested, CottonSeal™ has proven to resist degradation and bacterial issues normally experienced.



From left to right the jars contain cotton seed hulls with 30%, 20%, 15% and 0% Seal-AX™ coating aged for a duration of three days in water. The discoloration is an indication of the degree of fiber breakdown and bacterial contamination. As displayed, even a 15% Seal-AX coating exhibits notably less decomposition as compared to untreated cotton seed hulls.

Melt Point: 88°C - 90°C

Benefits

- Increased pressure sealing capacity.
- Increased well bore adhesion.
- Easily mixed / dispersed in pill tanks or directly into the active system.
- Enhanced biological stability. Less susceptible to bacterial decomposition.
- Strengthened fibers equates to longer fiber life.
- Increased fiber stability under shearing.
- Less dust while mixing.
- Able to adhere other materials together and has proven to increase the probability of sealing the loss zone.

Packaging / Mixing

CottonSeal™ is available in 363 kg super sacks. CottonSeal™ can be mixed directly to a well agitated tank or through the hopper, depending on loading requirements.