



SHIELD BOND[®] CEMENTING SPACERS

Spacer Systems for Wellbore Shielding[®]





Solving Complex Wellbore Challenges Worldwide

Impact Fluid Solutions is a premier provider of specialty additives for oil and gas drilling and cementing. Impact combines advanced chemistry with extensive oilfield expertise to identify critical wellbore challenges and develop purpose-built solutions. Our best-in-class additives deliver advantages unavailable from conventional fluids and are:

- Proven in thousands of wells in more than 50 countries
- Trusted by leading operators, fluid companies and oilfield service providers
- Backed by technical support conventional chemical suppliers cannot provide

In particular, Impact is a recognized leader in the science of Wellbore Shielding® and stabilization. The proprietary chemistry at the core of our SHIELD BOND® Wellbore Shielding® spacer systems has delivered successful primary cementing operations in thousands of wells in troublesome formations worldwide.

Leading Loss-Prevention Spacer Systems

Critical to all drilling operations, cement spacer systems are designed to deliver full annular placement of uncontaminated cement slurries and help deliver an effective cement bond. Cement bond integrity and zonal isolation can be compromised by both losses encountered during the cementing operation and poor mud removal. The SHIELD BOND® Wellbore Shielding® spacer system is built on proprietary chemistry that has been proven in thousands of wells worldwide.

Advancing beyond the traditional spacer functions of separation and mud displacement, SHIELD BOND is specially formulated to allow cement circulation to the programmed top of cement (TOC) where the equivalent circulating density (ECD) window is tight, or in fragile and fractured formations. SHIELD BOND and SHIELD BOND NXT form a temporary, impermeable shield over the formation, mitigating lost circulation issues during cementing and formation damage. Typical cement spacers are not designed to address pre-existing losses or induced losses.

At the heart of our SHIELD BOND solution is a uniquely engineered ultra-low invasion additive that essentially deposits a thin but impermeable “shield” across a wide range of matrix pores and microfractures to prevent losses. This non-damaging Wellbore Shielding® chemistry creates an extremely low-permeability barrier, minimizing fluid and pressure invasion.

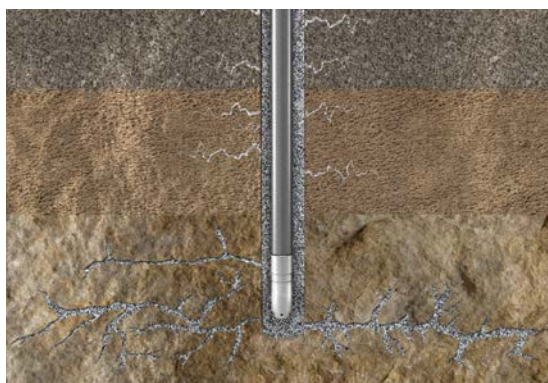


Figure 1 – Cementing in loss zones after using a conventional spacer system

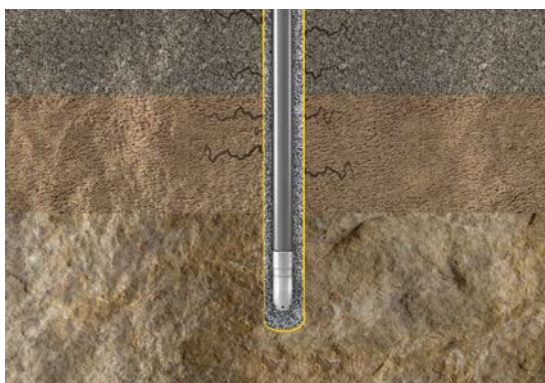


Figure 2 – Cementing in loss zones when using SHIELD BOND® Wellbore Shielding® spacer system





Shielding Against Cement Losses

SHIELD BOND® Wellbore Shielding® spacer systems help prepare the wellbore for cementing. The spacer system forms an impermeable shield on the formation face, mitigating lost circulation issues before cement enters the annulus, reducing losses from the cement column. SHIELD BOND also helps reduce fluid invasion, minimizing damage to the formation to help with ultimate production.

SHIELD BOND allows safe operations slightly above the fracture gradient and can handle the typical high equivalent circulating density (ECD) near the end of the displacement in wells, where the fracture gradient has traditionally limited the design of the cement job.

+ ADDITIVE PERFORMANCE

Saving \$329,500 While Improving Cementing Quality

On a geothermal well pad in Kenya, an operator encountered uncontrolled losses during the drilling phase, resulting in a severe top-of-cement shortfall.

Problem: Remediation attempts with LCM proved unsuccessful.

Solution: Impact's Wellbore Shielding® spacer system was used in tandem with our proprietary, synergistic LCM.

RESULT:

- ▶ For 20" casing jobs, the number of top jobs was reduced from an average of 11.5 to 2; extra cement required to finish filling the annulus was reduced from 1,047 bbl to 138 bbl
- ▶ 13 3/8" casing jobs showed similar improvements
- ▶ Overall well costs were reduced by \$329,500



SHIELD BOND® Advantages

- ▶ **Maximum Mud Removal** – To obtain an effective cement job, all or a high percentage of the drilling fluid must be removed before the cement is introduced into the annular space. Impact's Wellbore Shielding® spacers have adjustable rheology. If the spacer system's rheology is optimized for mud removal, enhanced displacement efficiency can be achieved.
- ▶ **Superior Mixability** – SHIELD BOND® can be batch mixed or mixed on the fly. The capability to mix on the fly is critical, as it drastically simplifies field operations when a weighted spacer is required. Mixing on the fly also allows an unlimited volume of spacer to be mixed, which can be critical for larger cement jobs.
- ▶ **Wellbore Shielding & Stabilization** – SHIELD BOND® has two unique shielding capabilities that truly separate it from the rest of the spacers currently used in the well cementing industry:
 - **Attacking the Frac Gradient** – The initial simulation run on many complicated cementing jobs shows final ECDs that approach or exceed the frac gradient. With the addition of Impact's Wellbore Shielding® technology, SHIELD BOND® can facilitate achieving successful top of cement (TOC) even under these conditions. Under these same conditions, without SHIELD BOND®, displacement rates must be slowed and/or cement density and/or volumes must be reduced. All of these options are counterproductive.
 - **Preventing Pre-Job Losses** – In certain wells, cementing is attempted without complete control of the wellbore. If full circulation of mud is not possible prior to cementing, achieving desired TOC will not happen unless you are just trying to tag the shoe. When our proprietary spacer LCM (SHIELD BOND® LC) is added to SHIELD BOND® to extend its capabilities, circulation can be returned to the wellbore, allowing achievement of desired TOC, provided the losses are not into extremely large fractures or vugs. Desired TOC has been achieved in wells with total losses when the cement was preceded with SHIELD BOND®.
- ▶ **Single-Sack Blend** – SHIELD BOND® comes in a single sack so there are no ratios or additional materials that need to be designed or tested, or to get wrong on site. The only additional material that might be required would be weighting material, if a weighted spacer is required; surfactant, if an OBM or SBM fluid is in the wellbore; and SHIELD BOND® LC, when severe losses are present prior to cementing. Any standard weighting material can be used with SHIELD BOND®.
- ▶ **Enhanced Capability** – SHIELD BOND® NXT provides extreme levels of compatibility when wellbore and fluid conditions demand superior performance.



SHIELD BOND® Products

Cementing Spacer Systems & Lost Circulation Additives

Impact recognizes that every cement job is different, so we offer a range of SHIELD BOND products to meet a variety of requirements. We first developed the industry-leading SHIELD BOND cementing spacer, then extended the product line to meet specific customer needs.

SHIELD BOND®

- Prevents cement losses and mitigates formation damage
- Extends the frac gradient for higher ECDs
- Enhances hole cleaning and mud removal prior to cement placement
- Adjustable rheology
- Forms a shield on the surface of the formation to limit fluid invasion

SHIELD BOND® NXT

- Same characteristics as SHIELD BOND
- Designed for high temperature environments up to 350°F (177°C)
- Enhanced compatibility test results
- Superior rheological linearity

SHIELD BOND® LC_{1k}

- Enhances the SHIELD BOND system's effectiveness when losses are problematic
- Effective at sealing a wide range of fracture sizes up to 1,000 µm and permeabilities up to 3,500 darcies
- Withstands differential pressures ≥1,000 psi

SHIELD BOND® LC_{3k}

- Enhances the SHIELD BOND system's effectiveness when losses are problematic
- Effective at sealing a wide range of fracture sizes up to 3,000 µm
- Withstands differential pressures ≥1,000 psi

+ ADDITIVE PERFORMANCE

Stopping Losses & Saving Rig Time

In Abu Dhabi, offsets required an operator to use a multi-stage cementing process. Prior to cementing one well, the operator measured static losses of 81 bbl/hr and dynamic losses of 120 bbl/hr.

Problem: Drilling fluid pills could not bring static losses below 65 bbl/hr and dynamic losses below 100 bbl/hr.

Solution: Impact's Wellbore Shielding® spacer system was used.

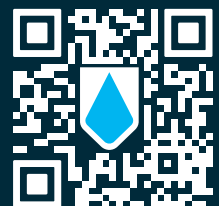
RESULT:

- ▶ Stopped losses and allowed cement returns to the surface
- ▶ Saved rig time by generating a single-stage cement job



Whether we're working with operators, fluid companies or oilfield service providers, we take the time to fully understand each customer's individual technical requirements before making a recommendation. To discuss how Impact can help solve your wellbore challenges, contact your regional sales representative.

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