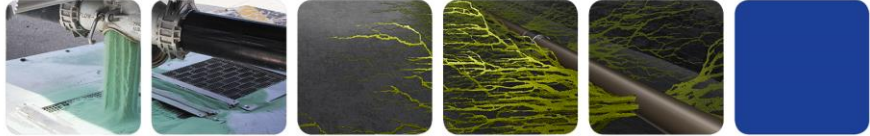


# Technical Sales Bulletin

## Resin Coated Proppants

High proppant pack integrity and quick consolidation

## Black Pro™ Resin Coated Sand



Events such as well shut-ins during workovers, connections to a pipeline or possible shut-ins due to pipeline capacity lead to cyclic changes in fracture closure stress on the proppant pack during the life of a well. These stress changes often cause uncoated proppants to fail prematurely under wet, hot downhole conditions. Proppant embedment is another factor that is a concern, especially in soft shale formations, and can lead to reduced well production. Cyclic stress due to well shut-ins results in increased proppant embedment, increased formation fines from proppant embedment craters, and increased proppant fines.

Black Pro™ proppants offer next-generation resin bonding technology for improved proppant pack integrity, even under the harshest cyclic stress conditions common in today's shale wells. This proppant also provides enhanced proppant embedment resistance under cyclic stress, maintaining higher pack permeability and fracture width compared to traditional curable resin coated proppants (RCPs). Black Pro proppant's quicker bond strength development allows for faster post-treatment flowback at higher drawdowns than other resin coated proppants.

### Technical Applications

Fracture Treatments:

- At closure stress up to 12,000 psi [83 MPa]
- Where higher fracture flow capacity and proppant flowback control are desired
- For wells that will be shut-in multiple times during their productive life

### New Curable Resin Technology Provides:

- Industry's highest proppant pack integrity – Even under the harshest cyclic stress conditions common in today's shale wells
- Enhanced proppant embedment resistance under cyclic stress – Maintains higher pack permeability and fracture width compared to traditional RCPs
- Quicker bond strength development – Provides faster post-treatment flowback at higher drawdowns than other RCPs

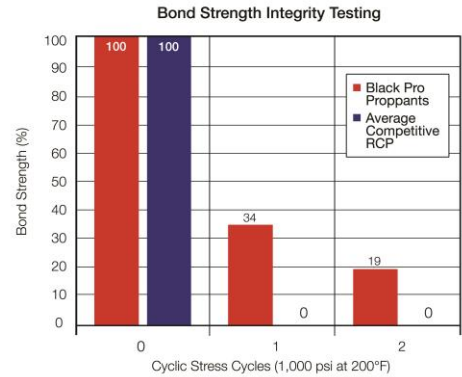


Black Pro Proppant Pack



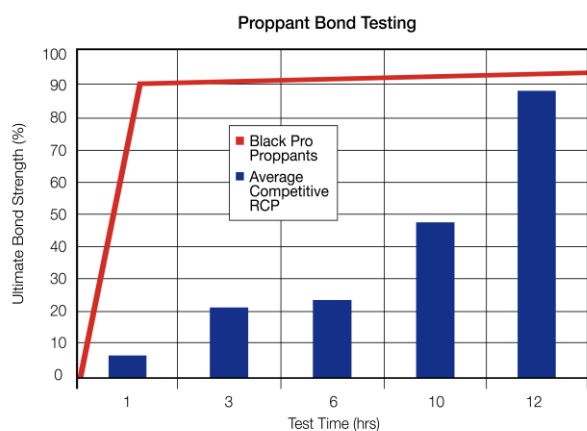
Uncoated Frac Sand

### Black Pro Proppant's Enhanced Bond Strength Integrity



Black Pro proppants are Hexion's newest RCP that rebonds after multiple stress cycles. It minimizes additional embedment from cyclic stress and maintains higher fracture conductivity.

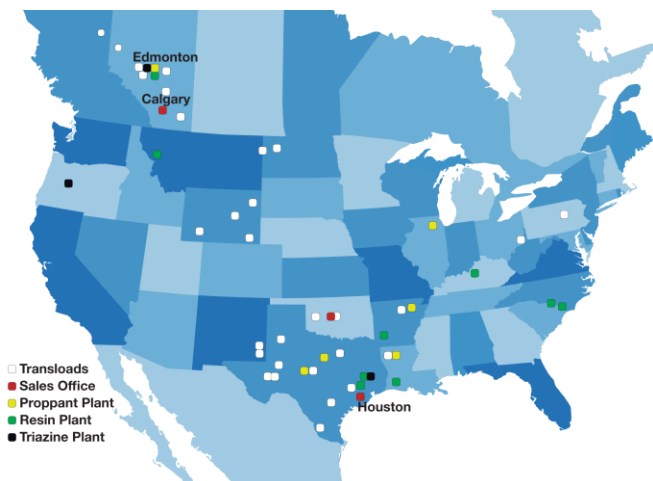
## Black Pro Proppant Technology Provides Rapid Bond Strength Development



Testing Conditions at 300°F, 1,000 psi Closure Stress, 2% KCl Fluid.

Black Pro proppants reach 90% ultimate bond strength in one hour, while other RCPs take over 12 hours to reach 90%. These innovative proppants provide for quicker post treatment well flowback at much higher rates.

## North America Manufacturing and Distribution Network



Hexion continues to expand capacity and strategically locate transloads near the major shale plays in North America to meet the industry's increasing need for resin coated proppants.



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## Black Pro Proppant Long-Term Conductivity

Stim-Lab, Inc. Consortium Long-Term Baseline Procedure Proppant Concentration: 2 lb/ft<sup>2</sup> (9.8 kg/m<sup>2</sup>), Temperature: 250°F (121°C)

Closure Stress (psi)	2,000	4,000	6,000	8,000	10,000
Size	Conductivity (md-ft)				
40/70	1090	877	569	271	151