

CARBOBOND KRYPTOSPHERE LD

Resin-coated low-density, ultra high-performance ceramic proppant

Features

- KRYPTOSPHERE LD provides an ultra-conductive, low-density proppant as the substrate
- Specially formulated for maximum compatibility with complicated frac fluids used in deeper wells
- Bonded proppant pack reduces effective stress on proppant
- High cyclic loading tolerance
- Resin coating completely encapsulates substrate
- Bonds in the fracture with temperature and closure

Benefits

- Versatile—expands the usable application range (depth, temperature and stress) to replace intermediate-density and bauxite
- No proppant flowback—eliminates subsequent equipment damage, expense of cleanouts and disposal
- Maintains conductivity—resin coating prevents fines from being released
- Maintains particle integrity—prevents chemical attack on substrate
- No additional chemical costs—since no fluid chemistry change is required, the job can be pumped as designed



Extending the lightweight advantage

The higher-strength CARBOBOND® KRYPTOSPHERE® LD resin-coated low-density, ultra high-performance ceramic proppant is effective at greater well depths, temperatures and stresses than any comparable ceramic proppant. CARBOBOND KRYPTOSPHERE LD also requires 20% less proppant by weight than any resin-coated intermediate-density ceramic proppant and 30% less proppant than any resin-coated bauxite ceramic proppant. It is designed with high cyclic loading tolerance, and the bonded proppant pack reduces the effective stresses encountered at deeper depths.

Long-term conductivity

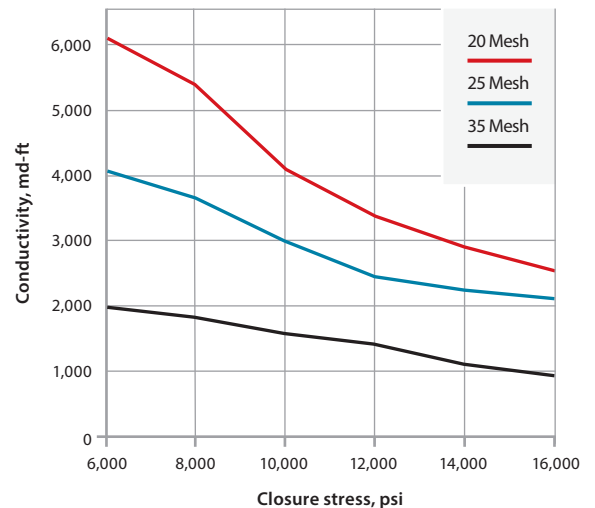
Reference conductivity, md-ft @ 250°F (121°C)

Closure stress psi	20 Mesh	25 Mesh	35 Mesh
6,000	6,050	4,060	2,000
8,000	5,200	3,600	1,830
10,000	4,200	3,070	1,600
12,000	3,450	2,550	1,400
14,000	2,885	2,200	1,160
16,000	2,425	1,900	965

Reference permeability, Darcies @ 250°F (121°C)

Closure stress psi	20 Mesh	25 Mesh	35 Mesh
6,000	343	231	115
8,000	298	208	107
10,000	245	180	94
12,000	205	152	83
14,000	174	133	70
16,000	147	117	60

2 lb/ft², 250°F, with 2% KCl | Between Ohio sandstone



Production. Enhanced.

Reference conductivity and permeability are measured with a single phase fluid under laminar flow conditions in accordance with API RP 19C. In an actual fracture, the effective conductivity will be much lower due to non-Darcy and multiphase flow effects. For more information, please refer to SPE Paper #106301.

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Bond strength performance

Unconfined compressive strength

Fluid temp °F (°C)	Bond strength psi			
	12 hours	24 hours	48 hours	72 hours
150 (66)	61	113	104	151
200 (93)	895	952	1542	1976
250 (121)	1827	2163	2185	2359

For bottomhole static temperature (BHST) less than 150°F/65°C use CARBOBOND Low Temperature Chemical Activator (LTCA) to enhance bond strength. LTCA may also be beneficial in cold weather conditions.

Physical and chemical properties

Typical chemical properties

Resin type	Proprietary Phenolic
Equilibrium pH	8.9 - 9.3
Residual acidity per gal 50% NaOH/1000 gal 2% KCl	< 0.1
Shelf-life (years)	> 3 estimated
Solubility: ISO 13503-2	Weight %
Water	< 0.2
Alkaline water [†] uncured	< 1.0
Alkaline water [†] cured	< 0.2
Water with 2% KCl	< 0.2
Light brine	< 0.3
12% HCl/3% HF Acid	< 1.0
Oil	< 1.0

[†]66°C, unbuffered 2% KCl, adjusted to pH = 11, 1.4 kg/L added

Compatibility: Compatible with most commonly used fracturing fluids, both water and oil. Testing with fluids prior to pumping is advised. Some fluids may require adjustment of pH control, breaker or foamer loading. Avoid prolonged exposure to highly alkaline fluids, i.e., pH > 12 and > 2¼ gal 50% NaOH/1000 gal (2.2 L/m³).

Typical physical properties

Available sizes	20, 25, 35
Substrate	KRYPTOSPHERE LD
Physical state	Solid, particulate
Apparent specific gravity	2.70 ± 0.02
Specific volume (cm ³ /g)	0.0442
Bulk density [lb/ft ³] (g/cm ³)	96 ± 4 1.53 ± 0.06
Roundness	0.9
Sphericity	0.9
Particle size distribution uncoated ceramic substrate	Meets or exceeds API RP 19C
Turbidity, (NTU) [FTU]	< 250
Coating efficiency (weight %)	> 99.8
Bond strength	See included chart
Long-term conductivity	See included chart

All data represents typical values.

Talk to CARBO to find out how we can help you enhance your production.

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CARBO

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