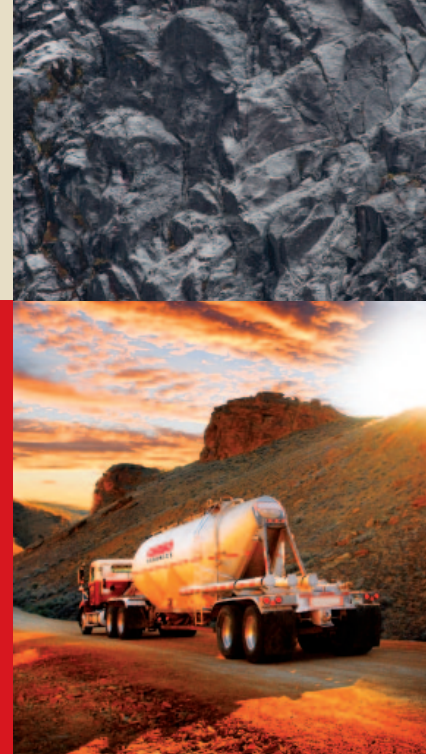


## High-strength sintered bauxite proppant

### FEATURES

- Maximum strength and conductivity for use in deepest wells.
- Maintains high fracture conductivity in hot, hostile downhole environments.
- Excellent roundness and sphericity minimize the abrasion characteristics that cause wear on production and pumping equipment.
- Available in four sizes – 12/18, 16/30, 20/40 and 30/60.



### Physical and Chemical Properties

#### Typical Sieve Analysis [weight % retained]

U.S. Mesh [mesh]	Microns	12/18	16/30	20/40	30/60
+12 mesh	+1700	1	—	—	—
-12+14 mesh	-1700+1400	27	—	—	—
-14+16 mesh	-1400+1180	43	3	—	—
-16+18 mesh	-1180+1000	27	30	—	—
-18+20 mesh	-1000+850	2	55	4	—
-20+25 mesh	-850+710	—	12	45	—
-25+30 mesh	-710+600	—	—	40	3
-30+40 mesh	-600+425	—	—	11	70
-40+50 mesh	-425+300	—	—	—	25
-50+60 mesh	-300+250	—	—	—	2
<b>Median Particle Diameter [microns]</b>		1291	956	697	430

#### API Crush Test

% by weight fines generated	@10,000 psi	9.3	2.0	0.7	0.6
	@12,500 psi	13	3.8	1.4	1.3
	@15,000 psi	—	8.0	2.7	2.3

**Sizing Requirements:** A minimum of 90% of the tested sample should fall between the designated sieve sizes.

These specifications meet the recommended practices as detailed in ISO 13503-2.

#### Typical Additional Properties

Roundness	0.9	Chemistry [weight %]	
Sphericity	0.9	Al <sub>2</sub> O <sub>3</sub>	83
Bulk Density [lb/ft <sup>3</sup> ] [g/cm <sup>3</sup> ]	128	SiO <sub>2</sub>	5
	2.0	TiO <sub>2</sub>	3.5
Apparent Specific Gravity	3.56	Fe <sub>2</sub> O <sub>3</sub>	7.0
Absolute Volume [gal/lb]	0.034	Other	1.5
Solubility in 12/3 HCl/HF Acid [% weight loss]	3.5		



## Long-Term Conductivity

### Reference Conductivity\*, md-ft @ 250°F

Closure Stress [psi]	2 lb/ft <sup>2</sup> 12/18	2 lb/ft <sup>2</sup> 16/30	2 lb/ft <sup>2</sup> 20/40	2 lb/ft <sup>2</sup> 30/60
2,000	42,266	18,408	8,168	3,720
4,000	36,530	14,150	6,595	3,233
6,000	23,462	10,637	5,368	2,791
8,000	12,522	7,386	4,283	2,343
10,000	5,379	5,429	3,405	1,849
12,000	3,598	3,975	2,719	1,333
14,000	2,325	2,973	2,140	927

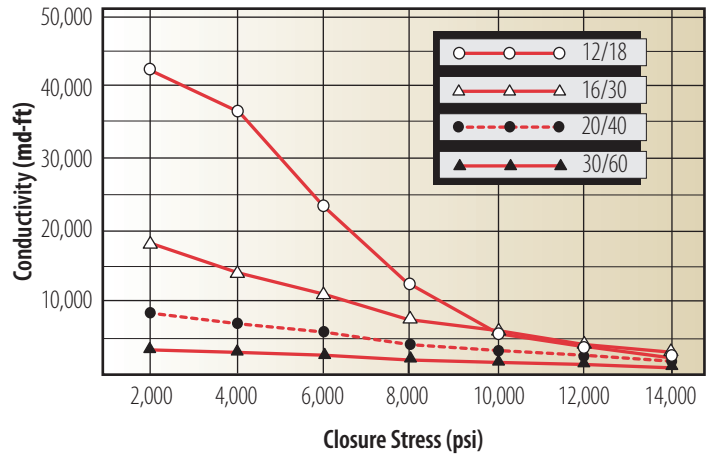
### Reference Permeability, Darcies @ 250°F

Closure Stress [psi]	2 lb/ft <sup>2</sup> 12/18	2 lb/ft <sup>2</sup> 16/30	2 lb/ft <sup>2</sup> 20/40	2 lb/ft <sup>2</sup> 30/60
2,000	2,742	1,207	539	254
4,000	2,395	939	440	224
6,000	1,609	721	370	197
8,000	894	515	302	167
10,000	409	393	246	134
12,000	284	298	204	99
14,000	194	232	166	73

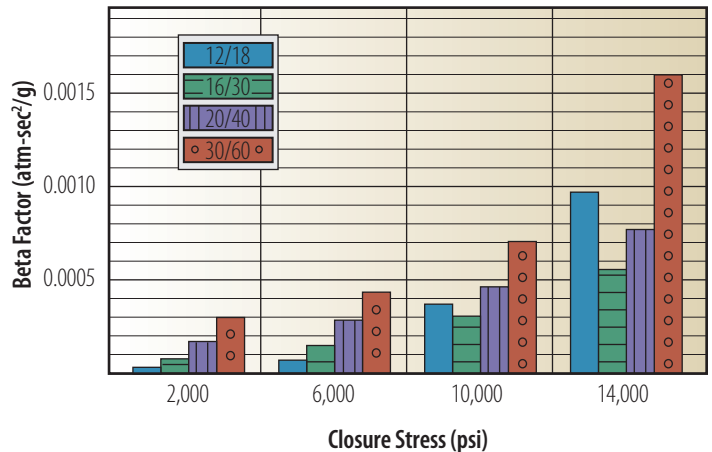
## Beta Factors

Closure Stress [psi]	Beta Factor [atm sec <sup>2</sup> /g]			
	12/18	16/30	20/40	30/60
2,000	0.00003	0.00008	0.00018	0.00030
4,000	0.00004	0.00011	0.00023	0.00036
6,000	0.00007	0.00015	0.00029	0.00043
8,000	0.00014	0.00022	0.00037	0.00053
10,000	0.00038	0.00030	0.00047	0.00071
12,000	0.00060	0.00041	0.00060	0.00106
14,000	0.00097	0.00055	0.00077	0.00160

### 2 lb/ft<sup>2</sup>, 250°F, with 2% KCl | Between Ohio sandstone



### 2 lb/ft<sup>2</sup>, 250°F, with 2% KCl | Between Ohio sandstone, Young's modulus of 5x10<sup>6</sup> psi | No gel damage included



Beta Factor data reported by Stim-Lab Consortium, PredK Feb 2002

\* Reference conductivity and permeability are measured with a single phase fluid under laminar flow conditions in accordance with ISO 13503-5. 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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