

CARBOHSP

High-density sintered bauxite proppant

Features

- High strength and conductivity for use in deepest wells
- Excellent roundness and sphericity
- Available in five sizes—12/18, 16/30, 20/40, 30/60 and 40/70

Benefits

- Maintains high fracture conductivity in deep, high-temperature and similarly harsh downhole environments
- Minimizes abrasion characteristics that cause wear on production and pumping equipment



High strength for deep and hostile downhole environments

CARBOHSP® is the original high-density sintered bauxite proppant, with enhanced performance to maintain high fracture conductivity in deep hot, high-stress downhole environments.

Long-term conductivity

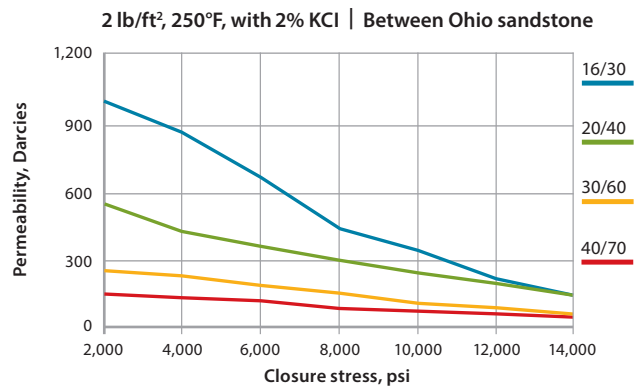
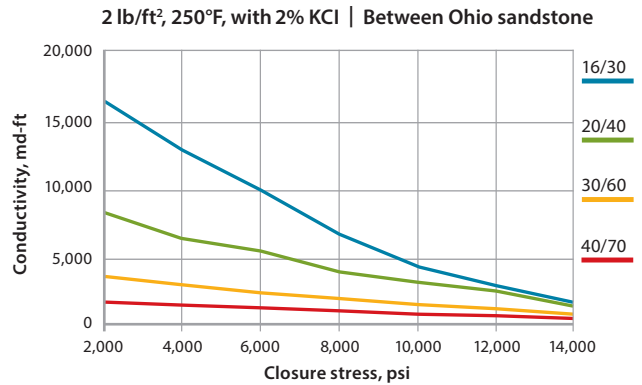
Reference conductivity, md-ft @ 250°F (121°C)

Closure stress [psi]	2 lb/ft ² 16/30	2 lb/ft ² 20/40	2 lb/ft ² 30/60	2 lb/ft ² 40/70
2,000	16,595	8,170	3,720	2,170
4,000	13,150	6,595	3,235	1,865
6,000	10,000	5,370	2,790	1,585
8,000	6,900	4,285	2,345	1,250
10,000	4,675	3,405	1,850	995
12,000	2,825	2,650	1,335	765
14,000	1,950	1,925	925	565

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

Closure stress [psi]	2 lb/ft ² 16/30	2 lb/ft ² 20/40	2 lb/ft ² 30/60	2 lb/ft ² 40/70
2,000	1,085	540	255	145
4,000	875	440	225	130
6,000	675	370	195	112
8,000	490	300	165	92
10,000	340	245	135	75
12,000	215	200	100	60
14,000	150	150	75	48

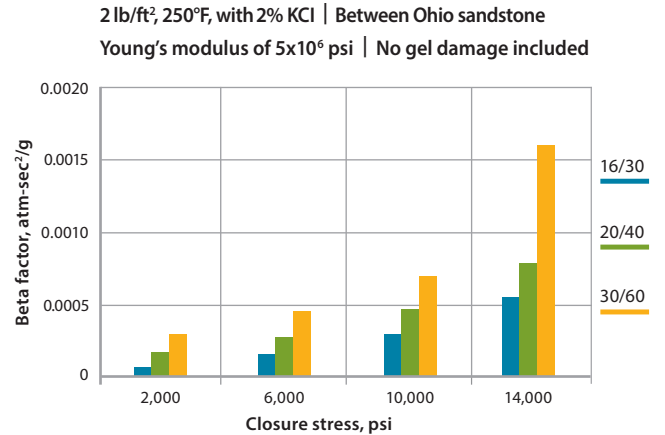
Reference conductivity and permeability are measured with a single phase fluid under laminar flow conditions in accordance with API-19D. In an actual fracture, the effective conductivity will be much lower due to non-Darcy and multiphase flow effects. For more information, please refer to SPE Paper #106301 - "Determining Realistic Fracture Conductivity and Understanding its Impact on Well Performance -Theory and Field Examples."



Production. Enhanced.

Beta factors

Closure stress [psi]	Beta factor [atmsec ² /g]		
	16/30	20/40	30/60
2,000	0.00008	0.00018	0.00030
4,000	0.00011	0.00023	0.00036
6,000	0.00015	0.00029	0.00043
8,000	0.00022	0.00037	0.00053
10,000	0.00030	0.00047	0.00071
12,000	0.00041	0.00060	0.00106
14,000	0.00055	0.00077	0.00160



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

Physical and chemical properties

Typical sieve analysis [weight % retained]

U.S. Mesh [mesh]	Microns	16/30	20/40	30/60	40/70
+12 mesh	+1700				
-12+14 mesh	-1700+1400				
-14+16 mesh	-1400+1180	3			
-16+18 mesh	-1180+1000	30			
-18+20 mesh	-1000+850	55	4		
-20+25 mesh	-850+710	12	45		
-25+30 mesh	-710+600		40	3	
-30+40 mesh	-600+425		11	70	3
-40+50 mesh	-425+300			25	70
-50+70 mesh	-300+212			2	26
-70+100 mesh	-212+150				1
Median particle diameter [microns]		956	697	430	350
API/ISO crush test	@10,000 psi	2.2	1.0	0.6	—
% by weight fines generated	@12,500 psi	5.4	2.2	1.4	1.4
	@15,000 psi	9.0	3.7	2.3	2.3
API k-factor [kpsi]		8	23	28	>30

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 API 19C.

Typical additional properties

Roundness	0.9	Apparent specific gravity	3.61
Sphericity	0.9	Absolute volume [gal/lb]	0.033
Bulk density [lb/ft ³]	131	Solubility in 12/3 HCl/HF acid [% weight loss]	2.5
	2.1		

All data represents typical values.

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

carboceramics.com