TECHNICAL DATA SHEET

CARBOPROP

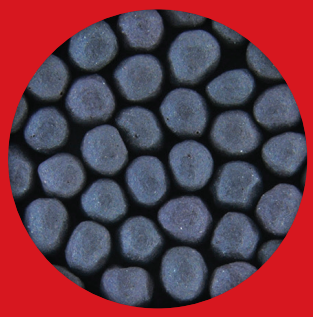
Intermediate-density ceramic proppant

Features

- Consistent, high-quality, engineered intermediate-density proppant
- Exceptional roundness and sphericity
- Frequently selected for moderate to higher stress oil and gas wells
- Available in five standard sizes—12/18, 16/30, 20/40, 30/60 and 40/70

Benefits

- Excellent long-term conductivity
- Minimizes wear and tear on production and pumping equipment
- Cost-effective alternative to bauxite proppant in targeted applications
- Broad range of proppant sizes ensures availability for your specific frac program



Optimum fracture conductivity for moderate to higher stress wells

CARBOPROP® intermediate-density proppant provides optimum fracture conductivity in moderate-depth, higher-stress wells. CARBOROP is a cost-effective alternative to available bauxite proppant.

Long-term conductivity

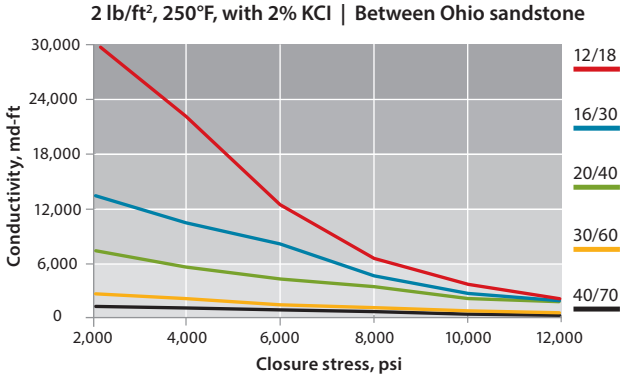
Reference conductivity, md-ft @ 250˚F (121°C)

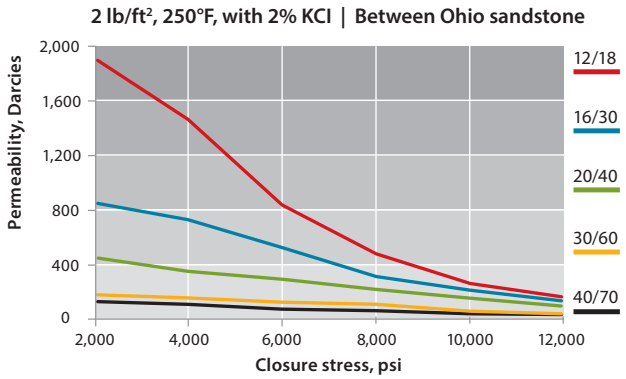
Closure stress [psi]	2 lb/ft² 12/18	2 lb/ft² 16/30	2 lb/ft² 20/40	2 lb/ft² 30/60	2 lb/ft² 40/70	2 lb/ft² 70/140
2,000	30,940	13,400	7,290	2,870	1,680	375
4,000	22,040	10,920	5,840	2,440	1,350	300
6,000	12,260	7,940	4,820	2,010	1,015	250
8,000	6,750	4,620	3,540	1,575	770	210
10,000	3,810	2,930	2,400	990	570	185
12,000	2,270	2,120	1,900	665	440	165

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

Closure stress [psi]	2 lb/ft² 12/18	2 lb/ft² 16/30	2 lb/ft² 20/40	2 lb/ft² 30/60	2 lb/ft² 40/70	2lb/ft² 70/140
2,000	1,900	875	455	175	140	27
4,000	1,400	725	365	150	110	22
6,000	820	545	305	130	80	19
8,000	470	330	230	105	65	17
10,000	280	215	160	70	50	15
12,000	175	155	130	50	40	14

Reference conductivity and permeability are measured with a single phase fluid under laminar flow conditions in accordance with API RP 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."





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Production. Enhanced.

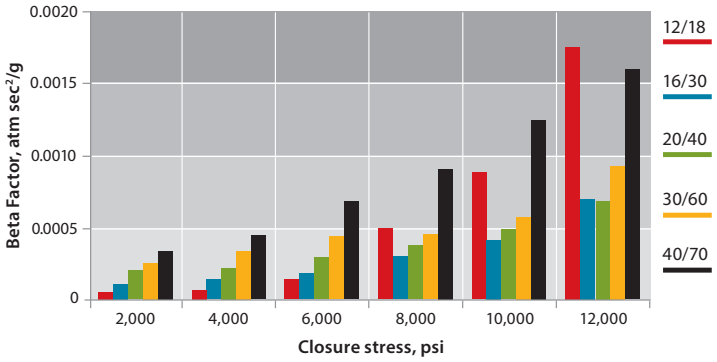
CARBOPROP

Intermediate-density ceramic proppant

Beta factors

Closure stress [psi]	Beta factor [atm sec²/g] 12/18	16/30	20/40	30/60	40/70
2,000	0.00006	0.00010	0.00021	0.00027	0.00035
4,000	0.00008	0.00013	0.00024	0.00034	0.00047
6,000	0.00015	0.00017	0.00030	0.00044	0.00070
8,000	0.00050	0.00028	0.00037	0.00047	0.00091
10,000	0.00087	0.00043	0.00049	0.00059	0.00127
12,000	0.00175	0.00072	0.00069	0.00093	0.00167

2 lb/ft², 250°F | Between Ohio sandstone
Young's modulus of 5x10⁶ psi | No gel damage included



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	12/18	16/30	20/40	30/60	40/70	70/140
+12 mesh	+1700	2					
-12+14 mesh	-1700+1400	42					
-14+16 mesh	-1400+1180	40	3				
-16+18 mesh	-1180+1000	15	28				
-18+20 mesh	-1000+850	1	46	4			
-20+30 mesh	-850+600		23	75	3		
-30+40 mesh	-600+425			21	68	3	
-40+50 mesh	-425+300				28	70	
-50+70 mesh	-300+212				1	26	1
-70+100 mesh	-212+150					1	51
-100+140 mesh	-150+106						43
-140+200 mesh	-106+75						5
Median particle diameter [microns]		1328	936	672	453	324	154
API/ISO crush test % by weight fines generated	@10,000 psi	14.0	5.0	2.8	2.3	2.0	
	@12,500 psi	20.0	9.4	5.3			
	@15,000 psi						5

Typical additional properties

Roundness	0.9		Apparent specific gravity	3.27	+-0.04
Sphericity	0.9		Absolute volume [gal/lb]	0.037	
Bulk density [lb/ft³]	117	+-0.04	Solubility in 12/3 HCl/HF acid [% weight loss]	4.5	
[g/cm³]	1.88	+-0.07			

All data represents typical values.

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 RP 19C.

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

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