PROPPANT TABLES / 2015

World Oil is pleased to present the industry's exclusive set of proppant tables. The tables presented here are classified according to the supplier, products and specifications. The common specifications listed include physical and chemical properties, API crush test results, mesh size and conductivity. Please contact the supplier for more detailed specifications on a specific product.

Northern White sand pours out of a sand master onto a duel-belt conveyor at a Southeast Texas frac job. Photo: Fairmount Santrol.

SPECIAL SUPPLEMENT TO
World Oil®
PUBLISHED IN SEPTEMBER 2015

CARBO

CARBOECONOPROP LOW-DENSITY CERAMIC

TYPICAL SIEVE ANALYSIS [WEIGHT % RETAINED]			
U.S. MESH	MICRONS	20/40	30/50
-16+20	1180+850	5	-
-20+30	-850+600	60	3
-30+40	-600+425	35	79
-40+50	-425+300	-	17
-50	-300	-	1

MEDIAN PARTICLE DIAMETER [MICRONS]			
		20/40	30/50
		635	473
API CRUSH TEST			
		20/40	30/50
% BY WEIGHT FINES	@5,000 PSI	1.0	0.8
	@7,500 PSI	5.2	2.8

REFERENCE CONDUCTIVITY, MD-FT@250°F		
CLOSURE STRESS, PSI	2 LB/FT²	2LB/FT²
	20/40	30/50
2,000	6,300	4,150
4,000	5,500	3,300
6,000	4,100	2,550
8,000	2,500	1,600
10,000	1,300	975

CARBOHYDROPROP LOW-DENSITY CERAMIC

TYPICAL SIEVE ANALYSIS [WEIGHT % RETAINED]		
U.S. MESH	MICRONS	40/80
+40	+425	2
-40+50	-425+300	68
-50+80	-300+180	30

MEDIAN PARTICLE DIAMETER [MICRONS]		
		40/80
		325
API CRUSH TEST		
		40/80
% BY WEIGHT FINES	@5,000 PSI	0.5
	@7,500 PSI	2.0

REFERENCE CONDUCTIVITY, MD-FT@250°F	
CLOSURE STRESS, PSI	2LB/FT²
2,000	1,570
4,000	1,210
6,000	890
8,000	610
10,000	360

CARBOLITE LOW-DENSITY CERAMIC

TYPICAL SIEVE ANALYSIS [WEIGHT % RETAINED]						
U.S. MESH	MICRONS	12/18	16/20	20/40	30/50	40/70
+12	+1,700	4	-	-	-	-
-12+16	-1,700+1,180	91	5	-	-	-
-16+20	-1,180+850	5	93	7	-	-
-20+30	-850+600	-	2	90	4	-
-30+40	-600+425	-	-	3	90	1
-40+60	-425+250	-	-	-	6	97
-60+70	-250+212	-	-	-	-	2
-70	-212	-	-	-	-	-

MEDIAN PARTICLE DIAMETER [MICRONS]						
		12/18	16/20	20/40	30/50	40/70
		1,374	1,001	730	522	334
API CRUSH TEST						
		12/18	16/20	20/40	30/50	40/70
% BY WEIGHT FINES	@7,500 PSI	17.9	14.0	5.2	2.5	2.0
	@10,000 PSI	-	19.3	8.3	5.8	4.4

REFERENCE CONDUCTIVITY, MD-FT@250°F					
CLOSURE STRESS, PSI	2 LB/FT²	2 LB/FT²	2 LB/FT²	2 LB/FT²	2 LB/FT²
	12/18	16/20	20/40	30/50	40/70
2,000	38,795	24,630	10,700	4,640	2,200
4,000	24,560	17,780	8,900	3,740	1,660
6,000	9,940	9,035	6,000	2,870	1,270
8,000	4,840	4,625	3,700	1,900	870
10,000	2,235	2,400	2,000	1,270	555
12,000	-	-	-	650	340

CARBOPROP INTERMEDIATE-DENSITY CERAMIC

TYPICAL SIEVE ANALYSIS [WEIGHT % RETAINED]						
U.S. MESH	MICRONS	12/18	16/30	20/40	30/60	40/70
+12	+1700	2	-	-	-	-
-12+14	-1700+1400	42	-	-	-	-
-14+16	-1400+1180	40	3	-	-	-
-16+18	-1,180+1,000	15	28	-	-	-
-18+20	1,000+850	1	46	4	-	-
-20+30	-850+600	-	23	75	3	-
-30+40	-600+425	-	-	21	68	3
-40+50	-425+300	-	-	-	28	70
-50+70	-300+210	-	-	-	1	26
-70	-210	-	-	-	-	1

MEDIAN PARTICLE DIAMETER [MICRONS]						
		12/18	16/30	20/40	30/60	40/70
		1,328	936	672	453	324
API CRUSH TEST						
		12/18	16/30	20/40	30/60	40/70
% BY WEIGHT FINES	@10,000 PSI	14.0	5.0	2.8	2.3	2.0
	@12,500 PSI	20.0	9.4	5.3	–	–

REFERENCE CONDUCTIVITY, MD-FT@250°F					
CLOSURE STRESS, PSI	2 LB/FT²	2 LB/FT²	2 LB/FT²	2 LB/FT²	2 LB/FT²
	12/18	16/30	20/40	30/60	40/70
2,000	30,940	13,400	7,290	2,870	1,680
4,000	22,040	10,920	5,840	2,440	1,350
6,000	12,260	7,940	4,820	2,010	1,015
8,000	6,750	4,620	3,540	1,575	770
10,000	3,810	2,930	2,400	990	570
12,000	2,270	2,120	1,900	665	440

KRYPTOSPHERE ULTRA-CONDUCTIVE, HIGH-DENSITY CERAMIC

TYPICAL SIEVE ANALYSIS [WEIGHT % RETAINED]			
U.S. MESH	MICRONS	25	20
–16+18	-1180+1000	0	0
–18+20	-1000+850	0	100
–20+25	-850+710	100	0
–25+30	-710+600	0	0

MEDIAN PARTICLE DIAMETER [MICRONS]			
		25	20
		815	960
API CRUSH TEST			
% BY WEIGHT FINES	@15,000 PSI	1	3
	@5,000 PSI	4	8
	@7,500 PSI	8	—

REFERENCE CONDUCTIVITY, MD-FT		
CLOSURE STRESS, PSI		
	25	20
10,000	3,400	4,500
12,000	2,900	3,600
14,000	2,475	2,875
16,000	2,050	2,300
18,000	1,650	1,800

CARBOHSP HIGH-DENSITY SINTERED BAUXITE PROPPANT

TYPICAL SIEVE ANALYSIS [WEIGHT % RETAINED]					
U.S. MESH	MICRONS	12/18	16/30	20/40	30/60
12	1,700	1	–	–	–
–12+14	–1,700+1,400	27	–	–	–
–14+16	–1,400+1,180	43	3	–	–
–16+18	–1,180+1,000	27	30	–	–
–18+20	–1,000+850	2	55	4	–
–20+25	–850+710	–	12	45	–
–25+30	–710+600	–	–	40	3
–30+40	–600+425	–	–	11	70
–40+50	–425+300	–	–	–	25
–50+70	–300+212	–	–	–	2
–70	–212	–	–	–	–

MEDIAN PARTICLE DIAMETER [MICRONS]					
		12/18	16/30	20/40	30/60
		1,291	956	697	430
API CRUSH TEST					
		12/18	16/30	20/40	30/60
% BY WEIGHT FINES	@10,000 PSI	9.3	2.0	0.7	0.6
	@12,500 PSI	–	3.8	1.4	1.3
	@15,000 PSI	–	8.0	2.7	2.3

REFERENCE CONDUCTIVITY, MD-FT@250°F				
CLOSURE STRESS, PSI	2 LB/FT²	2 LB/FT²	2 LB/FT²	2 LB/FT²
	12/18	16/30	20/40	30/60
2,000	42,265	18,410	8,170	3,720
4,000	36,530	14,150	6,595	3,235
6,000	23,460	10,635	5,370	2,790
8,000	12,520	7,385	4,285	2,345
10,000	5,380	5,430	3,405	1,850
12,000	3,600	3,975	2,720	1,335
14,000	2,325	2,975	2,140	925

CARBOBOND LITE CURABLE RESIN-COATED CERAMIC PROPPANT

TYPICAL CHEMICAL PROPERTIES	
RESIN TYPE	PHENOLIC
EQUILIBRIUM pH	8.9-9.3
RESIDUAL ACIDITY	< 0.1
per gal 50% NaOH/100 gal 2% KCL	
SOLUBILITY: ISO 13503-2	**WEIGHT, %**
WATER	< 0.2
ALKALINE WATER	
Uncured	< 1.0
Cured	< 0.2
Water with 2% KCL	< 0.2
Light brine	<0.3
12% HCl/3% HF ACID	< 1.0
Oil	< 1.0
SHELF-LIFE, years	> 3 estimated

TYPICAL PHYSICAL PROPERTIES	
AVAILABLE SIZES	12/18, 16/20, 20/40, 30/50
SUBSTRATE	CARBOLITE
PHYSICAL STATE	SOLID, PARTICULATE
SPECIFIC GRAVITY	2.60 ± 0.05
ABSOLUTE VOLUME, gal/lb	0.046
BULK DENSITY, lb/ft^3	96 ± 4
KRUBLEIN SHAPE FACTORS	
Roundness	0.9
Sphericity	0.9
PARTICLE SIZE DIST.	Meets or exceeds
Uncoated ceramic substrate	API RP 19C
TURBIDITY, (NTU/FTU)	< 250
COATING EFFICIENCY, wt%	> 99.8

REFERENCE CONDUCTIVITY, MD-FT@250°F

CLOSURE STRESS, psi	2 LB/FT^2 12/18	2 LB/FT^2 16/20	2 LB/FT^2 20/40	2 LB/FT^2 30/50
2,000	24,670	14,355	7,715	2,985
4,000	22,315	12,855	6,960	2,755
6,000	17,640	10,910	6,025	2,415
8,000	9,525	7,340	4,580	1,910
10,000	6,310	4,870	3,580	1,445
12,000	3,655	3,270	2,605	965
14,000	–	–	1,825	–

COORSTEK

CERAPROP

TYPICAL SIEVE ANALYSIS (WEIGHT % RETAINED)

		MESH			
U.S. MESH	MICRONS	16/30	20/40	30/50	40/70
-16+20	850-1,180	37	9		
-20-30	600-850	63	90	6	
-30+40	425-600		1	94	1
-40+50	300-425				84
-50+70	212-300				15
-70	<212				

API CRUSH RESISTANCE TEST (% BY WEIGHT FINES)

	MESH			
CLOSURE STRESS, PSI	16/30	20/40	30/50	40/70
7,500	8.1	5.3		
8,000	8.5			
9,000	10.4			
10,000		8.1	3.9	3.1
12,000		9.4		
12,500			7.6	3.7
13,000		11.4		
14,000				
15,000			8.5	4.6
17,500				7.2
20,000				9.6

REFFERENCE CONDUCTIVITY (MD-FT@250°F, 2 LB/FT^2)

	MESH			
CLOSURE STRESS, PSI	16/30	20/40	30/50	40/70
2,000	12,327	7,353	3,375	2,227
4,000	10,162	6,271	2,803	1,877
6,000	6,572	5,276	2,585	1,579
8,000	3,191	3,082	1,871	1,120
10,000	1,686	1,627	1,128	688
12,000	1,081	1,109	800	478

REFFERENCE PERMEABILITY (DARCY@250°F, 2 LB/FT^2)

	MESH			
CLOSURE STRESS, PSI	16/30	20/40	30/50	40/70
2,000	584	371	167	110
4,000	491	324	141	96
6,000	324	277	132	81
8,000	167	168	98	59
10,000	93	93	62	38
12,000	61	66	46	27

TYPICAL CHARACTERISTICS (ISO 13503-2)				
	MESH			
TEST	16/30	20/40	30/50	40/70
APPARENT SPECIFIC GRAVITY	2.67	2.69	2.71	2.70
SPHERICITY, KRUMBEIN AND SLOSS	0.9	0.9	0.9	0.9
ROUNDNESS, KRUMBEIN AND SLOSS	0.8	0.9	0.9	0.9
BULK DENSITY, LB/FT^3	95.5	95.3	94.9	95.6
ACID SOLUBILITY 12/3 HCL/HF, % WEIGHT LOSS	3.8	3.8	4.6	4.2
TURBIDITY, NTU	47	52	52	39
SETTLING RATE, FT/MIN	174	114	56	29

FAIRMOUNT SANTROL

FAIRMOUNT SANTROL COOLSET CURABLE RESIN-COATED SAND

PHYSICAL AND CHEMICAL PROPERTIES				
MESH	BULK DENSITY, LB/FT^2	BULK DENSITY, G/CM^3	ABSOLUTE VOLUME, GAL/LB	CRUSH RESISTANCE, 8,000 PSI
20/40	92.4	1.48	0.0467	4.2%
KRUMBEIN ROUNDNESS		KRUMBEIN SPHERICITY		
0.8		0.8		

CONDUCTIVITY, MD-FT @ 2 LB/FT^2, 2% KCl					
MESH	TEST TEMP., °F	2,000	4,000	6,000	8,000
20/40	125	1,862	1,486	1,202	786
20/40	150	2,732	2,183	1,544	1,103
20/40	250	3,157	2,791	1,879	1,307
30/50	125	1,209	980	772	346
30/50	250	1,668	1,428	1,143	583

CRUSH RESISTANCE				
MESH	2,000	4,000	6,000	8,000
20/40	0.1	0.6	1.9	4.2
30/50				2.7

UNCONFINED COMPRESSIVE STRENGTH, TESTED AT 2% KCl			
MESH	24 HR @ 1,000 PSI at 110°F	12 HR @ 1,000 PSI at 125°F	12 HR @ 1,500 PSI at 150°F
20/40	38	60	69

FAIRMOUNT SANTROL SUPER LC CURABLE RESIN-COATED SAND

PHYSICAL AND CHEMICAL PROPERTIES				
MESH	SPECIFIC GRAVITY	BULK DENSITY, LB/FT^3	BULK DENSITY, G/CM^3	ABSOLUTE VOLUME, GAL/LB
40/70	2.55	96.8	1.55	0.0465-0.0469
30/50	2.55	96.8	1.55	0.0465-0.0469
20/40	2.55	96.8	1.55	0.0465-0.0469
16/30	2.55	96.8	1.55	0.0465-0.0469
KRUMBEIN ROUNDNESS	KRUMBEIN SPHERICITY	ACID SOLUBILITY	TURBIDITY, FTU	TEMP. STABILITY, °F
0.7	0.7	< 2%	< 250	400
0.8	0.8	< 2%	< 250	400
0.8	0.8	< 2%	< 250	400
0.8	0.8	< 2%	< 250	400

CONDUCTIVITY, MD-FT @250°F, 2 LB/FT^2, CLOSURE STRESS PSI					
MESH	2,000	4,000	6,000	8,000	10,000
40/70	869	730	525	322	215
30/50	2,023	1,680	1,031	602	313
20/40	4,490	3,954	2,842	1,029	452
16/30	8,623	4,509	1,909	880	340

CRUSH RESISTANCE		
MESH	4,000	8,000
40/70	0.8%	4.2%
30/50	2.3%	5.1%
20/40	3.4%	5.9%
16/30	3.9%	6.8%

PERMEABILITY DARCIES @ 250°F DEGREES 2LB/FT^2					
MESH	2,000	4,000	6,000	8,000	10,000
40/70	44	38	29	18	13
30/50	109	92	58	38	21
20/40	238	219	161	62	29
16/30	238	98	49	20	9

UNCONFINED COMPRESSIVE STRENGTH, 200°F						
MESH	1 HR @ 1,000 PSI	6 HR @ 1,000 PSI	12 HR @ 1,000 PSI	18 HR @ 1,000 PSI	24 HR @ 1,000 PSI	48 HR @ 1,000 PSI
40/70	125	445	800	920	950	955
30/50	125	385	660	800	855	860
20/40	125	325	550	700	760	765
16/30	135	220	300	360	410	415

FAIRMOUNT SANTROL OPTIPROP G2 CURABLE RESIN-COATED SAND

PHYSICAL AND CHEMICAL PROPERTIES				
MESH	SPECIFIC GRAVITY	BULK DENSITY, LB/FT³	BULK DENSITY, G/CM³	ABSOLUTE VOLUME, GAL/LB
40/70	2.54	93	1.49	0.0469-0.0473
30/50	2.54	93	1.49	0.0469-0.0473
20/40	2.54	93	1.49	0.0469-0.0473
16/30	2.54	93	1.49	0.0469-0.0473
KRUMBEIN ROUND-NESS	KRUMBEIN SPHERIC-ITY	ACID SOLUBILITY	TURBIDITY, FTU	TEMP. STABILITY, °F
0.7	0.7	< 2%	< 250	450
0.7	0.7	< 2%	< 250	450
0.8	0.8	< 2%	< 250	450
0.8	0.8	< 2%	< 250	450

CONDUCTIVITY, MD-FT @250°F, 2 LB/FT²					
MESH	2,000	4,000	6,000	8,000	10,000
40/70	980	862	730	560	330
30/50	1,986	1,843	1,269	687	379
20/40	4,670	3,943	2,950	1,700	906
16/30	6,230	5,600	3,945	2,100	900

CRUSH RESISTANCE		
MESH	4,000	8,000
40/70	0.5%	1.4%
30/50	1.0%	2.5%
20/40	1.0%	3.0%
16/30	1.2%	3.7%

PERMEABILITY DARCIES @ 250°F, 2LB/FT²					
MESH	2,000	4,000	6,000	8,000	10,000
40/70	56	50	44	35	22
30/50	109	102	72	40	22
20/40	245	198	160	105	55
16/30	350	306	205	131	50

UNCONFINED COMPRESSIVE STRENGTH @250°F						
MESH	1 HR @ 1,000 PSI	6 HR @ 1,000 PSI	12 HR @ 1,000 PSI	18 HR @ 1,000 PSI	24 HR @ 1,000 PSI	48 HR @ 1,000 PSI
40/70	255	635	900	1,115	1,270	1,290
30/50	255	635	880	1,085	1,240	1,260
20/40	225	635	850	1,050	1,190	1,210
16/30	160	510	765	890	965	985

FAIRMOUNT SANTROL SUPER DC CURABLE RESIN-COATED SAND

PHYSICAL AND CHEMICAL PROPERTIES				
MESH	SPECIFIC GRAVITY	BULK DENSITY, LB/FT³	BULK DENSITY, G/CM³	ABSOLUTE VOLUME, GAL/LB
40/70	2.57	92.4	1.48	0.0464-0.0468
30/50	2.57	92.4	1.48	0.0464-0.0468
20/40	2.57	92.4	1.48	0.0464-0.0468
KRUMBEIN ROUND-NESS	KRUMBEIN SPHERIC-ITY	ACID SOLUBILITY	TURBIDITY, FTU	TEMP. STABILITY, °F
0.7	0.7	< 2%	< 250	400
0.7	0.7	< 2%	< 250	400
0.8	0.8	< 2%	< 250	400

CONDUCTIVITY, MD-FT @250°F, 2 LB/FT², CLOSURE STRESS PSI					
MESH	2,000	4,000	6,000	8,000	10,000
40/70	920	755	560	322	260
30/50	2,215	1,780	1,175	655	357
20/40	5,601	4,940	3,810	1,359	763

PERMEABILITY DARCIES @ 250°F, 2LB/FT²					
MESH	2,000	4,000	6,000	8,000	10,000
40/70	47	41	30	18	16
30/50	121	99	67	38	21
20/40	290	278	220	96	47

CRUSH RESISTANCE		
MESH	4,000	8,000
40/70	0.5%	2.0%
30/50	2.0%	3.5%
20/40	3.0%	4.9%

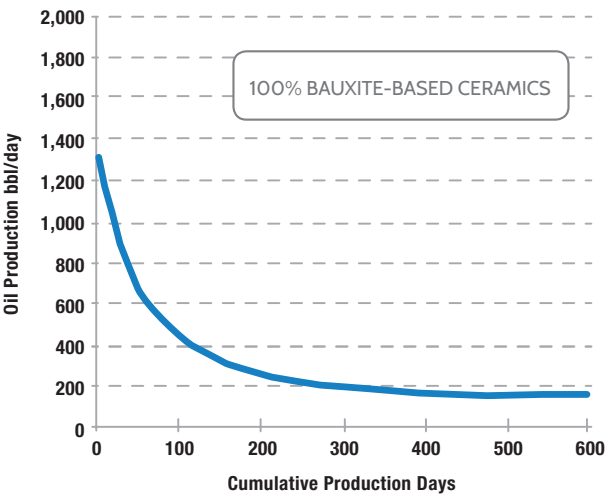
UNCONFINED COMPRESSIVE STRENGTH @200°F						
MESH	1 HR @ 1,000 PSI	6 HR @ 1,000 PSI	12 HR @ 1,000 PSI	18 HR @ 1,000 PSI	24 HR @ 1,000 PSI	48 HR @ 1,000 PSI
40/70	255	530	800	1,050	1,180	1,200
30/50	225	480	735	955	1,060	1,080
20/40	225	460	675	865	980	1,000

SAINT-GOBAIN

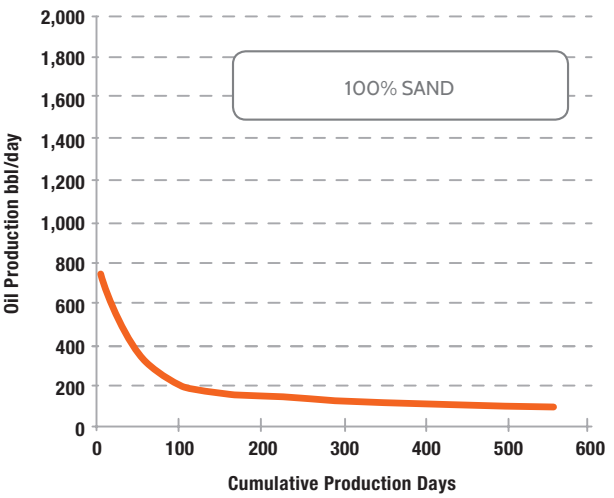
The proof is in the data!

Average reported oil production for wells completed by a single service company in Dunn County, ND in 2013.

WTI@$55
Average revenue (3 years)
$10.2 M
Profit/lb of proppant
+$0.32/lb



WTI@$55
Average revenue (3 years)
$4.07 M
Profit/lb of proppant
-$1.3/lb



Contact your Saint-Gobain representative for details of this study.

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MADE IN U.S.A.

FAIRMOUNT SANTROL POWERPROP PRECURED RESIN-COATED SAND

PHYSICAL AND CHEMICAL PROPERTIES				
MESH	SPECIFIC GRAVITY	BULK DENSITY, LB/FT³	BULK DENSITY, G/CM³	ABSOLUTE VOLUME, GAL/LB
40/70	2.51	91.8	1.47	0.0475-0.0479
30/50	2.55	94.9	1.52	0.0468-0.0472
20/40	2.56	99.3	1.59	0.0467-0.0471
KRUMBEIN ROUND-NESS	KRUMBEIN SPHERIC-ITY	ACID SOLUBILITY	TURBIDITY	TEMP. STABILITY, °F
0.7	0.7	< 2%	< 250	450
0.8	0.8	< 2%	< 250	450
0.8	0.8	< 2%	< 250	450

CONDUCTIVITY, MD-FT @250°F, 2 LB/FT²							
MESH	2,000	4,000	6,000	8,000	10,000	12,000	14,000
40/70	1,380	1,121	848	664	373	226	170
30/50	3,320	3,003	2,366	1,508	818	502	-
20/40	5,009	3,847	3,008	1,969	1,190	626	334

CRUSH RESISTANCE			
MESH	4,000	10,000	12,000
40/70	0.0%	0.8%	1.4%
30/50	0.0%	1.2%	2.4%
20/40	0.0%	2.0%	3.7%

PERMEABILITY DARCIES @ 250°F, 2LB/FT²							
MESH	2,000	4,000	6,000	8,000	10,000	12,000	14,000
40/70	74	63	50	41	24	16	13
30/50	178	169	141	94	54	36	–
20/40	268	218	176	119	76	41	23

FAIRMOUNT SANTROL TLC PRECURED RESIN-COATED SAND

PHYSICAL AND CHEMICAL PROPERTIES				
MESH	SPECIFIC GRAVITY	BULK DENSITY, LB/FT³	BULK DENSITY, G/CM³	ABSOLUTE VOLUME, GAL/LB
40/70	2.57	96.8	1.55	0.0464-0.0468
30/50	2.57	96.8	1.55	0.0464-0.0468
20/40	2.57	96.8	1.55	0.0464-0.0468
16/30	2.57	96.8	1.55	0.0464-0.0468
KRUMBEIN ROUND-NESS	KRUMBEIN SPHERIC-ITY	ACID SOLUBILITY	TURBIDITY, FTU	TEMP. STABILITY, °F
0.7	0.7	< 2%	< 250	400
0.7	0.7	< 2%	< 250	400
0.8	0.8	< 2%	< 250	400
0.8	0.8	< 2%	< 250	400

CONDUCTIVITY, MD-FT @250°F, 2LB/FT², CLOSURE STRESS PSI						
MESH	2,000	4,000	6,000	8,000	10,000	12,000
40/70	869	706	470	245	124	–
30/50	1,583	1,272	856	419	207	121
20/40	5,035	3,629	2,014	987	503	–
16/30	9,950	6,730	3,120	1,156	513	–

CRUSH RESISTANCE				
MESH	4,000	8,000	10,000	12,000
40/70	0.8%	1.9%	3.7%	5.9%
30/50	0.9%	2.1%	3.9%	6.9%
20/40	1.0%	2.6%	4.2%	7.8%
16/30	1.76%	7.3%	–	–

PERMEABILITY DARCIES @250°F, 2LB/FT²						
MESH	2,000	4,000	6,000	8,000	10,000	12,000
40/70	48	40	27	15	8	-
30/50	86	71	49	25	13	8
20/40	272	201	115	59	31	-
16/30	530	360	174	69	32	-

FAIRMOUNT SANTROL THS PRECURED RESIN-COATED SAND

PHYSICAL AND CHEMICAL PROPERTIES				
MESH	SPECIFIC GRAVITY	BULK DENSITY, LB/FT³	BULK DENSITY, G/CM³	ABSOLUTE VOLUME, GAL/LB
40/70	2.52	93	1.49	0.0473-0.0477
30/50	2.52	93	1.49	0.0473-0.0477
20/40	2.52	93	1.49	0.0473-0.0477
KRUMBEIN ROUND-NESS	KRUMBEIN SPHERIC-ITY	ACID SOLUBILITY	TURBIDITY, FTU	TEMP. STABILITY, °F
0.7	0.7	< 2%	< 250	450
0.7	0.7	< 2%	< 250	450
0.8	0.8	< 2%	< 250	450

CONDUCTIVITY, MD-FT @250°F, 2LB/FT², CLOSURE STRESS PSI							
MESH	2,000	4,000	6,000	8,000	10,000	12,000	14,000
40/70	1,090	980	762	485	305	–	–
30/50	1,990	1,866	1,230	790	400	202	100
20/40	6,743	4,302	3,011	1,753	995	–	–

CRUSH RESISTANCE				
MESH	4,000	8,000	10,000	12,000
40/70	0.4%	0.8%	1.5%	3.5%
30/50	0.4%	1.2%	2.2%	3.7%
20/40	0.6%	1.6%	2.6%	4.3%

PERMEABILITY DARCIES @ 250°F, 2LB/FT²							
MESH	2,000	4,000	6,000	8,000	10,000	12,000	14,000
40/70	60	55	43	28	21	-	-
30/50	105	101	70	46	25	15	9
20/40	328	249	178	103	61	-	-

HEXION

SPECIALTY CURABLE RESIN COATED PROPPANTS

OILPLUS PROPPANTS			
MESH SIZE	TYPICAL CLOSURE STRESS, PSI	TYPICAL TEMP. RANGE, °F	PROPPANT TYPE
16/30, 20/40, 30/50, 40/70	8,000 (16/30) 10,000 (20/40, 30/50, 40/70)	160-450*	Resin coated sand for enhanced oil flow

AQUABOND PROPPANTS			
MESH SIZE	TYPICAL CLOSURE STRESS, PSI	TYPICAL TEMP. RANGE, °F	PROPPANT TYPE
20/40, 30/50, 40/70	10,000	120-450	Resin coated sand that reduces the production of formation water

PREMIUM/INTERMEDIATE CURABLE RESIN COATED PROPPANTS

PRIME PLUS PROPPANTS			
MESH SIZE	TYPICAL CLOSURE STRESS, PSI	TYPICAL TEMP. RANGE, °F	PROPPANT TYPE
30/50, 40/70	12,000	160-450*	Premium resin coated sand

BLACK PRO PROPPANTS			
MESH SIZE	TYPICAL CLOSURE STRESS, PSI	TYPICAL TEMP. RANGE, °F	PROPPANT TYPE
40/70	12,000	130-400	Premium resin coated sand

SB PRIME PROPPANTS			
MESH SIZE	TYPICAL CLOSURE STRESS, PSI	TYPICAL TEMP. RANGE, °F	PROPPANT TYPE
20/40	10,000	160-450*	Premium resin coated sand

SB EXCEL PROPPANTS			
MESH SIZE	TYPICAL CLOSURE STRESS, PSI	TYPICAL TEMP. RANGE, °F	PROPPANT TYPE
20/40, 30/50	8,000	160-450*	Resin coated sand

LOW TEMPERATURE CURABLE RESIN COATED PROPPANTS

BLACK ULTRA PROPPANTS			
MESH SIZE	TYPICAL CLOSURE STRESS, PSI	TYPICAL TEMP. RANGE, °F	PROPPANT TYPE
16/30, 20/40, 30/50	8,000 (16/30, 20/40) 10,000 (30/50)	90-160	Ultra low-temp. resin coated sand (U.S. only)

YUKON BLACK PROPPANTS			
MESH SIZE	TYPICAL CLOSURE STRESS, PSI	TYPICAL TEMP. RANGE, °F	PROPPANT TYPE
16/30, 20/40	8,000	70-160	Ultra low-temp. resin coated sand (Canada only)

SIBERPROP PROPPANTS			
MESH SIZE	TYPICAL CLOSURE STRESS, PSI	TYPICAL TEMP. RANGE, °F	PROPPANT TYPE
16/30, 20/40	8,000	130-200**	Low temperature resin coated sand

CURABLE RESIN COATED CERAMICS

XRT CERAMAX P PROPPANTS			
MESH SIZE	TYPICAL CLOSURE STRESS, PSI	TYPICAL TEMP. RANGE, °F	PROPPANT TYPE
20/40	14,000***	175-450	Resin coated bauxite

XRT CERAMAX V PROPPANTS			
MESH SIZE	TYPICAL CLOSURE STRESS, PSI	TYPICAL TEMP. RANGE, °F	PROPPANT TYPE
-14+40	14,000	175-450	Resin coated intermediate ceramic

XRT CERAMAX E PROPPANTS			
MESH SIZE	TYPICAL CLOSURE STRESS, PSI	TYPICAL TEMP. RANGE, °F	PROPPANT TYPE
20/40	12,000	175-450	Resin coated lightweight ceramic

* At temperatures below 160°F, use AcTivator consolidation aid.
** At temperatures below 130°F, use AcTivator consolidation aid.
*** XRT Ceramax P proppant uses bauxite, which is the highest strength ceramic. Conductivity testing conducted up to 14,000 psi.

Visit hexion.com/oilfield or fracline.com for additional information and specifications.

RAINBOW

RAINBOW REALITE - ULTRA-LIGHTWEIGHT CERAMIC

TYPICAL SIEVE ANALYLSIS [WEIGHT % RETAINED]			
U.S. MESH	MICRONS	30/50	40/70
-20+30	-850+600	1	-
-30+40	-600+425	60	2
-40+50	-425+300	39	82
-50+70	-300+212	-	16
-70	-212	-	-

API CRUSH TEST			
		30/50	40/70
% BY WEIGHT FINES	@7,500 PSI	7.1	2.7
	@10,000 PSI	12.0	6.7

REFERENCE PERMEABILITY, DARCIES@250°F		
CLOSURE/STRESS, PSI	2 LB/FT^2 30/50	2 LB/FT^2 40/70
2,000	151	91
4,000	113	74
6,000	69	54
8,000	35	30
10,000	19	16

RAINBOW PROPLIGHT - LIGHTWEIGHT CERAMIC

TYPICAL SIEVE ANALYLSIS [WEIGHT % RETAINED]				
U.S. MESH	MICRONS	20/40	30/50	40/70
-16+20	-1,180+850	1	-	-
-20+30	-850+600	95	0.5	-
-30+40	-600+425	4	81	1
-40+50	-425+300	-	18	74
-50+70	-300+212	-	0.5	25
-70	-212	-	-	-

API CRUSH TEST				
		20/40	30/50	40/70
% BY WEIGHT FINES	@5,000 PSI	0.6	-	-
	@7,500 PSI	3.0	1.5	1.3
	@10,000 PSI	7.5	2.5	2.7

REFERENCE CONDUCTIVITY, MD-FT@250°F			
CLOSURE STRESS, PSI	2 LB/FT^2 20/40	2 LB/FT^2 30/50	2 LB/FT^2 40/70
2,000	8,157	3,663	1,677
4,000	6,443	2,882	1,489
6,000	4,429	2,238	1,292
8,000	2,334	1,562	889
10,000	1,249	826	486
12,000	741	527	-

REFERENCE PERMEABILITY, DARCIES@250°F			
CLOSURE STRESS, PSI	2 LB/FT^2 20/40	2 LB/FT^2 30/50	2 LB/FT^2 40/70
2,000	426	194	84
4,000	345	155	76
6,000	245	124	67
8,000	136	90	48
10,000	77	51	28
12,000	48	34	-

RAINBOW PROPMASTER - INTERMEDIATE-STRENGTH CERAMIC

TYPICAL SIEVE ANALYLSIS [WEIGHT % RETAINED]					
U.S. MESH	MICRONS	16/30	20/40	30/50	40/70
-16+20	-1,180+850	74	-	-	-
-20+30	-850+600	25	94	-	-
-30+40	-600+425	1	6	60	2
-40+50	-425+300	-	-	40	77
-50+70	-300+212	-	-	-	21
-70	-212	-	-	-	-

API CRUSH TEST					
		16/30	20/40	30/50	40/70
% BY WEIGHT FINES	@7,500 PSI	-	0.6	0.5	-
	@10,000 PSI	5.6	2.0	1.3	1.0

REFERENCE CONDUCTIVITY, MD-FT@250°F				
CLOSURE STRESS, PSI	2 LB/FT^2 16/30	2 LB/FT^2 20/40	2 LB/FT^2 30/50	2 LB/FT^2 40/70
2,000	14,920	8,314	3,061	1,564
4,000	11,607	6,868	2,566	1,380
6,000	7,256	5,323	2,080	1,150
8,000	4,202	3,478	1,611	956
10,000	2,345	2,250	926	765
12,000	-	1,435	634	-

REFERENCE PERMEABILITY, DARCIES@250°F				
CLOSURE STRESS, PSI	2 LB/FT² 16/30	2 LB/FT² 20/40	2 LB/FT² 30/50	2 LB/FT² 40/70
2,000	865	509	187	96
4,000	700	432	161	87
6,000	456	343	134	73
8,000	282	232	106	62
10,000	167	159	64	52
12,000	–	107	47	–

SAINT-GOBAIN PROPPANTS

SAINT-GOBAIN BAUXLITE/VERSALITE

SPECIFIC GRAVITY	BULK DENSITY
2.85	1.6

TYPICAL SIEVE ANALYSIS	
SIEVE NO	12/18 BAUXLITE
12	5
14	38
18	57
MPD* (mm)	1.35

TYPICAL SIEVE ANALYSIS	
SIEVE NO	16/20 BAUXLITE
16	5
18	55
20	40
MPD* (mm)	0.97

TYPICAL SIEVE ANALYSIS	
SIEVE NO	16/30 BAUXLITE
16	4
20	84
30	12
MPD* (mm)	0.95

TYPICAL SIEVE ANALYSIS	
SIEVE NO	VERSALITE
18	8
25	56
40	36
MPD* (mm)	0.74

TYPICAL SIEVE ANALYSIS	
SIEVE NO	20/40 BAUXLITE PLUS
20	8
30	82
40	10
MPD* (mm)	0.71

TYPICAL SIEVE ANALYSIS	
SIEVE NO	20/40 BAUXLITE
20	5
30	60
40	35
MPD* (mm)	0.65

TYPICAL SIEVE ANALYSIS	
SIEVE NO	30/50 BAUXLITE
30	5
40	75
50	20
MPD* (mm)	0.47

TYPICAL SIEVE ANALYSIS	
SIEVE NO	40/80 BAUXLITE
40	4
70	90
80	6
MPD* (mm)	0.33

*MPD: Median Particle Diameter

API CRUSH TEST				
CLOSURE STRESS, PSI	12/18	16/20	16/30	VERSALITE
6,000	7	4	2	1.5
8,000	16	9	6	3
10,000	20	16	12	6
CLOSURE STRESS, PSI	20/40 PLUS	20/40	30/50	40/80
6,000	1.5	1	1	1
8,000	3	3	3	2
10,000	6	5	5	4

CONDUCTIVITY (MD-FT)				
CLOSURE STRESS, PSI	12/18	16/20	16/30	VERSALITE
2,000	33,555	18,725	16,185	9,735
4,000	27,145	15,165	13,360	7,435
6,000	13,350	10,390	9,555	5,190
8,000	7,435	6,495	6,070	3,445
10,000	4,395	4,260	4,140	2,155
12,000	2,975	2,815	3,005	1,365
CLOSURE STRESS, PSI	20/40 PLUS	20/40	30/50	40/80
2,000	8,490	6,515	3,045	1,500
4,000	6,710	5,285	2,435	1,300
6,000	4,925	3,955	1,890	1,060
8,000	3,340	2,670	1,420	845
10,000	2,270	1,750	995	700
12,000	1,410	1,165	695	525

SAINT-GOBAIN INTERPROP/VERSAPROP

SPECIFIC GRAVITY	BULK DENSITY
3.2	1.88

TYPICAL SIEVE ANALYSIS	
SIEVE NO	12/18 INTERPROP
12	5
14	38
18	57
MPD* (mm)	1.35

TYPICAL SIEVE ANALYSIS	
SIEVE NO	16/30 INTERPROP
16	4
20	84
30	12
MPD* (mm)	0.95

TYPICAL SIEVE ANALYSIS	
SIEVE NO	20/40 INTERPROP
20	8
30	82
40	10
MPD* (mm)	0.71

TYPICAL SIEVE ANALYSIS	
SIEVE NO	VERSAPROP
18	8
25	56
40	36
MPD* (mm)	0.74

TYPICAL SIEVE ANALYSIS	
SIEVE NO	30/50 INTERPROP
30	5
40	75
50	20
MPD* (mm)	0.47

TYPICAL SIEVE ANALYSIS	
SIEVE NO	40/80 INTERPROP
40	4
70	90
80	6
MPD* (mm)	0.33

TYPICAL SIEVE ANALYSIS	
SIEVE NO	35/140 IP-H
35	5
50	35
80	50
140	10
MPD* (mm)	0.28

*MPD: Median Particle Diameter

API CRUSH TEST							
CLOSURE STRESS, PSI	12/18	16/30	VER-SAP-ROP	20/40	30/50	40/80	35/140
7,500	8	2.2	1.4	0.8	0.5	0.9	1.5
10,000	13	4.4	3.5	2.5	1.2	1.7	3
12,500		7.6	5.9	4	2.6	3.1	4

CONDUCTIVITY (MD-FT)			
CLOSURE STRESS, PSI	12/18	16/30	VERSAPROP
2,000	34,915	16,560	9,120
4,000	25,251	13,100	6,930
6,000	14,137	8,950	5,027
8,000	7,428	5,630	3,292
10,000	4,222	3,180	2,238
12,000	2,621	2,260	1,397
14,000			

CLOSURE STRESS, PSI	20/40	30/50	40/80	35/140
2,000	7,830	3,138	1,330	936
4,000	6,585	2,525	1,088	735
6,000	5,230	2,043	910	539
8,000	3,615	1,721	739	361
10,000	2,375	1,299	593	242
12,000	1,720	994	416	153
14,000			302	105

SAINT-GOBAIN SINTERED BAUXITE/ULTRAPROP

SPECIFIC GRAVITY	BULK DENSITY
3.5	2.04

TYPICAL SIEVE ANALYSIS	
SIEVE NO	16/30 SINTERED BAUXITE
16	4
20	84
30	12
MPD* (mm)	0.95

TYPICAL SIEVE ANALYSIS	
SIEVE NO	20/40 SINTERED BAUXITE
20	8
30	82
40	10
MPD* (mm)	0.71

TYPICAL SIEVE ANALYSIS	
SIEVE NO	ULTRAPROP
18	8
25	56
40	36
MPD* (mm)	0.74

TYPICAL SIEVE ANALYSIS	
SIEVE NO	30/50 SINTERED BAUXITE
30	5
40	75
50	20
MPD* (mm)	0.47

TYPICAL SIEVE ANALYSIS	
SIEVE NO	40/80 SINTERED BAUXITE
40	4
70	90
80	6
MPD* (mm)	0.33

*MPD: Median Particle Diameter

API CRUSH TEST					
CLOSURE STRESS, PSI	16/30	20/40	ULTRA-POP	30/50	40/80
7,500	1	0.5	0.6	0.2	0.2
10,000	2.5	1.2	1.5	0.6	0.5
12,500	4.5	2.2	3	1	0.9
15,000	9	4	6	1.5	2.1

CONDUCTIVITY (MD-FT)					
CLOSURE STRESS (PSI)	16/30	20/40	ULTRA-PROP	30/50	40/80
2,000	16,375	7,065	8,535	2,710	1,324
4,000	12,210	5,980	6,640	2,220	1,118
6,000	9,505	5,030	5,649	1,875	947
8,000	7,155	4,140	4,552	1,430	792
10,000	4,875	2,800	3,469	1,100	642
12,000	3,515	2,030	2,348	845	501
14,000	2,470	1,595	1,727	615	379

SAINT-GOBAIN TITAN

SPECIFIC GRAVITY	BULK DENSITY
3.65	2.19

TYPICAL SIEVE ANALYSIS	
SIEVE NO	TITAN V
18	8
25	56
40	36
MPD	0.74

API CRUSH TEST	
CLOSURE STRESS, PSI	TITAN V
10,000	<1
15,000	<4
20,000	<7

CONDUCTIVITY (MD-FT)	
CLOSURE STRESS, PSI	TITAN V
10,000	4640
12,000	4000
14,000	3370
16,000	2800
18,000	2300
20,000	1795

SINTEX

SINTERBALL BAUXITE

TYPICAL SIEVE ANALYSIS (WEIGHT % RETAINED)					
U.S. MESH	MICRONS	16/30	20/40	30/50	40/80
-16+20	-1,180+850	84	4	-	-
-20+30	-850+600	14	79	3	-
-30+40	-600+425	1	17	77	3
-40+50	-425+300	-	-	18	84
-50+70	-300+212	-	-	2	13
-70	-212	-	-	-	-

API CRUSH TEST					
		16/30	20/40	30/50	40/80
% BY WEIGHT FINES	@ 12,500 PSI	5.6	2.1	1.6	0.7
	@ 15,000 PSI			1.8	1.2

REFERENCE CONDUCTIVITY, -MDFT@250°F				
CLOSURE STRESS, PSI	2 LB/FT² 16/30	2 LB/FT² 20/40	2 LB/FT² 30/50	2 LB/FT² 40/80
2,000	–	8,060	4,408	1,447
4,000	–	6,909	3,780	1,267
6,000	9,742	6,023	3,265	1,130
8,000	7,356	4,901	2,806	989
10,000	5,455	3,833	2,341	850
12,000	4,013	2,903	1,815	712
14,000	3,053	2,116	1,383	574
16,000	–	1,647	1,000	438

REFERENCE PERMEABILITY, DARCIES@250°F				
CLOSURE STRESS, PSI	2 LB/FT² 16/30	2 LB/FT² 20/40	2 LB/FT² 30/50	2 LB/FT² 40/80
2,000	–	542	302	102
4,000	–	480	264	90.9
6,000	664	432	234	82.2
8,000	516	363	205	73.3
10,000	397	293	175	64.3
12,000	303	229	139	54.7
14,000	240	172	108	45.1
16,000	–	138	80.6	35.1

SINTERLITE BAUXITE

TYPICAL SIEVE ANALYSIS (WEIGHT % RETAINED)						
U.S. MESH	MICRONS	12/18	16/30	20/40	30/50	40/80
-16+20	-1,180+850	3	86	2	–	–
-20+30	-850+600	–	13	77	2	–
-30+40	-600+425	–	–	21	47	3
-40+50	-425+300	–	–	–	43	54
-50+70	-300+212	–	–	–	8	34
-70	-212	–	–	–	–	6

API CRUSH TEST						
		12/18	16/30	20/40	30/50	40/80
% BY WEIGHT FINES	@ 7,500 PSI	15.3	9.4	4.0	2.3	1.8

REFERENCE CONDUCTIVITY, -MDFT@250°F					
CLOSURE STRESS, PSI	2 LB/FT² 12/18	2 LB/FT² 16/30	2 LB/FT² 20/40	2 LB/FT² 30/50	2 LB/FT² 40/80
2,000	34,018	16,509	9,249	3,308	2,044
4,000	23,124	14,124	7,526	2,759	1,644
6,000	12,888	9,834	5,515	2,299	1,274
8,000	6,941	6,439	3,643	1,753	904
10,000	3,994	3,488	2,061	1,252	576
12,000	2,847	2,033	1,100	773	343

REFERENCE PERMEABILITY, DARCIES@250°F					
CLOSURE STRESS, PSI	2 LB/FT² 12/18	2 LB/FT² 16/30	2 LB/FT² 20/40	2 LB/FT² 30/50	2 LB/FT² 40/80
2,000	2,013	1,012	563	205	124
4,000	1,447	893	472	175	102
6,000	847	643	355	150	80.7
8,000	474	436	243	117	58.5
10,000	283	244	142	85.8	38.1
12,000	209	147	78	54.2	23.2

SINTERPROP BAUXITE

TYPICAL SIEVE ANALYSIS (WEIGHT % RETAINED)					
U.S. MESH	MICRONS	16/30	20/40	30/50	40/80
-16+20	-1,180+850	49	8	–	–
-20+30	-850+600	46	80	2	–
-30+40	-600+425	1	12	51	3
-40+50	-425+300	–	–	43	47
-50+70	-300+212	–	–	4	47
-70	-212	–	–	–	3

API CRUSH TEST					
		16/30	20/40	30/50	40/80
% BY WEIGHT FINES	@ 7,500 PSI	2.6	–	–	–
% BY WEIGHT FINES	@ 10,000 PSI	5.1	4.4	1.4	0.8
% BY WEIGHT FINES	@ 12,500 PSI	10.7	8.3	2.9	1.5
% BY WEIGHT FINES	@ 15,000 PSI	–	–	–	3.8

REFERENCE CONDUCTIVITY, -MDFT@250°F				
CLOSURE STRESS, PSI	2 LB/FT² 16/30	2 LB/FT² 20/40	2 LB/FT² 30/50	2 LB/FT² 40/80
2,000	13,752	8,773	3,001	1,597
4,000	11,392	7,758	2,567	1,244
6,000	9,157	6,543	2,198	1,113
8,000	6,682	5,015	1,785	985
10,000	4,819	3,200	1,356	821
12,000	3,417	1,988	969	658
14,000	2,311	1,198	623	501

REFERENCE PERMEABILITY, DARCIES@250°F				
CLOSURE STRESS, PSI	2 LB/FT² 16/30	2 LB/FT² 20/40	2 LB/FT² 30/50	2 LB/FT² 40/80
2,000	855	554	193	104
4,000	728	499	168	82.8
6,000	600	430	147	75.2
8,000	451	338	121	67.6
10,000	335	223	94.1	57.3
12,000	245	143	69.2	46.9
14,000	171	88.6	46.2	36.4

SINTERPROP BAUXITE

TYPICAL SIEVE ANALYSIS (WEIGHT % RETAINED)				
U.S. MESH	MICRONS	20/40	30/50	40/70
-16+20	-1,180+850	-	-	-
-20+30	-850+600	95	1	-
-30+40	-600+425	5	96	-
-40+50	-425+300	-	3	88
-50+70	-300+212	-	-	11
-70	-212	-	-	-

API CRUSH TEST				
		20/40	30/50	40/70
% BY WEIGHT FINES	@ 7,500 PSI	4.0	3.5	1.4
% BY WEIGHT FINES	@ 10,000 PSI	9.6	7.1	3.7

REFERENCE CONDUCTIVITY, -MDFT@250°F			
CLOSURE STRESS, PSI	2 LB/FT² 20/40	2 LB/FT² 30/50	2 LB/FT² 40/70
2,000	10,737	5,202	2,519
4,000	8,789	4,3112	2,112
6,000	6,359	3,093	1,614
8,000	3,697	1,804	954
10,000	2,077	1,044	511
12,000	1,107	587	288

REFERENCE PERMEABILITY, DARCIES@250°F			
CLOSURE STRESS, PSI	2 LB/FT² 20/40	2 LB/FT² 30/50	2 LB/FT² 40/70
2,000	594	291	142
4,000	501	249	115
6,000	374	184	91
8,000	225	110	61.4
10,000	132	64.8	35.2
12,000	72.7	37.4	23

SUN

SUN FRACKBLACK HT

PHYSICAL AND CHEMICAL PROPERTIES					
MESH	SPE-CIFIC GRAV-ITY	BULK DENSITY, LB/FT³	BULK DENSITY, G/CM³	KRUM-BEIN ROUND-NESS	TYPICAL TEMP RANGE, °F
14/40	1.05	41.2	0.66	0.9	< 275
30/80	1.05	41.2	0.66	0.9	< 275

CONDUCTIVITY, MD-FT @0.02 2LB/FT²				
MESH	2,000	4,000	6,000	8,000
14/40	14,100	2,600	500	300
30/80	2,000	400	80	50


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