

Technical Data Sheet

Black Ultra[™] Proppants

Description

Black Ultra[™] proppants are available in 16/30, 20/40, 30/50 and 40/70 mesh sizes. These resin coated proppants utilize an advanced resin system, which bonds at low temperatures without the use of a consolidation aid for proppant flowback control.

Typical Applications

Fracture treatments:

At closure stress up to:

- 8,000 psi [55 MPa] (16/30 and 20/40)
- 10,000 psi [69 MPa] (30/50 and 40/70)

At bottom-hole static temperatures* from:

- 90 - 450°F [32 - 232°C]

*Does not require low temperature consolidation aid down to recommended temperatures.

Technical Advantages and Benefits

- Proppant flowback control in low temperature reservoirs without a consolidation aid
- High conductivity
- Proppant fines reduction
- Cyclic stress resistance
- Minimizes proppant embedment
- Reduces respirable silica dust exposure below PEL limits

Typical Properties

Black Ultra[™] Proppants
<https://www.hexion.com/en-US/product/blackultra>

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| Property | Value | Unit |
|----------------------------------|--|-----------------------------|
| Specific Volume | 0.386 [0.0463], 0.383 [0.0439], 0.386 [0.0463], 0.385 [0.0461] | cm ³ /g [gal/lb] |
| API Mesh Size | 16/30, 20/40, 30/50, 40/70 | |
| Bulk Density | 1.46 [12.2], 1.53 [12.8], 1.48 [12.4], 1.47 [12.3] | g/cm ³ [lb/gal] |
| Color | tan to reddish tan | |
| Composition | resin coated, northern white frac sand | |
| Median Particle Diameter | 0.7660, 0.5775, 0.3825 | mm |
| Particle Size Distribution | meets or exceeds API RP 19C | |
| Physical State | solid granule | |
| Pipe Fill Factor | 0.685 [0.0821], 0.654 [0.0784], 0.676 [0.0810], 0.681 [0.0816] | cm ³ /g [gal/lb] |
| Resin Type | thermosetting, curable | |
| Solubility in Water, Brine & HCl | 0.0 | weight % |
| Specific gravity | 2.59, 2.61, 2.59, 2.60 | |
| Turbidity | ≤ 250 | NTU (FTU) |

Technical Considerations

- Grain-to-grain contact must occur and closure stress must be applied during the cure period for proper bonding
- Consolidation of curable product at bottom-hole static temperatures below 90°F [32°C] is achieved by use of Hexion's AcTivator™ low temperature consolidation aid

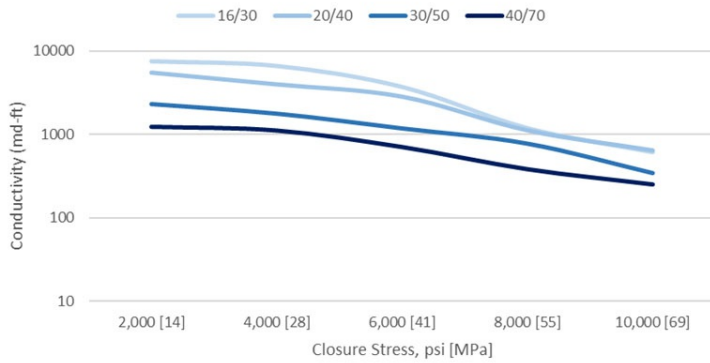
Conductivity

PropTester, Inc. Long-Term Baseline Procedure

Proppant Concentration: 2 lb_m/ft² [9.8 kg/m²], Temp: 150°F [66°C]

| Closure Stress, psi [MPa] | 2,000 [14] | 4,000 [28] | 6,000 [41] | 8,000 [55] | 10,000 [69] |
|---------------------------|------------|------------|------------|------------|-------------|
|---------------------------|------------|------------|------------|------------|-------------|

| Size | Conductivity (md-ft) | | | | |
|-------|----------------------|-------|-------|-------|-----|
| 16/30 | 7,841 | 6,575 | 3,697 | 1,189 | 615 |
| 20/40 | 5,449 | 3,941 | 2,811 | 1,109 | 637 |
| 30/50 | 2,315 | 1,778 | 1,185 | 779 | 346 |
| 40/70 | 1,227 | 1,107 | 704 | 383 | 252 |



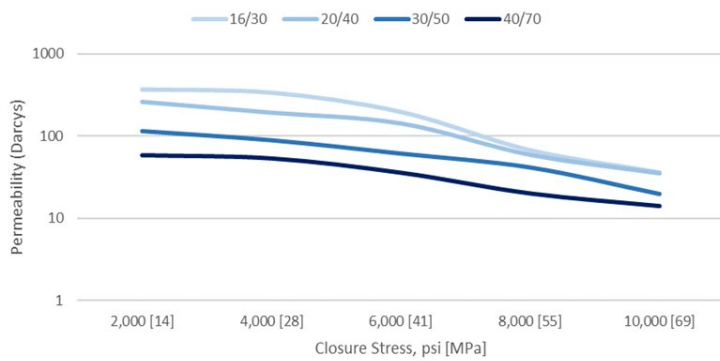
Permeability

PropTester, Inc. Long-Term Baseline Procedure

Proppant Concentration: 2 lb_m/ft² [9.8 kg/m²], Temp: 150°F [66°C]

| Closure Stress, psi [MPa] | 2,000 [14] | 4,000 [28] | 6,000 [41] | 8,000 [55] | 10,000 [69] |
|---------------------------|------------|------------|------------|------------|-------------|
|---------------------------|------------|------------|------------|------------|-------------|

| Size | Permeability (Darcy) | | | | |
|-------|----------------------|-----|-----|----|----|
| 16/30 | 365 | 333 | 195 | 67 | 36 |
| 20/40 | 260 | 192 | 142 | 59 | 35 |
| 30/50 | 116 | 90 | 62 | 42 | 20 |
| 40/70 | 59 | 54 | 36 | 20 | 14 |



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