



Sourced and Manufactured in the USA Battery-Ready  
**Natural Delaminated Expanded Graphite (DEXDG)** for  
 Lithium-ion, Lithium Primary, Lead-Acid & Alkaline Batteries

## TECHNICAL DATA SHEET

### General Characteristics

Product Name	ULTRA-DEXDG™
Type	Natural Flake Delaminated Expanded Graphite
Chemical Name	Graphite
Chemical Element	C
Appearance	Fine dark gray powder
True Density	2.1 to 2.23 g/cm <sup>3</sup>
County of Origin	USA
Country of Manufacture	USA
Melting Point	3,750 °C (sublimes)
Molecular Weight	12.01 g/mol
CAS Number	7782-42-5
EC Number (EINECS)	231-955-3
Harmonized Tariff Schedule (HTS US)	2504.10.10.00

### Physical Characteristics

Purity (LOI <sub>950</sub> )	> 99.95 wt% C
Ash, wt%	0.05%
Moisture	< 0.1 wt%
BET Surface Area	18 m <sup>2</sup> /g
Tap Density	0.12 g/cm <sup>3</sup>
Scott Volume	0.07 g/cm <sup>3</sup>

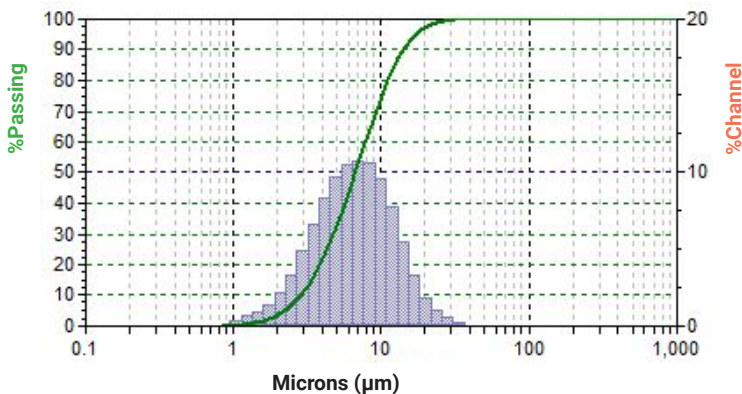
### Standard Grades

ULTRA-DEXDG-45™ Graphite	D <sub>50</sub> = 45 μm
ULTRA-DEXDG-25™ Graphite	D <sub>50</sub> = 25 μm
ULTRA-DEXDG-15™ Graphite	D <sub>50</sub> = 15 μm
ULTRA-DEXDG-09™ Graphite	D <sub>50</sub> = 9 μm
ULTRA-DEXDG-07™ Graphite	D <sub>50</sub> = 7 μm
ULTRA-DEXDG-04™ Graphite	D <sub>50</sub> = 4 μm

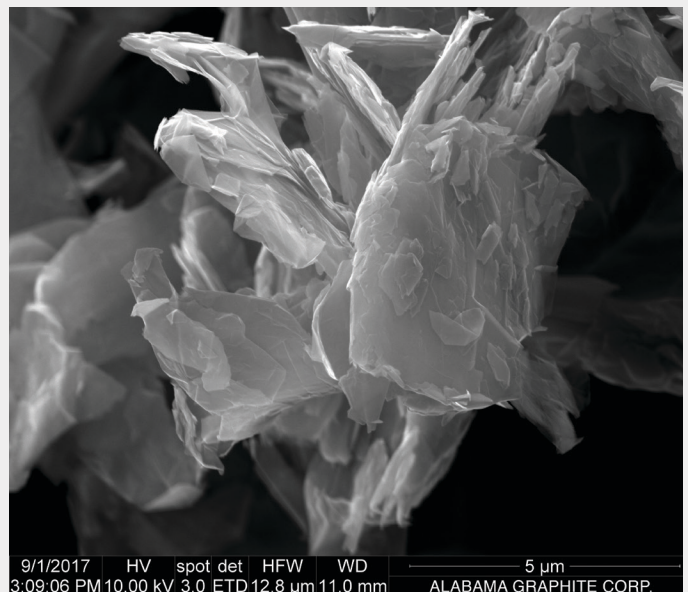
• All data presented is based on a D<sub>50</sub> particle size of 6.7 μm

### Particle Size Distribution

Laser diffraction particle size analysis by Microtrac S3500



D <sub>10</sub>	2.9 μm
D <sub>50</sub>	6.7 μm
D <sub>90</sub>	14.0 μm
Mean Value	7.8 μm



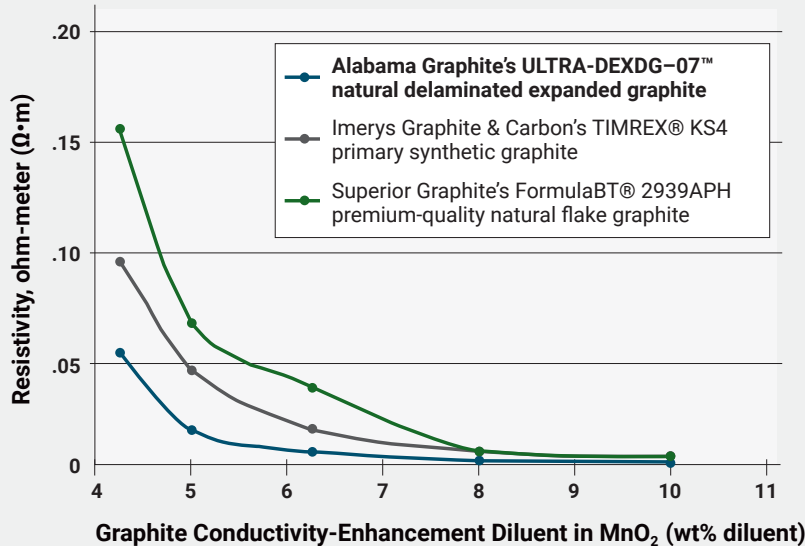
9/1/2017 HV spot det HFW WD 5 μm  
 3:09:06 PM 10.00 kV 3.0 ETD 12.8 μm 11.0 mm ALABAMA GRAPHITE CORP.

SEM of Alabama Graphite's natural ULTRA-DEXDG™ processed natural graphite for conductivity-enhancement applications



## FIGURE 1: 4T-SENSING RESISTIVITY TEST RESULTS OF AGC'S DEXDG VS. COMPETITIVE PRODUCTS

## TRACE MINERAL IMPURITIES KEY ELEMENTS



In Figure 1, the horizontal line (or the 'X' axis) represents the addition of conductivity-enhancement graphite in manganese dioxide (MnO<sub>2</sub>) matrix as a function of total weight percentage (wt%) of the additive. The vertical line (or the 'Y' axis) represents the electrical resistivity measured in SI units of ohm-meters (Ω·m). The ideal is to obtain the lowest amount of resistivity with the least amount of conductivity-enhancement graphite.

Element	Concentration (ppm)
Al	2.67
As	1.36
Ca	1.29
Co	<0.1
Cr	0.075
Cu	0.09
Fe	6.373
Mo	0.849
Ni	0.392
Pb	0.02
Sb	0.124
Si	0.15
Sn	0.08
V	0.119

Data by Solid ICP

## TABLE 1: 4T-SENSING RESISTIVITY TEST RESULTS OF AGC'S DEXDG VS. COMPETITIVE PRODUCTS

Conductivity-Enhancement Material	Graphite Conductivity-Enhancement Diluent in MnO <sub>2</sub> (wt% diluent)	Resistivity Measurement (Ω·m)
<b>Alabama Graphite's ULTRA-DEXDG-07™</b> natural Delaminated Expanded Graphite	<b>4.25</b>	<b>.0533 Ω·m</b>
<b>Imerys Graphite &amp; Carbon's TIMREX® KS4</b> primary synthetic graphite	4.25	.0991 Ω·m
<b>Superior Graphite's FormulaBT® 2939APH</b> premium-quality natural flake graphite	4.25	.1524 Ω·m

As indicated in Figure 1 and Table 1 above, AGC's ULTRA-DEXDG-07™ features lower resistivity in MnO<sub>2</sub> electrolytic manganese dioxide (EMD) electrode matrices across all practical percentage point additions, compared to commercially available grades of both natural and synthetic graphite products, produced by Superior Graphite and Imerys Graphite & Carbon respectively.

### DISCLAIMER

**FOR REFERENCE ONLY.** The information contained within this product information bulletin is not a product specification. Information provided in this document is supplied to indicate the approximate physical and chemical properties of the material. Customers are strongly urged to test the material independently prior to application/purchase.

**QUALIFIED PERSON:** Gareth P. Hatch, PhD, CEng, FIMMM, FIET, Chief Executive Officer and Director of Alabama Graphite, is a Qualified Person as defined by National Instrument 43-101 ("N.I. 43-101") guidelines, and has reviewed and approved the scientific and technical disclosure in this technical data sheet.

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