Physical Properties of EDM Graphite

There are 5 measured physical properties used to evaluate all EDM graphites. These physical properties combine to determine the performance that EDMers can expect from their electrode materials. Here you can read about these properties and how their values impact performance. More importantly, you can also read about the benefits you, as an EDMer, will derive from using graphite that has properties with values in the ranges recommended.

Particle Size - Manufactured graphite is made up of millions of particles of finely milled powder. EDM graphites typically have particle sizes ranging from 1m up to more than 30m. However, EDM quality graphite today would not have a particle size larger than about 20m. The size of the particles has a major impact on at least two characteristics of the job being completed in the EDM process. First, the surface finish that is achieved is dependent upon the effective size of the particles in the electrode material. With all settings the same on your EDM machine, a smaller effective particle size will produce a finer surface finish. Second, a larger particle size will result in a faster Metal Removal Rate (MRR).

Apparent Density - This is a calculation of how much mass or carbon is contained in a given volume of graphite. Most EDM graphites have densities ranging from 1.55 to 1.90g/cc. A higher density graphite has more carbon contained in a given volume. The higher density graphite typically has better bonding between particles. This usually means that higher density graphite will have lower wear rates during the EDM process.

Flexural Strength - This is the primary measure of graphite strength. An EDMer should look for higher flexural strength in graphite, as it typically indicates both good machinability and reduced particle erosion during the discharge phase. Flexural strength is directly related to the particle-to-particle bonding within the graphite. With bundled technology the EDMer gets a high particle-to-particle strength, but in addition the bundling process provides high levels of face bonding between the bundles rather than the typical particle/point bonding seen in conventional graphite technology. Thus the ability to withstand higher tool pressures is significantly increased while the incidence of particle erosion is significantly reduced when bundled technology is utilized.

Hardness - Graphite is usually measured in Shore hardness values. A desired hardness for good machining of graphite is between 60 and 80 Shore. Micron Research graphites fall between 63 and 76 Shore hardness - perfect for machining. There is little or no chipping or cracking due to high loading, and tool wear is kept to a minimum.

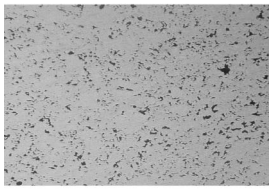
Electrical Resistivity - Electrical Resistivity (ER) is usually measured but, surprisingly, has little to do with the actual performance within an EDM application. Of note is the fact that higher density graphites have lower ER values. Micron Research's materials with their high average densities have generally low ER values. This means that Micron Research graphites never have overheating problems, even in the thinnest ribs or sharpest detail.

Micron Research
EDM Graphites

Typical Physical Properties

Ultra-Premium

E-970

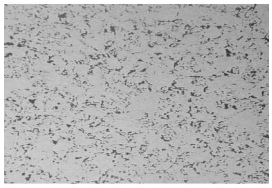


Average Particle Size (μ):	<4
Flexural Strength (psi):	13,600
Apparent Density (g/cc):	1.85
Hardness (Shore):	76
Electrical Resistivity (μΩin):	520

Aerospace
Punch & Die Sets
Plastic Injection Molds
Fine Detailed Electrodes
Powdered Metal Tooling

Premium

E-940

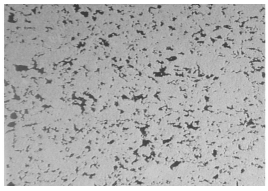


Average Particle Size (μ):	<7
Flexural Strength (psi):	11,500
Apparent Density (g/cc):	1.80
Hardness (Shore):	72
Electrical Resistivity (μΩin):	600

Blind Cavities
Punch & Die Sets
Plastic Injection Molds
Powdered Metal Tooling
Fine Detailed Electrodes

Superfine

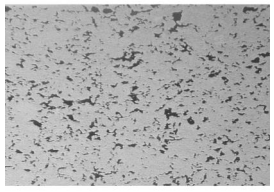
E-900



Average Particle Size (μ):	<8
Flexural Strength (psi):	10,000
Apparent Density (g/cc):	1.78
Hardness (Shore):	70
Electrical Resistivity (μΩin):	600

Die Cast Dies
Blind Cavities
Extrusion Dies
Fine Detailed Electrodes

E-888



Average Particle Size (μ):	14
Flexural Strength (psi):	7,500
Apparent Density (g/cc):	1.69
Hardness (Shore):	63
Electrical Resistivity (μΩin):	650

Forging Dies
Die Cast Dies
Extrusion Dies
Detailed Roughing Electrodes

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