



GRAPHITE PRECISION FIXTURES

Materials and machining capabilities

Overview

Entegris has a variety of fixturing materials for brazing and sealing operations, semiconductor backend packaging applications and various front end applications. Users of standard graphite brands can now choose an Entegris POCO graphite with the characteristics that give improved performance at an economical price.

Materials

Graphite

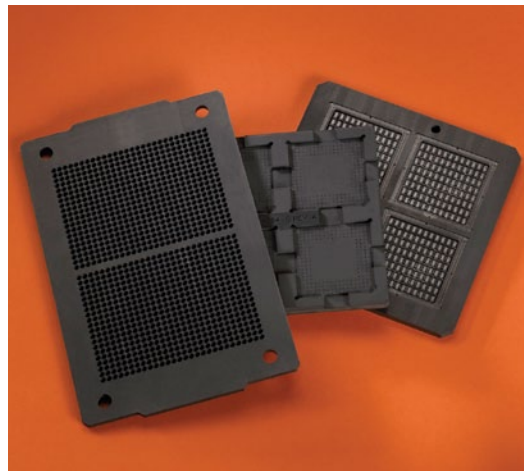
Entegris offers a full line of polycrystalline graphite materials to meet your application needs. Entegris materials range in grain size from 1 micron to 10 micron. Each graphite grade enables the user to select a material that will be cost effective for their own unique application. Infiltrations and coatings allow materials to be tailored to specific conditions. The thermal expansion of Entegris materials is higher than common graphites and gives better performance when used with metals. All Entegris graphite materials are isotropic; conductivity and expansion are uniform in all directions.

The unique structure of the materials combined with superior strength and small particle size make this material very easy to machine. Entegris materials have a good balance between strengths and hardness, resulting in less tool wear during machining operations.

Entegris has design and machining operations to produce precision-machined parts per customer drawings or sketches. Graphite is also available in block form for user machining.

FABMATE™

This material is ideal for applications requiring an abrasion-resistant, particle-free surface. Purified, finished graphite parts go through a unique, proprietary Chemical Vapor Infiltration (CVI) process that provides a nonporous surface by depositing an amorphous carbon coating. The treatment seals



the surface of the graphite and reduces particle generation in demanding environments.

The finished fixtures have a very clean surface that will not mark ceramic packages. FABMATE is thermally stable and ideal for applications with temperatures up to 510°C in the presence of oxygen and in excess of 1500°C in an inert atmosphere. FABMATE can be acid cleaned without dimensional changes.

Copper Impregnated Graphite

Copper impregnated material offers increased wear resistance for longer part life. Entegris graphite infiltrated with copper is easily machinable and allows machining detailed features and fine surface finish. High thermal conductivity and low electrical resistivity allow the parts to dissipate heat and currents during the application and enhance the performance of the fixture.

Specialty Coatings

Both high- and low-temperature specialty coatings are available, manufactured through Chemical Vapor Deposition (CVD), Physical Vapor Deposition (PVD) and Plasma Enhanced Chemical Vapor Deposition (PECVD) processes.

Features

Uniform Properties

Entegris graphites have excellent thermal properties. The polycrystalline, fine-grain graphites are isotropic, high-strength materials that improve wear and resist breakage. Materials without a grain direction offer maximum design flexibility.

These graphites are not affected by brazing temperatures and provide good heat transfer. Graphite fixtures remain dimensionally stable even after repeated cycling.

Thermal Properties

In an inert atmosphere, Entegris graphite can be exposed to temperatures in excess of 2500°C and still can maintain its physical properties. If heated in atmospheric conditions, the graphite will begin to oxidize above 450°C. Compared to other fixture material (metals, ceramic and glass), Entegris graphite has excellent thermal shock resistance properties.

Coefficient of Thermal Expansion (CTE)

The CTE of Entegris materials are closer to metals than other graphites. This helps eliminate misalignment problems between the package and fixture.

Solder/Glass to Metal Seal

Typically does not wet graphite and can be removed by normal cleaning procedures.

Machinability

High-strength, fine-grained graphites are very easy to machine. They hold tight tolerances and can be machined into intricate shapes. Entegris has a complete machining facility with sophisticated machining and inspection equipment available. Our machinists are leaders in the field of graphite machining.

Cleaning

After Entegris' final machining process, all parts are ultrasonically cleaned with deionized (DI) water to remove machining dust.

Technical Support

When switching from metals or ceramic fixtures, Entegris' engineering staff can assist with your design changes. Graphite does not have the design limitations common to these alternative materials. Entegris engineers offer suggestions that can improve part performance when designing in graphite.

For More Information

Please call your Regional Customer Service Center today to learn what Entegris can do for you. Visit www.entegris.com and select the Customer Service link for the center nearest you.

Terms and Conditions of Sale

All purchases are subject to Entegris' Terms and Conditions of Sale. To view and print this information, visit www.entegris.com and select the Legal Notices link from the footer.

Entegris® is a registered trademark of Entegris, Inc.
FABMATE™ is a trademark of Poco Graphite, Inc.

ENTEGRIS, INC.

Corporate Headquarters | 129 Concord Road | Billerica, MA 01821 USA
Customer Service Tel. +1 952 556 4181 | Customer Service Fax +1 952 556 8022
In North America 800 394 4083 | www.entegris.com

