Air Bearings

OVERVIEW

As the world's preeminent synthetic graphite, Entegris' POCO Materials are ideal for structural applications. The key to a customers' success using our materials lies in the level of control we maintain over the graphite microstructure. This feature, combined with the inherent lubricity of graphite, allows for unique applications that are not possible with any other material.

AIR BEARINGS

The inherent porosity of our graphite makes it ideal for the support and channeling structure for Air Bearings. Only our graphite maintains sufficient control of that porosity, allowing manufacturers to reliably predict and select the airflow needed to support their unique spindles.

Another priority in creating air bearings is to enable a 'soft landing' in the event of loss of plant air. Again, this capability is inherent to our graphite grades. Providing a non-galling, non-abrasive surface, bearing sleeves made from our materials present a perfect solution in the event of catastrophic loss of airflow. As spindles ramp down from high-RPM operation they touch down on a material that exhibits minimal fretting and protects the high-precision components from damage.

SUPPORT

We offer a wide range of porosity to support the range of airflow required for different applications. In addition, we have the capability to test components for airflow either individually or at the bulk level, ensuring 100% yield in manufacturing. We are available to provide technical assistance to designers wanting to use our materials in these sensitive and demanding applications.

COST OF OWNERSHIP

By switching from metal bearings to our graphite bearings, OEMs are able to drastically reduce the cost of components, reduce the total cost of their end-products, ensure against catastrophic failure, and enhance yield in their manufacturing operations.

FEATURES

- Uniform microstructure
- Inherent porosity
- High compressive strength
- Natural lubricity

BENEFITS

- Excellent airflow uniformity
- Crash resistance
- Low cost in comparison to machined components
- High yield in production

TYPICAL MATERIAL PROPERTIES

Properties	ZXF-5Q	ACF-10Q	AXF-5Q	AXM-5Q	AXZ-5Q
Particle size	1 µm (40 µin)	5 µm (200 µin)	5 µm (200 µin)	5 µm (200 µin)	5 µm (200 µin)
Pore size	0.3 µm (12 µin)	0.8 µm (32 µin)	0.8 µm (32 µin)	0.8 µm (32 µin)	0.7 µm (28 µin)
Total porosity: % volume	20%	21%	20%	23%	26%
Open porosity: % of total	80%	75%	80%	85%	90%
Apparent density	1.78 g/cm³ (0.0641 lb/in³)	1.77 g/cm³ (0.0637 lb/in³)	1.78 g/cm³ (0.0641 lb/in³)	1.73 g/cm³ (0.0623 lb/in³)	1.66 g/cm³ (0.0598 lb/in³)
Compressive strength	175 MPa (25,500 psi)	186 MPa (27,000 psi)	138 MPa (20,000 psi)	124 MPa (18,000 psi)	103 MPa (15,000 psi)
Flexural strength[1]	112 MPa (16,200 psi)	97 MPa (14,000 psi)	86 MPa (12,500 psi)	69 MPa (10,000 psi)	52 MPa (7500 psi)
Tensile strength[2]	79 MPa (11,500 psi)	69 MPa (10,000 psi)	62 MPa (9000 psi)	48 MPa (7000 psi)	34 MPa (5000 psi)
Modulus of elasticity	14,500 N/mm² (2.1 10^6 psi)	11,000 N/mm² (1.6 10^6 psi)	11,000 N/mm² (1.6 10^6 psi)	10,500 N/mm² (1.5 10^6 psi)	9000 N/mm² (1.3 10^6 psi)
Tensile strain to failure	0.78%	0.62%	0.95%	0.99%	n/a
Shore hardness	86	95	74	72	69
Electrical resistivity	1950 µΩ-cm (770 µΩ-in)	2460 µΩ-cm (970 µΩ-in)	1470 µΩ-cm (580 µΩ-in)	1650 µΩ-cm (650 µΩ-in)	2030 µΩ-cm (800 µΩ-in)
Coefficient of thermal expansion	8.1 µm/m°C (4.5 µin/in°F)	8.5 µm/m°C (4.6 µin/in°F)	7.9 µm/m°C (4.4 µin/in°F)	7.8 µm/m°C (4.3 µin/in°F)	7.6 µm/m°C (4.2 µin/in°F)
Thermal conductivity[3]	70 W/(cm·K) (40 BTU·ft/hr/ft²°F)	60 W/(cm·K) (35 BTU·ft/hr/ft²°F)	95 W/(cm·K) (55 BTU·ft/hr/ft²°F)	88 W/(cm·K) (50 BTU·ft/hr/ft²°F)	70 W/(cm·K) (40 BTU·ft/hr/ft²°F)
Oxidation threshold[4]	450°C (840°F)	470°C (880°F)	450°C (840°F)	460°C (860°F)	440°C (820°F)

[1] Measured using four-point bend method.
[2] Estimated at 70% of flexural strength.
[3] Estimated value.
[4] Temperature that results in 1% weight loss in 24 hours. Oxidation threshold increases by approximately 100°C if graphite is purified. Test sample size equals 0.5" x 0.5" x 1.0".

FOR MORE INFORMATION

Please call our Customer Service Center today to learn what our premium graphite and silicon carbide solutions can do for you. Visit poco.entegris.com/contact-us for the location nearest you.

TERMS AND CONDITIONS OF SALE

All purchases are subject to Poco Graphite's Terms and Conditions of Sale. To view and print this information, visit poco.entegris.com/terms-and-conditions.

Entegris
POCO Materials

300 Old Greenwood Road
Decatur, Texas 76234
USA

Customer Service
Tel +1 940 627 2121
Fax +1 940 393 8366