Introduction

Graphite is a natural mineral derivative of carbon. It is a native element, often the result of sedimentary carbon compounds, but also occurring in certain rocks containing organic carbon, in magma or as the result of the reduction of sedimentary carbon through the reduction of carbonates. Graphite has a non-compact layered structure made up of hexagonally-shaped structures. These layers are known as graphene have an inter-layer distance of approximately 0.336 nm. In each layer, the carbon atoms are strongly bonded together by molecular links whereas the layers are not strongly bonded together, which explains the material’s relative lack of hardness.

Physical properties:

Graphite is the stable form of carbon at ordinary temperatures and pressures. Graphite has a black, shiny, submetallic appearance. Its hardness is low, between 1 and 2 on the Mohs scale. Due to its layered structures, all of its physical properties are anisotropic. Indeed, its electrical conductivity varies greatly if measured between the layers or perpendicularly.

Graphite has many industrial applications in various natural or synthetic forms:

- Mechanical Engineering: friction parts, seals, lubricants
- Electrical manufacturing: brush motors
- Reducers, particularly in the steel industry (blast coke furnaces)
- Electrodes for the steel industry (electrical steel)
- Moderators in nuclear reactors
- Adsorbents in activated charcoal filter

Final Advanced Materials has manufacturing processes and an ISO 9001 certified quality system allowing us to manufacture the most complex parts in complete compliance with your designs and requirements.

- Flat or round grinding, turnery on lathes,
- Milling,
- Drilling,
- Ultrasonic processing,
- Plane and cylindrical polishing,
- Tapping, threading, grinding,
- Graphite-metal and graphite-ceramic compounds, brazing, metallizing.

For any question, please contact: info@final-materials.com
1 - MACHINABLE GRAPHITE

Machinable graphite is known for its excellent isostatic qualities and its perfect homogeneity. It does not absorb moisture, deform, burst or shrink due to thermal stress.

Graphite offers optimal resistance at very high temperatures and in highly corrosive environments. Heat losses are minimalized and thermal conduction optimized. Graphite is self-lubricating and easily machinable.

Graphite, an essential material for the production of silicon, is widely used in the production of semiconductors. It is also an essential material for different dedicated machining solutions in the industries of plastic processing, glass manufacturing, metallurgy and even as an insulating material for furnaces.

Graphite can be manufactured through extrusion or isostatic pressing.

HLM: extruded graphite, standard particle size

HLR: HLM lower quality with higher porosity.

R7340: isostatic standard.

R7340P30: equivalent to R7340 with greater purity and an ash content less than 30 ppm.

R4550: isostatic, fine particle size and very high mechanical strength.

R6650: isostatic, fine particle size and very high mechanical strength, exceeding those of R4550.

R6650P5: equivalent to R6650, very high purity, ash content less than 5 ppm.

R6710: isostatic, ultra-fine particle size and excellent mechanical strength.

R6710P5: equivalent to R7340, very high purity, ash content less than 5 ppm suitable for semiconductor manufacturing.

After machining, isostatic graphite has a surface roughness of 0,6µm.
### EXTRUSION

<table>
<thead>
<tr>
<th>REFERENCES</th>
<th>HLM</th>
<th>R4550</th>
<th>R6650</th>
<th>R6710</th>
<th>R7340</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction as per grain length</td>
<td>//</td>
<td>//</td>
<td>//</td>
<td>//</td>
<td>//</td>
</tr>
<tr>
<td>Density</td>
<td>g/cm³</td>
<td>1.7</td>
<td>1.83</td>
<td>1.84</td>
<td>1.88</td>
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<tr>
<td>Max. particle size</td>
<td>mm</td>
<td>0.8</td>
<td>0.01</td>
<td>0.007</td>
<td>0.003</td>
</tr>
<tr>
<td>Open porosity</td>
<td>%</td>
<td>17</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Electrical resistivity</td>
<td>Ohm.cm</td>
<td>7.3.10⁻⁴</td>
<td>9.4.10⁻⁴</td>
<td>13.10⁻⁴</td>
<td>14.10⁻⁴</td>
</tr>
<tr>
<td>Young’s modulus</td>
<td>GPa</td>
<td>10</td>
<td>9</td>
<td>11.5</td>
<td>12.5</td>
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<tr>
<td>Flexural strength</td>
<td>MPa</td>
<td>18</td>
<td>17</td>
<td>60</td>
<td>65</td>
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<tr>
<td>Compressive strength</td>
<td>MPa</td>
<td>39</td>
<td>35</td>
<td>125</td>
<td>150</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>MPa</td>
<td>13</td>
<td>12</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Hardness</td>
<td>Shore 20-25 (Shore D 70)</td>
<td>Rockwell B 95</td>
<td>Rockwell B 95</td>
<td>Rockwell B 110</td>
<td>Rockwell B 80</td>
</tr>
<tr>
<td>Thermal expansion (20/200°C)</td>
<td>10⁻⁶.K⁻¹</td>
<td>2.1</td>
<td>3.1</td>
<td>4</td>
<td>3.9</td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>W/m.K</td>
<td>180</td>
<td>140</td>
<td>100</td>
<td>90</td>
</tr>
<tr>
<td>Ash content</td>
<td>%</td>
<td>&lt; 0.1</td>
<td>0.002</td>
<td>/</td>
<td>/</td>
</tr>
</tbody>
</table>

For the **R7340** reference, we supply a wide range of bars directly extruded in a selection of standard diameters representing a significant cost-saving to the customer as the bars require no preparatory machining. These 300-mm bars are available in the following diameters:

Ø 3.2 - Ø 4.8 - Ø 6.4 - Ø 7.9 - Ø 9.5 - Ø 12.7 - Ø 13.8 - Ø 16 - Ø 19 mm

**Special applications:** Graphite is used for the handling, machining and shaping of heated glass.

Machinable graphite is an indispensable material for the manufacture of tools for the transformation of heated glass.

For any question, please contact: info@final-materials.com
Final offers a full range of materials and processes for the transformation of glass. With our extensive experience and know-how in this field, we are able to provide a full range of solutions for processes involving a number of metallic or composite tools using graphite.

**Advantages of these multi-material solutions**

They resist thermal shocks.

They do not adhere to glass.

They avoid mechanical tension in glass and prevent scratches on hot glass.

They feature low wear and friction coefficients, with positive thermal conductivity.

Our graphite-metal or graphite-composite tooling can increase the productivity of your production lines. They will make the set-up, settings and the maintenance of your production tools easier and quicker.

**BLOWN GLASS**

Final machines graphite moulds for glass casting and blow moulding.

- Fixture and insertion mechanisms
- Support plates, guides, handling mechanisms
- Transfer wheels and rotary plates
- Smelting crucibles
- Press tools
- Furnace insulation

**2 – COATINGS AND SURFACE TREATMENTS**

In order to modify the specific characteristics of graphite, different coatings and treatments can be applied.

We propose 5 types of coating and graphite impregnations for fine grain isostatic graphite (<10 µm):

- **Pyrolytic Carbon**: with the use of high-temperature, high-pressure chemical vapour deposition, (CVD process), the ultra-pure pyrolytic carbon coating provides a smooth surface, high density, strength and hardness along with very low porosity making it virtually impermeable to fluids and gases. The coating thickness is typically 2 to 30 microns. Pyrolytic carbon coating is composed of 99.9995% elemental carbon and is

For any question, please contact: info@final-materials.com
virtually free of organic or metallic impurities. This process prevents the formation of SiC (Silicon Carbide) in contact with the silicon. The coating resists attack by hydrofluoric (HF) and most other acids. Thermal shock will not cause spalling, crazing or flaking of the coating. It is ideal for both semiconductor and solar applications. It is thermally stable and ideal for applications with temperatures up to 550°C in the presence of oxygen and up to 250°C in vacuum or inert atmosphere.

- **SiC**: also obtained using the CVD process, the SiC layer is 75 to 125 microns thick. This treatment can seal the graphite completely, the result being a high-quality tool that is virtually inert to all process gases and chemicals, with great hardness, resistance to oxidation and good thermal conduction.

- **PTFE**: we also provide PTFE treatments which increase resistance to acids, eliminating porosity while maintaining the thermal characteristics of the graphite.

- **Methacrylate resin**: Graphite can also be impregnated with this resin which will ensure that the graphite provides excellent sealant capacities.

- **Antimony (only available for carbo-graphite)**: Our graphite can be impregnated with antimony for applications where resistance to wear is essential.

Graphite adhesives:

Our **Cotronics Resbond 931 Adhesive** bonds graphite or carbon components for use at temperatures up to 3000°C with 99% pure graphite. Just apply and cure at 120°C. Resbond 931 has excellent adhesion to graphite, and other porous surfaces, forming graphite to graphite bonds with strengths over 17.5 N / mm². Resbond 931 is ideal for repairing broken or cracked graphite trays, components, fixtures, dies; filling and rebuilding crevices, cracks, worn areas and bonding graphite cloths, felts, boards, etc.

Graphite spray: **013-0001**

Graphite spray is used for lubrication of metal, plastic or rubber parts without using grease. With this binder, it is possible to affix a film of graphite powder of very fine particle size with virtually no thickness on different materials.

**Applications**:

- Dry lubrication for all materials
- Anti-seize agent for all materials
- Release agent

For any question, please contact: info@final-materials.com
3 – POWDER GRAPHITE

Using scrap from our production of machinable graphite, we can provide sifted powder in the following standard sizes:

- 315-500 microns, ref: 113-0025
- 200-315 microns, ref: 113-0024
- 100-200 microns, ref: 113-0023
- 50-100 microns, ref: 113-0022
- 0-50 microns, ref: 113-0021

The powder is sold in 1L or 5L quantities or in 20kg bags. Custom sieving or bulk unscreened filling are also available.

4 - Soft Carbon and Graphite Felts for thermal insulation

Carbon / graphite Felts with thicknesses of 6 and 11 mm and a width of 1200 mm are available. Specific widths can be provided and special shapes can be cut to your specifications.

CHARACTERISTIC PROPERTIES

- Low thermal conductivity: greater than that of loose particle fillings such as granular carbon or metal radiation shields (energy savings of up to 75%)
- Low specific heat: allowing for rapid heating and cooling of furnaces
- High thermal stability: in oxidizing atmospheres up to 350°C, in protective or vacuum atmospheres up to approximately 3000°C for graphite and 1000°C for carbon
- Ease of processing: can be cut with scissors or blades. Flexible – adapted to small flexural radii.
- Favourable surface properties: unaffected by nearly all molten metals. Small specific surface area – low adsorption capacity; surface properties may be increased by partial oxidation.
- No electrostatic charging: when used together with plastics in composite materials.
- High resistivity: coupling in an inductive field only occurs above 12 kHz.

APPLICATIONS

- Thermal insulation for resistance- or induction-heated vacuum furnaces and inert gas furnaces, such as degassing furnaces, brazing furnaces, soft and bright annealing
furnaces, sintering furnaces for hard metals, carburizing furnaces, graphitizing furnaces.

- **For inductively heated** smelting and holding furnaces, a proportion of the ceramic insulating material is replaced by graphite or soft carbon felt in order to increase the electrical efficiency and to prevent the molten metal from coming into contact with the induction coil in the event of crucible fracture (no wetting of the graphite felt by the molten metals).

- **Filters** for hot and/or corrosive gases and liquids, for molten metals (no wetting)

- **Backing strips for soldering and welding** - no wetting, no smouldering

**USES**
Aerospace, semiconductors and photovoltaic, metallurgy, production of optical fibre, glass and ceramic processing, insulation of induction furnaces.

<table>
<thead>
<tr>
<th>CARBON FELT</th>
<th>GRAPHITE FELT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TYPICAL PROPERTIES</strong></td>
<td><strong>KFA 5</strong></td>
</tr>
<tr>
<td>Weight/Area</td>
<td>g/m²</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>MPa</td>
</tr>
<tr>
<td>Resistivity</td>
<td>Ohm.cm</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>W/m.K</td>
</tr>
<tr>
<td>Specific surface area</td>
<td>m²/g</td>
</tr>
<tr>
<td>Ash content</td>
<td>%</td>
</tr>
<tr>
<td>Sulphur content</td>
<td>%</td>
</tr>
<tr>
<td>Sizes</td>
<td>m</td>
</tr>
<tr>
<td>Thickness</td>
<td>mm</td>
</tr>
</tbody>
</table>

For any question, please contact: info@final-materials.com
The KFA 5, KFA 10 and GFA 5 references are available only in full rolls. GFA 10 is in stock; we offer custom-made cuts according to your needs. GFA 10 can be split into two parts with a thickness of 5mm.

5 – THREAD FOR FLEXIBLE graphite felt

It is also possible to sew or fasten flexible GFA felts together using thread spun using carbon. We stock a reference of thread measuring 2mm in diameter (reference D2-3K).

<table>
<thead>
<tr>
<th>Properties</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>mm</td>
</tr>
<tr>
<td>Weight/m</td>
<td>g</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>N</td>
</tr>
<tr>
<td>Maximum loop resistance</td>
<td>N</td>
</tr>
<tr>
<td>Maximum knot resistance</td>
<td>N</td>
</tr>
<tr>
<td>Ash content</td>
<td>%</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>2.0</td>
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<tr>
<td>Weight/m</td>
<td>1.8</td>
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<tr>
<td>Tensile strength</td>
<td>900</td>
</tr>
<tr>
<td>Maximum loop resistance</td>
<td>600</td>
</tr>
<tr>
<td>Maximum knot resistance</td>
<td>250</td>
</tr>
<tr>
<td>Ash content</td>
<td>&lt;0.5</td>
</tr>
</tbody>
</table>

We can also provide 24k and 50k carbon fibres. (References: C T24-4.8/240-E100, C T24-5.0/270-E100, C T50-4.0/240-E100, C T50-4.4/255-E100, C T50-4.0/240-T140)
6 - Rigid Graphite Felt

Rigid Graphite felt is available with a thickness of 40 mm (maximum size 1524 x 1219 mm²). This product is a shape-retentive insulating material made of graphite fibres and a carbon binder. It is suitable for temperatures up to 2000°C in a vacuum environment and used in the form of self-supporting boards, cylinders and other components, mainly in high-temperature furnace applications. Specific widths and shapes can be cut to your specifications.

CHARACTERISTIC PROPERTIES

Low thermal conductivity
This property allows high-temperature furnaces to be designed and manufactured with thin layers of insulating material. Moreover, graphite foil-faced felts ensure heat reflection into the furnace, and the foil acts as a convection barrier.

Low heat capacity
The low mass of the heat insulating layer, resulting from the low density of this material, allows rapid heating and cooling of the furnace.

High thermal stability
Rigid graphite felts are stable up to 2200°C in a vacuum or inert atmosphere. Above 2200°C their physical properties will change, i.e. thermal conductivity will increase and the material will shrink. For applications above 2200°C, users should consult us for advice.

Shape retention
Our felts do not compress or shrink under normal operating conditions. The bulk density thus remains unchanged throughout the entire insulating layer. The insulating properties remain constant, and no voids, channels or hot spots occur. Shape retention can be improved by optional carbon-fibre-reinforced carbon layers on both sides.

Low adsorption of gases and vapours
Due to their low specific surface area, rigid graphite felts adsorb only insignificant amounts of moisture. This allows short evacuating times from vacuum furnaces.

MAIN CHARACTERISTICS

- Density: 0.2 g/cm³
- Flexural strength: 1 MPa at 20°C
- Compressive strength: 1 MPa at 20°C
- Maximum application temperature: 2000°C in vacuum or inert gas
- Ash content: 1000 ppm
- Moisture adsorption: <1%

For any question, please contact: info@final-materials.com
• Low thermal conductivity: 0.19 W/m.K at 20°C up to 0.85 W/m.K at 2000°C
• Easy to machine
• High resistance to erosion
• Ideal for insulation of induction furnaces
• Available in purified grade
• Possibility of surface coating

This rigid felt is also available with one or both sides covered with graphite foil to prevent the release of fibres and increase the mechanical strength of the product.

The MFA - F reference has graphite bonded to one side.
The MFA – FF reference has graphite bonded to both sides.

These felt products can also be covered with CFC (carbon reinforced carbon).

This product is available from stock, parts can be cut according to your requirements.

Rigid felts

MFA: rigid felt without coating

**Application:** insulation

MFA-FF: Rigid felt with a sheet bonded to both surfaces.

**Applications:** insulation, inward reflection of radiation in furnaces, protection from erosion, convection barrier

For any question, please contact: info@final-materials.com
MFA CC: rigid felt coated with a C/C composite on both surfaces

**Applications:** insulation, strengthening for specific shapes

MFA-FCCF: rigid felt with a C/C composite and a bonded sheet on both surfaces.

**Applications:** insulation, strengthening for specific shapes, inward reflection of radiation in furnaces, protection from erosion, convection barrier

### Thermal conductivity of MFA felts at different temperatures (inert atmosphere)

![Graph showing thermal conductivity](image)

**Max. application temperature 2200 °C (inert gas atmosphere or vacuum)**

We can also provide rigid felt cylinders. Feel free to contact us!

### 7 – BONDING SHEET

Bonding sheets use high quality expanded graphite without any adhesive or bonding elements. They can be used at high temperatures up to 3000°C in an inert atmosphere or a vacuum. We stock 1 and 2 mm thicknesses, with a dimension of 1000 x 1000 mm². These sheets are often used with rigid felts as a coating on one or both surfaces.

**Principal Characteristics**

- Soft and flexible
- Inert, highly impermeable
- Light
- Easy to machine, cut or punch
- Heat dissipation, electrical conductivity
- Excellent chemical resistance
- Ash content: ≤0.15%

**CHARACTERISTICS OF BONDING SHEETS WITH A VOLUMETRIC MASS DENSITY OF 1.0 g/cm³**

- Temperature resistance: approximately 400°C in air and 3000°C in an inert environment or a vacuum
- Thermal conductivity: parallel to the surface: 190 W/m.K, perpendicular to the surface: 5 W/m.K
- Specific heat capacity (20°C): 0.7 kJ/K.kg
- Thermal expansion coefficient (20-1000°C): parallel to the surface: approx. 1.10⁻⁶/K, perpendicular to the surface: approx. 50.10⁻⁶/K
- Breaking strain: ≥1 %
- Tensile strength: ≥4 N/mm²

**Principal applications**
- Thermal screens,
- Protective coating,
- Diffusion barrier,
- Anti-adhesive protection,
- Heating elements

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**8 – CARBO-GRAPHITE**

These materials have a fine or very fine particle size and can have a very high degree of anisotropy due to the axial process. They are made of amorphous carbon and graphite. These materials are designed with specific properties in terms of tribology and electricity which can be reinforced through impregnations with resins or phosphates.

**Principal characteristics**
- Excellent resistance to corrosion
- Anti-wear
- Long-term stability
- Custom properties

For any question, please contact: info@final-materials.com
We stock **3 references of carbo-graphite: EK24, EK2240 and EK305.**

<table>
<thead>
<tr>
<th>Properties</th>
<th>EK24</th>
<th>EK2240</th>
<th>EK305</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impregnation</td>
<td>No impregnation</td>
<td>Phenolic resin</td>
<td>Antimony</td>
</tr>
<tr>
<td>Density</td>
<td>g/cm³</td>
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<td>1.8</td>
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<tr>
<td>Flexural resistance</td>
<td>MPa</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>Compressive strength</td>
<td>MPa</td>
<td>180</td>
<td>200</td>
</tr>
<tr>
<td>Young's modulus</td>
<td>GPa</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Rockwell B hardness</td>
<td></td>
<td>105</td>
<td>110</td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>W/m.K</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>Linear expansion</td>
<td>10⁻⁶.K¹</td>
<td>4.1</td>
<td>5.0</td>
</tr>
<tr>
<td>Temperature resistance</td>
<td>°C</td>
<td>350</td>
<td>200</td>
</tr>
</tbody>
</table>

**Principal applications**
- Sealing gaskets
- Gaskets
- Bearings

**9-CARBON/CARBON COMPOSITE**

Carbon reinforced carbon composites are primarily composed of carbon. The purity of these composites is very great as they are manufactured at temperatures of well over 2000°C. The ash content is 600 ppm. A rate of only 10 ppm can also be reached through post-purification.

Carbon/Carbon composites have a high degree of resistance to bending and are thus well suited to loaded systems, flat heating elements as well as screws and nuts for aeronautics.

**Principal Characteristics**
- High dimensional stability and mechanical strength up to 2700°C (using inert gas or in a vacuum)
- High resistance to thermal shocks
- Excellent resistance to alternating loads even at high temperatures
- High degree of purity
- Increase of stability with increasing temperatures

For any question, please contact: info@final-materials.com
• Good corrosion resistance at high temperatures
• Low density
• Low thermal expansion coefficient
• Resistance to vibrations
• Electrical conductivity

We provide 4 types of C/C composites: **Standard grade, Premium grade, Performance grade** (for load surfaces) and **Mechanical grade** (for fastenings).

**Standard and Performance grades:**
The Standard grade C/C composites are made of woven carbon. They are available in plates or as profiles.

**Premium grade:**
Also made of woven carbon, these composites are designed for components which will have a high stress-level. They are highly-rigid semi-finished sheets.

### Properties of C/C materials

<table>
<thead>
<tr>
<th>Properties of C/C materials</th>
<th>Standard</th>
<th>Premium</th>
<th>Performance</th>
<th>Mechanical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>g/cm³</td>
<td>1.45</td>
<td>1.50</td>
<td>1.50</td>
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<tr>
<td>Flexural strength, ⊥</td>
<td>MPa</td>
<td>140-180</td>
<td>240-300</td>
<td>200</td>
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<tr>
<td>Young’s modulus, //</td>
<td>GPa</td>
<td>60-70</td>
<td>70-85</td>
<td>70</td>
</tr>
<tr>
<td>Tensile strength, //</td>
<td>MPa</td>
<td>300-350</td>
<td>320-400</td>
<td>-</td>
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<tr>
<td>Ash content</td>
<td>ppm</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Ash content (purified grade)</td>
<td>ppm</td>
<td>&lt;10</td>
<td>&lt;10</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Inert atmosphere or vacuum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

⊥ perpendicular measurement
// parallel measurement

For any question, please contact: info@final-materials.com
10 - GLASSY CARBON

Glassy carbon is high-temperature resistant in inert gas or vacuum environments up to 3000°C. Unlike all other ceramic and metallic high-temperature materials, glassy carbon increases in strength with a rise in temperature up to 2400°C. Glassy carbon is thus twice as strong at 2400°C as it is at room temperature. The material does not become fragile at high temperatures and has a high degree of resistance to thermal shocks. Repeated high-level heating and cooling are not problematic.

Principal characteristics

- Low heating and smelting times, as the metal melts faster and more homogeneously. Glassy carbon crucibles have a longer life-span than those made of ceramics or ordinary graphite.
- Glassy carbon crucibles are not porous.
- Its high degree of purity, the low specific surface area and the isotropic structure of a carbon crucible give rise to a slight oxidation which produces protective gas above the smelted metal helping to prevent the formation of oxide on the molten metal.
- Uniform casting is possible without wetting the surfaces of the crucible. This property remains intact throughout the life-span of the product.
- With their high resistance to thermal shocks, crucibles made of glassy carbon will not crack even when placed on cold surfaces when still hot.
- Glassy carbon crucibles can be used in induction heating.
- Glassy carbon crucibles are ideally suited for smelting palladium alloys and other alloys containing a percentage of noble metals: they can be used to smelt ceramic alloys containing a percentage of noble metals at approximately 1400°C. Glassy carbon crucibles are also used with rare metals and titanium alloys.
- Glassy carbon crucibles are not to be used for the smelting of steel or ferrous alloys.
Available standard products: Cylindrical crucible - Evaporating dish - Conical crucible (high angle) - Conical crucible (low angle) - Lid - Crystal growth crucible - Crucible with dispensing spout - Boat, incinerating dish.

Other types are also available
- Bars, 1 to 10 mm diameter
- Plates, 0.5 to 6 mm thickness
- Films, 60 to 180 μm thickness
- Tubes upon request
- Powders

We can machine parts out of glassy carbon from your plans.

<table>
<thead>
<tr>
<th>REFERENCES</th>
<th>Grade K</th>
<th>Grade G (crucibles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>g/cm³</td>
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</tr>
<tr>
<td>Open porosity</td>
<td>%</td>
<td>0</td>
</tr>
<tr>
<td>Max. temperature (vacuum or inert gas)</td>
<td>°C</td>
<td>1000</td>
</tr>
<tr>
<td>Electrical resistivity</td>
<td>Ohm.cm</td>
<td>50.10⁻⁴</td>
</tr>
<tr>
<td>Young's modulus</td>
<td>GPa</td>
<td>35</td>
</tr>
<tr>
<td>Flexural strength</td>
<td>MPa</td>
<td>210</td>
</tr>
<tr>
<td>Compressive strength</td>
<td>MPa</td>
<td>580</td>
</tr>
<tr>
<td>Vickers hardness</td>
<td>HV</td>
<td>340</td>
</tr>
<tr>
<td>Thermal expansion (20/200°C)</td>
<td>10⁻⁶.K⁻¹</td>
<td>3.5</td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>W/m.K</td>
<td>4.6</td>
</tr>
<tr>
<td>Permeability coefficient</td>
<td>%</td>
<td>1.10⁻¹¹</td>
</tr>
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</table>