Consistent high quality
Cooperation with engineering firms
Shortest lead time
Wide range of carbon and ceramic products
Toughest machining tolerances
INTRODUCTION

FangYuan Group LTD is a leading refractory manufacturer and service company located in Lushan county, Henan province, China. The company was established in 1979 and was originally called Lushan Carbon Refractory Company. It was one of only a few furnace refractory suppliers appointed by the Metallurgical Department of China.

Today, FangYuan Group LTD operates the largest carbon block production facility in China. Each year, the company produces over 60,000 metric tons of refractory materials. FangYuan Group LTD also provides a full range of lining services including lining research, lining design, sales and construction. The company currently employs 1500 full-time employees including over 200 refractory engineers and technicians.

FangYuan Group’s main products and services include electric smelting furnaces linings, blast furnace linings, ladle linings, and other types of lining materials. In the past few decades, our product research & development has mainly focused on increasing furnace efficiency, reducing process consumption and prolonging furnace campaign life. We are proud to have successfully completed over 400 electric smelting furnace lining installations and over 600 blast furnace lining installations worldwide. Our products and lining methodologies have been utilized in 30 provinces in China and over 10 countries worldwide.

This publication will give you a brief introduction to our electric smelting furnace lining products.

Our primary focus is to develop the most suitable lining solutions to help our customers to extend their furnace service life and increase their furnace output. Our dedicated R&D department work hard together with our partners such as:

- The Wuhan Iron & Steel Technology Center
- The Wuhan Science & Technology University
- The Beijing Iron and Steel Research Center
- The University of Hunan
- The Anshan Iron & Steel College.
OUR FACILITY

Our Pre-assembly Platform
We believe a successful pre-assembly is a significant step to ensure a successful furnace reline. Therefore we have installed three 20m x 20m pre-assembly platforms. The platform is perfectly level, flat and even to within +/- 0.5mm. This allows us to pre-assemble several furnaces simultaneously, thus we are able to reduce pre-assembly time and delivery time. In addition, the pre-assembly platform allows our customers to come to our site and inspect their linings prior to shipping, ensuring customer satisfaction.

QUALITY CONTROL

FangYuan Group is an ISO 9001:2008 certified company. We pride ourselves on our high quality and process consistency standards.

Raw Material Selection
To ensure the quality of our raw materials, we only purchase our raw materials from our long-term trusted suppliers. With every purchase, our quality control staff performs the first inspection at our supplier’s site. Once the raw materials arrive at our facility, our quality control team performs a second inspection on the batch. Each time raw materials enter our facility, they are inspected again prior to being accepted.

Process and Quality Control
From raw material to final product, our process control inspectors ensure that our procedures are consistently and correctly applied each step of the way. In addition to rigorous process control, our quality control team inspects the output of each process to ensure material quality and consistency. In each of our workshops, our employees understand that the output of their workshop is the input for the next manufacturing department. Therefore they have been trained to always carefully inspect the previous workshop’s work and be responsible for their own output.

Finished Product Inspection
Prior to shipping, a team made up of process and material quality control engineers inspects the final product to ensure that the product conforms to our high standards of quality. The finished products are then once again evaluated for adherence to the customer’s order specifications.
COOLING CONCEPT LINING STRUCTURE

For applications such as Chrome, Manganese, Magnesium, Nickel and Ferroalloy, we recommend our cooling concept lining structure (shown in the illustration below.) The structure applies high-alumina bricks in the upper sidewall due to lower temperatures in this area; carbon blocks and graphite blocks are used for the sidewall area and the furnace bottom; the outer surface of the lining uses water spray cooling method; the I-beam support underneath the furnace bottom allows for boiler exhaust.

Our cooling concept lining structure offers our customers the following advantages:

1. Unique materials are utilized based on the needs of different areas of the furnace.
2. The use of carbon blocks highly reduces the chemical erosion.
3. The beveled shape of the carbon blocks prevents the bottom blocks from floating during operation and increases furnace strength.
4. The highly thermally conductive graphite blocks lead to better cooling and protect the furnace bottom from attack by molten metal.

INSULATION CONCEPT LINING STRUCTURE

For applications such as Ferro-silicon, industrial Silicon and Carbide, we recommend our insulation concept lining structure (shown in the illustration below.) In this structure, the working layer utilizes carbon materials, the permanent layer uses high-alumina or clay bricks, and under the bottom and the outside uses insulation materials. The advantages of this structure include:

1. The semi-graphite blocks have proven to have good erosion resistance and good overall structure strength.
2. The high-alumina bricks in the permanent layer are oxidation-resistant and erosion resistant.
3. Products such as Carbide, Ferro-silicon, have higher melting point. The insulation layer reduces the thermal loss, increases the temperature of the molten metal and reduces the workload on the exhaust system.
4. Overall this structure is able to provide higher temperature in the furnace working area and also prevent furnace bottom infiltration.
ELECTRIC SMELTING FURNACE LINING PRODUCTS

About Our Products

FangYuan Group manufactures a full range of shaped products, such as blocks/bricks in carbon, graphite, alumina, silicon carbide and clay. We also manufacture a series of unshaped products, such as ramming paste, cements and grouts.

The following are our standard specifications for several of our electric smelting furnace lining products.

Please contact us for additional information on our full line of products.

"According to the statistics from the China Carbon Association, the premium grade carbon block output of FangYuan Group has been ranked No. 1 since the year 2003."

ELECTRIC SMELTING FURNACE LINING PRODUCTS

Micropore and Super Micropore Carbon Blocks:
(Application Areas: furnace hearth and bottom)

Micropore and Super Micropore Carbon Blocks use high temperature electric calcined anthracite and synthetic graphite as primary materials, with various additives. They are molded under high pressure, baked, and machined to specification.

They have high thermal conductivity and low permeability; they also have excellent resistance to hot metal erosion.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Unit</th>
<th>Micropore</th>
<th>Super-Micropore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk Density</td>
<td>g/cm³</td>
<td>&gt;=1.63</td>
<td>&gt;=1.70</td>
</tr>
<tr>
<td>Apparent Porosity</td>
<td>%</td>
<td>&lt;=16</td>
<td>&lt;=15</td>
</tr>
<tr>
<td>Compressive Strength</td>
<td>mPa</td>
<td>&gt;=38</td>
<td>&gt;=36</td>
</tr>
<tr>
<td>Permeability</td>
<td>mDa</td>
<td>&lt;=9.0</td>
<td>&lt;=1.0</td>
</tr>
<tr>
<td>Thermal Conductivity (20°C)</td>
<td>W/m²K</td>
<td>&gt;=9</td>
<td>&gt;=16</td>
</tr>
</tbody>
</table>

Graphite Blocks
(Application areas: bottom, side wall, taphole)

Graphite blocks utilize low ash synthetic graphite, high quality petroleum coke and pitch coke as primary materials, along with additives. The blocks are molded under high pressure, impregnated, baked, graphitized and then machined to specification.

Graphite Blocks feature excellent thermal conductivity that leads to better cooling.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Unit</th>
<th>Graphite Block A</th>
<th>Graphite Block B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk Density</td>
<td>g/cm³</td>
<td>&gt;=1.60</td>
<td>&gt;=1.65</td>
</tr>
<tr>
<td>Apparent Porosity</td>
<td>%</td>
<td>&lt;=21</td>
<td>&lt;=20</td>
</tr>
<tr>
<td>Compressive Strength</td>
<td>mPa</td>
<td>&gt;=32</td>
<td>&gt;=30</td>
</tr>
<tr>
<td>Ash</td>
<td>%</td>
<td>&lt;=0.5</td>
<td>&lt;=0.5</td>
</tr>
<tr>
<td>Thermal Conductivity (20°C)</td>
<td>W/m²K</td>
<td>&gt;=43</td>
<td>&gt;=80</td>
</tr>
</tbody>
</table>
ELECTRIC SMELTING FURNACE LINING PRODUCTS

Semi-Graphite Carbon Blocks
(Application Area: side wall, bottom)

Semi-Graphite Carbon Blocks utilize electric calcined anthracite as the primary material and use pitch as binder. The blocks are pressed under high pressure and baked at high temperature before final machining.

Semi-Graphite Carbon Blocks feature excellent erosion resistance, high density and compressive strength, and low permeability.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Unit</th>
<th>Semi-Graphite Carbon Block A</th>
<th>Semi-Graphite Carbon Block B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk Density</td>
<td>g/cm³</td>
<td>&gt;=1.52</td>
<td>&gt;=1.6</td>
</tr>
<tr>
<td>Apparent Porosity</td>
<td>%</td>
<td>&lt;=20</td>
<td>&lt;=18</td>
</tr>
<tr>
<td>Compressive Strength</td>
<td>mPa</td>
<td>&gt;=32</td>
<td>&gt;=30</td>
</tr>
<tr>
<td>Bending Strength</td>
<td>MPa</td>
<td>&gt;=8.0</td>
<td>&gt;=8.0</td>
</tr>
<tr>
<td>Thermal Conductivity (20°C)</td>
<td>W/m²K</td>
<td>&gt;=6</td>
<td>&gt;=18</td>
</tr>
</tbody>
</table>

High Alumina Bricks
(Application Area: side wall, bottom)

High Alumina Bricks utilize high Alumina chamotte as primary materials. The bricks are molded, baked and machined to specification. Alumina Bricks feature good refractoriness and can be used in the critical area in the furnace.

Semi-Graphite Carbon Blocks feature excellent erosion resistance, high density and compressive strength, and low permeability.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Unit</th>
<th>High Alumina Bricks</th>
<th>Clay Bricks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al2O3</td>
<td>%</td>
<td>&gt;=75</td>
<td>&gt;=42</td>
</tr>
<tr>
<td>Apparent Porosity</td>
<td>%</td>
<td>&lt;=19</td>
<td>&lt;=15</td>
</tr>
<tr>
<td>Refractoriness</td>
<td>20°C</td>
<td>&gt;=1790</td>
<td>&gt;=1750</td>
</tr>
<tr>
<td>0.20 MPa Refractoriness Under Load (R.U.L)</td>
<td>20°C</td>
<td>&gt;=1520</td>
<td>&gt;=1450</td>
</tr>
</tbody>
</table>

Delivery

FangYuan prides itself on quality, from raw material to delivery. After our preassembly team and our customers inspect the finished products, we carefully package each block. Our packaging team covers up each corner and edge, then put each block into fitted boxes. This way we know our products are well protected during shipping.

Once our products reach the customer’s site, our furnace construction specialists work side by side with our customers to ensure that the reline process goes smoothly. After the reline, we follow up with customers to provide support during furnace operation.

Customer reference upon on request.

* Actual packaging may vary based on project requirements
Contacts

Vice President, International Sales
**FangYuan Group LTD**
**Nancy Li**
34194 Aurora Rd, Suite 152
Solon, Ohio 44139-3803
USA
Tel: +1 • 216 • 544 • 3587
Email: nancyli@furnacelining.com

Headquarters in China
**FangYuan Group LTD**
ChengDong WuLiBao, Lushan County,
PingDingShan City, Henan Province, 467300
P.R.China
Tel: +86 • 375 • 5081838
Fax: +86 • 375 • 5055438

www.furnacelining.com