

FRC Global Graphite Electrodes

Innovation

High Temp

FRC
Global

Expert Teams.

Global Networks.

Quality Products.

Who We Are

FRC Global is a leading supplier of refractories, electrodes, and high temperature combustion systems.

FRC Global provides outstanding results for our clients within the iron, steel, and non-ferrous industries. Our company's reputation is built by delivering high quality products made with premium raw materials. We are more global now than ever before.

We give you a competitive advantage by offering you superior proven products that positively impact your bottom line and perform better. Our knowledgeable engineers ensure the proper application of our products to give you the maximum level of output and safety.

With over 25 warehouse facilities in the United States, Canada, Mexico, and South America we assure your products are readily available when you need them in these regions.

Through the use of vast global resources, all of us at FRC Global are committed to being the value creators and problem solvers for our industry.

Mission Statement

Embrace modern technology to increase innovation, efficiency, and transparency. Inspire the next generation by driving change, promoting curiosity, and shaping sustainable solutions in the high temp world.



About Us



Background information

FRC Global is a second generation family owned company with a 30-year history.

FRC Global has offices, agents, or partners in 20 countries around the world.

Global Offices:

- ◆ North America: United States and Canada
- ◆ South America: Colombia
- ◆ Asia: China

We provide quality engineered products and services for all your high temperature applications.

FRC Global facts

Our quality control employees thoroughly inspect shipments to ensure products are within specification and are properly packaged.

Sales force and service needs are available in the following:

- ◆ North America
- ◆ Central America
- ◆ South America
- ◆ Europe
- ◆ Middle East

Why FRC Global?

Why Us

Our goal is to study your operation, propose solutions and ultimately optimize your cost per ton.

We also supply products such as carbon blocks for blast furnaces and the aluminum industry, as well as high quality cathodes and anodes.

Our strong relationships with global enterprises, primarily in strategic raw materials, ensure availability, price stability, and consistent high quality.

We have on-staff engineers, product managers and quality control teams who travel around the world to produce high-end products from only the best raw material to generate superior results for our customers.



Providing Solutions



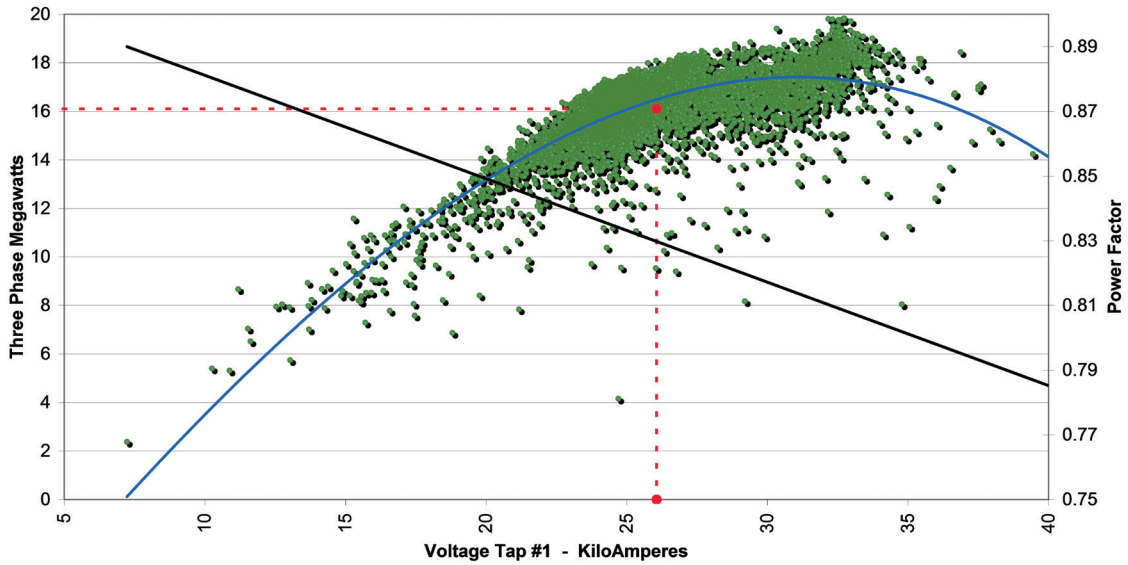
FRC Global is committed to providing innovative, quality products coupled with technical service specialists that continue to work with customers to monitor electrode performance. This results in better operational consistency, performance and cost effectiveness.

A full range of technical support services are designed to improve furnace performance and reduce your conversion costs.

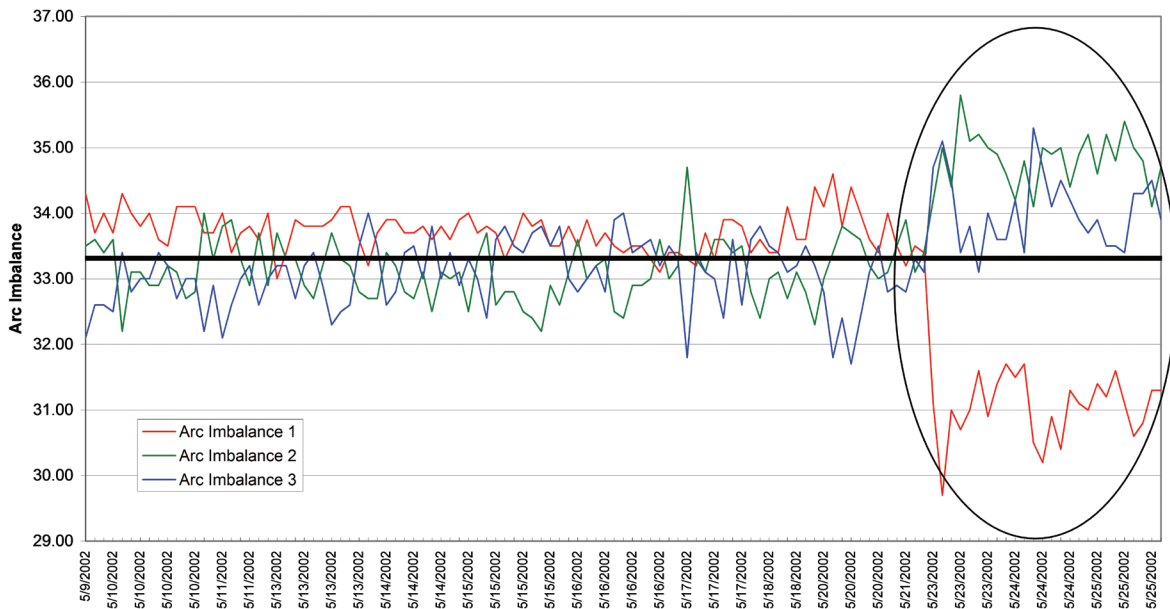
- ◆ Maximize energy input by determining effectiveness of power profile
- ◆ Maximize productivity by recharging at the optimal time
- ◆ Identify and solve regulation problems
- ◆ Determine electrical balance and solve arc flare problems
- ◆ Determine arc stability and effectiveness of foamy slag practice
- ◆ Trend furnace parameters - including those affecting electrode consumption

Technical Support

Power Curve



Help in Resolving Arc Imbalance



Technical Properties of Graphite Electrodes

Item	Unit	Product	Nominal Diameter (mm)						SHP	UHP		
			RP		HD		HP					
			Regular Power		High Density		High Power				Super High Power	Ultra High Power
			250-350	400-600	250-350	400-600	300-350	400-600			350-600	350-700
Resistivity	$\mu \Omega m$	Electrode	7.8 - 9.0	7.8 - 9.0	7.1 - 7.8	7.1 - 7.8	6.2 - 7.5	6.2 - 7.5	4.8 - 6.0	4.6 - 5.5		
		Nipple	5.2 - 6.5	5.2 - 6.5	4.2 - 5.0	4.2 - 5.0	4.2 - 5.0	4.2 - 5.0	4.2 - 5.0	4.2 - 5.0		
Flexural Strength	(Mpa)	Electrode	8 - 11	8 - 11	10 - 15	10 - 15	10 - 15	10 - 15	10 - 15	10 - 15		
		Nipple	10 - 15	10 - 15	10 - 15	10 - 15	10 - 15	10 - 15	10 - 15	10 - 15		
Elastic Modulus	(Gpa)	Electrode	7 - 11	7 - 14	7 - 14	7 - 14	7 - 14	7 - 14	7 - 14	7 - 14		
		Nipple	7 - 14	7 - 14	7 - 14	7 - 14	7 - 14	7 - 14	7 - 14	7 - 14		
Ash	%	Electrode Nipple	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2		
Bulk Density	(g/cm ³)	Electrode	1.53 - 1.65	1.53 - 1.65	1.60 - 1.69	1.60 - 1.69	1.65 - 1.73	1.65 - 1.73	1.68 - 1.75	1.70 - 1.77		
		Nipple	1.75 - 1.80	1.75 - 1.80	1.75 - 1.80	1.75 - 1.80	1.75 - 1.80	1.75 - 1.80	1.75 - 1.80	1.75 - 1.80		
C.T.E	(10 ⁻⁶ 1/°C)	Electrode	1.0 - 1.5	1.0 - 1.5	1.0 - 1.5	1.0 - 1.5	1.0 - 1.5	1.0 - 1.5	1.0 - 1.5	1.0 - 1.5		
		Nipple	1.0 - 1.5	1.0 - 1.5	1.0 - 1.5	1.0 - 1.5	1.0 - 1.5	1.0 - 1.5	1.0 - 1.5	1.0 - 1.5		

Product	Item	Nominal Diameter (mm)								
		250	300	350	400	450	500	550	600	700
RP	Rated Current	4000 - 9000	6000 - 13000	8000 - 16000	10000 - 23000	13000 - 27000	16000 - 34000	19000 - 36000	23000 - 40000	---
HD	Rated Current	5000 - 10000	7000 - 15000	9000 - 18000	12000 - 24000	15000 - 31000	19000 - 34000	24000 - 40000	27000 - 50000	---
HP	Rated Current	6000 - 12000	8000 - 17000	11000 - 21000	15000 - 30000	18000 - 35000	22000 - 40000	27000 - 50000	32000 - 55000	---
SHP	Rated Current	7000 - 13000	10000 - 18000	14000 - 24000	18000 - 33000	23000 - 41000	28000 - 45000	34000 - 60000	42000 - 65000	---
UHP	Rated Current	8000 - 15000	12000 - 20000	16000 - 28000	21000 - 40000	27000 - 45000	34000 - 55000	41000 - 67000	49000 - 75000	66000 - 85000

Torque Specs



Diameter	Torque (ft-lbs)	Torque (NM)
4"	103	140
6"	115	156
8"	180	244
9"	300	407
10"	332	450
12"	480	651
14"	650	881
16"	820	1112
18"	1180	1600
20"	1918	2600
22"	2655	3600
24"	3098	4200
26"	3688	5000
28"	4425	6000

Carbon Blocks for Blast Furnaces

Super Micro-pore Carbon Block

Super Micro-pore Carbon Block is made from calcined anthracite under high temperature with other various additives by extruding, baking and processing.

Typical properties: high thermal conductivity, high micro-pore porosity and good permeability which may reduce erosion to the body of the blast furnace, and avoid the iron liquid erosion and permeability.

Super Micro-pore Carbon Block can meet the requirements for the larger scale blast furnaces.

Micro-pore Carbon Block

Micro-pore Carbon Block is made from calcined anthracite under high temperature and other additives by extruding, baking and processing.

Typical properties: better micro porosity, permeability and anti-erosion against iron liquid.

Micro-pore Carbon Block can be used in blast furnace hearths.

High Thermal Conductivity Carbon Block

High Thermal Conductivity Carbon Block is made from high thermal conductivity materials and partial graphite materials. Pitch acts as binder. Main processes are extruding, baking, and processing.

The product has high thermal conductivity.

High Thermal Conductivity Carbon Block is used for the bottom of blast furnaces.

Size (mm)	Length (mm)	
200 x 200 x L	Available: 0 - 3,500 The best length: 800-2000	Tolerance (industry standard or customer requirement)
400 x 400 x L		
400 x 500 x L		
400 x 600 x L		
450 x 500 x L		
500 x 500 x L		
500 x 600 x L		
515 x 450 x L		
500 x 660 x L		
500 x 600 x L		
550 x 600 x L		
600 x 600 x L		

Premium Electrodes and Carbon Blocks

Item		Unit	Partial Graphite	Graphite Block	Ultra Thermal Conductivity	High Thermal Conductivity	Micro-pore	Super Micro-pore
Fixed Carbon	≥	%	---	98	99.5	---	---	---
Ash	≤	%	10	0.5	0.2	7	20	23
Bulk Density	≥	g/cm ³	1.55	1.52	1.65	1.60	1.62	1.68
Open Porosity	≤	%	20	25	20	18	18	17
Real Density	≥	g/cm ³	1.90	1.92	2.10	---	1.90	1.90
Compressive Strength	≥	Mpa	30	20	30	30	36	38
Bending Strength	≥	Mpa	8.0	6	11	8	9	9
Iron Liquid Melting Index	≤	%	32	---	---	32	30	30
Average Pore Diam	≤	μm	1.25	---	---	---	0.5	0.1
Poor Capacity under 1 μm	≥	%	30	---	---	---	70	80
Oxidation	≤	%	20	---	---	20	28	8
Permeability	≤	mDa	50	---	---	70	9.0	1
Thermal Conductivity	Room temp.	W/m.k	6	80	100	20	7	---
	300 °C		9	60	80	---	10	16
	600 °C		12	---	---	25	14	20
Anti-alkaline			U or LC	U or LC	U	U or LC	U or LC	Anti - alkaline

Note: Permeability, Oxidation, Iron liquid melting index for your reference.

Innovation

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