

COATED GRAPHITE ELECTRODES





COMPANY PROFILE

KANDI ENGINEERING PVT. LTD. was incorporated in 1982 and started initial trading activities at Manor (Maharashtra), an Industrial Area just 85 kms from Mumbai, INDIA. Cost saving and good quality being the motto of the Management, the production started in 1995 for manufacture of Industrial products related to Steel & Metallurgical Industry for products namely:

- 1. Calorised & Ceramic Coated Oxygen Lancing Pipes
- 2. Burning / Thermal Lances for scrap, scull, non-ferrous cutting and cleaning of tap holes, launders etc.
- 3. Refractory / Monolithic Injection Lance
- 4. Manually Operated Slide-Gate System for pouring of liquid steel (upto 30 MT ton capacity)
- 5. Powder Coated Pipes for Oil and Gas applications
- 6. M.S. ERW Steel Pipes from sizes 6NB to 100NB for general usage
- 7. Coated Graphite Electrode for EAF & LF/VOD

Why We

- ISO 9001:2015 Certification
- Over 2 decades of manufacturing
- Well conversant with Steel & Non-ferrous Mills
- Electrical connected load of 90HP
- Standby DG set with 65HP
- 15,000 sq.ft. of manufacturing shed
- Clean & Specious space availability
- Eco friendly
- Cost effective products
- Competitive & Effective organisation



Sanjay Aggarwal DIRECTOR

Global Presence

- U.S.A.
- GERMANY
- TAIWAN
- ABU DHABI
- QATAR
- BAHRAIN
- MYANMAR

Top management is very well associated and conversed with Iron & Steel Industry especially having Steel Melting Shops with 5 ~ 100 MT capacities over 3 decades:

- For various metallurgical aspects like shaped & monolithic refractories
- Introducing cost & energy saving products
- Analysing user requirements to ensure customer satisfaction
- Doing continuous research and introducing upgraded technologies
- Providing a team for technical assistance on shop floor for related products
- Offering globally competitive prices & services









GRAPHITE ELECTRODES

Graphite electrodes are used mainly in electric arc furnace steel production. Furthermore, coatings has been used on graphite electrodes since 1969 in these industries for steel melting, ranging from 5 tonnes to 185 tonnes capacity, using 200-600 mm diameter electrodes. Graphite electrodes are used for producing steel.

The coating has two main functions :

- To protect the surface of the electrodes while use in the furnace from oxidation. While the oxidation occurs, the diameter of the electrodes tip remains larger than that on a uncoated electrode. The linear rate of wear of the electrode is also decreased so that the overall electrodes consumption is reduced.
- To form high conductivity, low resistivity skin which increase the current carrying capacity of the electrodes. This allows more current to pass through the same sized electrodes, avoiding severe mechanical damage.

Parameter	Unit	Value
Thickness of the Coating	mm	0,5 - 0,8
Specific Electrical Resistivity	Ω.µm	0,07 - 0,10
Gas impermeability at 900° C	h	above 50
Temperature when Decomposition Process starts	°C	above 1850
Delay of Graphite Surface Oxidation	h	10 - 20

KANDI sophisticated **Coating gives excellent antioxidation properties** to graphite electrodes and **reduces the specific consumption of graphite** considerably. Coated electrodes are used for the production of electric steel as well as for manufacturing non-metalic products in electric are processing.

The protective coating consists of several layers and is added to the electrodes surface in a complicated, multilevel production process. A **special characteristic of the coating technology is the electric arc treatment of every single layer.** <u>Total coating thickness ranges from</u> <u>0.8~1.0 mm.</u>

Coating consists of 3 layers serving separate function. The first layer produces a high temperature, oxidation resistant coating, which forms the major protection of the electrode. Above this layer, a sprayed coat helps to nullify any porosity of the previous coating layer. The final layer is mainly responsible for the increase in conductivity. **The coating withstands temperatures over 1850°C** and chemically destroyed only after many hours in the furnace. It is relatively impermeable to gas, and being semi-fluid high aluminium layer, resistant to thermal shock.

The degree of oxidation is determined by measuring the carbon monoxide and carbon dioxide present in waste gases extracted during the heating of samples in an oxidizing gas stream. At temperature between $1000^{\circ} - 1850^{\circ}$ C found in arc furnace, the uncoated graphite samples yeild large amount of CO & CO2. By contrast, **at 1000°C**, the coated samples produce no CO or CO2, and even after some time at 1850°C, no CO and only 2-5% of CO2 is found. The electrical resistance is reduced (and hence conductivity increased) by the application of coating. Laboratory tests have shown the coating itself to have an electrical resistance of 14.50-22.00µ ohm cm against that of graphite of 600-1000µ ohm cm.





ELECTRODES DURING USE











ELECTRODES COATING / PRODUCTION



BENEFITS

Reduction of the specific Graphite Consumption up to 25%

- Reduces Side Oxidation
 - Reduced Oxidation Cone
 - Increased Tip Diameter
- Reduced Tip Consumption
 - Reduced Electrode Connections
 - Reduced Tip Losses

Improved Conductivity of the electrodes

- By the use of high conductive aluminium
- By redistribution of the electrical current flow.

Increased Electrical Load carrying Capacity of the electrodes

- By relieving the electrical strain to the electrodes centre and the nipples.
- Coating forms a high conductivity, low resistivity skin which can increase the current carrying capacity of the electrodes, permitting more current to be passed through the same sized electrode, or same current through smaller diameter electrodes.

Time Saving

- Reduced number of electrodes connections.
 - Improved working conditions for the furnace staff
 - Reduced crane times.
 - **Excellent Gas impermeability** thereby increasing in resistance of coating towards variations in temperature and thermal shocks.

Added Benefits

- Throughout the life of coating, it protects the surface of graphite electrodes from oxidation.
- Coating on electrodes decreases the probability of breakage during use due to higher current carrying capacity.



SIZES

Nominal Diameter		Typical Diameter	Nominal Length			
Inch	mm	mm	mm	mm	mm	mm
10	250	254	1800	2100	-	-
12	300	305	1800	2100		-
14	350	356	1800	2100	-	-
16	400	406	1800	2100	2400	-
18	450	457	1800	2100	2400	-
20	500	508	1800	2100	2400	2700
22	600	605	-	2100	2400	2700

Kandi does Antioxidant coating on Graphite Electrodes only.

We are not manufacturers of Electrodes, per se.







TESTING :

THERMAL RESISTIVITY





ELECTRICAL CONDUCTIVITY :











CRITICAL / IMPORTANT POINTS

- 1) Check for damage / crack for graphite electrode
- 2) Control of coating material & coating thickness
- 3) Use of safe coating materials & avoiding critical materials such as boron , cobalt, titanium, lead, etc.
- 4) Mechanical strength and adhesion ensured during production process
- 5) Ensuring that coating materials have proper electoral conductivity and continuity
- 6) Safe handling of electrodes during production process and storage
- 7) Programing production logistics for faster return of electrodes (duly coated) back to the client.
- 8) Proper IQC maintained for uniformity and consistency of production norms at all stages
- 9) Adequate packing of coated electrodes for avoiding damage during transit



PACKING



POLYESTER POWDER COATED GAS-LINE PIPES



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