

GRAPHITE ELECTRODES



INDEX

Trasteel	3
Trasteel map	4
Graphite Electrodes and Connecting Pins	7
The Production	9
Specifications	10
Typical Properties	11
Technical Assistance	13
Electrodes Regulation System	15
Customized Reporting	15
Instruments	15



TRASTEEL

Trasteel Group is a Swiss based Company, established in September 2009, active in production and trading of steel related products such as graphite electrodes, refractories, flat and long products, steel making raw materials such as coking coal, coke and iron ore, non-ferrous metals and solid fuel such as steam coal and pet-coke.

The Group operates as producer in the steel making consumables industry through a partnership put in place directly with one major selected supplier, offering stable and high quality products.

Trasteel idea comes from the entrepreneurship of a group of executives active in the steel industry for more than 25 years. To invest in industrial assets with clear sustainability and competitive long term advantages is the main strategy of the Group. This grants the support of the trading activities, allowing the development of a multitasking and flexible company able to mitigate the high volatility of the markets. Trasteel, in parallel to its trading activities, offers to its Customers a complete range of services, from shipping and logistic to financing, thereby forming an entire business chain with a 360° approach.

Trasteel positioned itself as a multi-geographical player with major focus on China, Middle East, Europe, CIS countries and South America. The Head Office of the Group is based in Lugano, Switzerland, while representative offices are located in South America, UAE, China, Italy, Russia, Congo and South Africa; the rest of the market is entirely covered through the network of agents and Group's representatives.

During the fiscal year of 2018 the Company generated a consolidated turnover in excess of half a billion US dollars and employing almost 100 Professionals.

HEADQUARTER

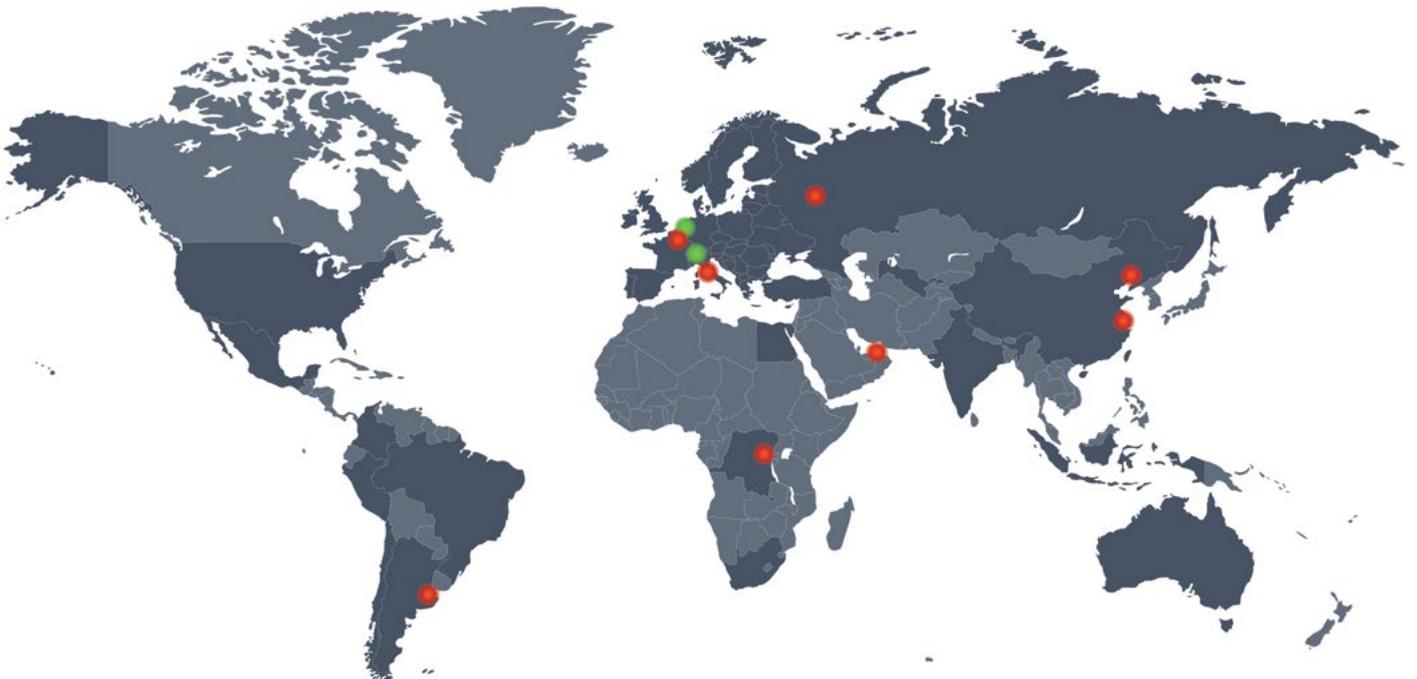
- Switzerland
- Luxembourg

OPERATIONAL OFFICES

- Lugano
- Dubai
- Shanghai
- Bayuquan
- Buenos Aires
- Moscow
- Massa
- Goma

MARKETS COVERED

- Europe
- Turkey
- Russia
- Ukraine
- Arab Emirates
- Brazil
- Chile
- Colombia
- Argentina
- Perú
- Mexico
- USA
- Indonesia
- Philippines
- Australia
- South Africa
- Congo
- Egypt
- Uzbekistan
- Azerbaijan
- India







GRAPHITE ELECTRODES AND CONNECTING PINS

Optimized for maximum performance and minimal consumption and offered at competitive prices, Trasteel graphite electrodes have the proven ability to maximize steel production capacity while reducing power and production costs. Trasteel products are designed to increase productivity and to maximize customer value: they are available with diameters from 100-700 mm (4-28 inches), in lengths from 1,500-2,700 mm (60-108 inches), and in various quality grades.

The consistent and high performance of Trasteel products is the result of stable materials:

- Electrical Conductivity
- Heat Resistance
- Resistance to Thermal Shock

The use of advanced measuring instruments ensures compliance with product tolerances in accordance with international standards. Trasteel plant also manufactures special size graphite electrodes, according to customer's specific needs.

Supply chain management guarantees a quick and efficient service.

Trasteel maintains surplus inventory in order to grant a consistent flow of materials, in a variety of sizes and qualities. Trasteel stocks graphite electrodes in different locations, thanks to its worldwide network, in order to ensure quick deliveries and constant supplies at all times.

Trasteel has designed and developed special packing solutions for each type of transportation and destination, in order to deliver always its products in perfect conditions.



THE PRODUCTION

Trasteel has a partnership with an ISO9001:2008 certified Chinese Graphite Electrodes producer. The plant facilities use modern technology and equipment, with lengthwise graphitization furnaces. Trasteel Graphite Electrodes have been continuously improved, and are produced with top quality needle coke and pitch. All products are subjected to rigorous testing and control procedures, in order to guarantee a high and consistent quality to the end users.

Trasteel technical staff follows step by step the manufacturing of our graphite electrodes.

The Group has a production line dedicated to its materials, on which it has complete quality control: from raw materials choice, to the baking and the graphitization process, ending with the machining of the final products.

A global sales and service network, with offices located in every continent, enables Trasteel to provide a high level service in the industry, both for timely supplies and technical support. The main goals are to increase melt shops' performances and to reduce transformation costs.

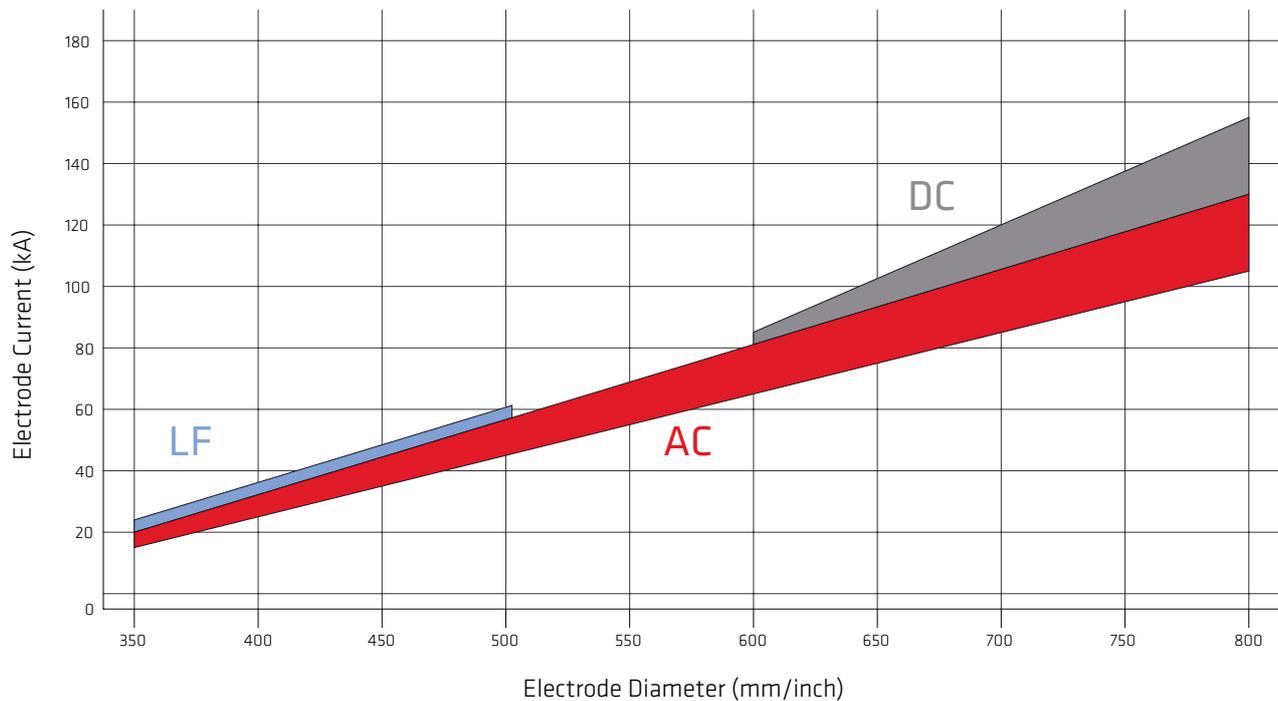
SPECIFICATIONS

Electrodes					Nipples			
Nominal Diameter		Minimal Diameter	Maximum Diameter	Available Lengths	iEC Designation		Diameter x Length	Threads per 25.4 mm
[In]	[mm]						[mm]	
4	100	98	103	1000	69T4N		69.85 x 101.60	4
				1500				
8	200	200	205	1500	69T4N		69.85 x 101.60	4
				1800				
10	250	251	256	1500	155T3N 152T4N		155.57 x 220.00 152.40 x 190.50	3 4
				1800				
12	300	303	307	1500	155T3N 177T3N 177T4N 177T4L		155.57 x 220.00 177.16 x 270.90 177.80 x 215.90 177.80 x 254.00	3 3 4 4
				1800				
				1500				
				1800				
14	350	352	357	1500	177T3N 215T3N 203T4N 203T4L		177.16 x 270.90 215.90 x 304.80 203.20 x 254.00 203.20 x 304.80	3 3 4 4
				1800				
				2100				
				1500				
16	400	403	409	1500	215T3N 241T3N 241T3L 222T4N 222T4L		215.90 x 304.80 241.30 x 338.70 241.30 x 355.60 222.25 x 304.80 222.25 x 355.60	3 3 3 4 4
				1800				
				2100				
				1500				
18	450	454	460	1500	241T3N 241T3L 273T3L 241T4L 269T4L		241.30 x 338.70 241.30 x 355.60 273.05 x 457.20 241.30 x 355.60 269.88 x 457.20	3 3 3 4 4
				1800				
				2100				
				2400				
20	500	505	511	1800	273T3N 273T3L 269T4N 269T4N		273.05 x 355.60 273.05 x 457.20 269.88 x 355.60 269.88 x 457.20	3 3 4 4
				2100				
				2400				
				2100				
22	550	556	562	2100	298T3N 298T4N 298T4L		298.45 x 372.50 298.45 x 355.60 298.45 x 457.20	3 4 4
				2400				
				2700				
				2100				
24	600	607	613	2100	317T4N 317T4L		317.50 x 355.60 317.50 x 457.20	4 4
				2400				
				2700				
26	650	657	663	2700	355T4N 355T4L		355.60 x 457.20 355.60 x 558.80	4 4
28	700	708	714	2700	374T4N 374T4L		374.65 x 457.20 374.65 x 558.80	4 4

TYPICAL PROPERTIES

Graphite electrodes						
Grade	Apparent Density	Specific Electrical Resistance	Flexural Strength	Elastic Modulus	Coefficient of Thermal Expansion	Ash Content
	(g/cm ³)	(μΩm)	(Mpa)	(GPa)	(μm/K - m)	%
HP	1.64 ÷ 1.68	5.40 ÷ 5.60	9.0 ÷ 12.0	8.5 ÷ 11.5	1.2 ÷ 1.6	0.2
SHP	1.68 ÷ 1.72	4.90 ÷ 5.20	9.0 ÷ 12.0	8.5 ÷ 12.0	1.1 ÷ 1.4	0.2
UHP	1.70 ÷ 1.74	4.80 ÷ 4.50	9.0 ÷ 12.0	8.5 ÷ 13.5	0.8 ÷ 1.2	0.2

Nipples						
Grade	Apparent Density	Specific Electrical Resistance	Flexural Strength	Elastic Modulus	Coefficient of Thermal Expansion	Ash Content
	(g/cm ³)	(μΩm)	(Mpa)	(GPa)	(μm/K - m)	%
HP	1.68 ÷ 1.72	3.40 ÷ 3.70	19.0 ÷ 23.0	11.5 ÷ 17.0	1.0 ÷ 1.4	0.2
SHP	1.80 ÷ 1.84	3.20 ÷ 3.50	20.5 ÷ 24.5	12.5 ÷ 18.5	0.9 ÷ 1.2	0.2
UHP	1.82 ÷ 1.86	3.00 ÷ 3.30	20.5 ÷ 24.5	12.5 ÷ 18.5	0.8 ÷ 1.2	0.2





TRASTEEL

TECHNICAL ASSISTANCE AND OPTIMIZATION OF ELECTRODES APPLICATIONS

Trasteel prouids itself on the quality of its engineering staff, which is capable of optimizing the performance of its materials even in extreme furnaces' working conditions.

Besides, it can offer a wide range of services, teaming up with customer's technical staff and reducing the transformation costs of the mill.

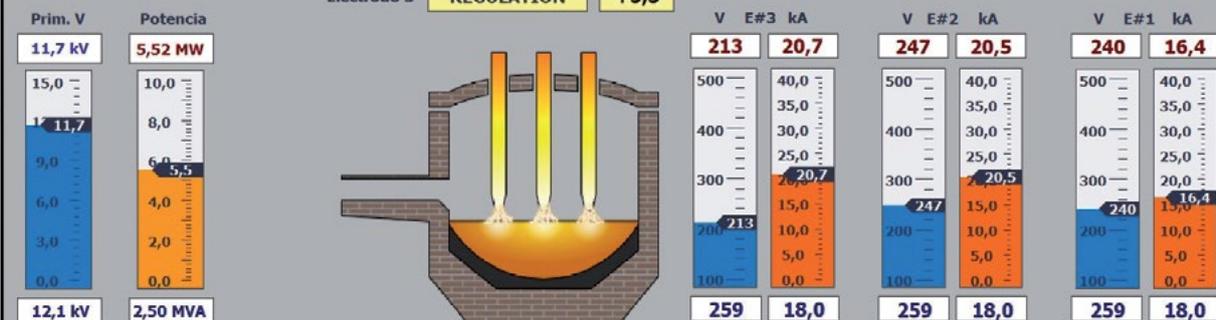
Trasteel technical team provides complete assistance and consulting in order to maximize the results of its products. Its services go beyond a simple product-related service, as listed below:

- Detailed practical and theoretical studies related to the electric arc furnaces and their operations
- Monitoring and optimization of operational, mechanical and electrical variables which affect the performances of the electric arc furnaces
- Calculation of productivity increase
- Furnace start-up assistance
- Furnace Regulation
- Hydraulics
- Evaluation of power supply system
- Evaluation of transformer performance
- Evaluation of load current and current balance between phases
- Optimization of melting efficiency
- Optimization of graphite electrodes consumption
- Customized Reporting
- Interaction with customer's data – PLC
- Inspection of accessories



EAF VISION GENERAL

Cant. de chatarra cargada	7,00 t	Parada de emergencia	OK	Etapa de fusión	BUCKET # 1	Etapa de fusión	38,5 %	
Peso total planificado	15,00 t	Condiciones de TC	READY	FC Interruptor	CLOSED-ON	Cons. energia / ton	166 kWh/t	
Colada en progreso	61 min	ER condiciones	READY	Control de fusión	Auto	4	4	259 V
Tiempo power ON	25 min	Electrodo 1	REGULATION -10,1	El. Regulación	Auto	6	6	18,0 kA
		Electrodo 2	REGULATION +6,8					
		Electrodo 3	REGULATION +5,3					



INICIO DATOS GENERAL FUSION EL.REG PROTECCION HIDRAULICO MOVES ENFRIANDO CONSENTS REPORTS F-TABLES TENDENCIAS ALARMAS R-TABLES



CONTROL DE FUSION

No COLADA	190708	Cantidad fundida:		Fusion progress etapa actual	100% 4 10	Total fusion progres para todo el calor	
Nombre del tipo de acero	cmf	Interruptor de vacio	CLOSED-ON	Cálculo de energía	90%	Energía total consumida:	1193 KWh
Tipo de chatarra	UNKNOWN	Profile seleccionado	GEAR 1	Consumo de energía:	80%		170 kWh/t
Colada se inicio a las:	15:38:52	Power ON	26 min	Cons. energia / ton	70%	Electrodos subida auto	NO
Colada activa:	<input checked="" type="checkbox"/>	Power OFF	36 min	Cálculo energia por ton	60%	E1	REGULATION
Etapa de fusión:	BUCKET # 1	Tap to Tap	62 min	Estado cambiador de taps	50%	E2	REGULATION
Cambiador de tap:	ref: 4, act: 4, volts / amps: 259 V	Profile de fusión	1	Posición AT	40%	E3	REGULATION
Corriente de trabajo:	6, 6, 18000 A	Factor de potencia PF = MW / MVA	0,63		30%	Control de fusión	Auto
Potencia:	req. to trafo: 8,07 MVA , Activo real: 2,60 MW				20%	Regulación electrodo	Auto

INICIO DATOS GENERAL FUSION EL.REG PROTECCION HIDRAULICO MOVES ENFRIANDO CONSENTS REPORTS F-TABLES TENDENCIAS ALARMAS R-TABLES

ELECTRODES REGULATION SYSTEM

Trasteel offers a digital electrode regulation systems to better optimize the material usage.

The Digital Electrode regulation system uses state-of-the-art microprocessor technology and VME bus to achieve a real-time regulation loop. The TDRH system is typically used on furnaces that operate by hydraulic movement of the electrode arms.

The Trasteel system is a digital regulator that utilizes the latest automation technology and is typically installed on furnaces that operate by electro-mechanical drives (winch system) of the electrode arms.

Electrode regulation benefits include:

- Reduced electrode consumption
- Reduction of electrode breakage
- Increase in average power during heats
- Lower energy consumption
- Increase production output
- Reduction of furnace operating costs
- Reduction of maintenance expenditures
- Decrease downtime

CUSTOMIZED REPORTING

Each melt shop wants to monitor parameters specific to its process. Trasteel team members carry out on-site measurements and deliver reports and analysis in return. The reports are customized – in easily understandable formats – to meet each customer’s individual requirements. Alarm and warning limits can be indicated and visually flagged in these reports.

INSTRUMENTS

- Chauvin Arnoux CA8253 advanced network analyzer also used to Italian Power Suppliers, IEC 61000-4-30 class A, IEC 61000-3-6, IEC 61000-4-7
- Circuitor AR5 network analyzer
- Advanced arc stability monitor







Trasteel International SA

Via F. Pelli, 12 | 6900 Lugano | Switzerland

T +41 (0)91 910 5300 | F +41 (0)91 910 5353

www.trasteel.com