

A dramatic industrial scene featuring molten metal being poured from a large, dark, industrial structure. The scene is filled with a dense spray of bright, glowing sparks that create a vibrant, fiery atmosphere. The background is a bright, golden-yellow light, suggesting a high-temperature environment. The overall composition is dynamic and emphasizes the power and precision of industrial manufacturing.

# **GRAFTech** *International*

**HIGH QUALITY GRAPHITE ELECTRODE PRODUCTS**

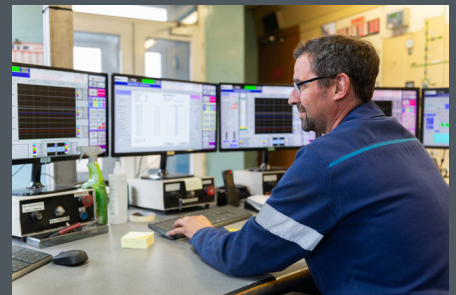


**GrafTech International** is a leading manufacturer of high-quality graphite electrode products essential to the production of electric arc furnace steel and other ferrous and non-ferrous metals. The Company has a competitive portfolio of low-cost, ultra-high power graphite electrode manufacturing facilities, with some of the highest capacity facilities in the world. We are the only large-scale graphite electrode producer that is substantially vertically integrated into petroleum needle coke, our key raw material for graphite electrode manufacturing. This unique position provides us with competitive advantages in product quality and cost.

## MAXIMIZING STEEL PRODUCTIVITY THROUGH TECHNOLOGY AND SERVICE LEADERSHIP

Founded in 1886, we have over 135 years of experience in the research and development (“R&D”) of graphite and carbon based solutions, and our intellectual property portfolio is extensive. We currently have graphite electrode manufacturing facilities in Calais, France, Pamplona, Spain, Monterrey, Mexico and St. Marys, Pennsylvania. Our customers include major steel producers and other ferrous and non ferrous metal producers in Europe, the Middle East and Africa, the Americas and Asia Pacific, which sell their products into the automotive, construction, appliance, machinery, equipment and transportation industries.

Our vision is to provide highly engineered graphite electrode services, solutions and products to EAF operators. Based on the high quality of our graphite electrodes, reliability of our petroleum needle coke supply and our excellent customer service, we believe that we are viewed as a preferred supplier by the global EAF steel producer market.



## GRAFTECH SERVICE AND SOLUTIONS

We consider sustained customer satisfaction as a key measure of product and service performance. GrafTech International's stringent quality system focuses on the customer's needs and satisfaction.

- Substantial vertical integration into petroleum needle coke provides a secure source of raw material supply and associated quality, along with a sustainable competitive advantage.
- Four manufacturing facilities in different continents provide a global footprint and a reliable graphite electrode supply in each region.
- Statistical process control used in our manufacturing process and over 130 years of experience in the graphite industry lead to the production of superior and reliable quality electrodes.
- Customer Technical Service multi-disciplinary engineers with extensive know-how in the steel and electrode industry provide consultative services and solutions in furnace operations and efficiency.
- Global experienced sales team located around the world provides continuous support and advice to customer specific needs in over 65 countries.
- With the support of ArchiTech® Furnace Productivity System, our engineers can follow key furnace operations data and help customers improve EAF operations.





### UCAR® Grade AGX™ Graphite Electrodes

A premium grade that we recommend for AC high-power, ultra-high-power and DC furnaces operating under severe electrical or mechanical conditions.



GrafTech Commercial Grade	Attributes	Units	Typical Physical Properties Range <sup>1</sup>			Connecting Pin All sizes	GrafTech Testing Methods <sup>2</sup>
			Electrode diameter 250-400 mm 10" - 16"	Electrode diameter 450-600 mm 18" - 24"	Electrode diameter 650-800 mm 26" - 32"		
AGX™	Bulk density	g/cm <sup>3</sup>	1.66 - 1.77	1.66 - 1.77	1.67-1.78	1.75 - 1.84	Full Piece
	Specific resistance	μΩ.m	4.4 - 5.8	4.3 - 5.4	4.1 - 5.1	3.4 - 4.4	Full Piece
	Flexural strength	MPa	9.0 - 13.5	8.0 - 12.0	8.5 - 12.5	19.0 - 32.0	Four-point bending
	Coefficient of thermal expansion	10 <sup>-6</sup> / °C	0.2 - 0.7	0.1 - 0.6	0.1 - 0.5	0.0 - 0.3	PATE <sup>3</sup> RT to 100°C

1: Displayed property values are typical ranges per GrafTech testing methods and constitute neither a guarantee or specification for individual electrode properties, nor any form of warranty, express or implied.

2: GrafTech testing methods have been specifically developed for graphite electrode characterization. Properties are measured in the axial direction.

3: PATE is a GrafTech invention for accurately measuring the coefficient of thermal expansion.



### UCAR® Grade LFX™ Graphite Electrodes

Ladle furnaces have different operating parameters than melting furnaces. We recommend this premium grade for ladle furnaces and other low-power melting applications.



## CHOOSING THE RIGHT ELECTRODE

Our technical experts can help you select the right UCAR® graphite electrode by assessing the specifics of your operating environment.

- Burner and oxygen usage
- Conversion costs
- Electrode consumption goals
- Electrode strength and oxidation
- Fume control system
- Furnace design
- Power level and power input program
- Productivity goal
- Refractory consumption goal
- Scrap types/charging practice
- Slag practice
- Steel type and grade
- Tap-to-tap time
- Water spray rings

## GRAPHITE ELECTRODE SELECTION GUIDE (Metric)

Select Electrode Diameter			Electrode Length Options				Pin Options			
	Min	Max		Min	Max	Typical Weight of PRE-CET™ Electrode	IEC Designation	Diameter	Length	Threads per 25.4 mm
mm	mm	mm	mm	mm	mm	kg		mm	mm	
800	813	816	2700	2680	2900*	2350	432T4L <sup>1</sup>	432.00	635.00	4
750	762	765	2700	2680	2900	2250	406T4L <sup>2</sup> 406T4N	406.40 406.40	685.80 609.60	4 4
700	711	714	2700 2400	2680 2325	2900* 2525	1940 1700	374T4L 374T4N	374.65 374.65	558.80 457.20	4 4
650	660	663	2700 2400	2680 2325	2900* 2525	1650 1450	355T4L 355T4N	355.60 355.60	558.80 457.20	4 4
600	610	613	2700 2400 2100	2680 2325 2045	2900* 2525 2225	1410 1250 1080	317T4EL <sup>2</sup> 317T4L 317T4N	317.50 317.50 317.50	558.80 457.20 355.60	4 4 4
550	559	562	2700 2400 2100	2680 2325 2045	2900* 2525 2225	1180 1050 910	298T4L 298T3L 298T4N	298.45 298.45 298.45	457.20 457.20 355.60	4 3 4
500	508	511	2400 2100 1800	2325 2045 1745	2525 2225 1905	870 760 690	273T3L 273T3N 269T4L 269T4N	273.05 273.05 269.88 269.88	457.20 355.60 457.20 355.60	3 3 4 4
450	457	460	2400 2100 1800	2325 2045 1745	2525 2225 1905	700 620 530	273T3L 269T4L 241T4N 241T4L 241T3L 241T3N	273.05 269.88 241.30 241.30 241.30 241.30	457.20 457.20 304.80 355.60 355.60 338.70	3 4 4 4 3 3
400	406	409	2400 2100 1800	2325 2045 1745	2525 2225 1905	550 480 420	241T3L 241T3N 222T4L 222T4N 215T3N	241.30 241.30 222.25 222.25 215.90	355.60 338.70 355.60 304.80 304.80	3 3 4 4 3
350	352	358	2100 1800	2045 1745	2225 1905	370 310	215T3N 203T4L 203T4N 177T3N	215.90 203.20 203.20 177.16	304.80 304.80 254.00 270.90	3 4 4 3
300	303	307	1800	1745	1905	230	177T4N 177T3N 155T3N	177.80 177.16 155.57	215.90 270.90 220.00	4 3 3
250	251	256	1800 1500	1745 1490	1905 1650	160 140	155T3N 152T4N	155.57 152.40	220.00 190.50	3 4

\* Longer maximum length available to many 2700 mm customers. <sup>1</sup> 432T4L pin is not part of the IEC 60239. <sup>2</sup> GrafTech also machines 406T4L and 317T4EL pins which are not part of the IEC60239.

## GRAPHITE ELECTRODE SELECTION GUIDE (English)

Select Electrode Diameter			Electrode Length Options				Pin Options			
	Min	Max		Min	Max	Typical Weight of PRE-CET™ Electrode	IEC Designation	Diameter	Length	Threads per inch
In	In	In	In	In	In	lbs		In	In	
32	32.00	32.12	110	105.51	114.17*	5170	432T4L <sup>1</sup>	17.00	25.00	4
30	30.00	30.12	110	105.51	114.17*	4950	406T4L <sup>2</sup> 406T4N	16.00 16.00	27.00 24.00	4 4
28	27.99	28.11	110 96	105.51 91.54	114.17* 99.41	4268 3740	374T4L 374T4N	14.00 14.00	22.00 18.00	4 4
26	25.98	26.10	110 96	105.51 91.50	114.17* 99.40	3630 3190	355T4L 355T4N	14.00 14.00	22.00 18.00	4 4
24	24.02	24.13	110 96 84	105.51 91.54 80.51	114.17* 99.41 87.60	3102 2750 2376	317T4EL <sup>2</sup> 317T4L 317T4N	12.50 12.50 12.50	22.00 18.00 14.00	4 4 4
22	22.01	22.13	110 96 84	105.51 91.54 80.51	114.17* 99.41 87.60	2596 2310 2002	298T4L 298T3L 298T4N	11.75 11.75 11.75	18.00 18.00 14.00	4 3 4
20	20.00	20.12	96 84 72	91.54 80.51 68.70	99.41 87.60 75.00	1914 1672 1518	273T3L 273T3N 269T4L 269T4N	10.75 10.75 10.63 10.63	18.00 14.00 18.00 14.00	3 3 4 4
18	17.99	18.11	96 84 72	91.54 80.51 68.70	99.41 87.60 75.00	1540 1364 1166	273T3L 269T4L 241T4N 241T4L 241T3L 241T3N	10.75 10.63 9.50 9.50 9.50 9.50	18.00 18.00 12.00 14.00 14.00 13.33	3 4 4 4 3 3
16	15.98	16.10	96 84 72	91.54 80.51 68.70	99.41 87.60 75.00	1210 1056 924	241T3L 241T3N 222T4L 222T4N 215T3N	9.50 9.50 8.75 8.75 8.50	14.00 13.33 14.00 12.00 12.00	3 3 4 4 3
14	13.86	14.09	84 72	80.51 68.70	87.60 75.00	814 682	215T3N 203T4L 203T4N 177T3N	8.50 8.00 8.00 6.97	12.00 12.00 10.00 10.67	3 4 4 3
12	11.93	12.09	72	68.70	75.00	506	177T4N 177T3N 155T3N	7.00 6.97 6.12	8.50 10.67 8.66	4 3 3
10	9.88	10.08	72 60	68.70 58.66	75.00 64.96	352 308	155T3N 152T4N	6.12 6.00	8.66 7.50	3 4

\* Longer maximum length available to many 110 inch customers. <sup>1</sup> 432T4L pin is not part of the IEC 60239. <sup>2</sup> GrafTech also machines 406T4L and 317T4EL pins which are not part of the IEC60239.

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(1) While maintaining the capability to produce graphite electrodes and pins, production activities at St. Marys were indefinitely suspended in 2024, with the exception of graphite electrode and pin machining.