

MEGAA Carbon Technology (Shanghai) Co.,Ltd
麦伽碳制品（上海）有限公司

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风电样册

Wind Power Manual

用碳刷，找麦伽，就够了！





麦伽碳制品（上海）有限公司创建于 2012 年，生产基地位于被誉为“世界钓鱼城 - 南部县”的河东工业园区平安路 38 号。麦伽公司是经麦伽德国（SCHMIDTHAMMER Elektrokohle GmbH）官方授权，主营各类型碳石墨材料制品，以研发、生产和营销为一体生产企业。以“麦伽碳 MEGAA”为商标，累计年产 35 万只碳刷产品，并致力于新碳石墨材料的相关研究和技术创新的中 - 德合营的碳石墨材料公司。

碳石墨材料产业是国家战略性和基础性的产业，是国家重大装备如轨道交通、风电能源、电线电缆设备、大型港口船舶和太阳能光伏行业等高质量发展的先导和压舱石。受益于碳石墨新材料在传统产业和新能源领域的广泛使用，麦伽公司跨越式发展与国家整体战略同频驱动。公司利用中德合作的技术优势，围绕碳基石墨新材料优势，跑出相关行业的加速度。

麦伽公司始终践行“诚信、经营、务实、创新”的发展理念。公司全体同仁发扬“锅里有，碗里才有”的企业精神，着力构建多方共赢的新格局，在新时代征程上奋力谱写麦伽碳新材料高质量发展的新篇章。

碳材料类型：天然石墨、高纯石墨、电化石墨、铜（或银）金属石墨、浸铜（或浸银）电化石墨、碳密封材料等。

碳材料应用：港口船舶、火力（或核能）发电、风力发电、电线电缆设备、轨道交通以及电动工具和吸尘器在家用电器中的应用。

客户群体：国家轨道交通铁路系统、大型船舶、风电机组（或整机）制造商，国家五大四小发电（或省级发电）业主和第三方服务公司等。

基于国际国内市场需求变化，麦伽公司不断研制优化碳石墨材料性能，制造更具有竞争力的碳石墨产品，持续满足新老用户的需求是麦伽公司全体同仁始终不渝追求的方向和目标。

麦伽公司获得荣誉及证书：

- 2017 年，麦伽公司获得国家质量体系认证证书 ISO9001:2015 标准
- 2022 年，麦伽公司获得国家“高新技术企业”认证证书
- 2022 年，麦伽公司获得上海市松江区方松街道年度“优秀企业奖”称号
- 2023 年，麦伽公司获得上海市松江区方松街道年度“纳税贡献奖”称号
- 2023 年，麦伽公司获得环境管理体系认证 GB/T24001-2016/ISO14001:2015 标准
- 2023 年，麦伽公司获得职业健康安全管理体系认证 GB/T45001-2020/ISO45001-2018 标准

MEGAA Carbon technology (Shanghai) Co., Ltd. was founded in 2012, and its production base is located at No. 38, Ping'an Road, Hedong Industrial Park, Nanbu County, "World Fishing City" in Sichuan province in China. MEGAA company is officially authorized by Germany SCHMIDTHAMMER Elektrokohle GmbH, It is mainly engaged in various types of carbon and graphite products, and is a production enterprise integrating R&D, production and marketing. With the trademark of "MEGAA", with an annual output of 350,000 carbon brush products, and is committed to the research and technological innovation of new carbon graphite materials, the Sino-German joint-venture carbon graphite material company.

The carbon and graphite material industry is a national strategic and basic industry, and is the pioneer and ballast stone for the high-quality development of major national equipment such as rail transit, wind power energy, wire and cable transmission, large port ships and solar photovoltaic industry. The company will give full play to the technical advantages of Sino-German cooperation, focus on the advantages of carbon-based graphite new materials, and run out of the acceleration of the industry.

The company has always practiced the values of "integrity, management, pragmatism and innovation", and all colleagues of the company carry forward the enterprise spirit of "there is in the pot first, then in the bowl", strive to build a new pattern of win-win for all parties, and strive to write a new chapter in the high-quality development of MEGAA carbon new materials in the new era.

Carbon material type: hard carbon graphite, natural graphite, high-purity graphite, electro-graphed graphite, copper (or silver) metal graphite, impregnated copper (or silver) electro-graphed graphite, carbon sealing materials, etc.

Carbon material applications: ship ports, thermal (or nuclear) power generation, wire and cable continuous casting and rolling, wind power generation, rail transit, and the application of household appliances such as power tools and vacuum cleaners.

Customer groups: national rail transit railway system, national large ships, national wind generators (or complete turbines) manufacturers, national five large and four small power generation (or provincial power generation) owners and third-party service companies, etc.

MEGAA Company won honors and certificates:

In 2022, MEGAA Company won the national "High-tech Enterprise" certification.

In 2022, MEGAA Company won the title of "Excellent Enterprise Award" in Fang-song Street in Shanghai.

In 2023, MEGAA Company won the title of "Tax Contribution Award" of Fang-song Street in the year in Shanghai.

In 2023, MEGAA Company obtained the environmental management system certification GB/T24001-2016/ISO14001:2015 standard.

In 2023, MEGAA Company obtained the occupational health and safety management system certification GB/T45001-2020/ISO45001-2018 standard.

麦伽公司的愿景：

工作态度：100% 用心来做

发展目标：成为碳石墨材料行业的领导者

发展远景：先进技术、降低成本、美化环境、客户至上、共享未来

发展理念：诚信、经营、务实、创新

The vision of MEGAA:

Work attitude: 100% hard work

Development goal: to become a leader in the excellent quality of carbon graphite materials industry.

Development vision: advanced technology, reduce costs, beautify the environment, customer first, share the future

Development concept: integrity, management, pragmatism, innovation

内陆 Onshore



- 极地环境
- 超低湿度
- 彻骨寒风
- Polar environment
- Ultra-low humidity
- Bone-chilling wind

高原 Plateau



- 燥热环境
- 极端湿度
- 灼热空气
- Hot and dry environment
- Extreme humidity
- Scorching air

近海 Offshore



- 惊涛骇浪
- 盐雾侵蚀
- 天气返潮
- Stormy waves
- Salt spray erosion
- The weather is back

轴承电蚀解决方案

Optional solutions

- ✦ 变频器采用特殊的调制算法或共模滤波器
The frequency converter adopts special modulation algorithm or common mode filter
- ✦ 特殊屏蔽电缆和布线模式
Special shielded cable and wiring mode
- ✦ 绝缘轴承 Insulated bearings
- ✦ 低阻抗油脂 Low impedance grease
- ✦ 陶瓷混合轴承 Ceramic hybrid bearings
- ✦ 对转子进行电磁屏蔽
Electromagnetic shielding of the rotor
- ✦ 绝缘耦合 Insulation coupling
- ✦ 旁路接地 Bypass grounding



轴电蚀
Axial electro-corrosion



接地碳刷在风机上的应用

Carbon brushes for wind energy

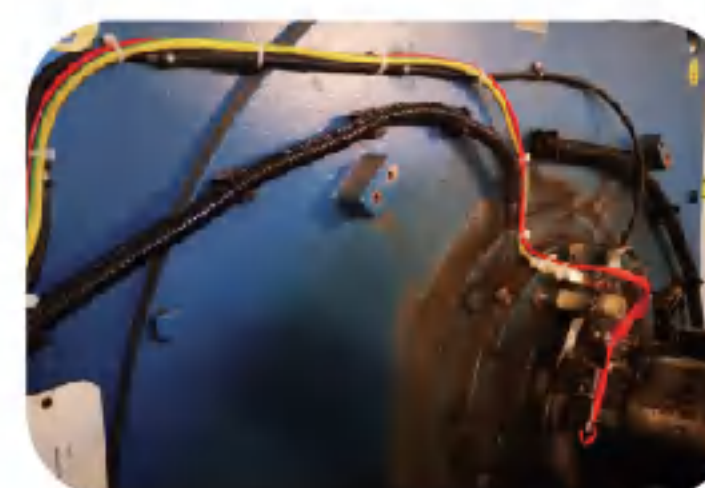
驱动轴端旁路接地 Bypass grounding by S20/T3A, S35/T3A or S50i/T3A



- ✦ 麦伽S20 / T3A, S35/T3A, S50i/T3A对释放风机轴电流有好的效果。
Megaa has carried out a long-term investigation into the performance of various shaft-earthing brushes, the upgraded silver loaded graphite brushes will not result in any damage after cleaning, like S20 / T3A, S35/T3A, S50i/T3A.

- ✦ 麦伽风电碳刷有极好的表现，尤其在极差或潮湿环境下，碳刷的摩擦系数更低。
Our carbon brushes offer you an excellent performance and low friction even under rough conditions and humidity.

- ✦ 麦伽碳刷提高风电机组的利用效率。
With MEGAA carbon brushes you can transfer high energy outputs.



发电机主碳刷 Wind generator phase carbon brushes

材质 Grades	电阻率 Resistivity (Ohm*mm ² /m)	体积密度 Bulk density (g/cm ³)	电流密度 Current (A/cm ²)	洛氏硬度 Ro. hardness HR 10/40	线速度 Periphery Speed (m/s)	金属含量 Metal content (%)	备注 Remarks
V8/V8-6	2.0	3.0	13	100	40	45-50	浸渍
X816Z1	0.25	3.5	15	96	40	50-55	Vestas
S35	4.0	4.0	20	100	30	65 silver (含银)	V52,V66 V80,V90
V880-1	0.25	4.2	18	80	35	65	
V880-2	0.20	4.1	20	80	40	65	
V991	0.35	4.2	22	75	40	65	

热压碳材料的优势：

1. 内在密度均匀，经过特殊的浸渍处理后，碳刷容易形成氧化膜，不易偏磨。
2. 承载电流能力较大，满足过载工况。
3. 在极寒、高温、高原、近海和内陆风场都有可靠的运行。
4. 适用于黄铜或不锈钢的滑环，提高耐磨性和降低阻抗，相对不同的机型有好的通用性。

发电机轴接地碳刷 Wind turbine shaft ground carbon brushes

材质 Grades	电阻率 Resistivity (Ohm*mm ² /m)	体积密度 Bulk density (g/cm ³)	电流密度 Current (A/cm ²)	洛氏硬度 Ro. hardness HR 10/40	线速度 Periphery Speed (m/s)	银含量 Silver content (%)	备注 Remarks
S20/T3A	1.0	5.2	28	105	25	80	双拼含银 Sandwich earthing brushes
S35/T3A	4.0	4.0	20	100	30	65	双拼含银 Sandwich earthing brushes
S50i/T3A	5.0	3.2	20	95	30	50	双拼含银 Sandwich earthing brushes
E003	19.0	1.70	28	105	40	5~8%	浸渍银 Silver impregnated

防雷保护碳刷 Lightning protection carbon brushes

材质 Grades	电阻率 Resistivity (Ohm*mm ² /m)	体积密度 Bulk density (g/cm ³)	电流密度 Current (A/cm ²)	洛氏硬度 Ro. hardness HR 10/40	线速度 Periphery Speed (m/s)	金属含量 Metal content (%)	备注 Remarks
V3450	0.15	4.0	15	90	40	65	陆地防雷
E010P	52	1.62	12	120	50	浸渍	近海防雷

变桨电机碳刷 Variable paddle motor carbon brushes

材质 Grades	电阻率 Resistivity (Ohm*mm ² /m)	体积密度 Bulk density (g/cm ³)	电流密度 Current (A/cm ²)	洛氏硬度 Ro. hardness HR 10/40	线速度 Periphery Speed (m/s)	金属含量 Metal content (%)	备注 Remarks
E02i	22	1.60	12	110	40	no	浸渍 Impregnation

▶ Material 材料	▶ Application 应用
Copper graphite 铜石墨 / X816Z1	Slip ring of wind power 风电滑环

Typical material data according to din iec 413

典型值

▶ Specific resistance 电阻	▶ Bulk density 体积密度	▶ Metal content 金属含量
0.25 Q · mm ² / m	3.5g / cm ³	55%
▶ Flexural strength 抗折强度	▶ 洛氏硬度 HR10/40	
30N / mm ²	96	

Guide line values 动态测试

▶ Continuous load 电流密	▶ Peripheral speed 线速	▶ Brush pressure 工作压
15A / cm ²	40m / s	200-350 cn / mm ²
▶ Voltage drop 电压降	▶ Friction coefficient 摩擦系数	
≤ 1.3V	0.09 - 0.18	



自动化生产线 1
Automated production line 1



自动化生产线 2
Automated production line 2



种线方式（左）：

Thread method (left)

导线与刷体间联接采用填埋种线方式
(镀锡线+填塞粉+刷体)

The connection between the wire and the brush body is made of landfill seed wire
(Tin plating wire + causing powder + brush body)

压制方式（右）：

Pressing method (right)

导线与刷体间联接采用刷体与导线融为一体。
The connection between the wire and the brush body is pressed into one.

压制工艺优势点：

Advantages of pressing methods

- ✘ 在相环上，各只碳刷电流分配均匀。
On the phase loop, the current distribution of each carbon brush is uniform.
- ✘ 在相环上，每只碳刷过流在 110A 左右。
On the phase loop, the actual overcurrent of each carbon brush is about 110A.
- ✘ 在相环上，每只碳刷的温升在 45K-50K 左右。
On the phase loop, the temperature rise of each carbon brush is about 45K-50K.

镀镍编织导线（行业引领者V880-1、V880-2、V991）：

Nickel-plated braided wires (industry leaders V880-1, V880-2, V991)



镀镍线的优势点：

镀镍线在空气中的稳定性很高，由于金属镍具有很强的钝化能力，在表面能迅速生成一层极薄的钝化膜，能抵抗大气中酸或碱的侵蚀。

Advantages of nickel plating wire:

Nickel plating wire has high stability in the air, because nickel metal has a strong passivation ability, it can quickly form a very thin passivation film on the surface, which can resist the erosion of acid or alkali in the atmosphere.

- ✘ 采用新工艺解决碳刷在使用过程中联结电阻增大的风险，其具有低电阻率、低联接电阻的优势。
- ✘ 热态下，导线与刷体联接电阻在 $0.05\text{m}\Omega - 0.06\text{m}\Omega$ ，仅为传统碳刷的 1/3。
- ✘ 适应大机组，解决机组碳刷不均流引起的过热、膨胀卡涩、各只碳刷磨损长短不一、掉线等故障。
- ✘ 在干燥、潮湿和高盐份风况环境中，压制型碳刷具有更稳定、更安静运行的特征。

- ✘ The new process is used to solve the risk of increasing the bonding resistance of carbon brushes during use, which has the advantages of low resistivity and low connection resistance.
- ✘ In the hot state, the connection resistance between the wire and the brush body is $0.05-0.06\text{m}\Omega$, which is only 1/3 of the traditional carbon brush.
- ✘ It is suitable for large units to solve the problems of overheating, expansion jamming, different wear lengths of each carbon brush, and disconnection caused by the uneven flow of carbon brushes of the unit.
- ✘ In dry, wet and high-salinity environments, pressed carbon brushes are characterized by more stable and quieter operation.



双拼接地
J6565 S35 sandwich brushes



银碳刷
J6517 S35



滑环磨石
J6877 Grindstone



铜环（滑环）
J6635 SRU



VEM 电机碳刷
J6566 in V8-6/X816Z1



VEM 电机碳刷
J6692 in V8-6/X816Z1



通用碳刷
J6580 in V8-6/X816Z1



不锈钢滑环
J6676 SRU



铜编织带
J6590 Flexible wire



双拼银碳刷
J6693 in S35

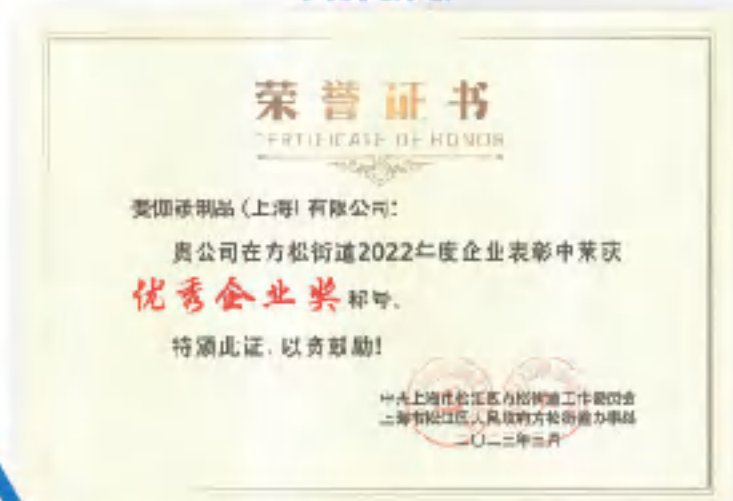
社会贡献

Social contribution

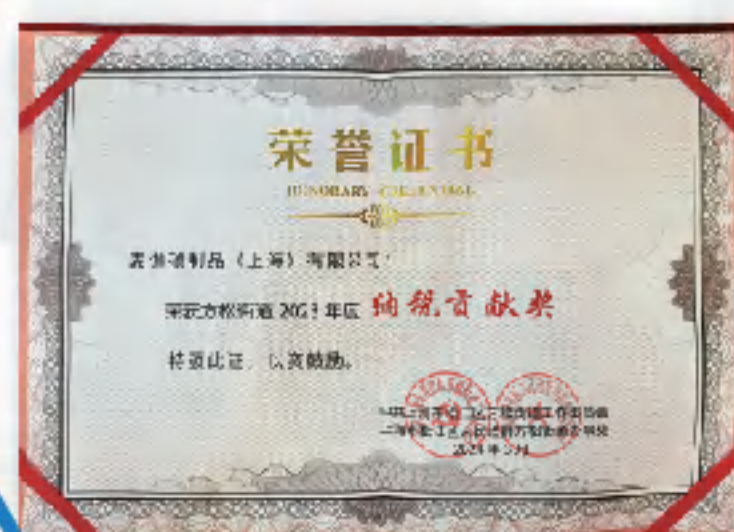
授权证书 Certificate of authorization



优秀企业奖 Outstanding Enterprise Award



纳税贡献奖 Tax contribution award



高新技术证书 High and new technology certificate



纳税贡献奖杯 Tax contribution trophy



管理体系认证证书

Management system certification

