RUN FENG

成都润封电碳有限公司

Chengdu Runfeng Electrical Carbon Co., Ltd.

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公司简介 COMPANY PROFILE

成都润封电碳有限公司地处四川新津工业园，总占地面积70多亩，公司注册资金2000万元，是一家专业从事碳-石墨材料及制品的研究、制造、销售、服务的国家级高新技术企业，产品现已广泛应用于机械、仪表、电力、石油、化工、汽车、航空、环保、船舶、核工业以及光伏等新能源领域。

公司业务涉及范围包括机械用碳石墨；电子电器用石墨；光伏热场、冶金、模具用石墨； 流体过滤用碳石墨；部分电工用碳石墨和锂电池负极材料。

公司创建于1993年，现已发展成为下设四个生产车间、一个材料研发中心，配备全新高温、高压设备、动态试验设备以及各种分析设备具有一定规模的现代企业。“因市场而创立，随科技发展而创新。 实力打造精品，诚信服务客户”的经营理念，在广大用户中赢得了信赖和支持。竭诚欢迎海内外各界企业及专家来公司考察、指导，进行技术合作与交流，携手共创新的辉煌。

Chengdu Runfeng Electrical Carbon Co.,Ltd. is located in Xinjin Industrial Zone in Chengdu of Sichuan, with a total area of 47000 m2, which is a private Hi-tech enterprise specialized in the research, manufacturing, sales and service of mechanical carbon and graphite materials and products, the products have now be widely used in machinery, instrumentation, metallurgy, electronics, electric power, petroleum, chemical, automobile, aviation, environmental protection, shipping, nuclear industry as well as new energy such as single crystal and polycry silicon.

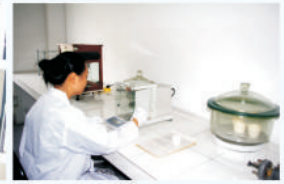
Business scope of our company includes mechanical carbon-graphite materials, graphite products for electronic and electrical engineering, solar thermal field, metallurgy, mold, filtering and carbon-graphite negative electrode materials for lithium secondary batteries.

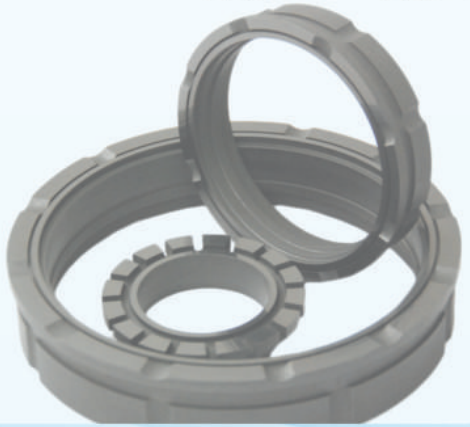
Our company founded in 1993 year, now already has four production workshops, a materials research center, equipped with high-temperature, high-pressure equipment, dynamic analysis test equipment and a variety of test instrumentations. Business philosophy is "Was founded because of the market, development and innovation with technology, build quality, honest customer service." At the majority of users has been built the trust and support. We sincerely welcome enterpriser and experts from various circles at home and abroad to visit our company, guide, cooperate and exchange in technical to join hands in new glory

成都润封电碳有限公司
Chengdu Runfeng Electrical Carbon Co., Ltd.

公司资质 COMPANY QUALIFICATION

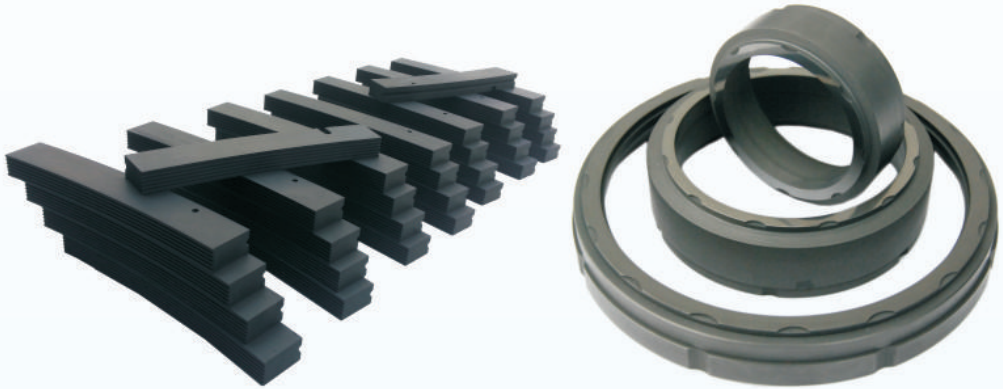
现场 PRODUCTION AND SCIENTIFIC RESEARCH FIELD

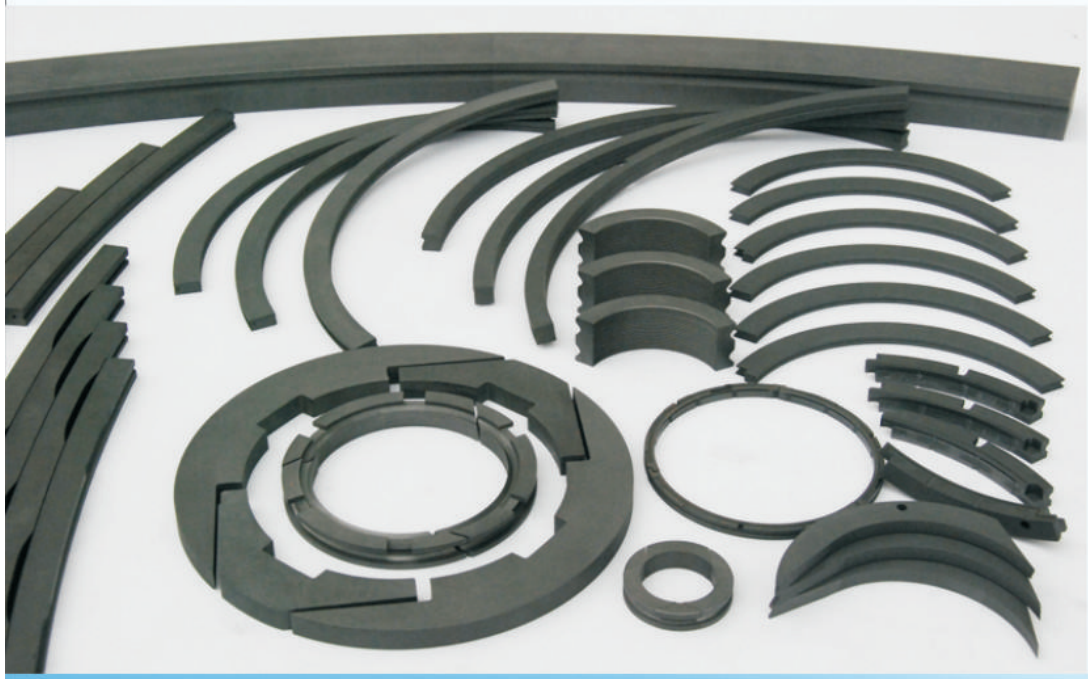




产品展示 PRODUCTS EXHIBITION

PRODUCTS EXHIBITION 产品展示





产品展示 PRODUCTS EXHIBITION

PRODUCTS EXHIBITION 产品展示

碳-石墨材料性能卓越
CARBON-GRAPHITE MATERIALS WITH EXCELLENT PERFORMANCE

碳-石墨材料包括光谱纯石墨，高纯、高强、高密以及热解石墨等。其晶格构造决定了碳-石墨材料具有如下特性：

Carbon-graphite materialincludes the spectrum pure graphite, high purity graphite, high strength graphite, high density graphite and pyrolytic graphite, and so on. Their structure has determined the following features of carbon-graphite material.

1）耐高温性Temperature resistance

石墨的熔点为3850±50℃,Graphite melting point 3850 ± 50 ℃

沸点为4250℃ Graphite boiling point to 4250℃

石墨经超高温电弧灼烧，重量的损失很小，热膨胀系数也很小。石墨强度随温度提高而加强，在2000℃时，石墨强度提高一倍。

Graphite even in ultra high temperature with arc burning weight loss is very small and graphite has very small thermal expansion coefficient. Strength of graphite increases with the temperature, when temperature reaches 2000℃, the strength of graphite will be double.

2）导电、导热性Electrical conductivity, thermal conductivity

石墨的导电性比一般非金属矿高一百倍

Electrical conductivity of graphite is higher than the General non-metallic minerals to 100 times.

导热性超过钢、铁、铅等金属材料

Thermal conductivity of graphite exceeds steel, iron, lead and other metals.

导热系数随温度升高而降低，甚至在极高的温度下，石墨成绝热体。石墨能够导电是因为石墨中每个碳原子与其他碳原子只形成3个共价键,每个碳原子仍然保留1个自由电子来传输电荷。

Thermal conductivity decreases with increasing temperature, even at very high temperature, graphite becomes insulation. Electricity of graphite is because each carbon atom forming 3 covalent bonds with other carbon atoms, each carbon atom still retains 1 free electron totransmit charge.

3）润滑性Lubrication

石墨的润滑性能取决于石墨鳞片的大小，鳞片越大，摩擦系数越小，润滑性能越好。

lubrication performance depends on size of the graphite flakes,the graphite flakes are larger, the coefficient of friction is smaller, lubricating properties are better.

4）化学稳定性Chemical stability

耐酸 Corrosion resistant to acid

耐碱Corrosion resistant to alkali

耐有机溶剂Corrosion resistant to organic solvent

石墨在常温下有良好的化学稳定性。

Graphite at room temperature provided with good chemical stability.

5）可塑性Plasticity

可碾成很薄的薄片

Toughness of graphite can be crushed into very thin slices.

6）抗热震性 Thermal shock resistance

石墨在常温下使用时能经受住温度的剧烈变化而不致破坏，温度突变时，石墨的体积变化不大，不会产生裂纹。

碳-石墨材料性能卓越
CARBON-GRAPHITE MATERIALS WITH EXCELLENT PERFORMANCE

At room temperature graphite can withstand sharp changes of temperature without damage, when temperature mutation, little is change in volume of graphite, does not cause cracking

此外，石墨还具有一些特性是可以应用的。

In addition, the graphite also has characteristics that can be applied.

开气孔率Open porosity

开气孔是总气孔的一部分，可以被液体填充。

Open porosity is that part of the whole volume which can be filled with liquid

7）加工性Machinability

石墨是易于加工的，其边缘强度及耐磨性都比较高。对具有闭合公差的复杂零件可以加工到很高的精度。

Graphite is easy to machine – both edge strength and abrasion resistance are high. Complicated parts with close tolerances can be manufactured to high precision.

8）润湿性 Wettability

石墨不被熔化的玻璃或大多数熔融金属所浸润。

Graphite is not wetted by molten glass or by most molten metals.

耐温度剧变性Resistance to temperature change

石墨特别能耐热冲击，快速加热或剧冷都没有问题的。

Graphite is extremely resistant to thermal shock, so rapid heating or cooling is no problem.

9)致密性Density

石墨单晶的理论密度是2.26 g/cm3。人造石墨的密度在1.5 到 1.9 g/cm3之间，热解石墨可以做到2.1 g/cm3。高纯石墨的密度定义为体积密度，包括气孔在内的。

The theoretical density of mono-crystalline graphite is 2.26 g/cm3. The density of synthetic graphite is typically between 1.5 and 1.9 g/cm3, but as high as 2.1 g/cm3 for solid pyrolytic graphite. The density of the high-puritygraphite grades is defined as the quotient of mass and volume, including all pores.

综上所述，由于石墨具有许多优良的性能，因而在冶金、机械、电气、化工、纺织、国防等工业部门获得广泛应用。可作为导电材料、耐火材料、耐腐蚀结构材料、减磨和润滑材料、高温冶金及超纯材料、铸模及压模的结构材料及原子能工业及军事工业中的特种结构材料。然而因其现代科学技术的迅猛发展，对材料性能要求越来越高，不断创新、改进、提高某些特性以满足发展需求成为必然，我们的优势就在于此。

To sum up, due to graphite has many excellent properties, and in the metallurgical, mechanical, electrical, chemical, textile, national defense industry is widely used. It can be used as conductive materials, refractory, corrosion resistant construction materials, wear, and lubrication materials and ultra-pure materials, high temperature metallurgy, mold and die construction materials and special structural materials at military and atomic energy industry. However, with the rapid development of modern science and technology, increasing demand for the material, requires continuous innovation, improvement and improve the performance to meet development needs, our strengths lie in this

应用实例 APPLICATION EXAMPLES

一、电厂磨煤机碳精密封环专用材料应用

FRT170D浸锑碳石墨材料是我公司根据北京电力设备总厂ZGM型中速辊式磨煤机工况条件研制的专用材料。

该材料适用于ZGM型全系列，包括沈重、上重同类机型的改造以及相同工况条件：密封气体压力≤20Kpa，气体温度≤400℃，与含煤粉尘硬度相当的固体颗粒物的恶劣摩擦、磨损工况。

该材料于1997年投入使用即取代原用M170D材料，成为北京电力设备总厂的主要配套产品和出口磨煤机的指定产品。

1. Special materials of carbon sealing rings for power plant coal pulverizer

Our company was developed specifically FRT170D carbon graphite materials impregnated with antimony for Beijing electric power equipment general factory, solves sealing problems of the ZGM-type medium speed roller mills.

Apply the material to all ZGM-series, including other similar models for Shenyang heavy machinery factory, Shanghai heavy machinery plant and so on. Work conditions: sealed gas pressure ≤ 20Kpa, gas temperature ≤ 400 ℃, condition of extreme friction and wear for coal dust or solid particles of hardness near to the former.

In 1997 year the material was been used instead of the old M170D materials, and become the main accessory products and exporting designated products of coal mill for Beijing electric power equipment general factory.

磨煤机碳精密封环材料性能对比

Comparison of coal pulverizer material performance of carbon seal rings

材料性能Material performan	EK305	M170D	T170D
体积密度Bulking density g/cm³	2.55	2.2	2.45
抗折强度Bending strength Mpa	80	60	80
抗压强度Compressive strength Mpa	290	210	270
硬度Shore hardness HS	115(HR)	75	90
气孔率Porosity %	≤2.5	≤2.5	≤2
使用温度 Using temperature℃	400	400	400

二、高速泵机械密封摩擦副材料应用

FRT163K高强度碳石墨材料是我公司为解决国内各大化工装置的高速泵用机械密封摩擦副而研制的材料，该材料成功解决了该类大型化工装置超高转速达30000rmp，泵腔压力13Mpa，线速度达到40M/S，流体扬程高达1300M的高速泵机械密封摩擦副用材料的技术难题。实现了该类产品的国产化。

2. Antifriction material of high speed pump mechanical seal

My company developed FRT163K of high strength carbon graphite sealing materials, and solved the large-scale chemical industry equipment for ultra-high speed of up to 30000rmp, pump pressure 13Mpa, line speed up to 40m/s, causing fluid head to 1300m. Our company took to succeed in solving technology problems of mechanical seal in high-speed pump friction materials to realize the localization of the product.

高速泵机械密封摩擦副材料性能

Material performance of high speed pump mechanical seal

材料性能 Material performan	设计指标 Design index	FRT163K
体积密度 Bulking density g/cm³	1.82	1.85
抗折强度 Bending strength Mpa	75	76
抗压强度 Compressive strength Mpa	245	255
硬度 Shore hardness HS	90	95
热膨胀系数 Coefficient of thermal expansion 10⁻⁶/℃	5.5	5.5
使用温度 Using temperature ℃	250	250

APPLICATION EXAMPLES 应用实例

三、多晶硅生产用石墨夹具材料应用

光伏用多晶硅生产是国内近几年发展迅猛、竞争激烈的新材料领域，石墨夹具是改良西门子法生产中的大宗耗材，降低消耗从而降低生产成本是多晶硅生产企业面临的重大课题。

我公司生产的FRG系列石墨材料是在为中能硅业提供服务中不断改型优化而形成的石墨夹具材料，三年多来为中能硅业节约耗材资金达千万之多。材料主要性能如：体积密度、抗折强度、电阻率、灰份等可根据用户需求进行调整。

3. Polycrystalline graphite jig

Photovoltaic polysilicon production is developing rapidly in China in recent years, graphite jig is a large amount of consumable material. Reducing consumption is a major problem for polysilicon costs.

FRG materials of our company become the dedicated fixture materials of graphite through supplying to Jiangsu China power Silicon Industry CO. and improving continuously. For more than three years Jiangsu China power Silicon Industry CO. saves money by as much as tens of millions of Yuan. Material properties can be customized according to user needs, including bulk density, fracture resistance, resistivity, ash, etc. Material properties such as bulk density, tensile strength, resistivity, ash can be adjusted according to user needs.

四、大型干燥设备用分瓣密封装置应用

FRT193材料是我公司专为轴密封新研制的高强度、自润滑碳石墨材料。是广泛应用于鼓风机、压缩机等的轴封材料

典型应用：2012年我公司为解决国内某大型企业超大型卧式干燥设备轴封装置用密封材料的技术难题，将FRT193材料进行特殊处理后用于轴径3.3米密封装置，密封气体温度达300°C的无油润滑工况。各项性能指标均超过设计指标。

4. Application development for Large drying equipment split seals

FRT193 is specially designed by our company self-lubricating shaft seal material with high strength. It is widely used in blower, compressor, etc.

Typical application: In 2012 our company undertook the development of mega carbon graphite seal ring for seal device of horizontal drying equipment of a large enterprise. The device seals shaft diameter is 3.3 m, sealing gas temperature reach up to 300℃ in oil-free lubrication condition. We used the new materials FRT193, after special treatment, and have solved this problem.The performance are more than the design value.

干燥设备用分瓣密封材料性能指标

Materials performance and design requirements

材料性能 Materials performance	体积密度 Bulking density g/cm³	抗折强度 Bending strength Mpa	抗压强度 Compressive strength Mpa	硬度 Shore hardness HS	使用温度 Using temperature ℃	气孔率 Porosity %
设计指标 Design requirements	1.85	72	225	85	300	≤2
FRT193G	1.92	75	235	90	350	≤1.5

应用实例 APPLICATION EXAMPLES

五、大轴径干气密封系统用碳石墨密封环应用

干气密封是目前最先进的一种非接触密封形式，其密封原理是依靠气体在两个相对高速旋转的端面形成气膜，从而封堵流体介质向大气泄露，保护环境。因此高速旋转的两个端面材料能否承受高压与高低温梯度变化而不变形是一套干气密封系统技术的瓶颈。我公司生产的FRT163D耐高温、高强度浸锑碳石墨材料，已广泛应用于干气密封系统。

典型应用：2013年为配合国内知名密封企业成都一通密封有限公司解决国家LNG项目、西气东输和大型煤化工等项目对大轴径透平压缩机干气密封装置的国产化，我公司研制生产了外径达475mm的FRT163D耐高温、高强度浸锑碳石墨材料。生产出外径469mm，总厚度仅为24mm的密封产品，提供系统实验获得成功，等待项目组验收。目前在国外能生产这种高强度、大规格浸锑密封材料的企业也只有为数不多的二、三家。该产品的成功填补了国内空白。

5. Large-diameter carbon graphite seal ring for dry gas seals systems

Dry gas seal is the most advanced form of a non-contact seal, its sealing principle relies on the gas membrane in two relatively rotating end, thereby blocking fluid leaked into the atmosphere, protecting the environment. High speed rotation of the two surface produced large thermal, the material can withstand high pressure and high temperature gradients without deformation, is a technology difficult problem of dry gas seals systems.

Typical application: Chengdu well-known enterprises, Yitong seal co, undertook the country's LNG project, the West-East gas pipeline and large coal chemical projects. Our company cooperated with Yitong seal co in 2013 year to solve the Localization for large-diameter turbine compressor dry gas seals system. Our company developed and produced high temperature resistance and high strength carbon-graphite impregnated antimony FRT163D with diameter 475mm, and machined large seal products with outside diameter 469mm, total thickness of 24mm only, the sealing products finished comparable experiment successfully, waiting acceptance for the item group. Currently abroad only can be produced this kind of sealing material impregnated antimony with high strength and large size by a few companies. The product fills the gap successfully.

设计指标与FRT163D材料性能指标
Design indicators and FRT163D material performance indicators

材料性能 Materials performance	体积密度 Bulking density g/cm³	抗折强度 Bending strength Mpa	抗压强度 Compressive strength Mpa	硬度 Shore hardness HS	使用温度 Using temperature ℃	气孔率 Porosity %
设计指标 Design requirements	2.3	95	290	100	400	≤2
材料指标 Performance	2.4	100	310	110	400	≤1.5

APPLICATION EXAMPLES 应用实例

六、超高温气体过滤碳材料的研发应用

2012年我公司承担中科院某电子所军工项目中超高温气体过滤用碳材料的研发，经过近一年的试制，研发出FRGT-3(4)超高温气体过滤碳材料，产品指标完全满足设计要求，打破了国外的垄断限制。FRGT-3(4)超高温气体过滤碳材料适用工况：过滤气体温度≥2500℃，平均孔径≤10μm，杂质含量≤30PPm

6. Super-hot gas filtration carbon materials research and development applications

In 2012 year our company accepted a military projects of an electronic Institute of Chinese Academy of Sciences, researched and developed the carbon materials for ultra-high temperature gas filtration. After a year we developed carbon filtration materials FRGT-3 (4). It can use in super- hot gas filtration. All indicators of the product fully meet the design requirements, breaking the foreign monopoly. FRGT-3 (4) super-hot gas filtration carbon materials suitable working conditions: filters gas temperature ≥ 2,500℃, average pore diameter ≤ 10 μm, impurity ≤ 30PPm

设计技术指标与产品技术指标
Design specifications and technical product specification

材料性能 Materials performance	平均孔径 Average pore diameter μ m	透气度 Degree of aeration m³/h.kpa.m²	孔隙度 Extent of porosity %	抗压强度 Compressive strength Mpa	使用温度 Using temperature ℃	杂质含量 Impurity ppm
设计指标 Design requirements	≤10	≥100	≥30	≥10	≤2500	≤50
产品指标 Performance	8.5	145	33	11	2500	≤25

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材料性能 MATERIAL PERFORMANCE

机械用碳石墨材料代表性牌号与物理特性

Representative model and materials physical properties for mechanical carbon and graphite

牌号 Model	材质 Material	体积密度 Bulking density g/cm³	肖氏硬度 Shore hardness HS	抗折强度 Bending strength Mpa	抗压强度 Compressive strength Mpa	气孔率 Porosity %	热膨胀系数 Coefficient of thermal expansion 10⁻⁶/℃	最高使用温度 Using temperature max. ℃
M238	碳石墨 Carbon-graphite	1.75	38	35	70	≤15	4.5	400
M254		1.70	32	25	50	≤18	4.4	400
FRT193		1.86	65	60	130	≤10	4.6	400
FRT183		1.72	70	60	140	≤18	4.2	400
FRT163		1.75	80	62	155	≤15	3.5	400
FRT153		1.74	85	70	175	≤15	4	400
M120		1.65	60	40	80	≤20	3.2	400
M238K	浸渍树脂 Carbon-graphite materials impregnated with resin	1.85	55	65	160	≤1.5	4.5	200
M254K		1.82	48	55	135	≤2	4.5	200
FRT193K		1.95	80	72	210	≤1	4.8	200
FRT183K		1.82	85	75	225	≤2	5.2	200
FRT163K		1.84	95	76	240	≤1.5	5.5	200
FRT153K		1.84	105	97	280	≤1.5	5.5	200
M120K		1.75	90	65	196	≤2.5	2.5	200
M238D	浸渍金属 Carbon-graphite materials impregnated with metal	2.35	50	48	150	≤1.5	5.5	400
M254D		2.45	42	45	136	≤2.5	5.5	400
FRT193D		2.30	75	70	215	≤1	4.5	400
FRT183D		2.45	85	75	230	≤1.5	5.0	400
FRT163D		2.35	95	88	265	≤1.5	5.0	400
FRT153D		2.35	98	90	285	≤1.5	5.0	400
FRT170D		2.40	88	75	255	≤2	5.0	400

注：表中所列材料是市场上广泛使用的，我司可根据顾客的特殊需要提供浸渍铜合金、巴氏合金、酚醛树脂等浸渍物的产品。

Note: Materials listed in the table are widely used in the market. According to customer's special needs we can provide products impregnated with copper alloy, Babbitt, phenolic resin.

相关数据为参考值，非保证值 Related data as reference values, not guaranteed values.

MATERIAL PERFORMANCE 材料性能

人造石墨材料代表性牌号与物理特性

Representative model and physical characteristics for artificial graphite material

牌号 Model	体积密度 Bulking density g/cm³	抗折强度 Bending strength Mpa	抗压强度 Compressive strength Mpa	电阻率 Electrical resistivity μ Ω.m	肖氏硬度 Shore hardness HS	热膨胀系数 Coefficient of thermal expansion 10⁻⁶/℃	灰分 Ash content %
FRG-05	1.88	55	105	11-14	60	4.8	500
FRG-04	1.84	50	95	11-14	55	4.5	500
FRG-03	1.78	40	78	11-14	50	4.0	500
FRG-02	1.82	36	72	11-14	45	4.0	500
FRG-01	1.72	30	60	11-14.5	40	3.6	500
FRG-15	1.86	60	115	13-17	68	4.5	800
FRG-14	1.83	54	105	13-17	65	4.2	800
FRG-13	1.75	43	82	13-17	55	3.8	800
FRG-25	1.90	53	105	8.5-11	60	5.5	50
FRG-24	1.85	48	96	8.5-11	55	5.2	50
FRG-23	1.80	38	75	8.5-11	48	5.0	50
FRG-22	1.84	35	68	8.5-11	45	5.2	50
FRG-21	1.75	28	55	8.5-11	38	4.8	50

注：相关数据为参考值，非保证值 Related data as reference values, not guaranteed values.

材料性能 MATERIAL PERFORMANCE

多孔过滤碳石墨材料代表性牌号与物理特性
Representative model and physical properties for Carbon graphite porous filters materials

牌号 Model	体积密度 Bulking density g/cm³	抗折强度 Bending strength Mpa	抗压强度 Compressive strength Mpa	孔隙度 Extent of porosity %	最大孔径 Pore size max. μm	透气度 Degree of aeration m³/h.kpa.m²	平均孔径 Average pore diameter μm.	最高使用温度 Using temperature max.℃	
								有氧环境 Aerobic	无氧环境 Anaerobic
FRDT05	1.30	≤ 15	≤ 35	30	25	35-60	< 5	400	800
FRDT10	1.25	≤ 13	≤ 30	40	35	80-150	< 10	400	800
FRDT25	1.20	≤ 12	≤ 25	55	100	200-300	< 15	400	800
FRDT40	1.15	≤ 10	≤ 22	65	120	400-550	< 25	400	800
FRGT05	1.35	≤ 8	≤ 15	25	22	30-50	< 3	400	2500
FRGT10	1.30	≤ 6	≤ 12	35	32	70-130	< 6	400	2500
FRGT25	1.25	≤ 5	≤ 10	50	95	170-260	< 10	400	2500
FRGT40	1.2	≤ 3.5	≤ 7	60	112	350-500	< 15	400	2500

注：相关数据为参考值，非保证值 Related data as reference values, not guaranteed values.

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