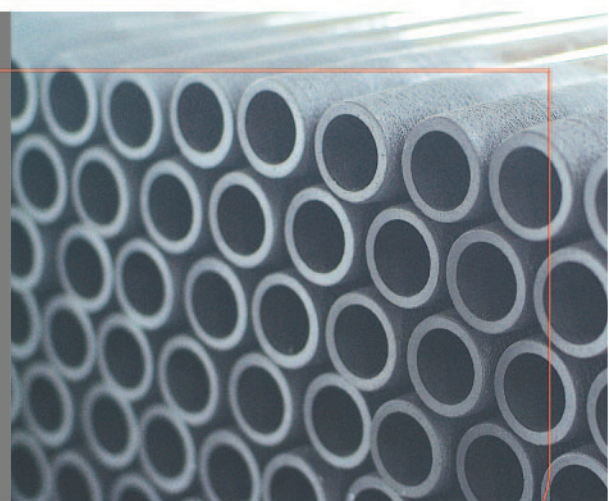




列管式石墨换热器

Tubular graphite heat exchanger

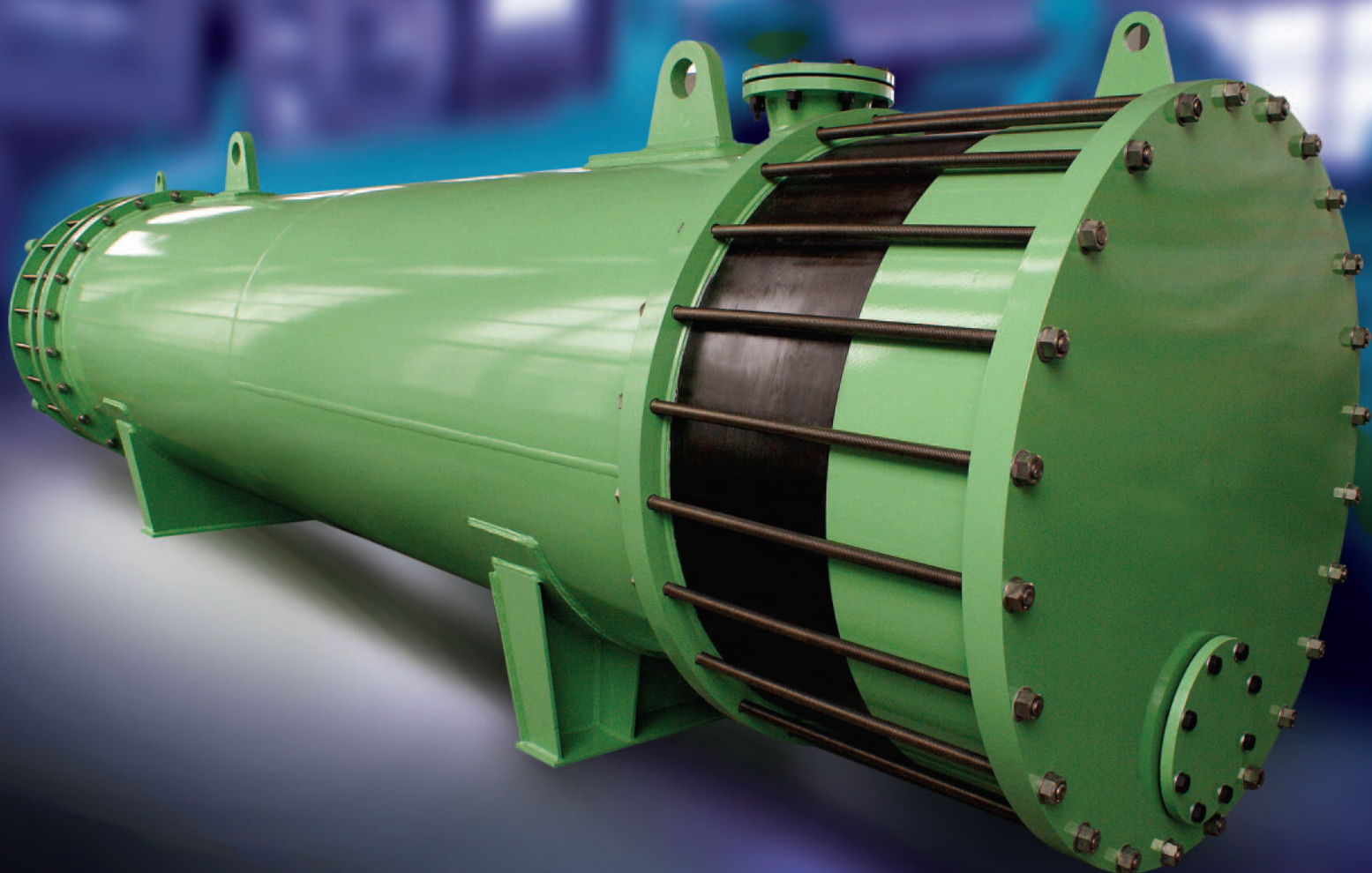


南通三圣石墨设备科技股份有限公司

NANTONG SUNSHINE GRAPHITE EQUIPMENT TECHNOLOGY CO.,LTD.

全球石墨设备系统设计制造专家

Global expert of the graphite equipments system design and manufacture.



公司简介： Company Introduction

南通三圣石墨设备科技股份有限公司,通过2008《高新技术企业认定管理办法》认定的高新技术企业,全球三大石墨设备制造商之一,中国中小企业100强,公司现已进入上市轨道。

公司同时拥有由国家质量监督检验检疫总局首批颁发的《非金属(石墨)压力容器制造许可证》和《非金属(石墨)压力容器设计许可证》,拥有33项国家专利和多项专有技术,其中多项专有技术达到或超过国际先进水平。

公司是法国国际检验局(BV)审核通过的ISO9001:2000认证企业,是国内唯一包括废硫酸浓缩工艺设计、石墨设备设计、石墨设备制造三项同时通过审核的石墨设备制造企业,并且是国内唯一通过PED质量体系认证,出口欧盟免检的石墨设备供应商。

公司拥有省级自营进出口权,出口产品按照欧洲AD压力容器标准或美国ASME标准制造,产品远销德国、瑞士、法国、瑞典、荷兰、美国等20多个国家和地区。

Nantong Sunshine Graphite Equipment Technology Co., Ltd. A hi-tech enterprise certificated according to the "Certification Method of Hi-tech enterprise (version 2008)", is one of the three largest graphite equipments manufacturers in the world, and one of the best 100 middle and small size enterprises in China. Now, the company is going to be a listed company.

The company passed the design qualification inspection and manufacture qualification inspection of non-metal (graphite) pressure vessels by China State Quality Supervision, Inspection and Quarantine Bureau. The company has 33 patents and many technical know-how, most of them reach or exceed advanced international standards.

The company got the ISO 9001:2000 certification by BV (France), is the only domestic enterprise certificated covering the design of waste sulfuric acid concentration process, the design and manufacture of graphite equipment. Also the only enterprise certified by the PED Quality System Certification. Now, the company is the graphite equipment supplier to EU exempted from inspection.

The company has the provincial import and export license. The products manufactured according to the AD pressure vessels standard of Europe or ASME standard of USA. The products exported to more than 20 countries or regions including Germany, Switzerland, Sweden, Holland, USA, etc.



三圣总部
HQ of Sunshine Group



三圣工业园
Sunshine Industrial Park

旗下全资、控股、参股企业：
Fully invested, proprietary, joint venture enterprises



德国WILK石墨公司
WILK-GRAPHITE GmbH, Germany



南通环境工程设计院
Nantong Environment Engineering
Designing Institute

艾伯纳三圣(南通)环保有限公司
Ebner-Sunshine (Nantong) Environment
Protection Co., Ltd.



SUNSHINE

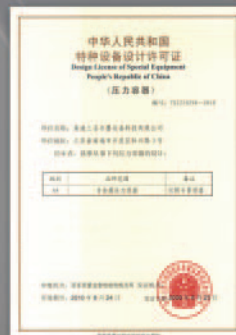
南通三圣石墨设备科技有限公司
Nantong Sunshine Graphite Equipment
Technology Co., Ltd.

南通三圣化工科技有限公司
Nantong Sunshine Chemical Process
Technology Co., Ltd.



江苏省工业废酸资源回收
利用工程技术研究中心
Jiangsu Industrial Wasteacid Recycling
Engineering Research Center

南通江东碳素股份有限公司
Nantong Jiangdong Carbon Joint Venture Co.,Ltd



浮头列管式石墨换热器 XYKRuihua Fuel Group

设备性能优点:

成膜条件优异
结构简单、紧凑
流体阻力小，介质通道光滑，不易结晶结垢。
可制造大型设备
换热效果好
使用寿命长

Advantages of the equipment:

Good film forming property
Simple structure
Low flow-resistance force, smooth surface of medium channel, crystallization reduced.
Suitable for large-size equipment
Good heat exchange efficiency
Long application life

技术特性:

行业标准:

设计压力:

管程: 0.3Mpa (DN≤900) 0.2Mpa (DN>900)

壳程: 0.3Mpa (DN≤1100) 0.2Mpa (DN>1100)

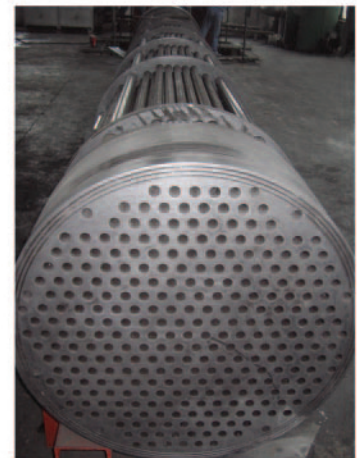
设计温度:

管程: -20℃ ~ 130℃ 壳程: -20℃ ~ 120℃

公司特殊设计:

设计压力: 可根据客户要求设计压力最大为1.0Mpa。

设计温度: 冷却时物料最大设计温度达250℃。



Technical property:

Industry standard:

Design pressure:

Tube side: 0.3Mpa (DN≤900)

0.2Mpa (DN>900)

Shell side: 0.3Mpa (DN≤1100)

0.2Mpa (DN>1100)

Design temperature:

Tube side: -20℃~130℃

Shell side: -20℃~120℃

Specially designed by our company:

Design pressure: Max. 1.0 Mpa is available, can design according to the requirement of customers.

Design temperature: Max.250℃ for the material.

主要构成部件：

石墨管，可根据客户要求生产不同规格的石墨管，不同类型石墨管：酚醛树脂石墨管、改性酚醛树脂石墨管、碳纤维加强管、石墨化浸渍管、石墨带翅片管等（参见P8）。

浮动管板及固定管板

密封系统材料优质、工作可靠

折流板

封头，一般由浸渍石墨加工而成也可根据客户要求做成钢衬结构，当管程为多程时，封头中设置隔程板

壳体，一般为钢制，也可根据客户要求进行防腐衬里，制造双向耐腐蚀设备。

Main parts:

Graphite tubes: different kinds of graphite tubes manufactured according to the requirement of customers, including: phenolic resin graphite tube, modified phenolic resin graphite tube, carbon fiber reinforced graphite tube, graphitized and impregnated tube, tube with wing structure and etc. (see page 8).

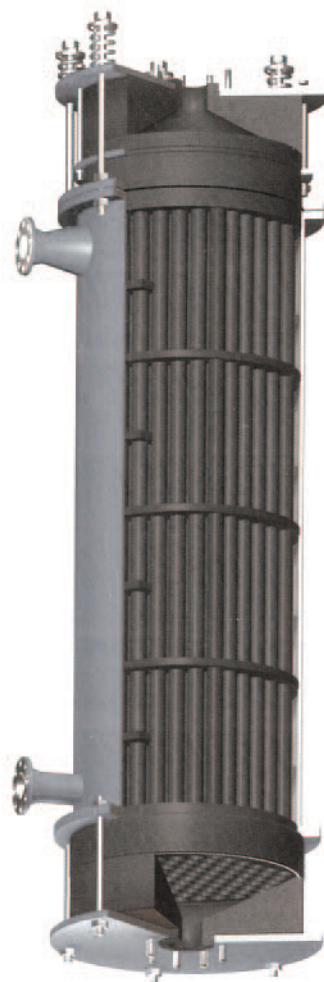
Floating tube sheet and fixed tube sheet.

Sealing system: sealing materials with good quality to ensure the reliable operation.

Baffle plate

Head plate: manufactured by impregnated graphite, or graphite material steining on the steel according to the requirement of customers. When multiple-flows process were adopted, flow separator plates were set on the head plate.

Shell: manufactured in steel, graphite material steining on the steel for two-dimensional anti-corrosion structure is available according to the requirement of customers.



设备种类：

冷却器、冷凝器、加热器、升膜蒸发器、降膜蒸发器、降膜吸收器等
可根据客户要求由不同型号规格的石墨管组装的列管式石墨换热器

应用行业：

氯碱

磷酸

氢氟酸

废水、废酸

有机类

.....

设备规格：0.5~1500m²/台 可设计为立式或卧式。

Type of equipments

Cooler, Condenser, Heater, Rising film evaporator, Falling film evaporator, Falling film absorber, etc.

The company can supply tubular graphite heat exchanger assembly with different tubular specification.

The equipment widely used in the following industries:

Chlor-alkali industry

Phosphoric acid industry

Hydrofluoric acid industry

Waste water, waste acid treatment

Organic compounds

.....

Equipment specification

0.5-1500m²/unit

Both vertical and horizontal types.



单管填料密封列管式石墨换热器

Independent Sealing Tubular graphite heat exchanger

设备性能优点：

成膜条件优异

结构简单、紧凑

流体阻力小，介质通道光滑，不易结晶结垢。

可制造大型设备

换热效果好

使用寿命长

彻底消除应力破坏：可单根石墨管浮动，彻底消除热膨胀差异引起的附加应力。

可单根换管，避免堵管。

Advantages of the equipment

Good film forming property

Simple structure

Low flow-resistance force, smooth surface of medium channel, crystallization reduced.

Suitable for large-size equipment

Good heat exchange efficiency

Long application life

Stress rupture eliminated, Tubes can float independently, subsidiary stress caused by difference of heat expansion eliminated.

Tubes can be changed independently.



设备结构特点：

结构材料为石墨

管板与换热管连接处采用高弹耐腐蚀材料，实现弹性密封连接

设备全部采用承插式活连接，维修方便

Equipment structural property

Structural materials: graphite

High elasticity and anti-corrosion materials used for the connections between tubes and tube sheet for elastic sealing.

Adapting-form connection adopted for the convenience of maintenance.

技术特性：

设计温度：-20~170℃

设计压力：

管程：0.3Mpa 壳程：0.7Mpa

也可根据客户要求设计最大压力为

1.2Mpa，工艺侧最高温度为250℃的换热器

Technical property:

Industry standard:

Design temperature: -20℃~170℃

Design pressure:

Tube side: 0.3Mpa

Shell side: 0.7Mpa

Max. temperature 250℃ on process side and Max. pressure 1.2 Mpa are available according to the requirement of customers.

设备类型：

冷却器

冷凝器

加热器

降膜吸收器

降膜蒸发器

冷回收器

酸洗系统热交换器

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Type of equipments:

Cooler

Condenser

Heater

Falling film absorber

Falling film evaporator

Recoverer

Heat exchanger for acid washing system

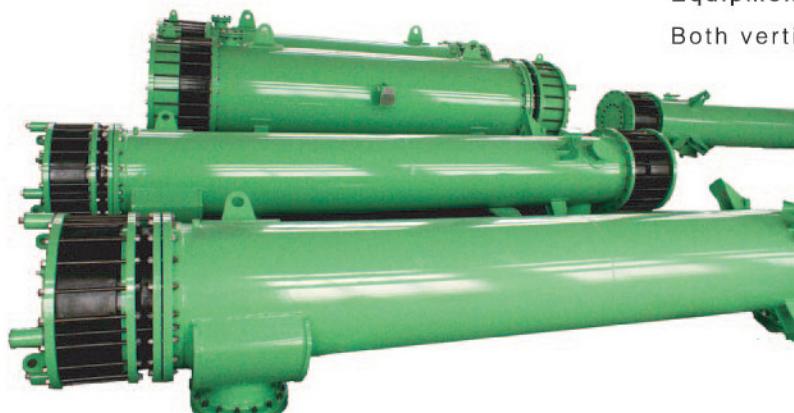
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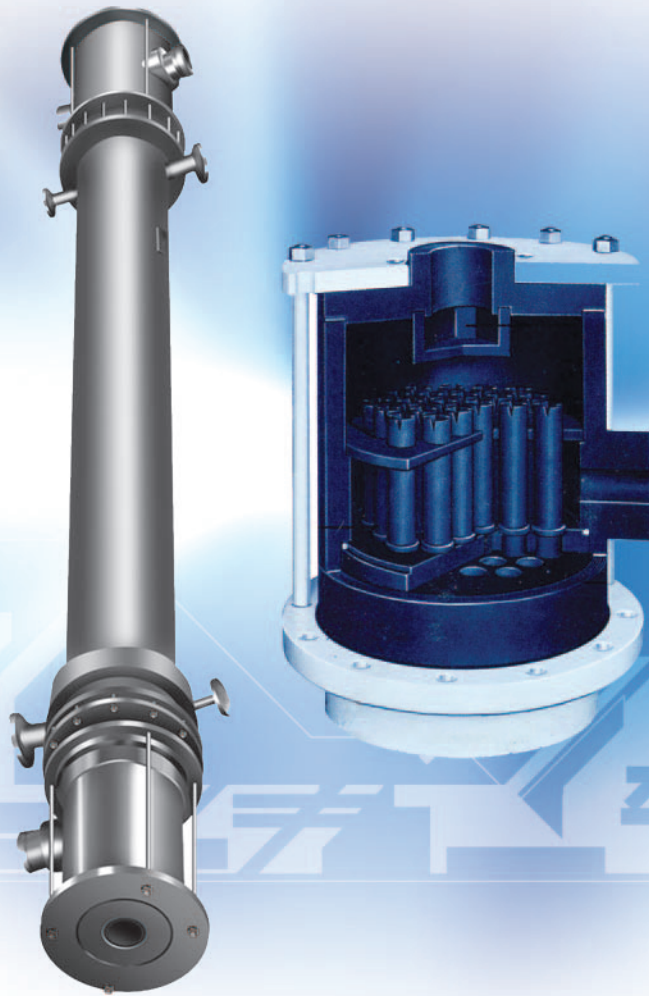
设备规格：0.5~1500m²/台。

可设计为立式或卧式。

Equipment specification: 0.5-1500m²/unit

Both vertical and horizontal types.





设备设计制造达到的国际标准：
Design and manufacture standard

欧洲AD 美国ASME 日本JIS 中国 国标要求

AD standard, Europe ASME standard, USA JIS standard, Japan Chinese standard

三 圣 Sunshine

OR 石墨管材
Graphite tubes

三圣OR石墨管材 Graphite Tubes

酚醛树脂石墨管

Phenolic resin graphite tubes

酚醛树脂石墨管是由石墨粉和酚醛树脂按一定比例配制、混合，经500吨压机成型、300℃高温热处理而成，具有良好的化学稳定性和物理机械性能，耐腐蚀性、热稳定性好，材料允许使用温度为170℃。

Through mixing process (graphite powder and phenolic resin mixed in certain proportion) and extrusion process, (500T extrusion machine and 300℃ heat treatment). We can get final products. The tubes have good chemical stability, physical mechanical character, anti-corrosion character and stable heat stability. The allowable temperature is 170℃.

改性酚醛树脂石墨管

Modified Phenolic resin graphite tubes

改性酚醛树脂石墨管是由石墨粉和改性酚醛树脂按一定比例配制、混合，经挤压而成。与酚醛树脂石墨管相比，提高了石墨管的耐碱性、耐高温性和气密性，因而具有更好的耐腐蚀性，更高的使用温度。

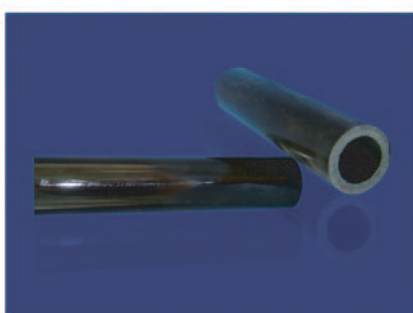
Through mixing process (graphite powder and modified phenolic resin mixed in certain proportion) and extrusion process, we can get final products. As compared with phenolic resin graphite tubes, modified phenolic resin graphite tubes have better anti-corrosion character and higher allowable temperature.

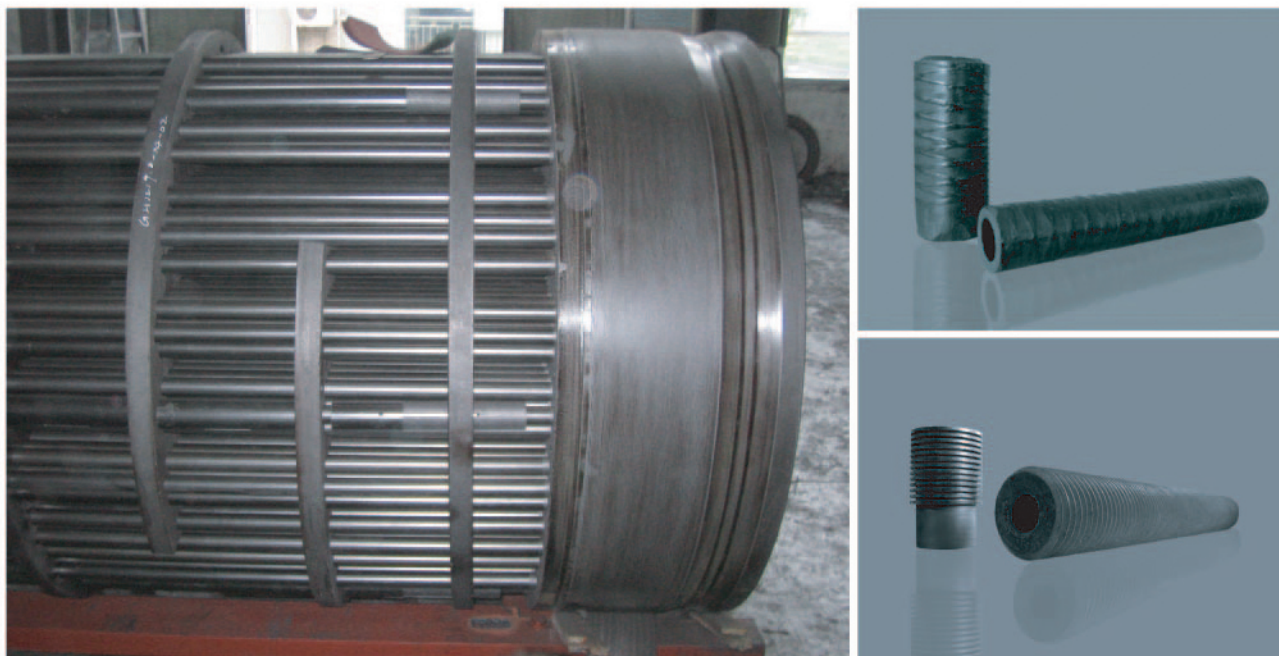
碳纤维加强管

Carbon fiber reinforced graphite tubes

碳纤维加强管与普通石墨管相比，抗蒸汽冲击和抗超极限的工作能力更强。材料允许的最高使用压力为1.5MPa，最高使用温度为200℃。

As compared with synthesis resin graphite tubes, carbon fiber reinforced graphite tubes have better strength, the Max. application pressure reaches 1.5Mpa, the Max. allowable temperature is 200℃.





石墨化浸渍管 Graphitized and impregnated tubes.

石墨化浸渍管为经过高温石墨化工艺处理后的石墨管，经合成树脂浸渍，热处理后成型。其换热效果、使用温度和使用压力均比普通酚醛树脂石墨管高15~20%，可根据不同的使用介质选用不同的合成树脂浸渍，耐腐蚀性更高。

Through graphitization process, impregnation process, and heat treatment process, we can get graphitized and impregnated tubes. The data of heat exchange efficiency, allowable temperature, and working pressure is 15% -20% high than that of phenolic resin graphite tubes. Different synthesis resin will be selected for different media.

石墨带翅片管 Wing-structure Graphite tubes

石墨带翅片管是由石墨粉和合成树脂按一定比例配制、混合，经500吨压机成型、300℃高温热处理而成，分外翅管和内翅管两种结构形式。石墨带翅片管与普通合成树脂石墨管相比，增加了传热面积，提高了单位面积的换热效果。

Through mixing process (graphite powder and synthesis resin mixed in certain proportion) and extrusion process, we can get final products. There are two kinds of structure: internal wing-structure and external wing-structure, through the modification of the structure, the heat exchange area enlarged, the heat exchange efficiency increased.

检测和实验

Inspection and experiment

检测和实验中心配备有专业技术人员和检测设备，负责为客户使用介质推荐可靠的防腐蚀材料、材料质量检测、半成品检测、成品综合指标检测，同时参与公司的新材料、新工艺的研发工作。

1、当接到客户的订单时，我们会根据客户工艺条件进行多种石墨材料在该条件下的耐腐蚀实验，选择合适的材料推荐给客户。

2、根据客户的工艺条件通过模拟实验确定传热系数“k”值，确定合理经济的换热面积和产品结构形式。

3、设备选型确定后，我们对选用的石墨材料进行抗拉、抗弯、抗压等综合机械性能和物理性能测试，确保所使用的材料质量。

4、凡是粘接部件，必须进行试件抗拉强度检测后，才可进行同等条件下的施工。

5、所有石墨成品必须通过综合指标检测方可进入组装工序。

6、为保证产品的质量，必须按相关标准和图纸设计要求进行综合指标测试，经质量评定合格后方可发货。

7、对废酸回收系统进行中试运行。

我公司实验室建有多条综合工艺流程装置，可以根据客户提供的介质，进行各种状态下的模拟运行测试，从中找到较佳的工艺流程。

Inspection and experiment center of the company is equipped with specified testing devices and professional technicians. It could offer reliable testing results to customers about material, material quality, semi-manufactured products and finished products according to different media, and is involved in development of new material and new process.

1. After receipt of purchasing order, do anti-corrosion test on graphite material under the process conditions offered by the customer and recommend suitable material to the customer.

2. Determine heat-transfer coefficient K value according to customer offered process conditions by analog test, then find reasonable and economic heat-transfer area and structure.

3. After the determination of equipment type, do mechanical and physical performance test, eg. tensile test, bending test and compression test, etc., on selected graphite material to ensure reliable quality.

4. For kitting parts, manufacture under the same conditions as for sample tensile test.

5. Assemble all the graphite parts after passed comprehensive performance tests.

6. To guarantee quality of the product, do comprehensive performance tests according to related codes and requirements on drawings, and deliver only when quality is acceptable.

7. Pilot-run the waste acid recovery system.



左图：化学分析室
右图：理化测试室
Left: chemical analysis room
Right: mechanical and physical testing room

石墨材料的主要物理机械性能

Main Physical and Mechanical Properties of Graphite Material

特性 speciality	单位 Unit	石墨块材 Graphite Block			石墨管材 Graphite tube			
		CARBEX [®] BF1	CARBEX [®] BF2	CARBEX [®] BF3	CARBEX [®] T	CARBEX [®] TT	CARBEX [®] TB	CARBEX [®] TS
最大颗粒尺寸 Max.grain size	mm	3	0.8	0.2	0.2	0.2	0.4	0.6
体积密度 Bulk density	g/cm ³	1.85-1.90	1.88-1.92	1.95-2.05	>1.90	>1.92	>1.92	>1.90
抗压强度 Compressive strength	MPa	>60	>78	>90	>80	>85	>80	>80
抗拉强度 Tensile Strength	MPa	>14	>16	>20	>20	>20	>20	>16
抗弯强度 Bending strength	MPa	>25	>32	>45	>55	>55	>50	>30
热导率 Thermal conductivity	W/mk	>110	>120	>140	>40	>40	>50	>50
线胀系数 Lin. coefficient of thermal expansion (20-200℃)	K ⁻¹ ·10 ⁶	4-6	8-10		4-6	4-6	4-6	4-6
许用温度 Max. service Temperature	℃	180	200	200	170	170	200	200
渗透系数 Coefficient of permeability	cm ² /s	10 ⁻⁶	10 ⁻⁶	10 ⁻⁷	10 ⁻⁷	10 ⁻⁷	10 ⁻⁶	10 ⁻⁶
灰分 Ash content	%	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5

SUNSHINE

南通三圣石墨设备科技股份有限公司

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