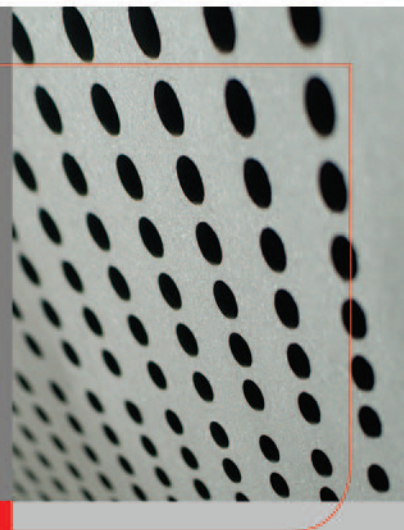




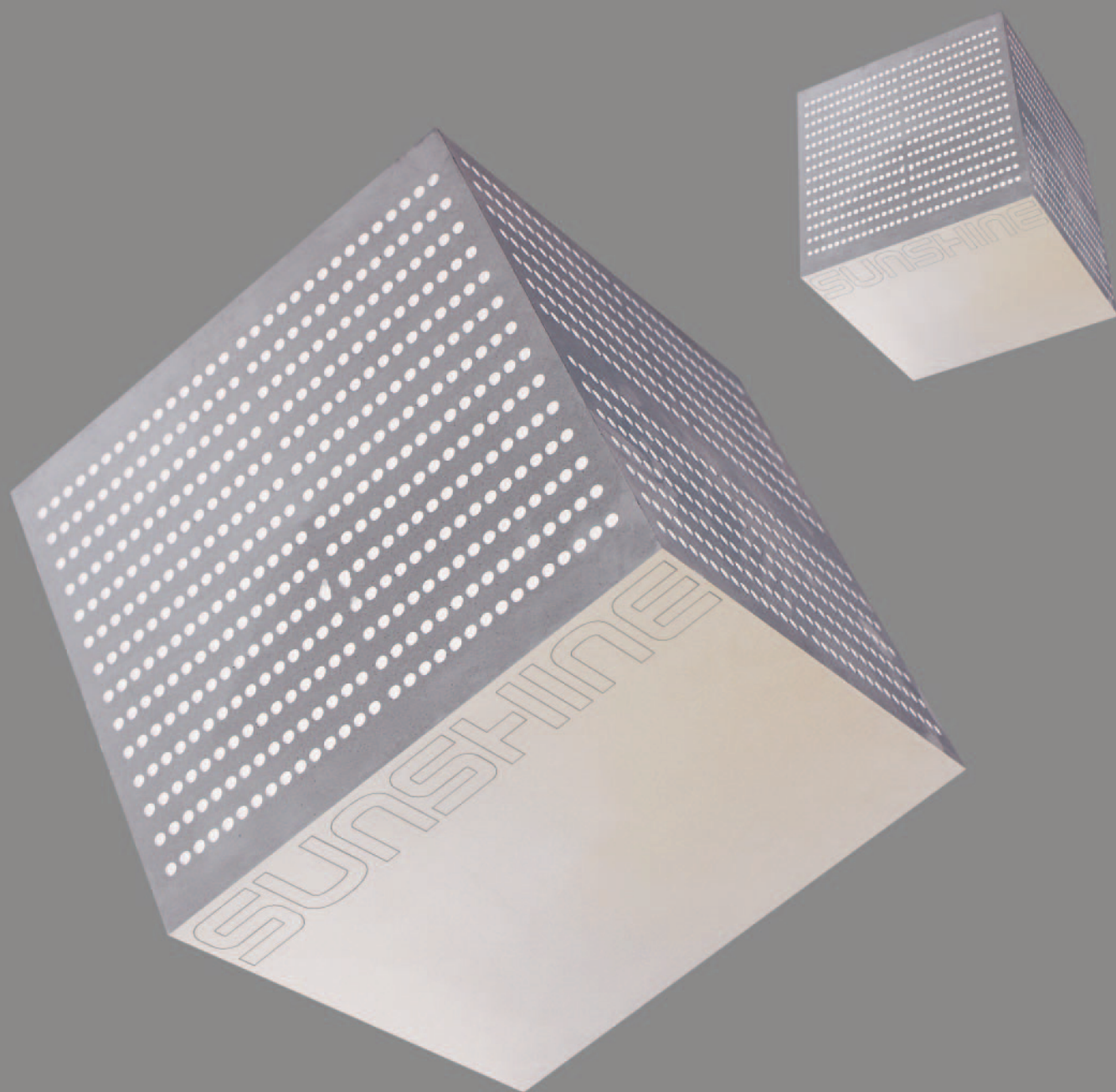
# 块孔式石墨换热器

Block type 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。

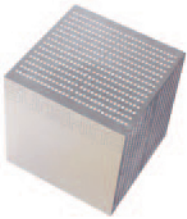
公司拥有省级自营进出口权,出口产品按照欧洲AD压力容器标准或美国ASME标准制造,产品远销德国、瑞士、法国、瑞典、荷兰、美国等20多个国家和地区。

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





## YKA 型圆块孔式石墨设备

### YKA New model holed-circular-block-type graphite equipment

#### 设备性能优点:

结构强度高  
耐高温性能强  
抗冲击性能好  
体积利用率高  
规格变化灵活  
使用寿命长  
便于检修等特点

#### Advantages of the equipment:

High structural strength  
Wide range for application temperature  
Good resistance to impact  
High volume-utilization rate  
Flexible for specification change  
Long application life  
Convenient for maintenance

#### 技术特性:

行业标准:

设计温度:  $-20\sim 165^{\circ}\text{C}$  (酚醛树脂浸渍)

设计压力: 0.4Mpa

公司特殊设计:

设计温度:  $-20\sim 220^{\circ}\text{C}$  (氟复合树脂浸渍)

可根据用户要求设计制造,最高压力 达1.2Mpa。

#### Technical property:

Industry standard:

Design temperature:  $-20\sim 165^{\circ}\text{C}$  (phenolic resin impregnated)

Design pressure: 0.4 Mpa

Specially Designed by our company:

Design temperature:  $-20\sim 220^{\circ}\text{C}$  (PTFE resin impregnated)

Design pressure: According to the requirement of customer,  
can reach 1.2 Mpa



### 主要构成部件：

换热块为标准单元块

密封采用四氟乙烯密封材料

设置压缩弹簧作热胀冷缩的自动补偿机构

采用短介质通道，设置再分配室，增强紊流效应，提高传热效果

壳体一般为钢制，为单节长筒或多节短圆筒，用法兰相连接也可根据工艺要求制作钢壳内衬橡胶或无缝聚氯乙烯、玻璃钢、喷涂三氟氯乙烯等防腐蚀材料制成双向耐腐蚀设备。

### Main parts

Heat exchange block: Standard unit block

Sealing material: PTFE sealing

Compression spring equipped as the automatic-compensation structure for heat-stretch and cool-compress.

Short-pass adopted, distribution room is amplified to increase turbulence effect and increase heat exchange efficiency.

Shell is normally made in steel, single or multi links, which are connected by flange. We also can provide double-passes corrosion-resistance equipment according to the requirement of customers by using different inner-lining materials such as fibber, PVC, glass reinforced plastic or painting trifluorochlorethylene

### 设备类型：

加热器

冷却器

冷凝器，冷凝器设气液分离器

升、降膜蒸发器

降膜吸收器

设备规格：0.5~1000m<sup>2</sup>/台

可设计成立式或卧式。

### Type of equipments:

Heater

Cooler

Condenser equipped with separator for gas and liquid

Rising, falling-film evaporator

Falling-film absorber

Specification: 0.5-1000m<sup>2</sup>/unit

Both vertical and horizontal.



## XYK型圆块孔式石墨设备

XYK New model holed-circular-block-type graphite equipment

公司创新产品 专利号：ZL 97 2 43307.4  
New patent product Patent No: ZL 97 2 43307.4

### 设备性能优点：

结构强度高  
抗冲击性能好  
体积利用率高  
传热效率高  
使用寿命长  
规格变化比YKA型更灵活  
用作吸收器、蒸发器比YKA型效果更优越

### Advantages of the equipment

High structural strength  
Good resistance to impact  
High volume-utilization rate  
High heat exchange efficiency  
Long application life  
More flexible for specification change than that of YKA type  
Better performance when used as absorber, evaporator as compared with YKA type equipment.

### 技术特性：

公司特殊设计：

设计温度：-20~165℃（酚醛树脂浸渍）  
-20~220℃（氟复合树脂浸渍）

设计压力：0.6Mpa，亦可根据用户要求的设计制造，  
最高设计压力达1.6Mpa。

### Technical property

Specially designed by our company:

Design temperature: -20~165℃ (Phenolic resin impregnated)  
-20~220℃ (PTFE impregnated)

Design pressure: 0.6Mpa, or we can design  
according to the requirement of customers,  
the pressure can reach 1.6Mpa.





### 主要构成部件：

石墨热交换块采用标准单元块，采用聚四氟乙烯密封材料，加装压缩弹簧作热胀冷缩的自动补偿机构，特制的外折流器在冷却水或蒸汽的压力冲击下，对石墨换热块无损坏，单元块的换热效率比原来提高了30%。可根据客户提出的各种要求进行优化设计，充分利用其优越的性能。

### Main parts

Heat exchange block: Standard unit block

Sealing material: PTFE sealing compression spring equipped as the automatic-compensation structure for heat-stretch and cool-compress. Specially made baffler will prevent the damage to blocks caused by the rush impact of cooling water or steam. The heat exchange efficiency increased 30%. We can also optimize our design according to the requirement of our customers, and to make full use of the excellent properties.

### 设备类型：

加热器  
冷却器  
冷凝器，冷凝器加装气液分离器  
升、降膜蒸发器  
降膜吸收器

**设备规格：** 0.2~1000m<sup>2</sup>/台

可设计成立式或卧式。

### Type of equipments:

Heater  
Cooler  
Condenser equipped with separator for gas and liquid  
Rising, falling-film evaporator  
Falling-film absorber

**Specification:** 0.2-1000m<sup>2</sup>/unit

Both vertical and horizontal.



设备设计制造达到的国际标准：

欧洲AD

美国ASME

日本JIS

中国 国标要求

**The manufacture standards:**

AD standard, Europe

ASME standard, USA

JIS Standard, Japan.

Chinese standard.









---

## 矩型块孔式石墨换热器

### Rectangular holed-block-type graphite heat exchanger

---

#### 设备性能优点:

结构强度较高

抗冲击性良好

检修装拆简便

物料流程可为单流程或多流程

#### Advantages of the equipment:

High structural strength

Good resistance to impact

Convenient for maintenance

Single or multi flow-pass for materials

#### 技术特性:

行业标准:

设计温度:  $-15\sim 150^{\circ}\text{C}$  (酚醛树脂浸渍)

设计压力: 纵向: 0.5Mpa 横向: 0.3Mpa

公司特殊设计:

设计温度:  $-20\sim 220^{\circ}\text{C}$  (氟复合树脂)

设计压力: 根据客户要求设计最大压力可达1.0Mpa。

#### Technical property:

Industry standard:

Design temperature:  $-15\sim 150^{\circ}\text{C}$  (Phenolic resin impregnated)

Design pressure: Lengthwise direction: 0.5 Mpa Cross direction: 0.3 Mpa

Specially designed by our company:

Design temperature:  $-20\sim 220^{\circ}\text{C}$  (PTFE impregnated)

Design pressure: Designed according the requirement of customers, the Max. pressure can reach 1.0 Mpa

**主要构成部件：**

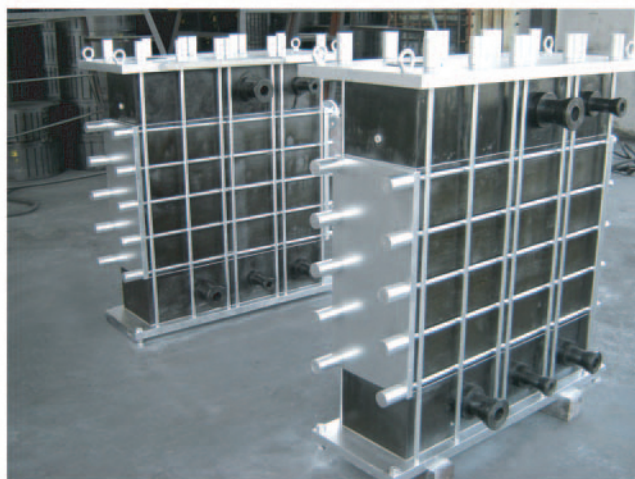
矩型石墨封头

石墨换热块

聚四氟乙烯密封垫片

水封侧板为铸铁板，也可制成双向耐腐蚀结构

工艺侧有单流程及多流程



**Main parts**

Rectangular graphite head

Rectangular graphite block

PTFE sealing gasket

Plate on the water side is cast iron,

The equipment can be designed and manufactured as double-passes corrosion-resistance structure.

Process side can be designed and manufactured as single or multi flow process.

**设备类型：**

加热器

冷却器

冷凝器

规格：5-500M<sup>2</sup>/台或根据客户要求设计、制造。

可设计成立式或卧式；也可设计成外联式或内联式。

**Type of equipment:**

Heater

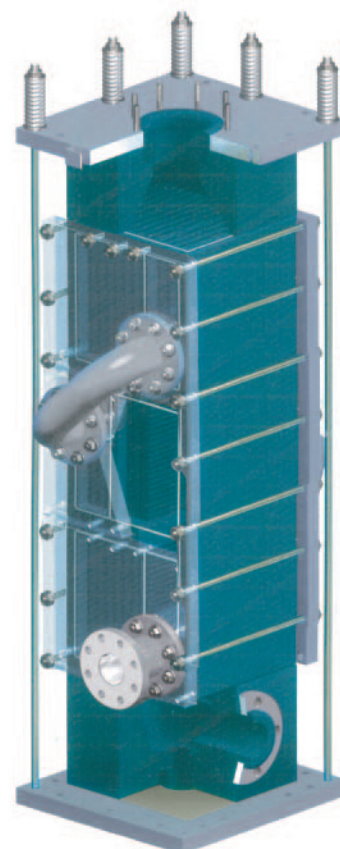
Cooler

Condenser

**Specification:** 5-500m<sup>2</sup>/unit. Or can design or manufacture

according to the requirement of customers.

Including vertical, horizontal, external connected and internal connected type.



---

## 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 <sup>®</sup> BF1	CARBEX <sup>®</sup> BF2	CARBEX <sup>®</sup> BF3	CARBEX <sup>®</sup> T	CARBEX <sup>®</sup> TT	CARBEX <sup>®</sup> TB	CARBEX <sup>®</sup> 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 <sup>3</sup>	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 <sup>-1</sup> ·10 <sup>6</sup>	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 <sup>2</sup> /s	10 <sup>-6</sup>	10 <sup>-6</sup>	10 <sup>-7</sup>	10 <sup>-7</sup>	10 <sup>-7</sup>	10 <sup>-6</sup>	10 <sup>-6</sup>
灰分 Ash content	%	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5

## 3WJKT型卧式偏钛酸专用石墨冷却器

3WJKT Horizontal type graphite cooler specialized in metatitanic acid application

本型设备于1998年，应中国核工业总公司要求开发研制，在中国已推广应用了100多台。

This equipment is designed for CNNC company in 1998. Now, more than 100 units were promoted in China.

### 优点:

结构强度较高 抗冲击性良好 逆向冷却;

双向防腐; (选用)

因介质粘度大, 介质孔径加大, 并设有多个排净口;

介质孔为短道多流程, 便于清理结晶;

国内独家氟复合树脂浸渍石墨, 防腐性较好; (选用)

采用自流方式, 无需供料泵。

### Advantages:

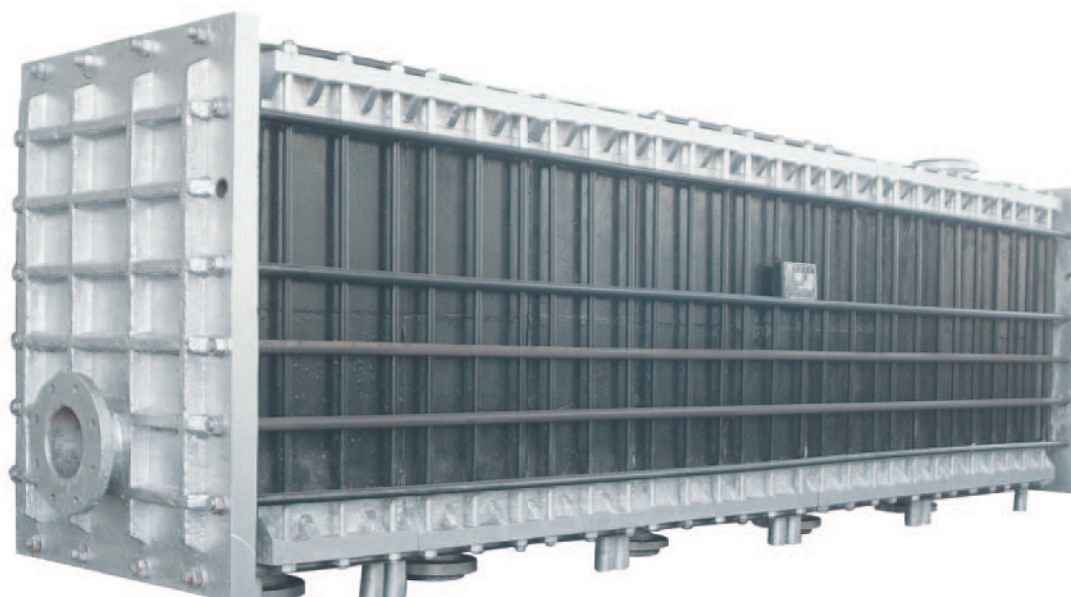
High structural strength. Good resistance to impact.

Counter-current cooling (optional)

Double process anti-corrosion

Diameter of holes increased for high viscous materials, and equipped with several drains. Only domestic manufacturer of PTFE impregnated graphite material, good performance of anti-corrosion. (Optional)

Self flow type, no pump need.



### 设备结构优点：

卧式偏钛酸专用石墨冷却器由矩形石墨封头、石墨换热块及其间的聚四氟乙烯密封垫片等迭装组成，因换热块仅承受压力并为整体结构，无胶结缝，因而特别适用于高浓度的固相悬浮液的热交换，可及时排放沉淀物，解决了固体的沉淀和阻塞的难题。

服务侧侧板为铸铁板，检修装拆简便，也可制成双向防腐结构，该设备工艺侧料流程可为多流程。

### Advantages of the equipment

Horizontal rectangular graphite cooler specialized in metatianic acid application is consist of rectangular graphite head, graphite blocks, PTFE sealing gasket. It has strong structure with good impact durability due to the fact the heat exchanging blocks bear only pressing and monolithic construction without cementing seam.

The shield in water sealing side is cast-iron plate, convenient for maintenance and assembling. Two dimensional anti-corrosion structure is available, the mass flow of this equipment is multi-flow.

### 技术特性：

公司特殊设计：

设计温度：-20~150℃ 特制达220℃（氟复合树脂）

设计压力：服务侧：0.3Mpa

工艺侧：0.2Mpa，

设计压力最高达1.0 Mpa.

设备规格：5-500M<sup>2</sup>/台 或根据客户要求设计、制造。

### Technical property:

Specially designed by our company:

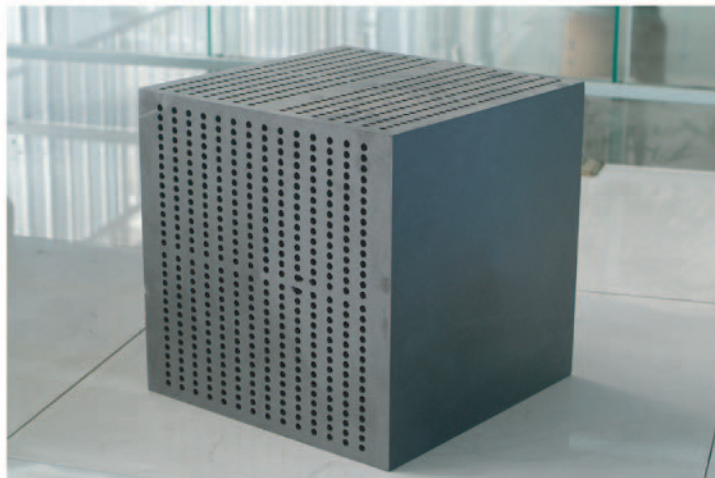
Design temperature: -20~150℃, 220℃ is available (PTFE impregnated)

Design pressure: Water side: 0.3Mpa,

Process side: 0.2Mpa,

1.0Mpa is available by special design.

Specification: 5-500 m<sup>2</sup>/unit, or design and manufacture according to the requirement of customers.





## EC型矩形块孔式石墨换热器

### EC rectangular holed-block-type graphite heat exchanger

该换热器为矩形块孔式结构，是欧洲比较流行且应用广泛的一种石墨换热器，其特点为结构简单，维修方便和优良的抗热冲击性、抗震动性，较其它矩形块孔换热器不同的是其横向流体采用外联式，多通道行程，总传热系数高，并且密封可靠，适用于较高的操作压力。

The equipment is rectangular structure, which is popular in Europe. It features in simple structure, easy maintenance, good resistance to heat shocks and vibrations. Compared with common rectangular block type heat exchangers, the equipment posses unique features, such as , its horizontal fluid goes through external structure, multiple passer, high heat-exchange efficiency in total, reliable sealing. The equipment is applicable to high working pressure.

#### 技术特性:

公司特殊设计:

设计温度:  $-20\sim 180^{\circ}\text{C}$  或特制最高达 $220^{\circ}\text{C}$  (氟复合树脂浸渍石墨)

设计压力: 最大达 $1.0\text{Mpa}$

设备规格:  $5\sim 500\text{m}^2/\text{台}$ 。 或根据客户要求设计、制造。

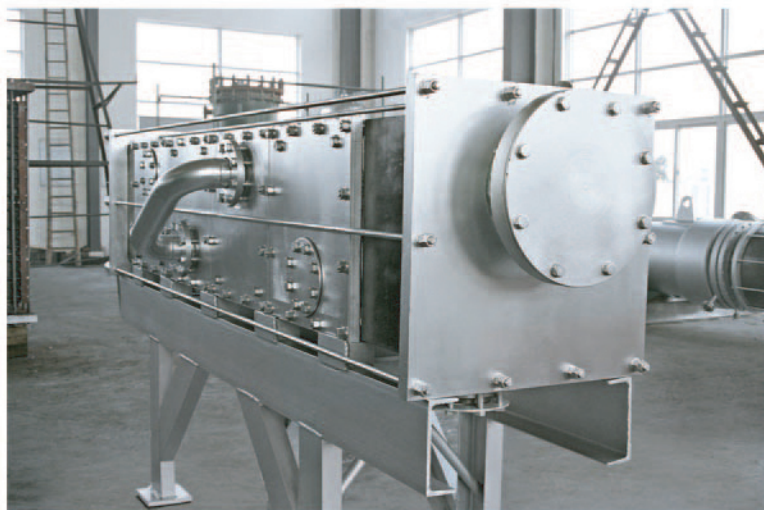
#### Technical property:

Specially designed by our company:

Design temperature:  $-20\sim 180^{\circ}\text{C}$ ,  $220^{\circ}\text{C}$  is available (PTFE impregnated)

Design pressure: Max.  $1.0\text{Mpa}$ .

Specification:  $5\sim 500\text{ m}^2/\text{unit}$ , or design and manufacture according to the requirement of customers.



# SUNSHINE

## 南通三圣石墨设备科技股份有限公司

NANTONG SUNSHINE GRAPHITE EQUIPMENT TECHNOLOGY CO.,LTD.

地址：江苏南通国家经济技术开发区科兴路3号

Add:Kexing Road 3#,Nantong Economic &Technological  
Development Zone ,Jiangsu,China

电话(Tel): 0086-513-85170033 85170018

传真(Fax): 0086-513-85170022

邮编(P.T.): 226009

http://www.ntsssm.com ( http://www.sunshine-china.cn )

E-mail: luhua.yun@sunshine-china.cn