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奥联德 AOLIANDÉ 玻璃钢管道及设备

FRP PIPE & EQUIPMENT

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公司简介 COMPANY PROFILE



河北奥联德化工设备有限公司是一家专业生产销售成套化工设备，成套玻璃钢产品生产线，同时生产 复合材料 SMC产品的公司，通过了ISO9001、ISO14001、ISO45001管理体系认证SGS认证等产品已销往世界各地，美国、加拿大，澳大利亚 巴西、日本、德国、俄罗斯，印度、马来西亚、印度尼西亚、埃及等国家，赢得广大新老客户的支持和信任好评。

● EPC化工设备系列：曼海姆法硫酸钾成套生产设备 硫酸钠生产设备 成套硫酸设备成套氯化钙生产设备。

● EPC成套玻璃钢产品生产线系列：微机控制成套玻璃钢管道，储罐缠绕生产线 成套玻璃钢格栅生产线 成套玻璃钢拉挤型材生产线 SF/FF油罐生产线。

● 玻璃钢产品系列：玻璃钢高、中、低压管道；玻璃钢储罐；玻璃钢塔；整体浇注超级电解槽；SF、FF双层油罐；玻璃钢冷却塔；玻璃钢模压SMC/BMC、拉挤系列产品及其他定制玻璃钢产品玻璃钢防腐等。

河北奥联德化工设备有限公司根据产品类别设立了曼海姆法硫酸钾化工设备设计 制造 安装，多种复合材料产品生产线设计 制造 安装 多种复合材料产品制造三个分公司，通过在专业和技术上的研发和升级并获得了多项专利。公司凭借先进的技术、精湛的工艺、可靠的质量和完善服务，不但有产品的供货能力，还具有有限元分析（材料、结构、产品的设计）项目总承包能力，我公司可为客户提供技术咨询、供货、运输、安装指导等一体服务。

● 主要应用领域：

硫酸钾、电力、水利、冶金、化工、制药、氯碱、海水淡化、印染、造纸、钛白、污水处理、固废焚烧处理、食品酿造、石油贮存、建筑、市政工程、公路设施、军工等领域。



Hebei Aoliande Chemical Equipment Co., Ltd. is a professional company that produces and sells complete sets of chemical equipment, complete sets of fiberglass product production lines, and composite material SMC products. The company has passed ISO9001, ISO14001, ISO45001 management system certification, SGS certification, and other products, which have been sold to countries around the world such as the United States, Canada, Australia, Brazil, Japan, Germany, Russia, India, Malaysia, Indonesia, Egypt, etc. Winning the support and trust of both new and old customers.



● EPC chemical equipment series: Mannheim process potassium sulfate production equipment, sodium sulfate production equipment, complete sulfuric acid equipment, complete calcium chloride production equipment.

● EPC complete set of fiberglass product production line series: microcomputer controlled complete set of fiberglass pipes, tank winding production line complete set of fiberglass grating production line complete set of fiberglass extruded profiles production line SF/FF oil tank production line.

● Fiberglass product series: Fiberglass high, medium, and low pressure pipelines; Fiberglass storage tanks; Fiberglass towers; Integrated casting super electrolytic cell; SF and FF double-layer oil tanks; Fiberglass cooling tower; Fiberglass molded SMC/BMC, extrusion series products, and other customized fiberglass products, including fiberglass anti-corrosion.

Hebei Aoliande Chemical Equipment Co., Ltd. has established three branches based on product categories: Mannheim process potassium sulfate chemical equipment design, manufacturing and installation, and various composite material product production lines design, manufacturing and installation. Through professional and technical research and development, upgrading, and obtaining multiple patents. With advanced technology, exquisite craftsmanship, reliable quality, and comprehensive services, our company not only has the ability to supply products, but also has the ability to perform finite element analysis (material, structure, product design) project general contracting. Our company can provide customers with integrated services such as technical consultation, supply, transportation, and installation guidance.

Main application areas:

Potassium sulfate, electricity, water conservancy, metallurgy, chemical industry, pharmaceuticals, chlor alkali, seawater desalination, printing and dyeing, papermaking, titanium dioxide, sewage treatment, solid waste incineration treatment, food brewing, petroleum storage, construction, municipal engineering, highway facilities, military industry and other fields.



T 技术检测 TECHNICAL TESTING

检测中心拥有专职的质量负责人员，并按照CNAS认可以及CMA认证的要求建立了一套完整可靠的质量控制体系，保证了测试过程的专业性和公正性。

检测中心与国家标准局以及复合材料行业的权威测试机构保持密切联系；能及时掌握复合材料的技术发展动态、检测技术发展动态、国内外测试标准以及产品标准等信息；保证测试技术、方法的及时有效性、可靠性和先进性。

检测中心拥有多名复合材料、机械设计、结构分析、高分子、非金属材料等等各专业的专业人才，具备了复合材料产品设计和开发能力，可以为客户提供专业的复合材料产品、结构、工艺等的设计开发工作。为客户提供满意的服务。

Testing center has a professional team for testing and quality control. We build a thorough quality control system to make sure that our testing process is accurate and just according to CNAS and CMA requirement.

We keep a closely connection with National Bureau of Standards and authoritative testing institutions of Composite field. We can get the newest informations about testing standard and development direction, and know technology trends of composite material to keep our result reliable. We would improve our testing technology and method timely to make sure it is the latest, reliable, advanced.

Our members are engaged in composite, Polymer, mechanical design, structural analysis, and non-metallic material research. We have a composite material Research and development ability. We can supply client with professional structural design, technology design and composite production. Client is the first. We will provide the most satisfactory service to our client.



精锐的设计团队 An elite design team



差示扫描量热仪
Differential scanning
calorimeter (DSC)

長期性能實驗室
Long-term performance Lab



熱性能實驗室
Combustion performance Lab



紫外线老化试验箱
UV aging test chamber



物理性能實驗室
Physics Lab



化學實驗室
Chemistry Lab



1. 玻璃钢夹砂管的性能和优势

玻璃钢夹砂管由于在管壁设计有夹砂层, 使它与纯玻璃钢管相比, 不仅具有轻质、高强的性能, 而且具有埋管所需要的高刚度和低成本, 因此自问世以来便得到人们的普遍欢迎。在输送水或其它液体方面的应用越来越多, 据有关资料报道, 90年代中期美国已安装了16万公里的玻璃钢夹砂管管线, 欧洲各国新铺设的大、中型输水、污水管中, 玻璃钢夹砂管的安装长度约占35%~50%。在日本, 该管也占市场的相当份额, 其安装长度已超过钢管和混凝土管。在中东地区, 几乎所有的大、中型输水、污水、海水淡化管道全部为玻璃夹砂管。

1. The property and advantage of RPM pipe

As the RPM pipe is accompanied with sand in its structure, compared with the pure FRM pipe, it not only has property of lightweight and high strength, but also possess high stiffness as the buried pipe and low cost. So it is welcomed from its presence. The usage in conveying water or other fluid is more and more. The relative information reported that 160 thousand kilometers long RPM pipe had been installed in America during the middle period of 1990s. In Europe, the length of new laid large and middle diameter RPM pipe for conveying water and sewage accounted for 30~50% of total installed length. In Japan, this kind of RPM pipe account for a certain share, its total installed length had exceeded the aggregate of steel pipe and concrete pipe. And in Mid-East area, almost all the pipes for conveying water, sewage and desalinated seawater are RPM pipe.

2. 玻璃钢夹砂管的特点

2.1. 轻质、高强、高刚度

玻璃钢夹砂管由内衬层、缠绕层、树脂砂浆层和外防腐层组成, 它的比重为1.7~2.1, 为钢管的1/5, 铸铁管的1/4, 预应力混凝土管的3/4。由于在树脂砂浆层的两侧有纤维缠绕增强结构, 该层的纤维含量70%, 完全可满足管线的强度要求。另外, 由于树脂砂浆层处在缠绕增强层中间的低应力区, 在不降低强度的情况下大大提高了管子的刚度。

2.2. 防腐性能

玻璃钢夹砂管的耐腐蚀性主要依赖于内衬层树脂的耐腐蚀性, 而内衬层可以根据介质条件的需要选择不同牌号的树脂。玻璃钢夹砂管的内衬层是采用纤维增强的富树脂层, 树脂含量达80%, 可以保证管子防腐蚀、防渗漏。

2.3. 水力性能优良

玻璃钢夹砂管内表面非常光滑, 糙率系数小, 不但新品是光滑的, 而且使用若干年后, 内壁仍光滑如初, 无海藻等水生生物附着。水利系数C可长期保持在145~150范围内, 经测试其水流摩阻损失系数 f 为0.000915, 比混凝土管($f=0.00232$)和钢管($f=0.00179$)能显著减少沿程压力损失, 提高输送能力20%以上。因此, 在输送能力相同时, 可选用内径较小的玻璃钢夹砂管, 从而降低工程的一次性投资。输水能力的具体比较见表1和图1。

2. Characteristics of RPM pipe

2.1 Lightweight, high strength and high stiffness

The RPM pipe is composed of inner layer, wound layer, resin-mortar layer and exterior corrosion-resistant layer, its density is 1.7~2.1, equals one fifth of steel pipe, one fourth of cast steel pipe and three fourth of pretensioned concrete pipe (PCP). As the filament wound reinforced structure exists at the two sides of resin-mortar layer, and its fiber content is 70%, so it can meet the strength requirement of the pipeline. Else, as the resin-mortar layer is between the middle areas—lower stress area, so it has increased the stiffness meantime no any decrement to the strength of the pipe.

2.2 Corrosion-resistant property

The corrosion-resistant property of RPM pipe is mainly relied on the inner resin, and be selected in accordance with the condition of the media. It is adopted the reinforced rich resin layer by fiberglass, the resin content is 80%, it can ensure that the RPM pipe prevent corrosion and leakage.

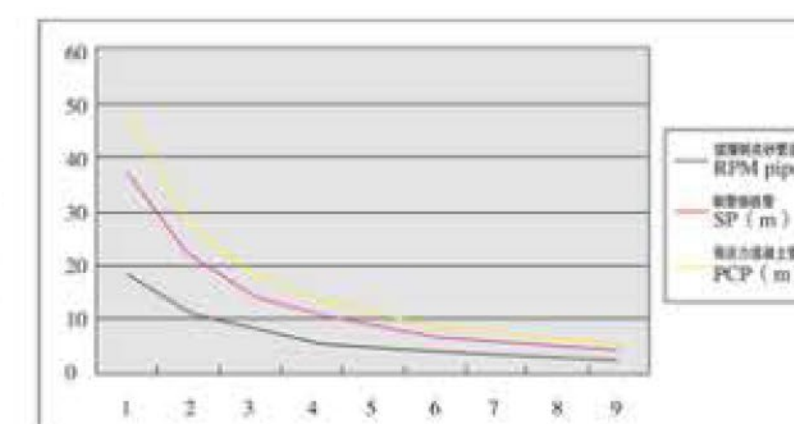
2.3 Good hydraulic property

The inner surface of the RPM pipe is very smooth; the roughness coefficient is very small. Not only the inner surface of new produced pipe is very smooth, but also it is same smooth as the beginning after has been used many years, and no seaweed and other aquatic derivative be adhered. The water conservancy factor (C) can be kept within 140 and 150 during a long period. After the relative testing, its friction factor (f) is 0.000915, it is smaller than the PCP ($f=0.00232$) and the steel pipe (SP) ($f=0.00179$). It can decrease the pressure head loss obviously; increase the conveying capacity above 20%. So when the conveying capacity is same, can adopt the RPM pipe with lower diameter, can save the investment of the project. The conveying capacity comparison can see the following Table 1 and Diagram

压头损失/10km 表1

Water head loss per 10km Table 1

内径 Inner diameter (mm)	流量 Volume of flow (L/s)	玻璃钢 夹砂管 RPM pipe (m)	钢管 铁管 SP (m)	预应力混 凝土管 PCP (m)
400	125.6	18.40	37.19	48.36
600	282.7	11.18	21.97	28.22
800	502.4	7.84	15.10	19.24
1000	785.4	5.97	11.31	14.31
1200	1131	4.77	8.92	11.23
1400	1539	3.94	7.30	9.14
1600	2010	3.35	6.14	7.65
1800	2543	2.89	5.26	6.54
2000	3142	2.54	4.60	5.69



2.4. 玻璃钢夹砂管的卫生性能

玻璃钢夹砂管道所用的原材料是不饱和聚酯树脂和玻璃纤维通过一定工艺制作而成的，管道的内表面非常光滑，而且巴氏硬度在40以上，不饱和聚酯树脂本身通过了国家卫生防疫部门的认证，玻璃钢管道成品也通过了国家卫生防疫部门的检验，所以玻璃钢夹砂管道完全可以满足饮用水卫生标准，而且在国内已有20多年的实例。

2.5. 抗震性能

由于玻璃钢夹砂管道介于刚性管和柔性管之间，所以它的抗震性能较好，在较强外力下不会出现变形、破坏，这是因为玻璃钢管道的变形在25%时，不分层、不裂纹。

2.6. 耐磨性能

玻璃钢夹砂管道内表面采用耐磨性能高的树脂，可以大大改善产品的耐磨性，从而提高了产品的使用寿命。

2.7. 耐低温性能

玻璃钢夹砂管道可以在-40℃不冻裂，管道的强度不降低。

2.8. 环境适应性

玻璃钢夹砂管道可适用于各种环境，如：海滩、海底、河流、山区、沼泽、沙漠和平原等，具有安装快捷、运输方便使用寿命长等特点。

2.4Health property of RPM pipe

The main material of RPM pipe is unsaturated resin and fiberglass, are formed by a specified procedure. So its inner surface is very smooth and the stiffness is above Barcol 40, the unsaturated resin itself was passed the certification by the relative national sanitary authority and the RPM pipe also has been verified by the relative national sanitary authority. So the RPM pipe can be completely used in the conveying drinking water and it has above 20 years practical example.

2.5Shock resistance

Since the RPM pipe is between the stiff pipes and flexible pipe, so its shock resistance property is good, it will deform under the action of strong foreign force, but it will not bring its breakdown and deformation because it doesn't bring delamination and cracking under the condition of deformation is 25%.

2.6Abrasive resistance

The inner surface is made of one kind of resin with high good abrasive resistance, so it can improve the abrasive resistant property of the pipe, and can pro-long the life of the product.

2.7Low temperature resistant property

There will not be cracking under the condition of -40℃ and the strength of the RPM pipe doesn't decline.

2.8Compliance against the environment

The RPM pipe is applicable for the different kind of environment, such as beach, bottom of the sea, river, mountain area, marshland, desert and plain, etc. It has the following characteristics: installation fast, convenient transportation and long life, etc.



2.9. 玻璃钢夹砂管道与其他管材的经济比较 (表3)

Comparison of different kind of pipe in economy (see Table 3)

Monetary unit: RMB 表3 Table 3

项目 Item	材料 Material	符号 Symbol	单位 Unit	玻璃钢夹砂管 RPM	钢套筒预应混凝土管 PCCP	混凝土管 PCP	钢管 SP	球墨铸铁管 NCIP
输水能力 Conveying capacity	Q	m³/s		6.8	6.8	6.8	6.8	6.8
直径 Diameter	DN	mm		2000	2400	2400	2200	2200
糙率系数 Roughness coefficient	n			0.0084	0.013	0.013	0.011	0.011
压力 Pressure	P	MPa		0.6	0.6	0.4	0.6	
重量 Weight	W	kg/m		420	3500	4320	1218	
单价 Unit price		元(yuan)/m		2857	3752	3249	4500	5091
运输安装费 Transportation & installation fee		元(yuan)/m		428	912	938	458	588
使用年限 Life		年 Year		50~70	<50	30	10~20	<50
材料综合费用 Total fees		元(yuan)/m		3285	4664	4187	4958	5679

注(Note):

1、此表为2000年预算标准

The Table 3 is calculated upon the Budgetary Standard Of 2000

2、RPM——玻璃钢夹砂管道；PCCP——钢套筒预应混凝土管；PCP——混凝土管；SP——钢管；NCIP——球墨铸铁管；

RPM: Reinforced Plastics Mortar

PCCP: Pretensioned Concrete Casing Pipe

PCP: Pretensioned Concrete Pipe

SP: Steel Pipe

NCIP: Nodular Cast Iron Pipe

3. 玻璃钢夹砂管的规格(表4)

3. Specification of RPM pipe

3. 玻璃钢夹砂管的规格(表4)

3. Specification of RPM pipe

3. 1常用压力等级

Usual nominal pressure class

3. 2常用刚度等级

Usual Stiffness Class

刚度 SN(N / m²)

2500 N / m² 5000 N / m² 10000 N / m²

Stiffness SN(N / m²)

2500 N / m² 5000 N / m² 10000 N / m²

3. 3规格

公称直径 Φ25 ~ 4000 以内的系列管道

Nominal diameter

The RPM Pipe that its diameter is between DN25 and DN4000

3. 4单根长度

夹砂玻璃钢管道的单根长度一般为12米 / 根以内的任意长度。

The length per piece

It is any length Within 12 meters per piece.

3. 5连接形式



该夹砂管道的连接形式有双密封“O”型胶圈承插连接、法兰连接、对接和承插胶接等连接方式(详见管道连接形式)。

Type of joint

The type of joint is socket-spigot with double “O” seal rings, flange joint, butt-joint and socket-pigot with adhering, etc. (The detail of the type can see illustration)

3. 6管件Fittings

为保证管道及管线能够满足多种连接形式,我们还配有符合GB、JB、HG、DIN等多种标准的法兰配置以及三通、变径、人孔等管件。

In order to satisfy the different types Of joint Of pipe Or pipeline, we also can produce many kinds Of flanges, tees, reducers, manholes and other fittings to meet the different standards, such as GB, JB, HG, DIN and others.

3. 7玻璃钢夹砂管道的主要性能指标

1)内表面糙率系数: 0.0084

2)巴氏硬度: 大于40

Main mechanical property index of RPM pipe

1). Inner surface roughness coefficient: 0.0084

2). Barcol hardness: >40

表4

如需特殊压力级别和刚度等级,也可另行设计。

Table4

The special pressure class and stiffness grade can be designed especially.

说明:该表的系列参数只适用于给排水管道,一般而言,小于或等于DN300的玻璃钢管道不加砂。

Note: The serial parameter listed in the above table is only applicable for water supply or drainage. Normally the pipe is not larger than DN400 doesn't add sand.

夹砂管道厚度参数

Parameter of RPM

(mm)

刚度 Stiffness 压力 Pressure 直径 Diameter	SN2500			SN5000			SN10000			
	MPa			MPa			MPa			
	0.2	0.6	1.0	0.2	0.6	1.0	0.2	0.6	1.0	1.6
125				5.3	5.9		5.3	5.9	5.9	
150				5.3	5.9		5.3	5.9	5.9	
200				5.3	6.2		6.2	6.2	6.2	
250				5.3	7.2		6.2	7.2	7.2	
300				5.3	7.2		7.2	7.2	7.2	
350				5.3	7.6		8.2	8.2	7.6	
400				5.3	7.6		8.5	8.2	7.6	
500	7.1	7.2	7.0	8.8	9.0	8.6	11.1	11.3	10.6	9.2
600	8.4	8.6	8.3	10.5	10.8	10.0	13.4	13.4	12.4	11.9
700	9.6	9.6	8.3	12.3	11.9	11.5	15.5	15.1	14.2	13.4
800	11.2	10.7	9.8	14.0	13.3	12.9	17.8	16.8	16.1	14.9
900	12.5	11.9	10.8	15.8	15.5	14.2	20.0	19.0	17.8	16.7
1000	13.9	13.2	12.3	17.5	16.6	15.8	22.2	21.2	19.7	18.2
1100	15.4	14.5	13.6	19.3	18.3	17.2	24.6	23.4	21.7	20.8
1200	16.6	15.5	14.5	21.0	19.6	18.6	26.8	25.0	23.3	21.8
1300	18.1	16.7	15.6	22.9	21.5	20.0	29.2	26.9	25.5	23.6
1400	19.5	17.7	15.4	24.6	22.4	21.5	31.2	28.6	27.0	25.5
1500	20.7	19.0	17.7	26.1	24.4	23.5	33.3	30.4	29.6	27.1
1600	21.8	20.5	19.2	27.8	26.0	24.5	35.4	33.3	31.0	28.9
1800	24.6	22.6	20.4	31.3	28.8	26.8	39.9	34.9	34.1	31.3
2000	27.4	25.4	23.4	35.0	32.4	29.6	44.7	38.2	37.3	36.1
2200	29.7	27.6	25.3	37.8	35.3	32.6	48.7	42.5	41.5	40.4
2400	32.6	30.3	28.4	41.8	38.8	34.6	53.4	45.8	44.6	42.8
2600	36.3	33.5	31.5	45.2	37.5	35.4	55.8	48.9	47.2	45.6
2800	39.3	36.0	34.0	49.4	45.1	42.0	62.0	56.5	53.0	51.0
3000	41.0	38.1	36.2	52.0	47.0	45.3	67.0	61.7	58.2	54.0
3200	47.1	41.4	39.5	56.6	49.2	46.3	69.9	62.9	59.4	—
3400	50.0	43.7	41.6	59.9	52.0	49.3	74.2	64.2	60.6	—
3600	52.5	46.2	44.2	62.7	55.1	52.0	77.6	68.5	63.9	—
3800	55.5	48.6	46.3	66.6	57.8	54.5	82.5	71.9	67.0	—
4000	58.3	50.9	48.6	69.8	61.0	57.6	86.3	75.5	71.0	—

玻璃钢工艺管道

FRP Process Pipes

1.玻璃钢管道的特点:

- (1) 耐腐蚀性好
- (2) 轻质高强
- (3) 安装方便
- (4) 内表面光滑,具有较高的流通能力
- (5) 耐低温性能好
- (6) 隔热性能好

用于化工等防酸碱腐蚀领域

2.管道及管件规格

管道厚度参数 Pipe

DN (mm)	L (mm)	A (mm)	0.6MPa	1.0MPa	1.6MPa
			TH(mm)	TH(mm)	TH(mm)
10	1800	1500	4.6	4.6	4.6
15	1800	1500	4.6	4.6	4.6
20	1800	1500	4.6	4.6	4.6
25	1800	1500	4.6	4.6	4.6
32	1800	1500	4.6	4.6	4.6
40	1800	1500	4.6	4.6	4.6
50	6000	2000	4.6	4.6	4.6
65	6000	2000	4.6	4.6	4.6
80	6000	2000	4.6	4.6	4.6
100	6000	2000	4.6	4.6	4.6
125	6000	3000	4.6	4.6	5.9
150	6000	3000	4.6	4.6	5.9
200	12000	3000	4.6	5.9	7.2
250	12000	4000	4.6	5.9	8.5
300	12000	4000	5.9	7.2	9.8
350	12000	4000	5.9	8.5	11.1
400	12000	4000	5.9	8.5	12.4
450	12000	4000	7.2	9.8	13.7
500	12000	4000	7.2	9.8	15.0
600	12000	6000	8.5	12.4	17.6
700	12000	6000	9.8	13.7	20.2
800	12000	6000	9.8	15.0	22.8
900	12000	6000	11.1	16.3	25.4
1000	12000	6000	12.4	17.3	28.0
1200	12000	6000	13.7		
1400	12000	6000	16.3		
1500	12000	6000	16.3		
1600	12000	6000	17.6		
1800	12000	6000	18.9		
2000	12000	6000	21.5		
2100	12000	6000	22.8		
2200	12000	6000	24.1		
2400	12000	6000	25.4		
2600	12000	6000	26.7		
3000	12000	6000	30.6		
3300	12000	6000	33.2		
3600	12000	6000	35.8		
4000	12000	6000	39.7		

1.Characteristics of FRP Pipes

- 1.Good corrosion-resistant
 - 2.Lightweight and high strength
 - 3.Installation conveniently
 - 4.Smooth inner surface has good property of circulation
 - 5.Good low temperature-resistant
 - 6.Good thermal insulation
- Used in chemical industry and other field of acid resistant or alkali resistant

2.Specification of FRP pipe and fittings

法兰 Flange

DN (mm)	0.6MPa		1.0MPa		1.6MPa	
	S(mm)	L(mm)	S(mm)	L(mm)	S(mm)	L(mm)
10	12	100	15	100	15	100
15	12	100	15	100	15	100
20	12	100	15	100	18	100
25	12	100	18	100	20	100
32	15	100	18	100	22	100
40	15	100	20	100	25	100
50	15	100	22	100	28	150
65	18	100	25	150	30	160
80	18	150	28	160	32	200
100	20	150	28	180	35	250
125	22	200	30	230	38	300
150	25	200	32	280	42	370
200	28	220	35	360	52	500
250	30	280	45	420	56	620
300	40	300	52	500		
350	45	400	60	570		
400	50	420				
450	50	480				
500	50	540				
600	50	640				

三通 Tee

DN (mm)	P=0.6MPa			P=1.0MPa			P=1.6MPa		
	TH	L=2L ₁	B	TH	L=2L ₁	B	TH	L=2L ₁	B
10	5.5	300	50	5.5	300	50	5.5	300	50
15	5.5	300	50	5.5	300	50	5.5	300	50
20	5.5	300	50	5.5	300	50	5.5	300	50
25	5.5	300	50	5.5	300	50	5.5	300	50
32	5.5	300	50	5.5	300	50	5.5	300	50
40	5.5	300	50	5.5	300	50	5.5	300	50
50	5.5	400	50	5.5	400	50	5.5	400	50
65	5.5	400	50	5.5	400	50	5.5	400	50
80	5.5	400	50	5.5	400	50	5.5	460	60
100	5.5	400	50	5.5	420	60	9.4	580	80
125	5.5	400	50	5.5	540	80	9.4	720	100
150	5.5	460	60	9.4	640	100	10.9	840	120
200	7.1	600	80	9.8	820	120	12.9	1100	150
250	9.4	740	100	10.4	960	120	15.2	1420	210
300	9.4	840	100	13.3	1180	150	17.3	1680	240
350	9.4	1000	120	15.8	1380	180	19.6	1940	270
400	10.6	1100	120	16.8	1580	210	23.8	2200	300
450	13	1260	150	18.3	1720	210	26.2	2500	360
500	13.7	1380	150	18.9	1940	250	26.2	2800	400
600	16.2	1640	180	22.7	2320	300	27.6	3280	450
700	18.6	1900	210	24.5	2660	330	37.2	3680	550
800	18.6	2180	240	28.3	3100	400	43.8	4360	600
900	20	2440	270	30	3400	420	48.3	5000	700
1000	22.9	2720	300	33.2	3860	500	52.6	5460	750

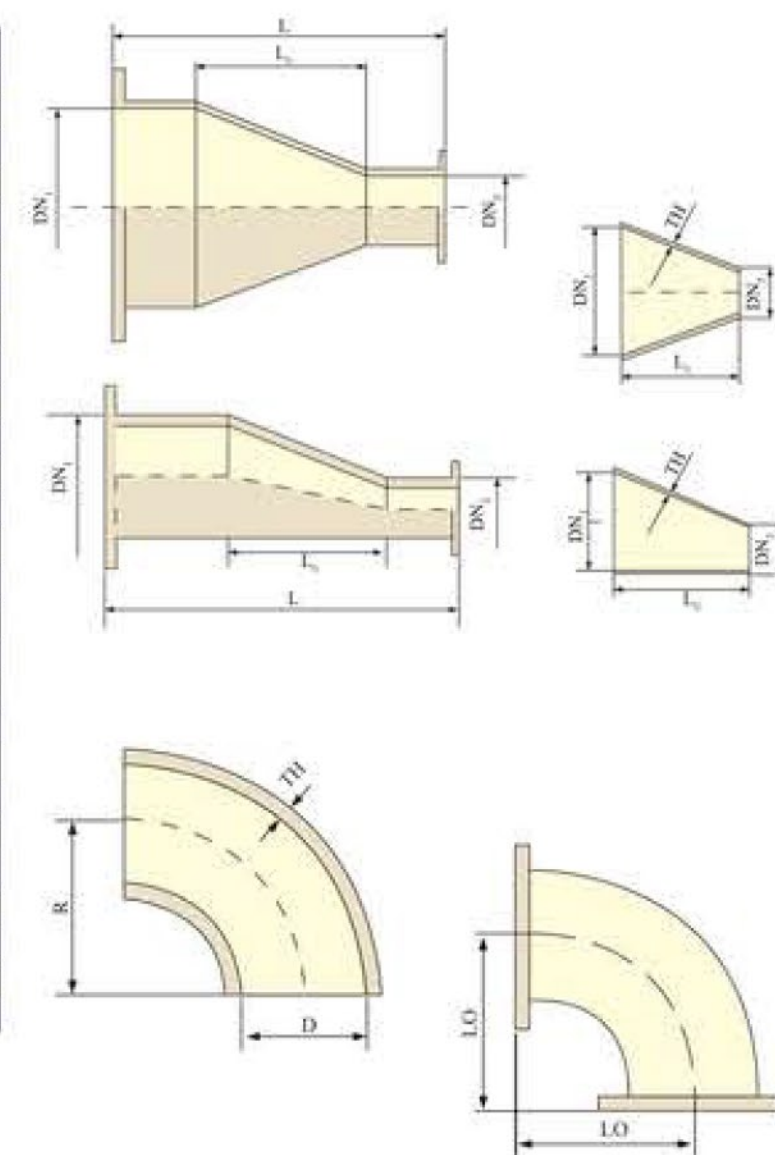
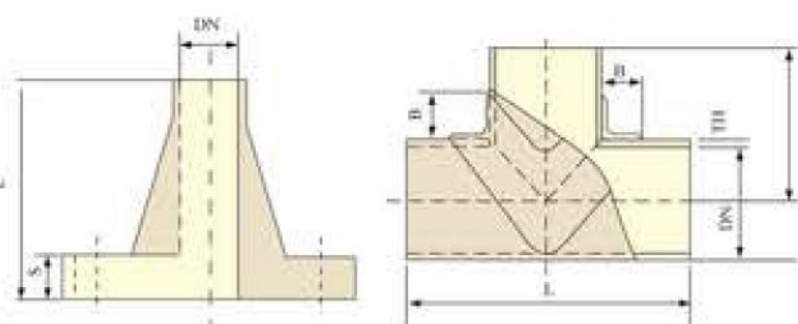
注: 连接方式可与管道相适任意选取。

Note: The type of joint can be selected in accordance with the pipes'.



变径管 Reducer

D1 (mm)	D2 (mm)	L0 (mm)	0.6MPa TH(mm)	1.0MPa TH(mm)	1.6MPa TH(mm)
15	10	37.5	5.5	5.5	5.5
20	15	37.5	5.5	5.5	5.5
25	20	37.5	5.5	5.5	5.5
32	25	37.5	5.5	5.5	5.5
40	32	37.5	5.5	5.5	5.5
50	40	37.5	5.5	5.5	5.5
65	50	37.5	5.5	5.5	5.5
80	65	37.5	5.5	5.5	5.5
100	80	50	5.5	5.5	9.4
125	100	62.5	5.5	5.5	9.4
150	125	62.5	5.5	9.4	10.9
200	100	250	7.1	9.8	12.9
200	150	125	7.1	9.8	12.9
250	200	125	9.4	10.4	15.2
300	200	250	9.4	13.3	17.3
300	250	125	9.4	13.3	17.3
350	300	125	9.8	15.8	19.6
400	300	250	10.6	16.8	23.8
400	350	125	10.6	16.8	23.8
450	400	125	13	18.3	26.2
500	400	250	13.7	18.9	26.2
500	450	125	13.7	19.9	26.2
600	500	250	16.2	22.7	27.6
700	600	250	18.6	24.5	37.2
900	800	250	20	33	48.3
1000	900	250	22.9	33.2	52.6



弯头 Elbow

DN (mm)	R (mm)	0.6MPa TH(mm)	1.0MPa TH(mm)	1.6MPa TH(mm)
10	15	5.5	5.5	5.5
15	22.5	5.5	5.5	5.5
20	30	5.5	5.5	5.5
25	37.5	5.5	5.5	5.5
32	48	5.5	5.5	5.5
40	60	5.5	5.5	5.5
50	75	5.5	5.5	5.5
65	97.5	5.5	5.5	5.5
80	120	5.5	5.5	5.5
100	150	5.5	5.5	9.4
125	187.5	5.5	5.5	9.4
150	225	5.5	9.4	10.9
200	300	7.1	9.8	12.9
250	375	9.4	10.4	15.2
300	450	9.4	13.3	17.3
350	525	9.8	15.8	19.6
400	600	10.6	16.8	23.8
450	675	13	18.3	26.2
500	750	13.7	18.9	26.2
600	900	16.2	22.7	27.6
700	1050	18.6	24.5	37.2
800	1200	18.6	28.3	43.8
900	1350	20	30.2	48.3
1000	1500	22.9	33.2	52.6

玻璃钢管道连接形式
TYPES OF PIPELINE JOINTS

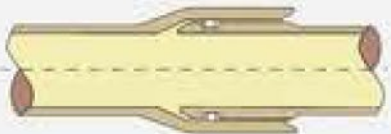



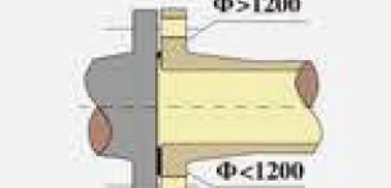
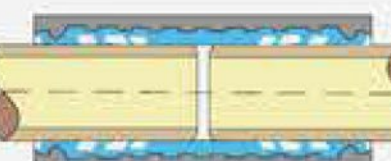
	1. 单密封圈承插连接 Socket-spigot joint with single seal ring 适用于中、低压地下埋设管线 It is suitable for medium and low pressure in buried line
	2. 双密封圈承插连接 Socket-spigot joint with double seal rings 适用于高压地下埋设管线, 可进行单接口试压 It is suited to high-pressure in buried line and enables pressure testing to be carried out with one joint
	3. 承插粘接 Socket-spigot joint with glueing 适用于高压及复杂荷载的大口径管线 Suitable for large dia. pipeline under conditions of high pressure and complex loads
	4. 对接 Butt joint 适用于高、中、低压管线及管件连接, L和t取决于使用条件 It is used in the pipeline and its fittings with high, medium and low pressure, L and t are determined by the working conditions
	5. 承插“O”密封连接尼龙棒“O”键锁口 Socket-spigot joint with double “o” ring and “o” locking key made of nylon rod 主要用于轴向拉力大的管道, 如深井管 It is mainly used in pipeline with strong axial pulling force such as deep well pipeline
	6. 法兰连接 Flanged joint 适用于中、低压管件, 管线及设备连接, 可与HG, JB, GB, ASTM, DIN, NF, JIS 等标准相适应。 It is used in the connection of its fittings and pipeline with medium and low pressure and the equipment The flange can be made according to any of HG, JB, GB, ASTM, DIN, NF or JIS standard.
	7. 套筒接头连接 Sleeve joint 适用于中、低压地上或地下管线及短管的连接, 可与金属管和其它非金属管连接。 It is suitable for the joint of above ground pipeline or under ground pipeline and short pipe, also be used for the joining with metal pipe and other non-metallic pipe.



图1



图2

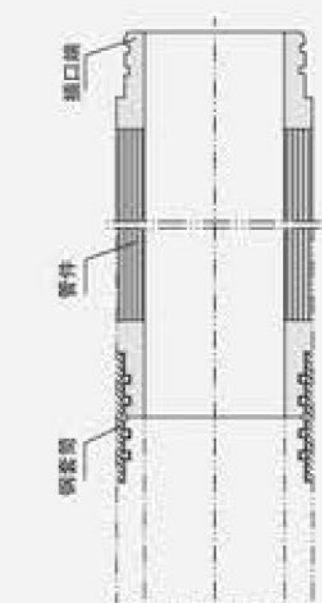


图3

玻璃钢电缆导管尺寸表
List of size of FRP cable casing pipe mm

标称内径 Nominal inner diameter D	标称厚度 Nominal thickness t			承插端内径 Inner diameter of socket end D1			承插深度 Depth of socket end S	标称长度 Nominal length L
	DB -N	DB -R	DB -E	DB -N	DB -R	DB -E		
100	3	5	8	116	120	126	80	4000
125	5	—	8	145	—	151	100	4000
150	5	8	10	170	176	180	100	4000
175	8	10	12	201	205	209	100	4000
200	8	10	14	226	230	238	120	4000

注：其它规格按照用户需求定做。
Note: For the special specification shall be made according to the client's requirements.

玻璃钢电缆导管的机械物理性能
Mechanical properties of FRP cable casing pipe

序号 No.	项目 Item	单位 Unit	指标 Index
1	弯曲强度Bend strength	MPa	≥135
2	拉伸强度Tensile strength	MPa	≥120
3	撞击性能Impact property	—	no cracks
4	管径向变化率10%时的管刚度 Stiffness while the radial variety ratio is 10%.	MPa	DB-N, DB-R, DB-E ≥1.2 ≥2.4 ≥5.0
5	弯曲负载(最大弯曲正应力为1.81MPa)热变形温度 Heat distortion temperature under bend load (Maximum bend positive stress is 1.81 Mpa)	°C	≥130
6	浸水后弯曲强度保留率 Retention ratio of bend strength after soaked in water	%	≥80
7	巴氏硬度Barcol hardness	—	≥35
8	氧指数Index of oxygen	%	≥26
9	滑动摩擦系数Sliding friction coefficient	—	≤0.34
10	热阻系数Heat resistance factor	°C · m/W	≤4.8



玻璃钢保温管 FRP insulation pipe

玻璃钢保温管是以纤维缠绕玻璃钢管道为输送管道，以聚氨酯等材质为中间保温层，以缠绕玻璃钢管道作为承受外压保护层的一种新型保温管道。

For FRP insulation pipe, fiber wound FRP pipe as conveying pipe, the polyurethane, etc material as central insulation layer, and the fiber wound FRP pipe as the external pressure-bearing protection layer, it is a new type insulation pipe.

玻璃钢保温管特点 Characteristics

1. 轻质高强、运输、安装和维护方便，不用重型吊装设备。
Light weight, high strength, convenient transportation, installation and maintenance, the heavy lifting equipment is not required.
2. 水力特性优异，内壁光滑，流体阻力小，可节省泵送费用。
Good water conveying, smooth inner surface, small resistance for fluid, can save the cost for the pumping.
3. 管道内壁不结垢，长期使用仍保持内壁光滑。
No fouling on the inner surface, through long-time use, the smooth inner surface also can be kept.
4. 导热系数低，0.39w/m · k,保温性能优异。
Low thermal conductivity, it is 0.39w/m · k, excellent insulation.
5. 耐腐蚀性能好，使用寿命长，可达30年以上。
Good corrosion resistant, long service life, it can achieve above 30 years.
6. 保温层在工厂内制造，可缩短安装时间。
The insulation layer shall be performed in our factory, it can reduce the installation time.

不同直径玻璃钢保温管的保温效果
Insulation effect of FRP insulation pipe with different diameter

直径 Diameter mm	壁厚 Thickness mm	保温层厚度 Thickness of insulation layer mm	套管厚度 Thickness of outer protection pipe mm	套管外径Outer diameter of outer protection pipe mm	长度 Length m	环境温度 Environmental temperature °C	进口水温 Inlet Temperature °C	出口水温 Outlet temperature °C
100	5	42	3	200	1000	-45	80	79.88
150	5	42	3	250	1000	-45	80	79.52
200	5	41	4	300	1000	-45	80	79.32
250	5	41	4	350	1000	-45	80	79.20
300	6	39	5	400	1000	-45	80	79.16
400	6	39	5	500	1000	-45	80	79.02
500	7.5	37.5	5	600	1000	-45	80	78.90



玻璃钢保温管工艺说明

Process description of FRP insulation pipe

玻璃钢保温管为泡沫塑料夹层结构。主要由FRP管道、聚氨酯和FRP外壳组成。用聚氨酯生产夹层结构的最大优点是防寒、绝热、质量轻，与壳体粘接面大，能均匀的传递荷载，抗冲击性能好等。

FRP insulation pipe is foam interlayer structure, it is mainly composed of FRP pipe, polyurethane and FRP outer protection pipe. The excellent advantages for the polyurethane interlayer are cold resistant, heat insulation, light weight, big adhesive area with the outer protection pipe, uniform load transferring, good impact resistant, etc.

工艺设计 Process design

FRP管道：根据输送介质的类型、浓度、温度和压力，确定管道使用的树脂，纤维等原材料类型，以及厚度和加工工艺。

FRP pipe: according to the medium, concentration, temperature and pressure, to determine the resin, fiber, etc raw material and its thickness & production process.

聚氨酯材料：采用导热率低（ $0.016 \sim 0.08 \text{ kcal/m} \cdot \text{h} \cdot ^\circ\text{C}$ ），耐寒性好（ -45°C ），制作加工方便的硬质聚氨酯泡沫塑料。此部分的厚度根据管内流体工作条件和环境条件计算确定。保证流体的温降在设计范围之内。

Polyurethane material: Adopt the rigid polyurethane foam with low thermal conductivity ($0.016 \sim 0.08 \text{ kcal/m} \cdot \text{h} \cdot ^\circ\text{C}$), good cold resistant (-45°C) and convenient fabrication & processing. Its thickness depends on the working condition of the medium and the environmental condition. The temperature falling of the medium within the range of the design shall be ensured.

FRP外壳：主要对聚氨酯层起保护作用，同是具有低导热性的特点，仅为金属的 $1/100 \sim 1/1000$ ，约为 $0.34 \text{ kcal/m} \cdot \text{h} \cdot ^\circ\text{C}$ ，另外要承受外部荷载，并加入紫外线吸收剂和抗老化剂防止管道老化延长使用寿命。

FRP outer protection pipe: it mainly plays the role of protecting the polyurethane, it also has low thermal conductivity, equals to $1/100 \sim 1/1000$ of the metal's, it is $0.34 \text{ kcal/m} \cdot \text{h} \cdot ^\circ\text{C}$ approximately, in addition, it undertakes the external load, and be added UV absorber & ageing resistant agent, to extend the service life of the FRP insulation pipe.

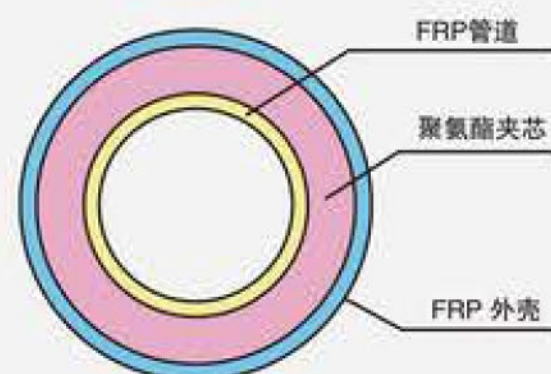
工艺流程 Process flow



玻璃钢保温管应用

玻璃钢保温管应用于温泉水输送、油田地热流体输送管、城市及工厂供热系统、其它热介质输送管等。

FRP insulation pipe can be used for hot spring water conveying, oilfield geothermic fluid conveying, heat supply system of city & factory, and other hot medium conveying, etc.



海洋工程与船舶用玻璃钢管道 FRP pipe for Ocean engineering and ship

产品技术特点 Characteristics

1. 重量轻、强度高、安装运输方便。Light weight, high strength and convenient transportation and installation.
2. 耐腐蚀性能优异，能在海水环境中长期应用。Excellent corrosion resistant, it can be used under the condition of seawater environment for long time.
3. 耐温度性能好，可在 -45°C 到 120°C 环境中长期使用。Good low temperature resistant, it can be used under the condition of -45°C to 120°C for long time.
4. 内壁光滑，内表面糙率系数为0.0084，输送能力强，且不结垢、无二次污染，降低管道运行及维护费用。Smooth inner surface, its roughness coefficient is 0.0084, good conveying, and no fouling, no secondary pollution, decrease the cost of the running & maintenance.
5. 耐火性：符合IMO A.753(18)三级耐火试验具有耐火能力。Fire resistant, it meets IMO A.753(18) Level-3 fire resistance test.

规格 Specification

直径 Diameter: DN25 - DN4000

压力 Pressure: 0.25MPa - 2.5MPa

温度 Temperature: -45°C - 120°C

单根长度 Length of single pipe: $< \text{DN}250 \text{ L}=6\text{m}$, $\geq \text{DN}250 \text{ L}=12\text{m}$ 也可根据使用情况定做任意长度。The length also can be made according to the requirements of the use.

连接方式 Connection way

连接可采用螺纹连接、承插连接、法兰连接、平端对接、套筒连接等连接方式。Connection way can adopt screw connection, spigot and socket connection, flange connection, plain end butt connection, sleeve connection, etc connection way.

玻璃钢管道在海洋工程与船舶的应用

Application of FRP pipe in ocean engineering and ship

玻璃钢管道应用在海洋工程与船舶的各类管道系统上，如：防火供水系统、盐水供水管线、冷却水、废水管线、饮用水管线、工艺管线、压舱管道、货油装卸管线、船底污水管道、喷水灭火系统、淡水管线、卫生供水管线、甲板排水管、测深管、通风管线、排水管以及导线管等。

FRP pipe can be used for every kind of pipeline system of ocean engineering and ship, such as: fire protection water supply system, brine water supply pipeline, cooling water, potable water pipeline, process pipeline, ballast piping, Oil loading & unloading pipeline, ship's bottom sewage pipeline, sprinkler system, freshwater pipeline, sanitation water supply pipeline, board water drainage pipeline, depth-measuring pipe, vent pipeline, water drainage pipe and cable protection pipe, etc.



FGD系统用玻璃钢管道 玻璃钢喷淋管、氧化空气管、浆液管 FRP pipe, FRP spraying pipe, air oxide pipe, Slurry pipe for FGD system

技术特性 Technical characteristics

1. 耐腐蚀性：管道内衬采用环氧乙烯基酯树脂能够抵御火电厂含硫含氟烟气和液体的侵蚀。Corrosion resistant: the inner liner of the pipe adopts epoxy vinyl ester resin, it can resist the erosion from the fume and liquid with sulfur, fluorine.

2. 耐热性：管道内衬树脂采用HDT(热变形温度)为104°C和154°C的环氧乙烯基酯树脂，瞬时耐温可达220°C。Heat resistant: the inner liner adopts the epoxy vinyl ester resin which HDT is 104°C and 154°C, it can resist the temperature of 220°C instantly

3. 耐磨性：管道制作时加入耐磨填料，且内表面层和外表面层光滑糙率系数低，在固含量15%液体中耐磨性能优异。Good abrasion: the abrasion resistant filler has been added during the fabrication of the pipe, the roughness coefficient of inner surface layer and outer surface layer is low, it has good abrasion resistant for the liquid with 15% solid.

4. 抗热震性：用环氧乙烯基酯树脂做成的玻璃钢具有良好抗热震性，可以避免在温度达200°C时热震条件下产生分层。Heat shock resistant: The pipe fabricated with epoxy vinyl ester resin, it has good Heat shock resistant, it can avoid the delamination occurs under the condition of heat shock at 200°C.

5. 缠绕成型：微机控制长纤维往复连续缠绕工艺制作，按照产品工作状态下所承受的轴向、环向应力情况进行合理的比例分配，可大大提高玻璃钢各层之间的粘接性能，又避免产生的环向裂纹。

Winding formation: adopt computer control filament reciprocating type continuous winding process, it can perform reasonable proportioning according to the axial and hoop stress be undertook under its working condition. It can improve the adhesive property between layers, and the hoop crack occurs also be avoided.

6. 可塑性：可根据安装需要制作各种非标部件。

Easy formation: Every kind of nonstandard part can be made according to the requirements of the installation.

规格Specification

规格Specification: DN25 - DN4000mm

耐温Temperature can be undertook: 220°C

耐压Pressure can be undertook: 2.5MPa

耐磨层厚度Thickness of abrasion resistant layer: >2.5mm

颜色Color: 绿色、淡黄色Green, light yellow

连接方式 Connection way

喷淋管采用缠绕包覆连接或法兰连接，浆液管氧化空气管等采用平端对接方式连接。The spraying pipe adopts filament wrap connection or flange connection, slurry pipe, air oxide pipe, etc adopt plain end butt connection.

玻璃钢管在FGD系统中的应用

Application of FRP pipe in FGD system

玻璃钢具有轻质、高强、耐腐、耐热、抗震、价格低等显著特点，目前以大规模应用于玻璃钢管道在FGD系统中应用，如：玻璃钢喷淋管、氧化空气管、浆液管、氧化空气喷枪、滤网等。FRP has light weight, high strength, corrosion resistant, heat resistant, shock resistant, low cost, etc outstanding characteristics, currently, FRP pipe has been used for FGD system in large amount, such as: FRP spraying pipe, air oxide pipe, slurry pipe, air oxide spraying gun, filter screen, etc.

玻璃钢高压管FRP high pressure pipe

产品技术特点Characteristics of FRP high pressure pipe

1. 具有良好的机械物理性能，重量轻、强度高、安装运输方便。It has excellent mechanical & physical properties, light weight, high strength, convenient transportation and installation

2. 耐腐蚀性能优异，一次成型不需二次防腐处理，能在恶劣环境中使用，且使用寿命长可达50年。Good corrosion resistant, the formation in one time, it can be used under severe environmental condition, and its service life can be up to 50 years.

3. 耐高低温性能性好，可在-45°C到120°C环境中长期使用。Good low temperature resistant, it can be used under the environmental condition of -45°C--120°C.

4. 抗高压能力强，高压玻璃钢管道的正常使用压力为：2.5MPa-32MPa。Good high pressure resistant, the range of the normal operation pressure is: 2.5MPa-32MPa.

5. 内壁光滑，内表面糙率系数为0.0084，输送能力强，且不结垢、无二次污染，降低管道运行及维护费用。Smooth inner surface, its roughness coefficient is 0.0084, good conveying, and no fouling, no secondary pollution, decrease the cost of the running & maintenance.

6. 玻璃钢高压管单根长度为12米接头少，从而减少了漏点。The length of one piece pipe is 12m, less joint, less leakage point.

规格Specification

直径Diameter: 3/2" (38mm) - 8" (200mm)

压力等级Pressure class: 2.5MPa-32MPa

单根长度Length of single pipe: <DN250 L=6m, ≥DN250 L=12m也可根据使用情况定做任意长度。The length also can be made according to the requirements of the use.

连接方式Connection type

采用螺纹连接，简单快捷、强度高、可靠性好。Adopt screw connection, it is simple & fast, high strength and good reliability.

玻璃钢高压管道在油田上的应用

Application of FRP high pressure pipe in oilfield

管线：盐水、水及原油输送管线，聚合物溶液输送管线，原油和天然气集输管线，化工污水和废水处理管线等。Pipeline: Brine, water and crude oil conveying pipeline, polymer solution conveying pipeline, crude oil and natural gas conveying pipeline, industrial sewage and waste water treatment pipeline, etc.

井管：生活井（油、气、地热水）、处理井（盐水、化工污水、废水）、注水井（盐水、CO₂、聚合物）。Pipe for well: living well (oil, gas, terrestrial heat water), treatment well (brine, chemical sewage, waste water), affusion well (brine, CO₂, polymer).



玻璃钢喷淋支管



玻璃钢喷淋主管



喷淋管



玻璃钢喷淋变径管



微机控制成套缠绕机械设备

Whole set of computer control filament winding equipment



微机控制成套缠绕机械设备是可耐特公司的另一拳头产品，目前在国内及越南、印尼、菲律宾、马来西亚、伊朗等国家和地区已销售几十套具有国际一流水平的微机控制成套缠绕机械设备，得到了用户的广泛好评。

Whole set of computer control filament winding equipment is one knockout product of KNT company, currently, several tens of filament winding equipments have been sold to domestic and Vietnam, Indonesia, Philippines, Malaysia, Iran, etc foreign countries, and got wide reputation from clients.

QFW-2500、JFW-1500、JFW-2500系列微机控制纤维缠绕夹砂管道生产线

Computer control filament winding RPM pipe production line

FW-4000、FW-10000、FW-15000、VFW-25000系列微机控制缠绕机

Computer control filament winding machine

FW-300二轴微控电缆套管生产线 Twin shaft computer control cable casing production line

MC-2500玻璃钢芯模加工机床 FRP mandrels processing lathe

SY-2500玻璃钢管道水压试压机 FRP pipe hydrostatic pressure testing machine

自动内衬成型机、各规格模具等等。Inner liner automatic forming machine, different type of moulds, etc.

