



Yicheng Machinery CO., LTD



Vacuum Pressure Impregnation

Maximum Winding Protection



企业荣誉
Enterprise honour



Project Proposal

Date: Feb 14, 2021

Offer No: YC-20210214-001

Client: Mr. CARLO SPAZIANI

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Supplier: Yicheng Machinery CO.LTD

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Hello Carlo,

Thanks for your inquiry, please check the below solution for you according to your requirements.

Model and Name	Brief Descriptions
YC-VPI1200 (Manual Control) Vacuum Pressure Impregnation System	Pressure size: inner diameter x depth 1200x2500mm. This equipment works under both vacuum and positive pressure condition, and controlled automatically by PLC.

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YC-VPI1200 (full-auto control) Vacuum Pressure Impregnation System

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1. Brief description and characteristics

Description

This kind of equipment is mainly used for insulation treatment to electrical products, such as high voltage motor, wind turbines, H-grade dry transformer, power capacitor and cable insulation materials, etc.

It also applies in material industry for modifying material and improving structure to achieve raising material performance. For example, through vacuum pressure impregnation, increase compactness of graphite so to raise strength and resistance characteristic of graphite products.

Technology Advantages

- Easily evaporate moisture and air
- Residual water rate less than 10ppm, good insulation performance
- Good humidity resistance
- High dielectric property
- Impregnation can be reused to reduce environmental pollution
- Short impregnation time, good result

Equipment Features

- Syncretizing different technologies of pressure vessel, vacuum, pressurization, refrigeration, heating and automation together
- Equipped with safety alarm and interlock protection devices

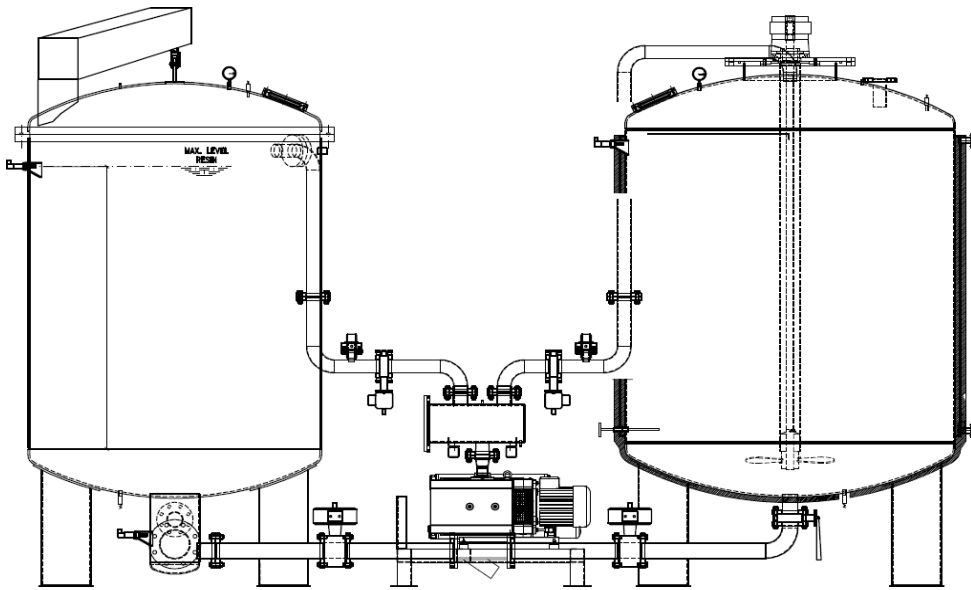
Working Principle

Firstly, load workpieces into a basket, lift the basket into the vacuum pressure tank by crane, evacuate the moisture and air from workpieces under vacuum condition. Then fill impregnation liquid into vacuum tank by pressure difference or pump. In order to impregnate fully, impose certain pressure to let impregnation liquid penetrate into gaps and pores of workpieces.

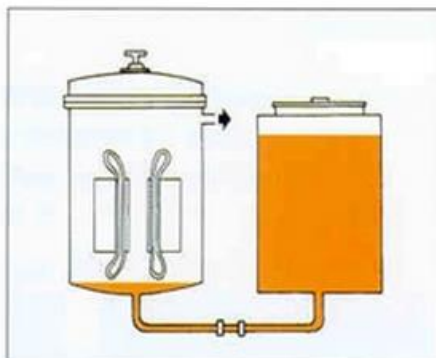
Then take out workpieces, put into a special drying oven which is electric heated, automatic intelligent control.

Finally take out workpieces from drying oven, and the complete process is finished.

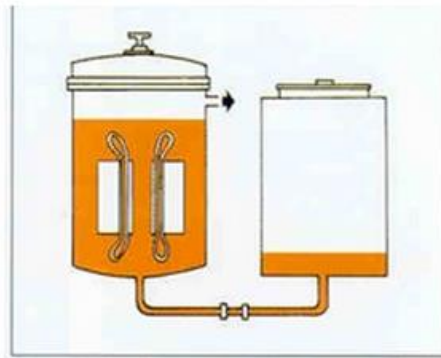
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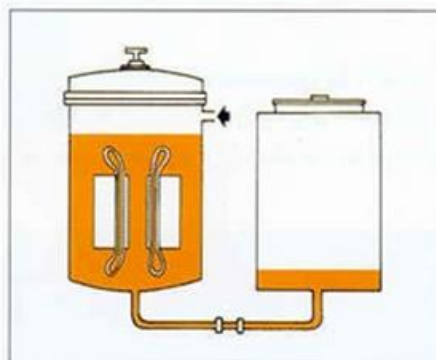
VPI Process



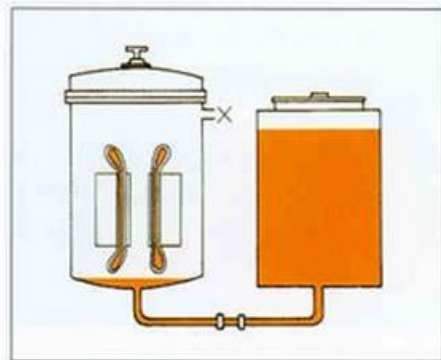
Stage 1 Preheat equipment, transfer to vacuum vessel, pull vacuum.



Stage 2 Transfer resin under vacuum, allow "soak" time.



Stage 3 Release vacuum, apply positive pressure.



Stage 4 Transfer resin back to storage tank, remove equipment to oven and cure resin.

2. 【Equipment Components】



2.1	Vacuum Pressure tank (autoclave)	1 set
2.2	Resin storage tank	1 set
2.3	Vacuum pump system	1 set
2.4	Hydraulic power unit	1 set
2.5	Pneumatic and pressure boosting system (prepared by the user) Including compressed air source and air filter/dryer	1 set
2.6	Resin transferring and recycling system	1 set
2.7	Valves	
2.8	Measurement and control system	1 set

【Technical Documents】 User's manual 1 piece, including technical manual, operating instructions, structure of equipment, operating steps, trouble shooting, maintenance, electrical schematic diagram and certificate of qualification.

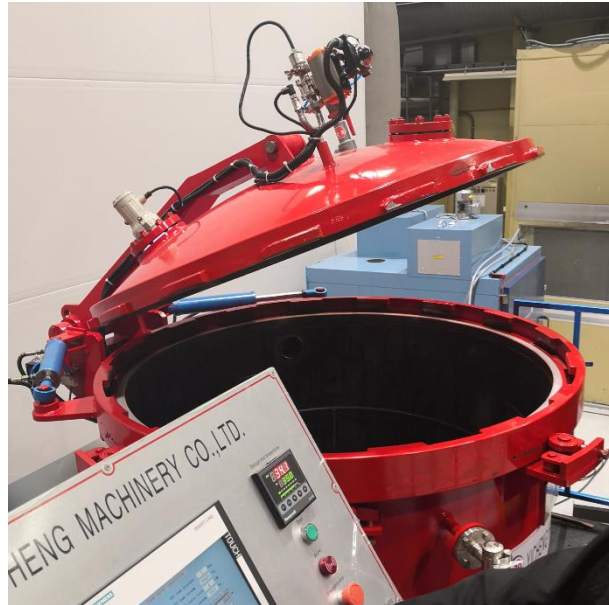


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3、【Technical Specifications】

3.1. Vacuum pressure impregnation tank



3.1.1. Basic configuration

- inner dimensions of the vacuum pressure tank: $\Phi 1200 \times 2500$ mm, diameter * height on straight wall (cylindrical part).
- Effective depth (max. resin level in the tank): 2200mm
- tank is installed with safety interlock and safety valve, to guarantee the safety;
- tank is overall made of Q345-R material, and the tank brim flange is made of forge piece of 16Mn;
- the vacuum pressure tank is designed and manufactured according to the drawings from **Pressure Vessel Design Institute of China**, and its design report and inspection report will be provided to the customer
- The pressure tank meets **CE and PED standard 2014/68/EU (Pressure Equipment)**.

3.1.2. Structure: (vertical, grade I pressure vessel)

- Flange on the tank edge adopts interlaced flange structure, which is not easy to deform, so that the sealing effect can be guaranteed.
- The tank cover operation is controlled by hydraulic power unit;
- Bayonet device is applied to fix the tank cover when it's fully opened and avoid any possibility of cover falling down.
- Hydraulic valve device to fix the tank cover in case of power off during the process of tank cover opening and closing.

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- Varnish/ resin returning: from the bottom;
- Flange seal: corrosion resistance labiates seal ring (rubber), and spare parts are provided;
- Installed with column magnetic reversible level meter, which clearly displays the liquid level in the tank. Remote control can be realized on touch screen to display and adjust the liquid level;
- Sight glass and spot light is installed on tank cover, and user can watch the whole process of impregnation clearly.

3.1.3. Technical specs:

- Working vacuum degree: **deepest 100Pa (1mbar)**
- Working pressure: **≤0.6Mpa (6 bar)**
- Designed pressure max.: **0.675Mpa (6.75bar)**
- One set of VPI basket for loading workpieces

3.2. Varnish/ resin storage tank



3.2.1. Basic configuration

- inner diameter: $\phi 1200 \times 2500$ mm(diameter*height);
- made of Q235A steel plate of national standard;

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3.2.2. Structure:

- Manholes are designed on the tank cover for easy cleaning;
- Liquid level controller is installed on the tank to indicate and control the varnish level in the tank;
- Varnish sampling opening is designed in it for easy getting varnish sample

3.2.3. Technical spec

- Working vacuum degree: maximum **-0.098Mpa**;

3.3. Vacuum pump system (2-stage)



3.3.1. Basic configuration:

- Composed of VSV-160 Rotary Vane Pump (forepump) and ZJP-150 Roots pump, vacuum pipelines, control valve and etc;
- There's a vacuum buffer in front of the vacuum pump in size of $\phi 280 \times 500$ mm. Air is vacuum buffered in pipelines and auxiliary valves, so that solvent will not go into the vacuum pump. And the service life of the pump can be guaranteed;

3.4.2. Technical spec

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- First stage: VSV-160 vacuum pump



MODEL			VSV-160
Displacement speed		m ³ /h	160
Ultimate pressure	Without gas ballast	Witmbar	$\leq 8 \times 10^{-2}$
Ultimate total pressure	With gas ballast I	Wimbar	≤ 0.5
	With gas ballast II	mbar	≤ 1.5
Water vapor tolerance	With gas ballast I	mbar	30
	With gas ballast II	mbar	50
Noise level (Lw)		dB	≤ 70
Power supply			3-Phase
Power rating		KW	4
Motor speed (50/60Hz)		rpm	1440/1720
Ambient temperature		°C	10-40
Oil capacity		L	5~7
level of protection			IP54
Intake and exhaust			G2"
Net weight		Kg	143
Dimension (L*W*H)		mm	930×533×436

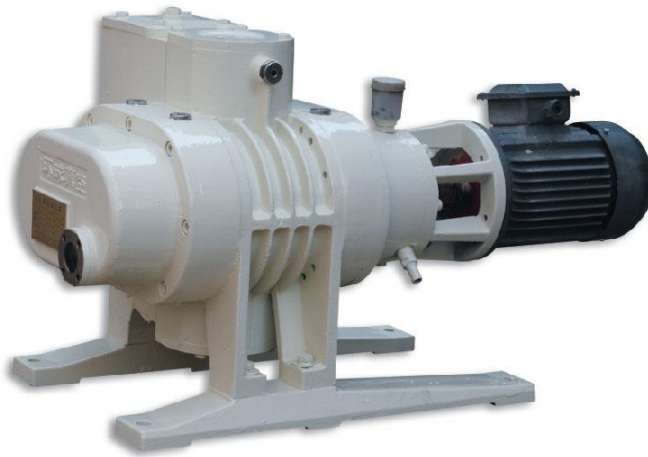


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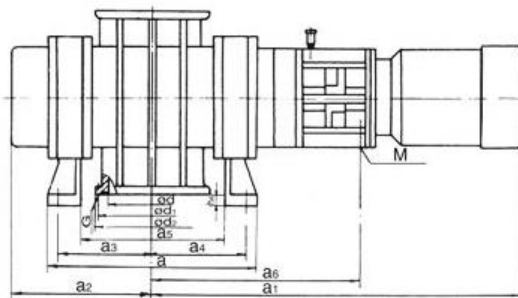
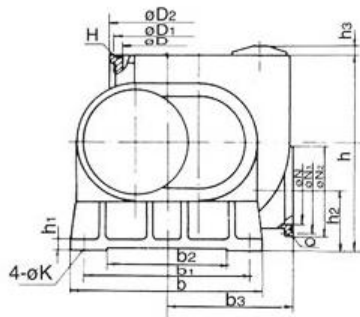
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- Second stage: ZJP-150 Roots vacuum pump

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Model	Ultimate Pressure		Pumping Speed (L/S)	Inlet Dia. (mm)	Outlet Dia. (mm)	Max. permissible Diff. pressure		Diff. pressure at overflow valve		Motor Power (kw)
	Pa	Torr				Pa	Torr	Pa	Torr	
ZJP-150	5×10^{-2}	3.7×10^{-4}	150	100	100	-	-	4000	30	2.2



型号	a	a1	a2	a3	a4	a5	a6	b	b1	b2	b3	h	h1	h2	h3	h4	K	D	D1	D2	H	d	d1	d2	G	N	N1	N2	Q	M
ZJP-150B	154	623	252	45	45	50	281	360	310	220	245	410	20	125	35	20	18	100	145	170	4-M10	100	145	170	4-M10	100	145	170	4-M10	M16

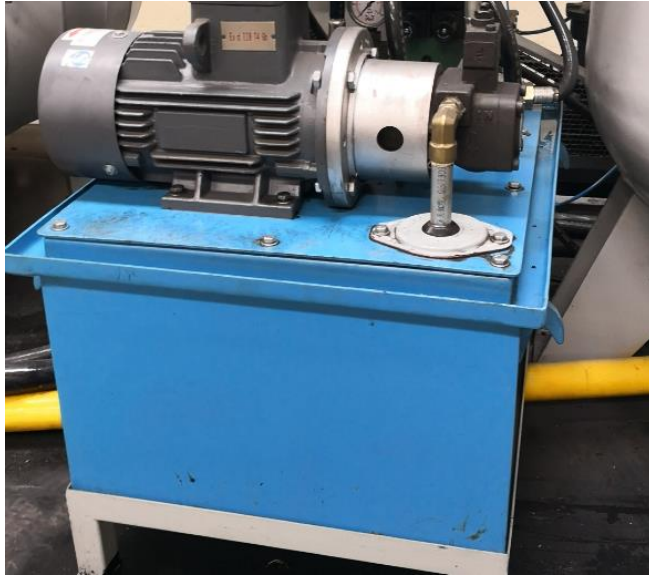
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3.4. Hydraulic system



3.4.1 Basic configuration

- It's composed of hydraulic station, oil tank, reversing valve, no-touch approach switch and meters;
- It controls the opening, closing, loosening and tightening of the vacuum tank cover

3.4.2 Technical spec

- Power of hydraulic station: 0.75KW;
- Max. pressure 16Mpa, working pressure 10Mpa

3.5. Pneumatic and pressure boosting system (air compressor, prepared by customer)

3.5.1 Basic configuration

- air compressor pressurize the impregnation tank, and the varnish can better penetrate into the products, in this way, final product quality can be improved;
- Air compressor provides power for all pneumatic valves, so valves can finish the open and close actions according to programs. Air compressor is connected electrical control system
- Air compressor pressure: max. 0.8Mpa;
- Air compressor is prepare by customer



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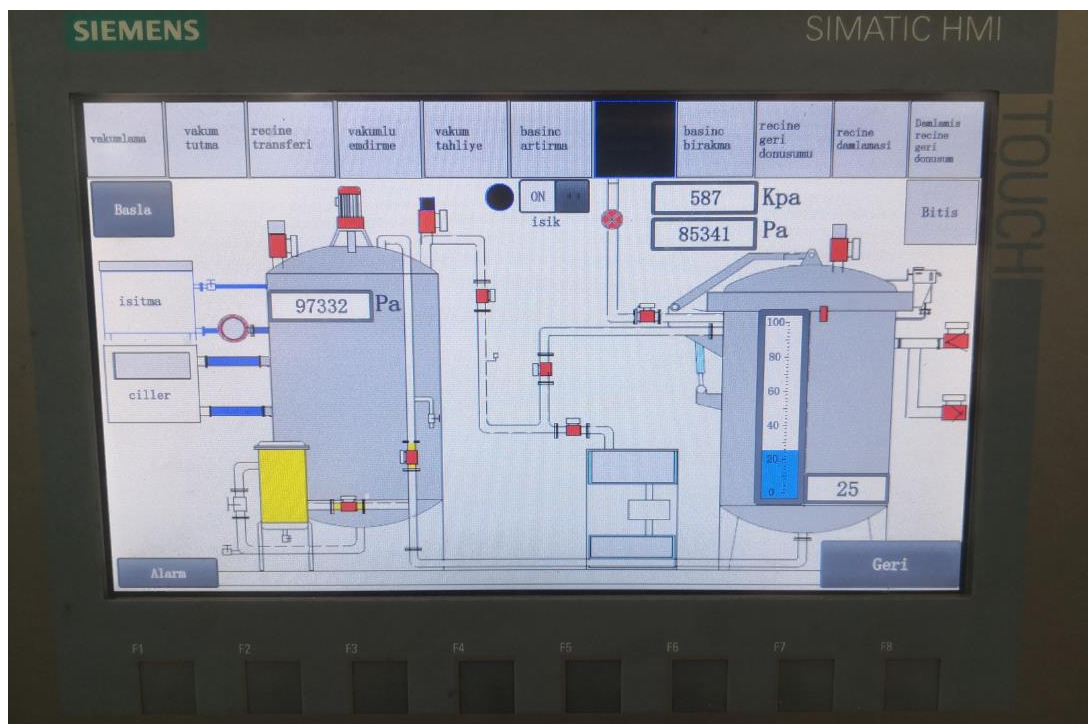
3.6. Varnish/resin transferring and recycling system

- Resin transfers and recycles between pressure tank and storage tank is realized through vacuum and differential pressure method;
- There is a filter of $\phi 250 \times 500 \text{mm}$ on resin pipelines between impregnation tank and resin storage tank. Impurities can be filtered by metal screen mesh in the filter to guarantee the quality

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3.7. Measurement and control system

- Electrical cabinet and control & operation station is designed to control the whole system;
- The whole system is controlled by PLC (SIEMENS), on a LCD touch screen. All process and production data can be displayed and change setting;
- Vacuum degree and pressure value are detected by vacuum pressure sensor;
- Liquid level is controlled by column Magnetic Reversible Level Meter, and the liquid level is displayed on monitor
- The system is protected by the password for different levels of access to prevent unauthorized access and changing of impregnation process program and its parameters;
- Below data of each cycle of vacuum-pressure impregnation could be stored (for certain amount of time) and printed (by printer):
 - Working vacuum degree
 - Working pressure value
 - Resin temperature
 - Resin level
 - Impregnation time
 - Total amount of production time
- Major control valves are pneumatic (automatic) type;
- Manual and automatic control modes are switchable.
- The voltage regulator is installed.
- Remote monitoring (not remote control) through Ethernet can be realized.



Major part list

No.	Name	Qty	Origin
1	VPI tank (autoclave)	1 set	Yicheng
2	Resin storage tank	1 set	Yicheng
3	Safety interlock device	1 set	Shanghai Ship and Shipping Research Institute
4	Vacuum pump system	1 set	Value vacuum pump, China Huanqiu, Zhejiang, China
5	Vacuum valve and pneumatic element	15 sets	Yongyi, China
6	Liquid Indicator	1 sets	Youding, Shanghai, China
7	Hydraulic station	1 set	Jiangyin, China
8	Control cabinet	1 set	Yicheng
9	Vacuum sensor & pressure sensor	1 set	Youding, Shanghai, China
10	Electrical components	1 set	Schneider
11	PLC and touch panel	1 set	SIEMENS

List of specifications

Items	Specifications
Pressure tank size	Dia * depth 1,200*2,500mm
Storage tank size	Dia * depth 1,200*2,500mm
Working vacuum degree for pressure tank	100Pa (equals to 1 mbar)
Max. working pressure for pressure tank	0.6Mpa (=6bar=87psi)
Designed pressure for pressure tank	0.675Mpa (=6.75 bar)
Vacuum system power	4 + 2.2 KW
Hydraulic station power	0.75KW
Power supply	3-Phase, 380-400V+N+PE, 50Hz
Total installed power	7KW





Commercial terms

Name	Model	Qty.	Price (USD)
Vacuum Pressure Impregnation System Full-auto control	YC-VPI1200 (1200*2500mm)	1 set	\$ 45,000
Packing cost			included
Inland shipping cost from factory to Shanghai port			included
Shipping freight from Shanghai to Italy			Included
Total amount (FOB Shanghai)			USD 45,000

Optional

Vacuum Pressure Impregnation System Manual control	YC-VPI1200 (1200*2500mm)	1 set	FOB Shanghai \$37,000 USD
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Delivery time	50 working days since the date of receiving deposit
Payment terms	30% deposit by T/T, 70% by T/T before delivery and after pre-acceptance
Warranty period	13 months since date of bill of lading, life-long service
Packing	With standard sea worthy exportable packing
Commissioning & installation	VPI system normally doesn't require on-site service from seller. Buyer can finish installation and commissioning work by themselves with seller's instructions.



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Our major customers

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 USA	 USA	 STROBELT Transformatoren-Manufaktur Germany
 Germany	 Austria	 UK
 IKM Technology AS Norway	 Slovenia	 Portugal
 Singapore	 Turkey	 Turkey
 Turkey	 Turkey	 Turkey
 Russia	 Russia	 Ukraine
 Guatemala	 Trinidad and Tobago	 SIBEXE Rebobinage Machines Electriques Traitement d'huile diélectrique Algeria
 Thailand	 Saudi Arabia	 TECHNOMAX MIDDLE EAST ENGG. LLC UAE

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 <p>China</p> <p>(CNR Group, China North Locomotive and Rolling Stock Industry (Group) Corporation)</p>	 <p>China</p> <p>NIO (Weilai) Electric car company. No 1 electric car maker in China</p>	 <p>中航工业北京航空材料研究院 AVIC BEIJING INSTITUTE OF AERONAUTICAL MATERIALS</p> <p>China</p> <p>(AVIC Beijing Institute of Aeronautical Materials, established in 1956)</p>
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 <p>China</p> <p>(ECRIEE-TAMURA Group, a Sino-Japanese joint venture)</p>	 <p>北京理工大学 BEIJING INSTITUTE OF TECHNOLOGY</p> <p>China</p> <p>(Beijing Institute of Technology. A world-class university)</p>	 <p>China</p> <p>(No 1 Maritime university in China)</p>

Thank you for your inquiry and we would be pleased to receive your order soon.

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