

**SPHEROIDIZING ANNEALING FURNACE**

**SBPNG-360/340-St-N2-W**

**LNG heating**



**Technical Annex**

**Buyer:**

**SUMON INDUSTRIAL(JIASHAN)CO.,LTD  
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# 1. Equipment introduction

(Photos are for reference only)

1.1 Name: Spheroidizing annealing furnace

1.2 Type: SBPNG-360/340-St-N2-W (LNG heating)

1.3 Furnace charging: about 18-22 ton/Each furnace

1.4 Effective space:  $\Phi 3600 \times 3400$  Hmm



## 1.5 Equipment power

Item	Power kw	Working condition
Heating system	1200	Full time
Convective seal motor	45	Full time
Burner blower	11	Cooling phase
Methanol Furnace	45	Heating and insulation
合计	1301	

## 1.6 Configuration Table

No	Name	Item
01	Double seal	Sealed motor+Vertical lathe flange
02	Control system	PLC+HMI+PC
03	Computer control system	SUM-C05
04	Methanol Furnace	SMG-45E
05	Pressure device	0-10kpa Digital display type
06	Furnace cover lifting device	Mechanical+Pneumatic
07	Mobile phone APP	SUM-APP

## 1.7 Refractory material

Item	Operating temperature	Thickness	Density
Refractory fiber modules	1260°C	270mm	270kg/m <sup>3</sup>
Refractory fiber blanket	1260°C	50mm	128kg/m <sup>3</sup>

## 2. Description of use

2.1 Use: Spheroidizing annealing of wire.

2.2 Main steel: Low-medium carbon steel , Alloy steel, Bearing steel (According to the reference planning of wire materials provided by the Buyer).

2.3 Gas protection: Methanol gas (Methanol).

Nitrogen N2 (Prepared by customer, It is suggest to use PSA nitrogen generator or liquid nitrogen).

2.4 Wire status: Pickled wire and drawn wire

2.5 Wire specification (Data provided by customer) :

(1). CHQ Wire : 10B21,10B38, SCM440

(2). Wire Diameters : 5 ~ 36mm

(3). Coil Diameters : < 1300 mm

(4). Coil Height : < 1130 mm

(5). Capacity : 18 ~ 22 T/Load

2.6 Loading data

Wire status	Pickled wire and drawn wire
Weight	Average 2 ton/coil

Loading planning	<p>(1) 1 Wire rack,3 coil,3 Wire rack in total, about 18 ton</p> <p>(2) Depend on real wire OD and loading layout.</p>
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### 3.Component introduction



#### 3.1 Main body of annealing furnace:

3.1.1 The heating barrel is made of 6mm steel plate, 10# to 12# section steel reinforced structure for barrel.

3.1.2 The furnace bed is made of special-shaped bricks, heat-resistant cement and heat-resistant castables, Matching of furnace bed radian and inner barrel head radian, Increase the service life of the inner barrel.

3.1.3 The electric resistance belt is made of 0Cr21Al6Nb, Long life in high temperature.

3.1.4 Combination of hard bricks and heat insulation bricks is adopted for furnace bottom, It has good load-bearing performance and heat insulation performance.

3.1.5. Surface polishing of heating barrel, Spray heat-resistant paint and high-temperature paint.



### 3.2 Insulator system:

The refractory material of the heating barrel is Use 1260°C degree Refractory fiber modules(Thickness:270 mm,Density:270kg/m<sup>3</sup>) and Refractory fiber blanket (Thickness:25/50mm,Density:128kg/m<sup>3</sup>), Nano thermal barrier materials are used at some high temperature, Good thermal insulation effect Reduced heat loss and production cost.

### 3.3. heating system :

3.3.1.heating mode: gas burner heating burner type: ordinary type (central heat exchanger)

3.3.2. control mode: PLC+PC+HMI

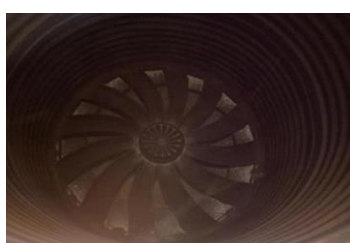
3.3.3 Ignition control: use pulse ignition controller

3.3.4 temperature control: two section temperature control in furnace, temperature control in two zones, over temperature protection system outside furnace.

3.3.5. rated power: 1200KW(860.000kcal/Nm<sup>3</sup>)

3.3.6. energy consumption: max100m<sup>3</sup>/h





### 3.4 Inner barrel:

3.4.1 Stainless steel sheet welding corrugated barrel body, barrel body SUS309  $t=8\text{mm}$ , head SUS309  $t=12\text{mm}$

3.4.2 Barrel shape by the corrugated high strength deformation is not easy to crack, the upper barrel section is the corrugated section, plate transition section thickness and the same head, circular head with better strength and resistance to thermal expansion and contraction

3.4.3 Ladder body stepped lightweight design effectively reduce the burden on the bottom of the furnace to reduce deformation.

3.4.4. The inner barrel flange is sealed with two vertical lathe precision machining + air tight ceramic fiber packing to ensure that the sealing surface is flat and not deformed without leakage.

### 3.5 Convection barrel

stainless steel coil welded corrugated barrel body, barrel body SUS304\*6mm  $t$  head material SUS304\*12mm  $t$

### 3.6 loading platform:

3.6.1 SUS3304\*12mm  $t$  (new material design of high strength stainless steel welding skeleton Naihe,





图 3.1 图名



图 3.1 图名



mining collapse deformation, durability)

3.6.2 Simple loading platform not only high strength and light weight, but also reduce the load to reduce the hearth furnace atmosphere prevents convection.

### 3.7 Furnace cover assembly:

3.7.1. Cantilever: air cylinder lift structure, hoist rotation to ensure that the maximum angle of 90°.

3.7.2. Furnace cover: lower head material SUS304 t=6mm, upper head material Q235, t=6mm strengthen the reinforcement.

3.7.3. Configure 8 manual locking devices.

### 3.8 Convection system:

The rated power of the double speed seal motor is 45KW, the axis of the motor is SUS310S, and the speed is Max 1460rpm

The sealed water cooled motor is a two speed motor, and the frame and flange end cover adopt water cooling structure. The motor can withstand the



**ABB**



operation condition of the furnace temperature at 850°C. The motor has good sealing performance .

Use condition:

Rated voltage: 380V

Rated frequency: 50HZ

Protection grade: IP65

Insulation grade: F

Work system: S1

Installation method:V3

Super strong convection impeller (homemade SUMON):

φ950mm material (SAE253MA)

Material:SAE253MA+ SUS310S

### **3.9 frequency converter:**

according to the temperature process set speed (low temperature and low speed, high temperature and high speed automatic transmission) energy saving, adopt the German SIEMENS. Design parameters:45KW MicroMaster430 is a new generation of standard inverter in the wind turbine variable torque load expert. It is designed according to the specific requirements, and uses the internal functional connectivity (BiCo) technology, with a high degree of reliability and flexibility. Control software can realize the special function: manual / automatic switch, bypass function, broken belt and water shortage detection, energy saving operation mode, etc..





### 3.10 Control system:

Sumon is a set of computer monitoring and control system which is developed gradually in the long-term engineering practice of the industrial furnace (Jiashan) Co., Ltd.. The use of mountain Weng system, can easily adapt themselves to the construction of the data acquisition system, to control the production of real-time information sent to the room at any time, real time and historical production data, timely understanding and evaluation production and operation level.

The basic function of Sum-C05 is data communication, data management and data exchange. Specifically, the data communication is 1) to get data from the scene and they can be processed into using the basic functions and form 2) to the signal control by the computer sent directly to the executive body site, two-way connection this set the control software required. Data management is based on the needs of users, the data for a deeper level of processing, such as the range of transformation, alarm, statistics, analysis, etc.. Data exchange is based on the needs of different users, the data in different forms submitted to the user to interact, such as operators need



to monitor, management personnel need data report, process engineer to analyze the data, provides many kinds of interactive means Sumon for different users. Sumon-C05 has been in engineering practice through long-term test, has been widely used in industrial furnace industry, industrial automation, process control, management and monitoring, industrial monitoring, remote monitoring and remote diagnosis (mobile phone APP), enterprise management / resource planning system. Application software SUMON V6.0 layout control software with SIEMENS PLC developed, to achieve the temperature monitoring and control and the establishment of curve formula, historical data query, data record and query the production function with. From the picture window to understand the action of ON/OFF and light furnace temperature value; when the abnormal alarm is generated when the map control can also be through find out what problems, so that operators can quickly grasp the situation and make appropriate treatment.



### **3.11 Methanol decomposition furnace (protective atmosphere equipment)**

3.11.1 Model: SMG-45E

3.11.2 Technical parameters of liquid methanol:

Molecular formula: CH<sub>3</sub>OH

Molecular weight : 32

Specific gravity: 0.792

Boiling point : 64.7

Specific heat : 18.4kcal/ C.Mol

Relative specific gravity of pyrolysis gas: 0.385

Natural point : 470

Cracking consumption fand: 0.55L/m

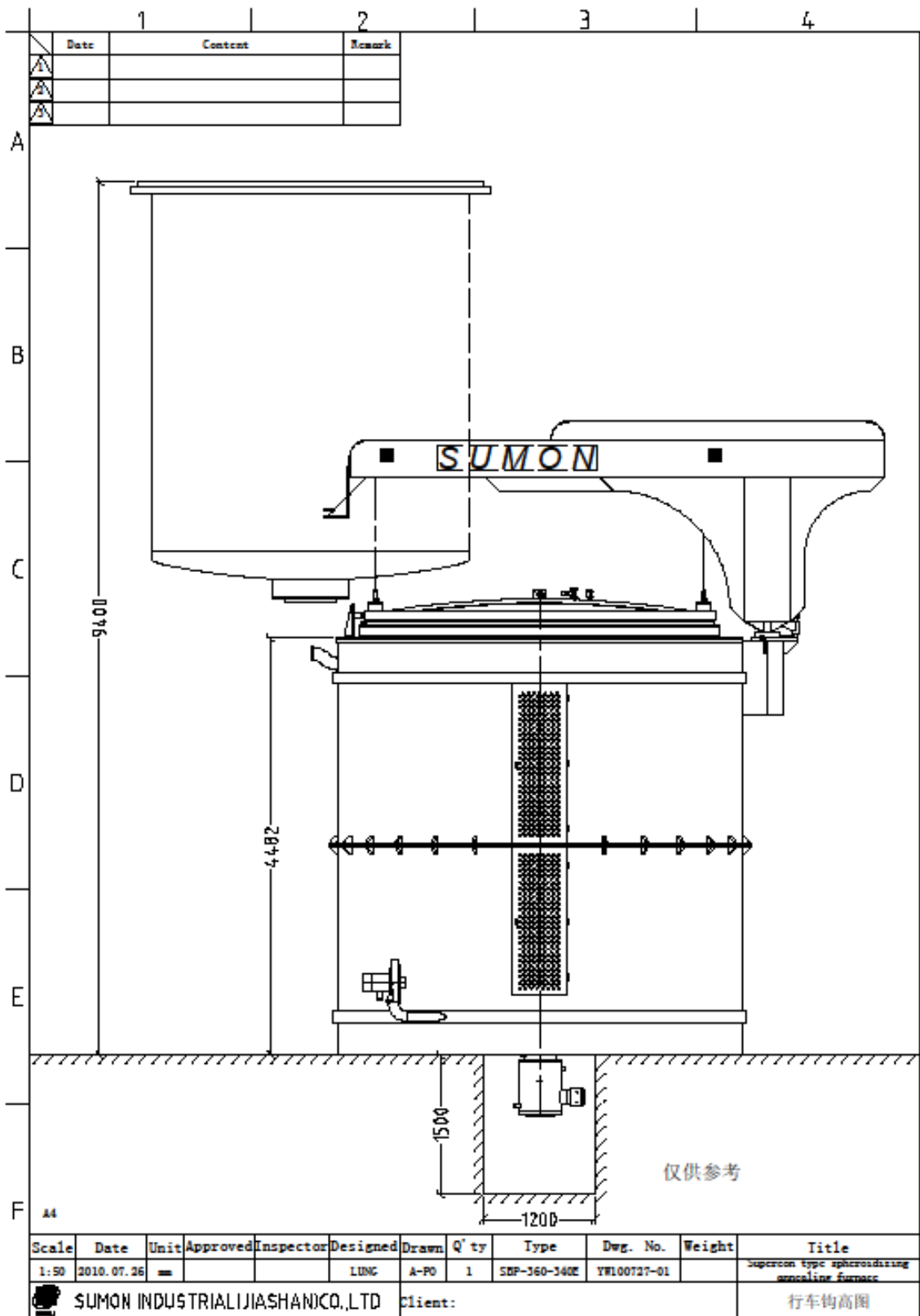
3.11.3 Gas production: max26m<sup>3</sup>/H

decomposition temperature: 930°C

3.11.4 Decomposed gas: 33.3%CO 66.7%H<sub>2</sub>

### **3.12 Carbon control system**

Oxygen potential analysis: configure the working principle of American SSI low temperature oxygen probe + oxygen potential instrument + computer analysis and control, feed back the furnace oxygen content data (MV) to the computer through the oxygen probe, and provide process correction reference to obtain the best atmosphere control means.



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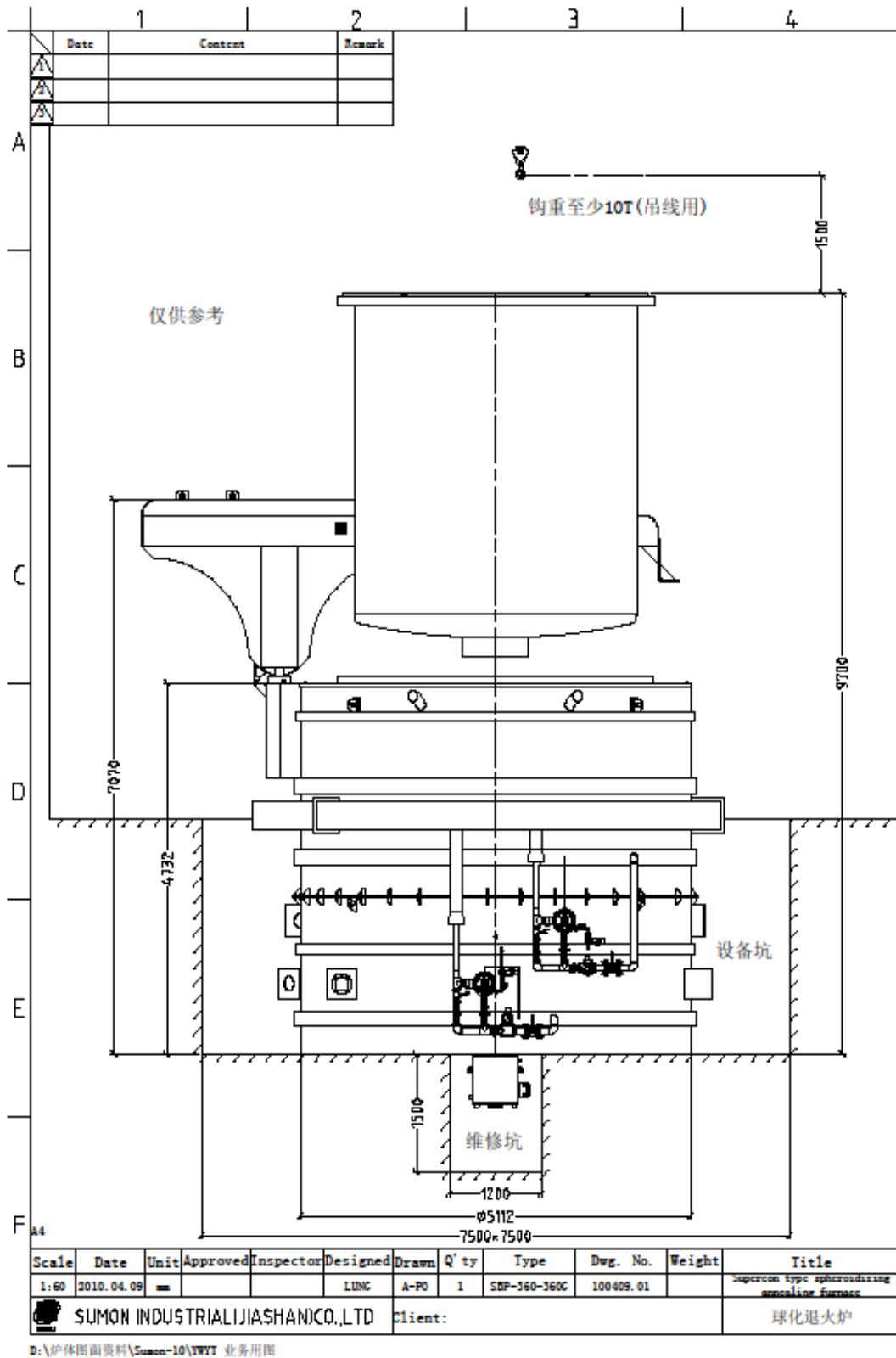


图 4.1 地坑示意图 (节能 15~20%)

The foundation pit is divided into two types: (for reference only, not for construction drawings).

A, Only maintenance pits are dug, the furnace is placed on the ground, and the height of the

crane/workshop is required.

B, Dig furnace pit and maintenance pit, suitable for crane and low plant.

## 4 Supply delivery (供货分交)

### Design and equipment and peripheral facilities (Buyer-B Seller-S)

NO	Device name (设备名称)	Qty (数量)	basic design(基本设计)	detailed design(详细设计)	Supplier (供货方)	Manufacturer (制造厂商)
1	Heating barrel (加热桶)	1	S	S	S	SUMON
2	Corrugated inner barrel + Corrugated bucket (波纹内桶+对流桶)	1	S	S	S	SUMON
3	Cantilever(悬臂)	1	S	S	S	SUMON
4	Furnace cover(炉盖)	1	S	S	S	SUMON
5	Convection circulation system (对流循环系统)	1	S	S	S	SUMON
6	Electric control cabinet (电控柜)	1	S	S	S	SUMON
7	Nitrogen gas drainage and pressure reduction (氮气排及减压系统)	1	B	B	B	
8	Factory design (工厂设计)	1	B	B	B	
9	Workshop crane (车间吊具)	1	B	B	B	



10	Carriers (线架)	1	S	S	B	
11	Cooling water supply system (冷却供水系统)	1	B	B	B	
12	Power supply (电源)	1	B	B	B	
13	Workshop lighting (车间照明)	1	B	B	B	
14	Fire safety (消防安全)	1	B	B	B	
15	Nitrogen gas supply system (氮气供气系统)	1	B	B	B	
16	Foundation pit pipe ditch construction (基坑管沟施工)	1	S	S	B	
17	one or two power cable and control line (一二次动力线/控制线)	1	S	S	B	
18	Communication line and supplementary wire (通讯线及 补偿导线)	1	S	S	S	SUMON

### 3.The main components of the equipment specification label list (设备的主要零组件规格厂牌明细)

#### 3.1. Electromechanical part (机务部分)

No	Material name(材料名称)	Material / specification (材质/ 规格)	Label (厂牌)	Set (数量)
01	Corrugated inner barrel (波纹	SUS309 t=8mm	Domestic	1

	内桶)	Head (封头) SUS309 t=12mmt Diversion plate(导流板) SUS309 t=12mmt	(中国)	
02	convective drums (对流桶)	SUS304 t=6mm Head (封头) SUS304 t=12mmt	domestic	1
03	Guide platform (八卦)	SUS304 t=12mm	domestic	1
04	Furnace cover (炉盖)	Upper head Q235 t=6mm Lower headSUS304 t=6mm	domestic	1
05	Outer barrel (炉体)	Q235 t=6mm	domestic	1
06	Thermalinsulation system (保温系统)	Ceramic fiber block1260°C (陶瓷纤维模组 1260°C)	domestic	1
07	Cantilever (悬臂)	Q235	domestic	1
08	Rotary seat (旋转座)	Q235	domestic	1
09	Convection fan (对流风扇)	750type ASTM253MA+SUS310S	domestic	1
10	Pneumatic cylinder(气压缸)	DN type	domestic	1
11	burner 烧嘴	Sinon	domestic	1
12	Cover seal (炉盖密封)	Graphite Packing	domestic	1
13	Seal motor (密封电机)	45KW 3phase 380V	domestic	1
14	Burner blower (助燃风机)	1.5KW 3phase 380V	domestic	3

15	Furnace cover locking device (炉盖锁紧装置)	Q235/8 group	SUMON	1
16	Furnace pressure device (炉压装置)	Digital display type 0-10kpa (显示型 0-10kpa)	domestic	1
3.2. Electric control part (电控部分)				
01	Electric control cabinet (电控柜)	2400*800*2000mm Q235	SUMON	1
02	Electric control cabinet cooling fan (电控柜冷却风扇)	--	domestic	2
03	PLC	S7-200SMART	SIEMENS	1
04	HMI (人机界面)	10.1"TFT	domestic	1
05	Thermocouple (热电偶)	K-type	Taiwan	3

## 5. Client provide for oneself: Peripheral supporting and public auxiliary equipment description

Cooling water tank

Size : L2000\*W1000\*H1500mm Water storage : about 2~2.5t

Material: cement casting (Specific construction methods to find professional civil construction units)

Cooling tower: Cooling capacity 2ton/hour.

Pipeline water pump (One use and one spare)



Annealing furnace: Interface pressure  $\leq 2\text{kg}$

Interface position: Bottom of the cooling water tank

Interface size: 3/4"

Flow size:  $2\text{m}^3/\text{h}$

Compressed air

corresponding parameters : Interface pressure

4~8kg

Interface position: cantilever rotating shaft position

Interface size: 1/2"



5.3.1.programme:

(We recommend the use of PSA nitrogen making machine)

1.Liquid nitrogen storage tank

2.PSANitrogen making machine

3.cylinder bundle

4. Stainless steel bottle

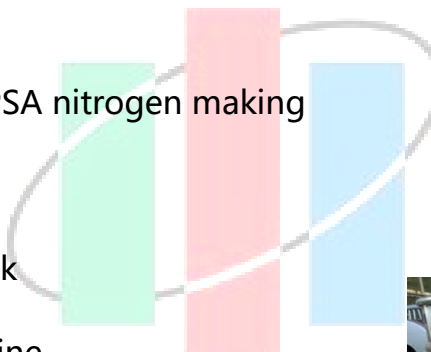


图 3.1 图名

图 3.1 图名

Corresponding parameters: Interface pressure  $\leq 1\text{kg}$

Interface position: The furnace cover convection

Electric machinery place.

Interface size: 3/4"

Flow size: Max  $100\text{m}^3/\text{h}$

Nitrogen purity requirements:  $\geq 99.999\%$

Heat-resistant stainless steel or universal carbon steel



Working platform:

Material: A3 (材质: A3)

According to site furnace area production



5.6.1. Hoisting ability 5~8t (for hoisting materials)



制造方(公章):  
The manufacturer (official seal)

買方(公章):  
The Purchaser (official seal)

代表人簽字  
Representative(signature):  
(signature):

代表人簽字:  
Representative(signature):  
(signature):

