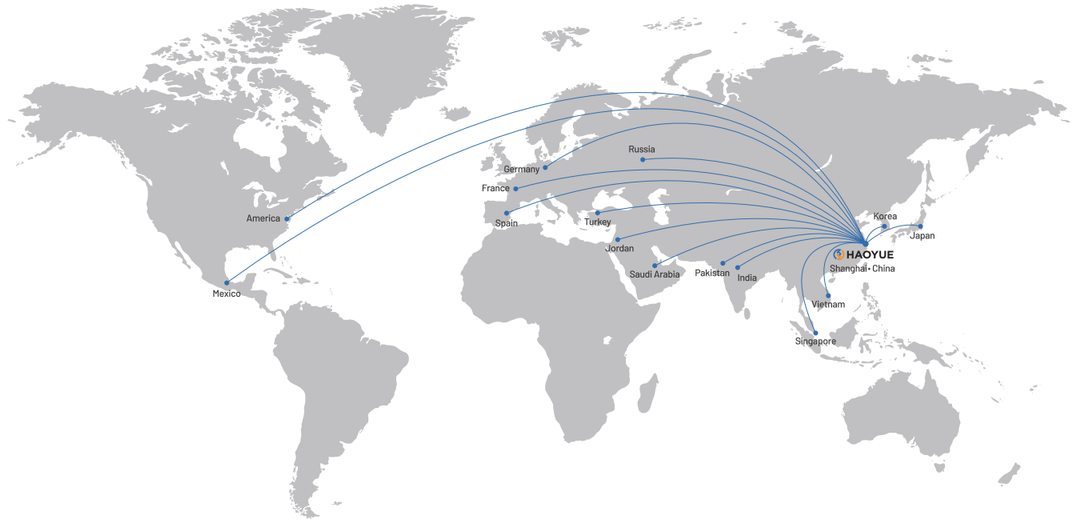
HAOYUE



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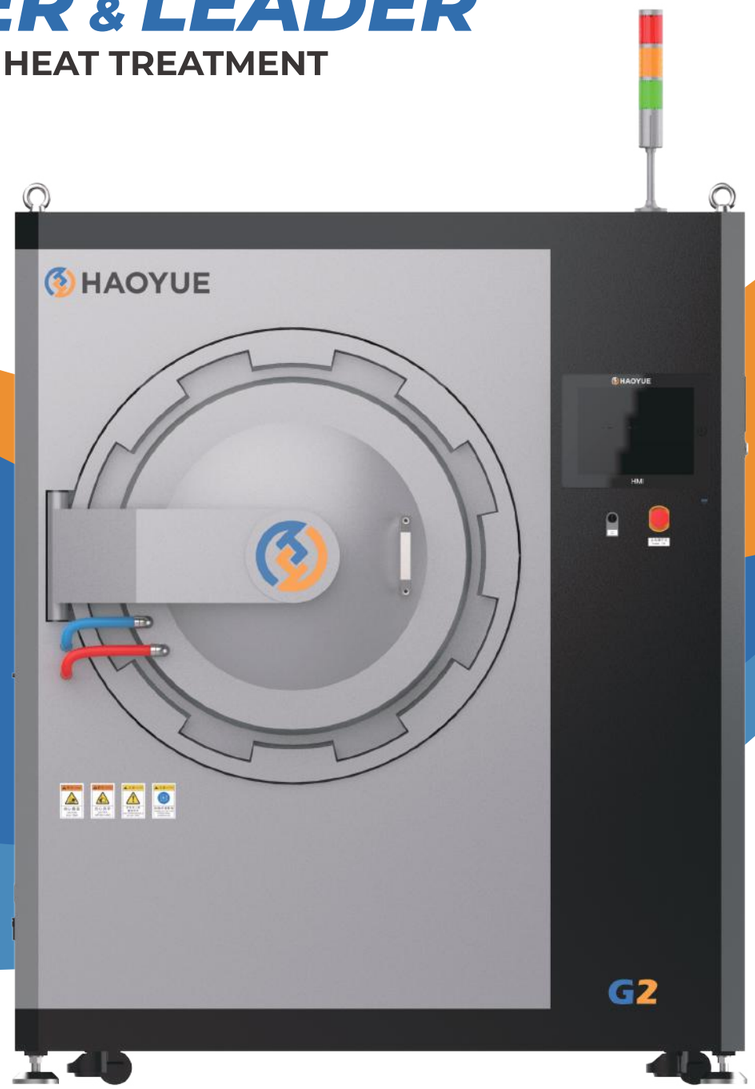
IN THE FIELD OF HEAT TREATMENT



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HAOYUE TECHNOLOGY
COMPANY FROFILE

Shanghai Haoyue Technology Co., Ltd.(Haoyue Technology), was founded in 2009. It is a high-tech enterprise that integrates R&D, production, and sales; Our products cover three major fields: advanced ceramic & composite material equipment, semiconductor material equipment, lithium battery materials&new energy equipment.

At present, the company has over 7000m² factory building, a complete set of processing equipment, a good quality management system, and an advanced equipment exhibition hall as well as a heat treatment R&D center laboratory of over 1500m². The laboratory is not only available for internal scientific research and exploration, but also for external universities, research institutes, enterprises to conduct experimental research and development.

The company has focused on the industry, gathering a group of technical elites who have been engaged in the manufacturing and service of heat treatment furnaces, vacuum furnaces, and special furnaces for a long time. Currently, it has more than 60 patent achievements and software works, and has the production capacity to produce 200 sets of heat treatment furnaces and 60 sets of large vacuum sintering furnaces annually; Our business covers markets in Europe, America, the Middle East, and Southeast Asia; In addition, the company has maintained long-term scientific research cooperation with Fudan University, Tongji University, Harbin Institute of Technology, Nanjing University of Aeronautics and Astronautics, and other universities, jointly building industry university research bases and talent training bases; At the same time, we have established cooperation with customers such as Huawei, CATL, Tiantong Holdings, Sanan Optoelectronics, China Shipbuilding Heavy Industry Corporation, AVIC Group, and China Electronics Corporation. We maintain a leading position in high-precision temperature control, vacuum systems, automation control, and computer analysis systems, providing customers with comprehensive integrated industrial solutions.

Based in the Yangtze River Delta, facing the whole China, building an international brand, with more than 15 years of stable operation and efficient development, showcasing the continuous pursuit of Haoyue Technology; Significant business performance records the unremitting efforts of Haoyue Technology; Haoyue Technology always adheres to the core values of "integrity, focus, excellence, innovation, and long-term development", continues to adhere to the mission of "promoting the rapid development of heat treatment, creating value, and repaying to society", and strives to become a leader in the field of new materials and new energy heat treatment.

From a high perspective, we strive for innovation, reliable quality, and honest service. Haoyue Technology looks forward to working together with you to create a better future!

EXPERIMENTAL VACUUM FURNACE PRODUCT SELECTION TABLE

Product Series	Numbering	Max. Temperature	Heater	Ultimate Vacuum(Pa)	Vacuum Pumps	Chamber Size (mm)	L×W×H (mm) Overall Dimensions	Weight	Applications	Note
S2 (Spark Plasma Sintering System)	S2	2400°C	SPS	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	Φ80×250	1425×1550×1850	1500	Sintering	Servo pressure 10T, accuracy ±1‰, heating rate 200°C/min, compressible Φ30-50mm products
	S2D	2400°C	SPS+CO	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	Φ80×250	1425×1550×1850	1500	Sintering	Servo pressure 10T, accuracy ±1‰, heating rate 200°C/min, compressible Φ30-50mm products
P2 (Vacuum Hot Pressing Furnace Series)	P2GR20	2000°C	GR	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1500	Hot Press Sintering	Servo pressure 30T, accuracy ±3‰, heating rate 20°C/min, compressible Φ20-80mm products
	P2GR23	2300°C	GR	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1500	Hot Press Sintering	Servo pressure 30T, accuracy ±3‰, heating rate 20°C/min, compressible Φ20-80mm products
	P2CO20	2000°C	CO	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	Φ200×200	1425×1550×1850	1600	Hot Press Sintering	Servo pressure 30T, accuracy ±3‰, heating rate 100°C/min, compressible Φ20-80mm products
	P2CO23	2300°C	CO	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	Φ200×200	1425×1550×1850	1600	Hot Press Sintering	Servo pressure 30T, accuracy ±3‰, heating rate 100°C/min, compressible Φ20-80mm products
V2 (Vacuum Furnace Series)	V2GR20	2000°C	GR	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1300	Sintering/Annealing/ Degreasing	Graphite furnace, Heating rate 20°C/min,
	V2GR23	2300°C	GR	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1300	Sintering/Annealing/ Degreasing	Graphite furnace, Heating rate 20°C/min,
	V2MO13	1300°C	MO	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1300	Annealing/Brazing/ Degassing	Molybdenum strip furnace, Heating rate 20°C/min,
	V2MO16	1600°C	MO	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1300	Sintering/Annealing/ Degreasing	Molybdenum strip furnace, Heating rate 20°C/min,
	V2W20	2000°C	W	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1300	Sintering/Annealing	Tungsten strip furnace, Heating rate 20°C/min,
	V2W23	2300°C	W	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1300	Sintering/Annealing	Tungsten strip furnace, Heating rate 20°C/min,
	V2CO20	2000°C	CO	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1500	Sintering/Annealing	Induction furnaces, Heating rate 100°C/min,
	V2CO23	2300°C	CO	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1500	Sintering/Annealing	Induction furnaces, Heating rate 100°C/min,
	V2MS17	1700°C	MS	6.7×10^{-2}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1300	Oxidation/Sintering/ Annealing	Oxidation furnace, Heating rate 20°C/min,
G2 (Gas Pressure Sintering Furnace Series)	G2GR20/10	2000°C	GR	10Pa	Direct Connection Pump	Φ200×250	2000×1500×1730	3000	Pneumatic Sintering/ Partial Pressure/ Degreasing	Vertical, 10MPa gas pressure furnace, heating rate 20°C/min,
	G2GR20/1	2000°C	GR	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1600	Pneumatic Sintering/ vacuum sintering/ Degreasing	Horizontal, 1MPa air pressure, Vacuum integrated furnace, Heating rate 20°C/min
	G2GR20/P/1	2000°C	GR	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1800	Pneumatic Sintering/ hot pressing sintering/ vacuum sintering	Horizontal, 1MPa air pressure, 30T Hydraulic pressure, Vacuum integrated furnace, Heating rate 20°C/min
H2 (Hydrogen Furnace Series)	H2MO13	1300°C	MO	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1300	Reduction/Annealing/ Brazing	Hydrogen furnaces, Heating rate 10°C/min,
	H2MO17	1700°C	MO	6.7×10^{-2}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1300	Reduction/ Annealing Sintering	Hydrogen furnaces, Heating rate 10°C/min,
	H2W20	2000°C	W	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1300	Reduction/ Annealing Sintering	Hydrogen furnaces, Heating rate 10°C/min,
	H2W23	2300°C	W	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1300	Reduction/ Annealing Sintering	Hydrogen furnaces, Heating rate 10°C/min,
C2 (CVD Furnace Series)	C2GR16	1600°C	GR	6.7×10^{-3}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1300	CVD/CVI	heating rate 10°C/min, 4 furnaces for gas, 1 CHxSiCl4, 1 ammonia, 1 hydrogen and 1 nitrogen
D2 (Diffusion Welding Furnace Series)	D2MO14	1400°C	MO	6.7×10^{-4}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1500	Diffusion Welding/ Brazing/Degassing	Servo electric pressure 5T, accuracy ±1‰, heating rate 10°C/min, compressible 160×180×160mm products
	D2GR20	2000°C	GR	6.7×10^{-4}	Direct Connection Pump+Diffusion Pump	200×200×300	1425×1550×1850	1500	Diffusion Welding/ Brazing/Degassing	Servo electric pressure 5T, accuracy ±1‰, heating rate 10°C/min, compressible 160×180×160mm products
R2 (Rotary Furnace Series)	R2	1050°C	A	10Pa	Direct Connection Pump	Φ273×500	1500×1280×860	1000	Calcination/Reduction	Effective volume: 6 L; Inner tank diameter: Φ273mm; Effective length: 500mm; Heating power: 18KW; Installed power: 18.5kW; Speed: 0-10rpm; Gas flow: 20L/min
	R2C	1050°C	A	10Pa	Direct Connection Pump	Φ273×2400	3800×1390×1260	1500	Calcination/Reduction	Effective capacity: 8 L/h; Gas flow: 20m³/h Effective length: 2400mm; Heating power: 27KW; Installed power: 28kW; Speed: 0-5rpm; Inner tank diameter: Φ273mm

Note: The optional configuration list is as follows.

1. MOD (Molybdenum Strip Furnace: Degreasing)
2. GRD (Graphite Strip Furnace: Degreasing)
3. H2RFC (Hydrogen Furnace, 2-way Float Flowmeter)
4. H2MFC (Hydrogen Furnace, 2-way Mass Flowmeter)
5. OM (Direct Connection Pump + Molecular Pump)
6. DM (Screw Pump + Molecular Pump)
7. UPS (Uninterruptible Power Supply)
8. AC (Air Conditioning)
9. OCA (Oxygen Content Analyzer)
10. HDP (Hydrogen Dew Point Meter)

Spark Plasma Sintering

S Series

S2 Isometric View

BRIEF INTRODUCTION

The SPS (Spark Plasma Sintering) / DCS discharge plasma sintering system is one of the most advanced sintering systems in the world today. It is a new rapid sintering technology that applies pulse current and axial pressure between two electrodes to densify powder sintering. It has distinct characteristics such as fast heating rate, short sintering time, controllable organizational tructure, energy conservation and environmental protection. It can be used to prepare metal materials, ceramic materials, composite materials, as well as nano bulk materials, amorphous bulk materials, gradient materials, etc.. In addition, SPS/DCS equipment also provides the possibility for the manufacturing of very special new materials, such as nanomaterials, functionally gradient materials, composite materials, tungsten carbide, silicon nitride, silicon carbide or other hard materials, structural ceramics, and functional ceramics, which can be sintered without significant grain growth.

APPLICATIONS

- Metals: Fe, Cu, Al, Au, Ag, Ni, Cr, Mo, Sn, Ti, W, Be;
- Ceramic oxides: Al_2O_3, Mulitex ZrO_2, Mg, SiO_2, TiO_2, HfO_2;
- Carbides: SiC, B_4C, TaC, WC, ZrC, VC;
- Nitrides: Si_3N_4, TaN, TiN, AlN, ZrN, VN;
- Boride: TiB_2, HfB_2, LaB_6, ZrB_2, VB_2;
- Fluorides: LiF, CaF_2, MgF_2;
- Metal ceramics: Si_3N_4+Ni Al_2O_3+Ni, ZrO_2+Ni, Al_2O_3+Ti, SUS+WC/Co, BN+Fe, WC+Co+Fe;
- Metal compounds: TiAl, $MoSi_2$, Si_3Zr_5, NiAl, NbCo, NbAl Sm_2Co_{17}.

ADVANTAGES

The main advantages of the SPS/DCS equipment of Haoyue Company:

- This series of discharge plasma sintering systems fully considers the automation and controllability of the sintering process, and automatic program control systems such as sintering temperature, pressure control, and current control are the standard configurations of the equipment.
- The device is equipped with a safety shutdown function, which automatically shuts down when monitoring or detecting sudden situations such as abnormal water temperature or mold damage.
- Equipped with a data collection and analysis system, the process parameters that determine the quality of sintered body products, such as sintering voltage, current, control temperature, applied pressure, displacement, vacuum degree, displacement change rate, measured temperature, etc., canbe saved and called up to track the production process of the product.
- The equipment adopts a self-developed pulse frequency conversion DC power supply, which significantly reduces power consumption compared to traditional SPS of the same level, and can truly effectively achieve energy-saving, environmentally-friendly and high-grade sintering production.
- Adopting a front door type water-cooled vacuum sintering chamber, the construction, maintenance, and repair of the workpiece on and off the machine table, and inside the chamber are easy and convenient.
- Using a large LCD touch operation panel, it is possible to diagnose and confirm the display, alarm display, alarm history, and pressure setting values of displacement data and interlocking status at any time.
- To avoid misoperation of various operating buttons or buttons on the device, the device is equipped with a safety interlock function, which can be used with confidence even for beginners.

S2D Isometric View

SPECIFICATIONS & PARAMETERS

Numbering	Model	Chamber Size (mm)	Sample Dia. (mm)	Pressure (ton)	Indenter Stroke (V)	Heater	Heating Power (KW)	Ultimate Vacuum (Pa)	Operating Temperature (°C)
S2	VHPsp-8/25-2400	Φ80×250	30~50	10	100	Pulsed DC power supply	50	6.7×10^{-3}	2400
S2D	VHPsp-8/25-2400	Φ80×250	30~50	10	100	Pulse power supply + induction power supply	100	6.7×10^{-3}	2400

Vacuum Hot Pressing Furnace P Series

P2 Isometric View

BRIEF INTRODUCTION

A vacuum hot pressing furnace is a complete set of equipment that forms materials by hot pressing under vacuum (or other atmosphere) conditions. It mainly uses resistance heating and is pressurized up and down by a pressure head driven by an oil cylinder. At high temperatures, the solid particles of the raw material bond with each other, resulting in grain growth, decreasing voids (pores) and grain boundaries. Through material transfer, its total volume shrinks, density increases, and finally becomes a dense polycrystalline sintered body with a certain microstructure, thereby pressing the material into shape.

ADVANTAGES

- **Adopting a horizontal and side door structure:**
  High precision for loading and unloadingmolds, easy to operate;
- **Fast temperature rise and fall:**
  Induction heating rate of 100°C/minute (≤ 1600°C), resistance heating rate of 20°C/minute (>1600°C);
- **Good temperature uniformity:**
  The average temperature uniformity is ± 5°C (measured at 5 points, with a constant temperature zone of 1000°C for 1 hour before testing);
- **High pressure accuracy:**
  Using a hydraulic control system, with a pressure accuracy of 3‰;
- **Adopting single temperature zone control:**
  Reserving two temperature measurement holes for high-temperature monitoring use;
- **Good safety performance:**
  Adopting HMI+PLC+PID pressure sensing control, safe and reliable;
- **Good sealing performance:**
  The dynamic pressure heads are sealed with corrugated pipes to ensure no air leakage.

P2 Front View

SPECIFICATIONS & PARAMETERS

Numbering	Model	Sample Dia. (mm)	Pressure (ton)	Heating Power (KW)	Ultimate Vacuum (Pa)	Operating Temperature (°C)
P2GR20	VHPgr-20/20/30-2000	Φ20~80	30	45	6.7×10^{-3}	2000
P2GR23	VHPgr-20/20/30-2300	Φ20~80	30	50	6.7×10^{-3}	2300
P2CO20	VHPco-20/20-2000	Φ20~80	30	45	6.7×10^{-3}	2000
P2CO23	VHPco-20/20-2300	Φ20~80	30	50	6.7×10^{-3}	2300

Vacuum furnace

V Series

V2 Isometric View

BRIEF INTRODUCTION

The Vacuum furnace is a vacuum resistance furnace that can use graphite / molybdenum belt / tungsten belt / silicon molybdenum bar / molybdenum bar as heating elements. It is mainly used for sintering, annealing, brazing, degreasing, degassing, etc. of ceramics, hard alloys, composite materials, stainless steel, etc.. in vacuum or protective atmosphere, and also for high-temperature heat treatment of metal materials under high vacuum conditions or degassing of precious metal materials.

ADVANTAGES

- **Easy to operate:**
  Adopting a horizontal and side door structure: easy to load and unload samples, easy to operate;
- **Fast temperature rise and fall:**
  Induction heating rate of 100°C/minute (≤ 1600°C), resistance heating rate of 20°C/minute (>1600°C);
- **Good temperature uniformity:**
  The average temperature uniformity is ± 5°C (measured at 5 points, with a constant temperature zone of 1000°C for 1 hour before testing);
- **Adopting single temperature zone control:**
  Reserving two temperature measurement holes for high-temperature monitoring use;
- **Good safety performance:**
  Adopting HMI+PLC+PID pressure sensing control, safe and reliable;
- **Strong expandability:**
  Sintering, brazing, annealing, degreasing, dehydrogenation, degassing, reduction, oxidation, etc..

V2 Front View

SPECIFICATIONS & PARAMETERS

Numbering	Model	Chamber Size (mm)	Heating Power (KW)	Ultimate Vacuum (Pa)	Operating Temperature (°C)
V2GR20	VHSgr-20/20/30-2000	200×200×300	45	6.7×10^{-3}	2000
V2GR23	VHSgr-20/20/30-2300	200×200×300	50	6.7×10^{-3}	2300
V2MO13	VHSmo-20/20/30-1300	200×200×300	40	6.7×10^{-3}	1300
V2MO16	VHSmo-20/20/30-1600	200×200×300	45	6.7×10^{-3}	1600
V2W20	VHSw-20/20/30-2000	200×200×300	45	6.7×10^{-3}	2000
V2W23	VHSw-20/20/30-2300	200×200×300	50	6.7×10^{-3}	2300
V2CO20	VHSco-20/20-2000	Φ200×200	45	6.7×10^{-3}	2000
V2CO23	VHSco-20/20-2300	Φ200×200	50	6.7×10^{-3}	2300
V2MS17	VHSms-20/20/30-1700	200×200×300	12	6.7×10^{-2}	1700

Gas Pressure Sintering Furnace

G Series

G2GR20/10 Isometric View

ADVANTAGES

Gas pressure sintering equipment is particularly suitable for sintering ceramics or metals that are easily decomposed at high temperatures or cannot be sintered through standard sintering processes. Like hot sintering, there are no restrictions on the treatment of sintered components or geometric shapes during this process, providing a favorable choice for more expensive HIP processes. Our pneumatic sintering furnace can be equipped with an integrated thermal dilatometer that can measure shrinkage and shrinkage rate during the sintering cycle. The measurement data obtained here is used for process control.
a workload of 1 to 500 liters can be achieved at 2200°C and 10 MPa (in N2 or Ar).
Gas pressure sintering furnaces are used to produce the following materials or components:

- Sintered silicon nitride and silicon aluminum oxide nitrogen polymer materials with good mechanical properties (such as cutting tools, turbocharger engines, engine components)
- Silicon carbide ceramics (high mechanical stress parts under corrosive conditions, etc.)
- Super alloy (mechanical stress parts for high-temperature applications)
- Hard metals in special sintered calcium carbide with low cobalt content have the best mechanical properties and higher quality
- General composite materials are mainly used in the automotive industry to produce SSN batch parts.

BRIEF INTRODUCTION

Gas pressure sintering refers to the sintering process first carried out under low pressure, followed by sintering the material to reach a fatigue state under normal pressure, and then sintering under high pressure (the result is further increasing the fatigue state of the material and quickly eliminating stress in the material).
After the high-temperature and high-pressure sintering process, the material's mechanical properties (hardness, strength, toughness, etc.) are superior to ordinary sintering processes in all aspects.

G2GR20/P/1 Isometric View

Haoyue Technology develop a new product in 2024:
G2GR20/P/1 multi-functional integrated furnace.
This equipment is a multi-functional furnace that integrates three sintering processes: Hot press sintering, gas pressure sintering, and vacuum sintering. It can achieve three environments: 1MPa gas pressure, 30T hydraulic pressure, and vacuum. It is a new product produced by Haoyue Technology in 2024, which has the advantages of small size, multiple functions, high pressure accuracy, fast heating speed, safety, and simple appearance.

SPECIFICATIONS & PARAMETERS

Numbering	Model	Heater	Structure	Loading	Chamber Size (mm)	Operating Temperature (°C)	Pressure	Ultimate Vacuum (Pa)	Heating Power (KW)
G2GR20/10	PVSgr-20/25-2000	GR	Vertical	Top Loading	Φ200×250	2000	10MPa Gas Pressure	10	50
G2GR20/1	PHSgr-20/20/30-2000	GR	Horizontal	Side Loading	200×200×300	2000	1MPa Gas Pressure	6.7×10^{-3}	50
G2GR20/P/1	PHSgr-20/20/30-2000	GR	Horizontal	Side Loading	200×200×300	2000	30T Hydraulic Pressure 10MPa Gas Pressure	6.7×10^{-3}	50

Vacuum Hydrogen Furnace H Series

H2 Isometric View

BRIEF INTRODUCTION

Vacuum hydrogen furnace is a vacuum resistance furnace that uses molybdenum strips as heating elements. It is mainly used for high-temperature sintering of ceramics, hard alloys, composite materials, etc. in vacuum or protective atmosphere. It can also be used for high-temperature heat treatment of metal materials under high vacuum conditions or degassing treatment of precious metal materials. The structural design of this equipment is advanced and reasonable, and the design and manufacturing comply with corresponding national and industry standards and specifications, which can meet the user's usage requirements. Its supporting products and components have international advanced level and can adapt to long-term, stable, safe, and reliable production needs. The energy-saving effect of the equipment is good. Convenient and simple to use, operate, and maintain, with a beautiful appearance, safe and reliable, and excellent after-sales service.

APPLICATIONS

Equipment for annealing and purifying metal parts used for ceramic sintering or metalization, brazing, and sealing of glass parts. Mainly used for heat treatment of tool steel, mold steel, high-speed steel, ultra-high strength steel, magnetic materials, stainless steel, non-ferrous metals and other materials in a hydrogen atmosphere.

H2 Front View

ADVANTAGES

- The furnace body adopts a vertical structure, and the columnar structure of the furnace liner ensures uniform airflow distribution and uniform service life. The outer shell material is made of double-layer SUS304 stainless steel material;
- The heating element adopts molybdenum strip with excellent mechanical properties at high temperatures, and its surface load is determined within a reasonable range. The furnace body adopts a vertical structure, which has fast heat transfer, easy maintenance and replacement, and is fast;
- **Fast heating:** heating rate of 10°C/minute (≤1400°C);
- **Good design optimization:** The thermal field of the heating chamber has been simulated and calculated in thermal state, with very high temperature uniformity. The configured heating elements and insulation layer are designed with modular optimization;
- This equipment has the characteristics of low investment, low operating cost, simple installation, convenient use and maintenance, high safety performance, and good adjustment performance;
- **High safety:** equipped with fault alarms such as over temperature and pressure, mechanical automatic pressure protection, action interlocking and other functions, ensuring high equipment safety.

SPECIFICATIONS & PARAMETERS

Numbering	Model	Chamber Size (mm)	Heater	Operating Temperature (°C)	Ultimate Vacuum (Pa)	Heating Power (KW)
H2MO13	VHHmo-20/20/30-1300	200×200×300	MO	1300	6.7×10^{-3}	40
H2MO17	VHHmo-20/20/30-1700	200×200×300	MO	1700	6.7×10^{-2}	12
H2W20	VHHw-20/20/30-2000	200×200×300	W	2000	6.7×10^{-3}	45
H2W23	VHHw-20/20/30-2300	200×200×300	W	2300	6.7×10^{-3}	50

CVD / CVI Coating Systems

C Series

C2 Isometric View

BRIEF INTRODUCTION

Thermal induced chemical vapor deposition (CVD) is a powerful method for depositing protective coatings on various dielectrics, semiconductors, and metal materials, whether in single crystal, polycrystalline, amorphous, or epitaxial states, in large or small forms. Typical coating materials include pyrolytic carbon, silicon carbide, and boron nitride. By using synthetic precursors, the coating is very pure and meets the typical requirements of the semiconductor industry. Depending on process parameters, there can be multiple layers, ranging from single or several atomic layers to solid protective or functional layers with thicknesses ranging from 10 nanometers to hundreds of micrometers, as well as single chip components with thicknesses up to 100 micrometers, and even up to several millimeters.
Thermal induced chemical vapor infiltration (CVI) is a technique related to CVD, which involves infiltrating porous or fiber preforms into a matrix material to prepare components made of composite materials with improved mechanical properties, corrosion resistance, heat resistance to impact, and low residual stress.

APPLICATIONS

Chemical vapor deposition furnaces (silicon carbide) can be used for surface oxidation resistant coatings and matrix modification of materials using silane as the gas source. Vertical chemical vapor deposition furnace (sedimentary carbon) can be used for materials using hydrocarbon gases (such as C3H8, CH4, etc.) as carbon sources. Surface or substrate isothermal CVD/CVI treatment. Horizontal chemical vapor deposition furnaces (SiC, BN) can be used for surface coating of materials, matrix modification, composite material preparation, etc..Substrates for epitaxial wafers, high-temperature refractory materials for crystal furnaces, hot bending molds, semiconductor crucibles, ceramic based composite materials, etc.

C2 Front View

ADVANTAGES

- Adopting a vertical, bottom/top door opening structure: high loading and unloading accuracy, easy operation;
- Adopting advanced control technology, it can precisely control the flow and pressure of MTS, stabilize the sedimentation airflow in the furnace, and have a small range of pressure fluctuations;
- Good temperature uniformity: the average temperature uniformity is ±5°C;
- Adopting a multi-channel sedimentation gas path, the flow field is uniform, there are no dead corners of sedimentation, and the sedimentation effect is good;
- Fully enclosed sedimentation chamber, with good sealing effect and strong anti pollution ability;
- Good safety performance: Adopting HMI+PLC+PID pressure sensing control, safe and reliable;
- Effectively treat highly corrosive exhaust gas, flammable and explosive gases, solid dust, and low melting point viscous products generated by sedimentation;
- Multi stage efficient exhaust gas treatment system, environmentally friendly, capable of efficiently collecting tar and by-products, easy to clean;
- Adopting a corrosion-resistant vacuum unit with a long continuous working time and extremely low maintenance rate;

SPECIFICATIONS & PARAMETERS

Numbering	Model	Chamber Size (mm)	Heater	Operating Temperature (°C)	Ultimate Vacuum (Pa)	Applications
C2GR16	VHCgr-20/20/30-1600	200×200×300	GR	1600	6.7×10^{-3}	CVD/CVI

Vacuum Diffusion Welding Furnace D Series

D2 Isometric View

BRIEF INTRODUCTION

Difusionwelding refersto a solid-statewelding method inwhich a workpiece is pressurized at a hightemperature, but does not produce visible deformation and relative movement. Difusionwelding is especially suitableforthejoining ofdissimilar metal materials, heat-resistant alloys and new materials such as ceramics, intermetallic compounds, composite materials, etc., especially for materials that are diicult toweld by fusion welding methods, difusion welding has obvious advantages and has attracted more and more attention.

ADVANTAGES

- Diffusion welding can weld almost all metals or non-metals without reducing the performance of the welded material, as the substrate does not overheat or melt. It is particularly suitable for fusion welding and other materials that are difficult to weld, such as active metals, heat-resistant alloys, ceramics, and composite materials. For the same type of material with poor plasticity or high melting point, as well as dissimilar materials that are immiscible or produce brittle intermetallic compounds during fusion welding, diffusion welding is a more suitable welding method.
- The diffusion welded joint has good quality, and its microstructure and properties are similar or identical to the base metal. There are no fusion welding defects, overheating structure, and heat affected zone in the weld seam. Welding parameters are easy to precisely control, and joint quality and performance are stable during mass production.
- Welding parts have high accuracy and small deformation. Due to the low pressure applied during welding, the workpiece is mostly heated as a whole and cooled with the furnace, resulting in minimal overall plastic deformation of the welded part. The welded workpiece is generally not subjected to mechanical processing.
- It is possible to weld large section workpieces with relatively low welding pressure, so the tonnage of equipment required for large section welding is not high, making it easy to achieve.
- It can weld workpieces with complex structures, difficult to access joints, and significant thickness differences, and can simultaneously weld many joints in the assembled parts.
- Fast cooling speed: optional with a fast cooling system under a gas pressure of 2 bar to 10 bar, ensuring fast cooling and efficient operation of the workpiece after hot pressing;

D2 Front View

APPLICATIONS

Diffusion welding is especially suitable for small parts that require vacuum sealing, equal strength of joints and base metals, and no deformation. It is the only way to manufacture vacuum-sealed, heat-resistant, vibration-resistant, and deform-free joints, so it is widely used in industrial production. Diffusion welding methods are used for the welding of metals and non-metals in electric vacuum equipment,and the welding of cemented carbide, ceramics, high-speed steel and carbonsteel in cutting tools.

Varioustitanium alloy components on supersonic aircraftare manufactured using the super plastic for ming-diffusion welding method.

The joint performance of diffusion welding can be the same as that of the base metal, and it is especially suitable for welding dissimilar metal materials, non-metallicmaterials such as graphite and ceramics,dispersion streng the ned superalloys, metal matrix composites and porous sintered materials.

Diffusion welding has been widely used in the manufacture of reactorfuel elements, hydraulic pumpwear parts, drilling rig oil shoe parts, corrosion resistant parts, honeycomb structural plates, electrostatics, impellers, stamping dies, filtertubes, and electronic components.

SPECIFICATIONS & PARAMETERS

Numbering	Model	Heater	Chamber Size (mm)	Ultimate Vacuum (Pa)	Pressure (ton)	Operating Temperature (°C)	Applications
D2MO14	VHDmo-20/20/30-1400	MO	160×160×180	6.7×10^{-4}	5	1400	Diffusion Welding/ Brazing/Degassing
D2GR20	VHDgr-20/20/30-2000	GR	160×160×180	6.7×10^{-4}	5	2000	Diffusion Welding/ Brazing/Degassing

Continuous Rotary Furnace R Series

R2 Isometric View

R2 Front View

BRIEF INTRODUCTION

This continuous rotary furnace of HaoyueTechnology uses high-quality resistance wire as the heating element, adopts double-layershell structure, 30-stage programmed temperature control system, phase shift trigger,thyristor control, the furnace is made of imported high-purity alumina polycrystallineber material, and the double-layer furnace shell is equipped with an air-cooling system, which can quickly raise and fall the temperature, and adopts high-purity 310s stainless steel tube, which has the advantages of balanced temperatureeld, low surface temperature, fast temperature rise and fall rate, and energy saving.

The rotary kiln adopts international advanced technology, mainly for the mix edring of powder,the furnace tube can rotate 360° when the instrument is running, and the furnace body can betilted,the inclination angle can reach 0.5-6°, which can increasethe uniformity ofpowder sintering, so it is especially suitable for the sintering of lithium battery materials and the reaction sintering of other compounds.The diameter of this rotary furnace is optional, and the heating zone can be customized.

APPLICATIONS

The sintering process has been widely used in many industrial industries such as steel industry, metallurgical industry, ceramic industry, etc., such as cemented carbide, ceramics, refractories, powder metallurgy, ultra-high temperature materialring, etc..

ADVANTAGES

- Compact structure, simple operation and easy maintenance;
- High precision atmosphere control, automatic temperature control;
- Adopting dynamic sintering method to significantly improve thermal efficiency;
- Specially made metal liner, corrosion-resistant;
- PLC control and touch screen for human-machine interaction;
- Fully sealed structure, low amount of protective gas used;
- Continuous production and significant increase in production capacity;
- Adopting dynamic sintering method, there is no overburning or entrainment
- phenomenon.

  High automation program: If an automatic loading and unloading system is selected, all processes can be fully automated, digitized, intelligent, and without the need for manual intervention.

R2 Isometric View

Numbering	Model	Device Form	Heater	Chamber Size (mm)	Ultimate Vacuum (Pa)	Operating Temperature (°C)	Applications
R2	VRSa-27.3/50-1050	Intermittent	Resistance Wires	Φ273×500	10	1050	Calcination/Reduction
R2C	ACSa-27.3/240-1050	Continuous	Resistance Wires	Φ273×2400	10	1050	Calcination/Reduction