XURAN NEW MATERIALS LIMITED

Graphite Products Catalog

2023

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Welcome to

Xuran New Materials Limited is a production-based trading company specializing in the production and sales of graphite materials and products. Located in Hebei Province, China, this company was established in 2010 and has been focused on the production and development of high quality graphite products to meet the needs of chemical, mechanical, semiconductor, new energy, metallurgy and other fields for inorganic nonmetallic materials.

Currently, our main products include special graphite, mechanical carbon graphite parts, carbon-carbon composites, graphite felts, graphite crucibles, graphite dies & molds, vacuum furnace graphite parts for heat treatment, photovoltaic thermal field graphite parts, etc. We are committed to providing our customers with effective, comprehensive solutions as well as technical consulting and product customization services.

Professional service team, strict product factory inspection and timely tracking throughout the transportation process guarantee we can provide our customers with high quality, accurate, convenient and fast services. We aim to be the most trustworthy graphite solution provider for our customers and provide strong support for the development of our customers!

XURAN

Chapter 4

Graphite Products

We are specialized in the production and sales of high quality graphite crucibles, graphite dies & molds, graphite heat exchangers, graphite for electrical discharge machining, mechanical carbon graphite and other graphite products. Our products have excellent high temperature resistance, corrosion resistance, thermal conductivity and mechanical properties and are widely used in various industrial fields. Our team have rich experience and profound expertise, and can provide our customers with all-around technical support and custom services to meet our customers' special needs.

Graphite Crucibles

The main raw materials for graphite crucibles include graphite, silicon carbide, silica, refractory clay, pitch, tar, etc. Graphite crucibles have good thermal conductivity, high temperature resistance, small coefficient of thermal expansion during using at high temperatures and certain strain resistance to rapid heat and cold. Meanwhile, they are highly resistant to acid/alkaline solutions and exhibit excellent chemical stability.

Therefore, graphite crucibles are widely used in industrial sectors such as metallurgy, casting, mechanical, and chemical engineering. They are commonly used in the smelting of alloy tool steel, non-ferrous metals and alloys.

Pre-Carbonized Graphite Crucible

The pre-carbonized graphite crucible for negative electrode materials is a graphite crucible specially made from artificial graphite material for the pre-treatment of negative electrode materials. The pre-treatment process includes pre-roasting and pre-carbonization, which are very important steps in the preparation of negative electrode materials. Pre-carbonization treatment allows the gases and impurities in the negative electrode material to evaporate and form a uniform carbonized layer, thus improving the electrical conductivity and stability of the negative electrode material.

It should be noted that this crucible can only be used for carbonization treatment and cannot be used for graphitization treatment, as graphitization requires higher temperature.

Features

- Good thermal conductivity, uniform heat dissipation and high strength
- Excellent thermal shock resistance and corrosion resistance
- Can be used for the pretreatment of negative electrode materials

Specifications of Graphite Crucible for Carbonization Process

Grade	Density (g/cc)	Grain Size (mm)	Electrical Resistance (μΩ.m)	Compressive Strength (MPa)	Bending Strength (MPa)	Fixed Carbon	Ash Content	Sulfur Content
GP-1	1.63	4.0 - 6.0	25.0	32.0	12.0	98.5%	0.9%	0.3%

Notes :
1 MPa = 10.2 kgf/cm^2; 1 W/m.k = 0.86 ˚cal/cm.h.˚ C
These properties are typical values and not guaranteed.

Graphitized Graphite Sagger

Graphitized graphite crucibles, also known as lithium iron phosphate graphite crucibles, are mainly made of high-purity graphite material through machining. They are often applied to the sintering of lithium iron phosphate battery anode materials and high temperature carbonization graphitization of cathode materials. They are used as vessels for loading cathode materials in high temperature sintering process. The graphite crucible with side wall opening avoids dust the phenomenon, improves the reducing high-temperature sintering atmosphere, and enhances the material properties. Graphite crucibles can also be used in non-ferrous metal smelting, such as copper, aluminum, zinc, silver and others, and as a place for gas reactions like N_2.

Features

- Good thermal conductivity and uniform heat dissipation
- Excellent electrical conductivity and low resistance
- Good resistance to thermal shock and corrosion
- Can be used for smelting non-ferrous metals
- Can be used as a site for gas reactions

Types

Specifications of Graphitized Graphite Crucibles

Item	Grain Size (μm)	Bulk Density (g/cm³)	Compressive Strength (MPa)	Flexural Strength (MPa)	Porosity	Specific Resistance (μΩ.m)	Ash Content	Shore Hardness
GS75	25	1.75	60	30	17%	15	0.08%	45
GS80	25	1.8	85	40	15%	15	0.06%	50
GS85	25	1.85	90	45	12%	15	0.05%	55
GS90	25	1.9	110	55	10%	15	0.05%	60

Notes :

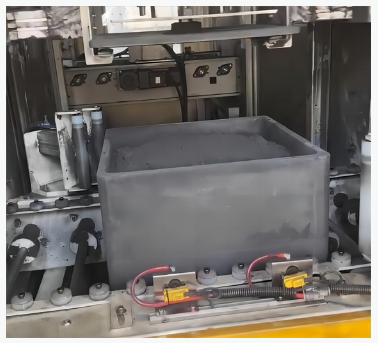
1 MPa = 10.2 kgf/cm^2; 1 W/m.k = 0.86 ^{k}cal/cm.h.℃
These properties are typical values and not guaranteed.

Graphitized Graphite Sagger for Preparation of Lithium Iron Phosphate Battery Materials

Graphitized Graphite Sagger in Sintering of Lithium Iron Phosphate Anode Material

In the process of making lithium iron phosphate anode material, it needs to be sintered at high temperature to improve battery performance and stability.

- It can safely sinter lithium iron phosphate in a high temperature environment, so that it is uniformly distributed, high density, and fine grain, thus improving battery performance.
- It has high strength and heat resistance characteristics, and can withstand the pressure of high temperature sintering process, to ensure the safe and stable production of lithium iron phosphate.
- It does not contain chemical substances harmful to the environment and the human body, in line with the needs of environmental protection and human health, applicable to the sintering of anode materials.



Graphitized Graphite Sagger in Cathode Material Carbonization Graphitization

In the manufacturing process of lithium-ion batteries, the cathode material needs to be carbonized and graphitized at high temperatures to improve the conductivity of the material and prevent contamination.

- It has excellent thermal conductivity, and can be in high temperature carbonization and graphitization process uniform distribution of heat, so that the material can be balanced carbonization at high temperature, and further graphitized and purified to improve battery performance.
- It has high strength and heat resistance performance, which can maintain stability in high temperature environments and safeguard the carbonization and graphitization process of cathode materials at high temperatures.

Graphite Crucible & Stopper

Graphite crucible & stopper are made of high purity graphite materials. Of which, graphite crucible is a vessel used for smelting precious metals, as well as casting and refining purposes. It is mainly used to smelt copper, brass, gold, silver, zinc, lead and other non-ferrous metals and their alloys. In the process of smelting gold in a crucible, the stopper can be used to control the opening and closing of the hole as well as the flow of molten liquids.

Crucible & stopper are important tools used in the process of gold smelting and casting. These tools can precisely control the smelting and casting processes to ensure that the gold is melted to the desired consistency and cast into the desired shapes

Features

- **High purity graphite:** 99.9% high purity graphite crucible, high density, fine and luster surface, and the crucible is not easy to be doped with impurities during the smelting process.
- **Great thermal conductivity:** It heats fast and can greatly shorten the melting time and save energy.
- **Stable quality:** It can be used normally even at high temperatures of 1800 ˚C, and can be used at high temperatures for a long time.
- **Stable performance:** It can maintain stability even in strong acid and alkali environments, and is not easy to be corroded and oxidized.
- **Wide range of applications:** It is widely used in the smelting of non-ferrous metals such as gold, silver, copper, aluminum, and lead.

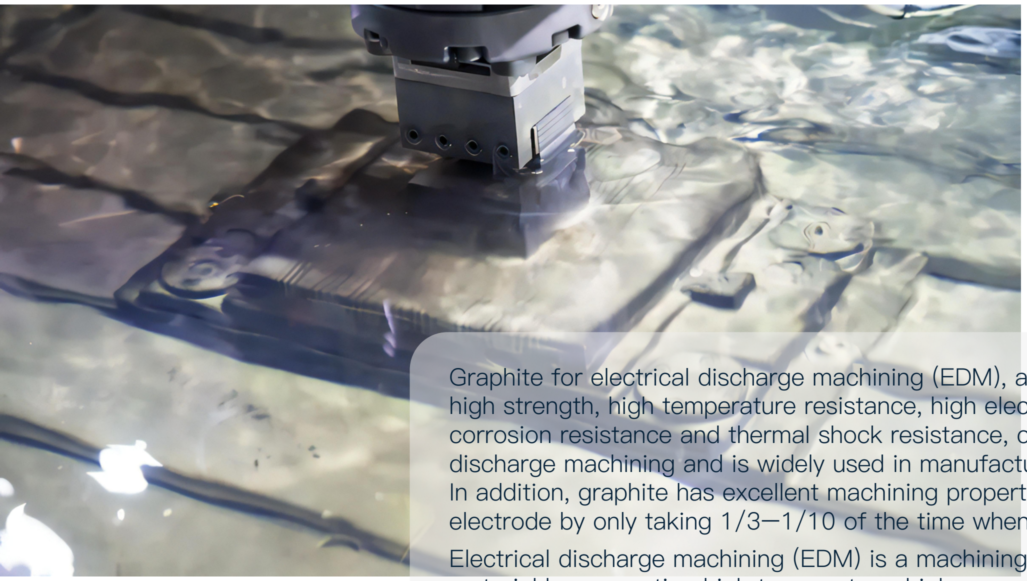
Specifications of Graphite Crucible & Stopper

Product Model	Name	Model	Size (mm)	Hole Diameter (mm)	Weight (g)
VPC-063	Crucible	V0016	ϕ74 × H106	7	–
VPC-063	Stopper	V003S	ϕ13.5 × H163	7	–
VPC-066	Crucible	V0030	ϕ74 × H136	7	455
VPC-066	Crucible (inclined)	V003X	ϕ74 × H136	7	–
VPC-066	Stopper	V003S	ϕ13.5 × H136	5	34
VC-400	Crucible	V0100	ϕ68 × H120	8	465
VC-400	Stopper	V010S	ϕ12 × H175	–	38
VC-600	Crucible	V0090	ϕ78 × H120	6	650
VC-600	Crucible	V0010	ϕ78 × H120	8	660
VC-600	Stopper	V001S	ϕ12 × H180	–	36
YK-2E/T17	Crucible	K0010	ϕ70 × H128	8	270
YK-2E/T17	Coated crucible	K0010-10	ϕ70 × H128	10	270
YK-2E/T17	Crucible	K001T	ϕ70 × H128	8	270
YK-2E/T17	Stopper	K001S	ϕ23.5 × H152	7	40
YL-003	Crucible	K0020	ϕ63 × H73	8	210
YL-003	Stopper	K002S	ϕ21.5 × H133	6.5	35
TC-030	Crucible	T0030	ϕ77 × H120	5.5	–
TC-030	Stopper	T003S	ϕ11 × H160	–	–

Notes :

ϕ represents diameter and H stands for height.
1 MPa = 10.2 kgf/cm^2; 1 W/m.k = 0.86 ^{k}cal/cm.h.˚C
These properties are typical values and not guaranteed.

Graphite for Electrical Discharge Machining (EDM)



Graphite for electrical discharge machining (EDM), as an excellent material with high strength, high temperature resistance, high electrical conductivity, highly corrosion resistance and thermal shock resistance, can perform stable electrical discharge machining and is widely used in manufacturing high precision parts. In addition, graphite has excellent machining properties and can be made into electrode by only taking 1/3—1/10 of the time when compared with metal.

Electrical discharge machining (EDM) is a machining method that removes material by generating high temperature, high pressure, and high-speed physical effects on the workpiece surface through electrical discharge, making it possible to manufacture complex components in a short time and improving manufacturing efficiency.

Graphite Electrode for EDM

In the metal processing industry, metal electrical processing methods are divided into two categories: electric thermal methods based on current heat effects and electrochemical methods based on current chemical effects. Electrical discharge machining is a kind of electrical thermal method.

Electrical discharge machining (EDM) is also known as electrical spark discharge machining. Its principle is to take advantage of the electrocorrosion phenomenon between the graphite electrode for EDM and the workpiece during pulse spark discharge, to remove excess metal and meet the machining requirements of corresponding parts on size, shape, and surface quality.

Graphite electrode for EDM can not only machine general materials workpieces, but also various metal materials with high melting point, high hardness, high toughness and workpieces with high precision requirements that are difficult to machine by using traditional cutting methods. Therefore, graphite electrodes for EDM are especially suitable for machining mold parts

Features

- **High electrical resistivity:** The electrical resistivity of graphite electrodes is tens to hundreds of times greater than that of metal materials like copper, and exhibits obvious anisotropy.
- **Good mechanical strength:** Compared with other materials, the mechanical strength of graphite electrodes (tensile strength, compressive strength and bending strength) increases as temperature rises.
- **High thermal conductivity:** The thermal conductivity of graphite electrodes is relatively high, being approximately half that of brass and similar to that of aluminum. It is approximately 91.96—137.94 W/(m·K).
- **Low coefficient of linear expansion:** The linear expansion coefficient of graphite is smaller than that of metal materials, and it has good resistance to thermal shock. The unidirectional coefficient of linear expansion is about 2.0 × 10^{-6} to 2.0 × 10^{-6} °C^{-1}.
- **High purity:** Generally, the purity of artificial graphite electrodes for electrical processing is above 99%.

Specifications of Graphite Electrode for EDM

Model	Density (g/cm^3)	Particle Size (μm)	Specific Resistance (μΩ.m)	Porosity	Shore Hardness	Compressive Strength (MPa)	Flexural Strength (MPa)	CTE (× 10^{-6} ℃$^{-1}$)	Application
ED-1 (Isostatic)	1.83	9	12	12%	65	116	51	5.8	EDM、Semi Finishing/Finishing
ED-2 (Isostatic)	1.81	7	12	12%	69	135	62	6.8	EDM、Semi Finishing/Finishing
ED-3 (Isostatic)	1.90	5	12	12%	69	135	62	6.8	EDM Finishing、Ultra Fine Grain for low electrode wear
ED-4 (Isostatic)	1.92	3	11	11%	72	160	69	6.9	EDM Finishing、Lowest Electrode Wear

Notes :

1 MPa = 10.2 kgf/cm^2; 1 W/m.k = 0.86 ˚cal/cm.h.˚C

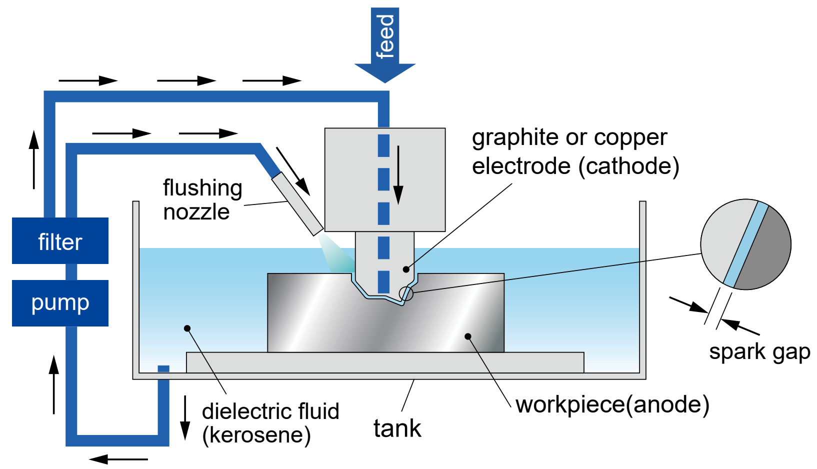
These properties are typical values and not guaranteed.

Something About EDM

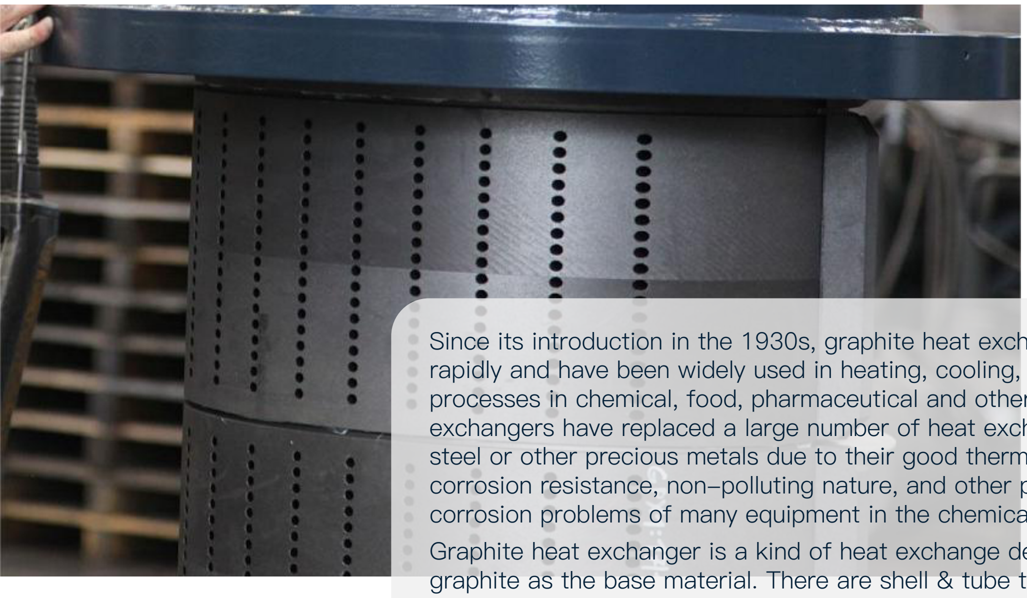
During electrical discharge machining, one pole of the pulse power source is connected to the tool electrode (graphite electrode for EDM), and the other pole is connected to the workpiece electrode. Both poles are immersed in a liquid dielectric medium with a certain degree of insulation (commonly using kerosene, mineral oil, or deionized water).

The graphite electrode of EDM is controlled by an automatic feed adjustment device to maintain a very small discharge gap (0.01—0.05 mm) between the tool and the workpiece during normal operations. When the pulse voltage is applied between the two poles, the liquid dielectric closest to the poles is broken down, forming a discharge channel. Due to the small cross-sectional area of the channel and the extremely short discharge time, the energy is highly concentrated (106—107 W/mm2). The instantaneous high temperature generated in the discharge zone is sufficient to melt or even vaporize the material, forming a small pit. When the first pulse discharge is finished, after a short interval, the second pulse is discharged in the other pole between recent click-through. This process continues to cycle at a high frequency, and the graphite electrode for EDM continuously feeds into the workpiece. Its shape is eventually replicated on the workpiece surface to create the required machining surface.

EDM is used for precision machining of conductive materials. This process is most commonly used in the production and manufacturing of tools, die-casting molds, injection molds, and forging molds.



Graphite Heat Exchanger



Since its introduction in the 1930s, graphite heat exchangers have developed rapidly and have been widely used in heating, cooling, evaporation and other processes in chemical, food, pharmaceutical and other industries. Graphite heat exchangers have replaced a large number of heat exchangers made of stainless steel or other precious metals due to their good thermal conductivity, excellent corrosion resistance, non-polluting nature, and other properties, thereby solving the corrosion problems of many equipment in the chemical industry and other sectors.

Graphite heat exchanger is a kind of heat exchange device made of impervious graphite as the base material. There are shell & tube type, block hole type, plate chamber type, spray type, insert type and jacket cooling type graphite heat exchangers. Among them, the most widely used are shell & tube type and block hole type graphite heat exchangers.

Graphite Block Heat Exchanger

Graphite block heat exchanger are divided round block hole type graphite heat exchangers and cubic block hole type graphite heat exchangers according to their structure. They are composed of several graphite heat exchange blocks with material channels, upper and lower graphite heads, their metal cover plates, a cylindrical steel shell (for round block hole type) or two end side covers (for cubic block hole type), and other main components. The parts are sealed with gaskets and secured with long bolts. They are commonly used in heating, cooling, evaporation and other processes in chemical, petroleum, metallurgy and other industries.

Features

- Compact structure with a small footprint: The graphite blocks mainly bear compressive stress and can make full use of the high compressive strength of graphite materials.
- Strong adaptability: It can be used in many chemical processes including heating, cooling, condensation, evaporation, reboiling, absorption, and desorption.
- Good interchangeability of parts: It adopts building block detachable combination structure and can be assembled into equipment with various heat exchange areas. The disassembly, installation, cleaning, maintenance, and transportation are convenient, which has great advantages for manufacturing and maintenance.
- No adhesive is required for connection.

Graphite Block Heat Exchanger Performance

Material	Material description	corrosion Resistance	Limitations	Temperature
HMC-1	Phenolic resin impregnated extruded graphite	Against most common acids	Alkalis Oxidizing chemicals	200 ℃
HIS-1	Phenolic resin impregnated isostatic graphite	Against most common acids	Alkalis Oxidizing chemicals	220 ℃
HIS-2	Carbon impregnatedisostatic graphite	Against most common acids + mildly oxidizing media	Strong alkalis Very oxidizing chemicals	430 ℃
Silicon Carbide	Sinteredsilicon Carbide	Universal	None	250 ℃

Notes :
1 MPa = 10.2 kgf/cm^2; 1 W/m.k = 0.86 ^{k}cal/cm.h.° C
These properties are typical values and not guaranteed.

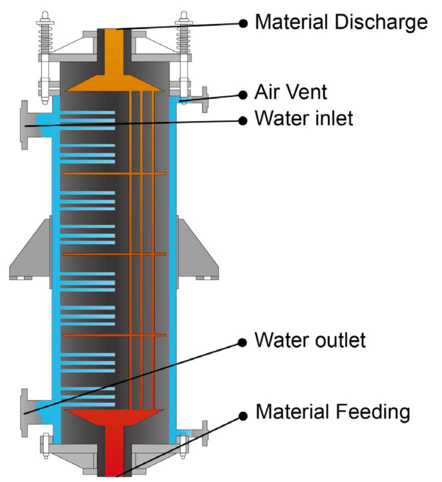
Structure Principle

Graphite block heat exchanger is an efficient heat transfer equipment that can be divided into round block hole type graphite heat exchanger (left in the picture) and cubic block hole type graphite heat exchanger (right in the picture).

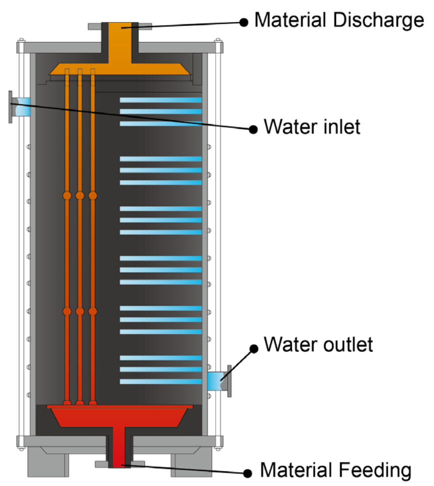
The round block hole type graphite heat exchanger has a series of equally spaced, parallel holes with the same diameter and length that are opened inside the graphite cylinder, and both ends of the holes are connected to the outer surface of the graphite cylinder. Fluid flows in these holes, transfers heat to the graphite block through contact, and then transfers heat to the other side through the conduction of the graphite block.

Cubic block hole type graphite heat exchanger has a series of rectangular cross-section holes that are opened inside the graphite cubic block, and both ends of the holes are connected to the outer surface of the graphite cubic block. Fluid enters from one side of the holes and contacts with neighboring graphite blocks through the holes, thus achieving heat transfer.

In general, their principle is to make use of the channels inside the graphite blocks to conduct heat transfer. Of which, round block hole type graphite heat exchanger features compact structure, small footprint, and high heat transfer coefficient. While cubic block hole type graphite heat exchanger features larger heat exchange area, low fluid resistance, and strong versatility. In practical applications, selecting different types of graphite block heat exchangers according to specific process conditions can effectively improve production efficiency and save energy.



Round block hole type graphite heat exchanger



Cubic block hole type graphite heat exchanger

Graphite Shell & Tube Heat Exchanger

Graphite shell & tube heat exchanger, also known as graphite tubular heat exchanger, is an inter-wall heat exchanger that uses the tube bundle enclosed in the shell wall as the heat transfer surface. It occupies an important position in graphite heat exchangers and can be divided into fixed-head type and floating-head type according to their structure.

Its advantages are easy to find leaks and easy to repair damaged tubes. The disadvantages are that the strength of graphite tubes is relatively low, and the steam pressure used cannot exceed 0.15 MPa. The flow rate of the heated medium is low and can only be controlled at 2—3 m/s. The temperature difference between the inlet and outlet can only be controlled at 2—4 ˚C. The heat exchanger features large volume, simple structure and reliable operation. It can be made of various structural materials, and can be used under high temperature and high pressure conditions. It is currently the most widely used type of heat exchanger.

Features

- High thermal conductivity and goog corrosion resistance
- Low coefficient of linear expansion, high temperature resistance and thermal shock resistance
- The surface is not easy to scale and no pollution
- Good physical, mechanical and machining properties
- Low density and lightweight

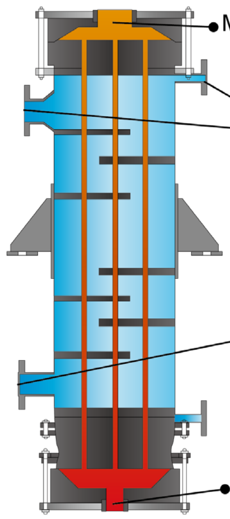
Graphite Shell & Tube Heat Exchanger Performance

Grade	Density (g/cm^3)	Thermal Conductivity (100˚C, W/mk)	Hydraulic Blasting Strength (MPa)	Compressive Strength (MPa)	Flexural Strength (MPa)	CTE ($\times10^{-6}$ ˚C^{-1})	Anti-penetrant Efficiency
GT-1 (Graphite Tubes)	1.8	32	7 (Size: ϕ32 mm / ϕ22 mm × 300 mm)	75	50	8.2	ϕ32mm/ϕ22mm × 100mm sample; 1MPa Water Pressure 10minutes, no leakage
GT-2 (Graphite Tubes)	1.85	108	7 (Size: ϕ32 mm / ϕ22 mm × 300 mm)	75	50	2.8	ϕ32mm/ϕ22mm × 100mm sample; 1MPa Water Pressure 10minutes, no leakage

Notes :
1 MPa = 10.2 kgf/cm^2; 1 W/m.k = 0.86 ^{k}cal/cm.h.˚C
These properties are typical values and not guaranteed.

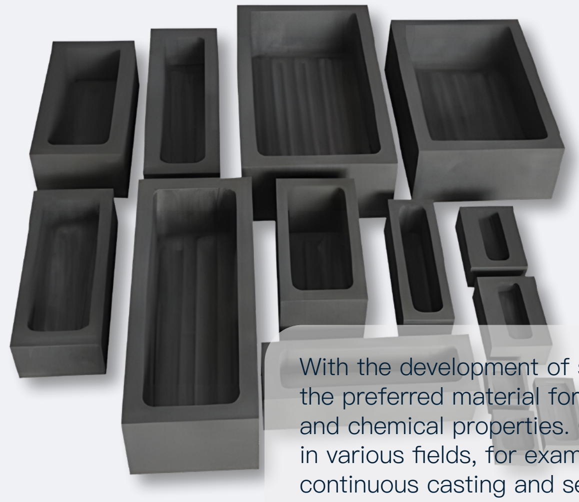
Structure Principle

Graphite shell & tube heat exchanger is an efficient heat transfer equipment composed of graphite tube bundles, graphite end caps, seals, support brackets, and other components. The graphite tube bundles are the main heat transfer component that consists of multiple graphite tubes. During use, the fluid passes through the interior of the graphite tube and undergoes heat transfer with the graphite tube surface, thus achieving the purpose of heat exchange. Graphite material has high thermal conductivity and good chemical stability, so this graphite heat exchanger has high efficiency and durability, and is widely used in the fields of chemical, pharmaceuticals, and food.



Tubular graphite heat exchanger

Graphite Dies & Molds



With the development of science and technology, graphite has become the preferred material for mold production due to its excellent physical and chemical properties. Graphite dies & molds are widely used in various fields, for example graphite dies for non-ferrous metal continuous casting and semi-continuous casting, graphite sintering molds and other molds, hot pressed molds, exothermic welding molds, diamond graphite sintering molds, etc. Besides, we can customize graphite dies & molds upon request to ensure that they can fully meet your needs.

Graphite Continuous Casting Dies

Graphite continuous casting die is the most common type of graphite mold used in the casting industry for producing continuous casting slabs. It takes the most widely used graphite as materials as graphite does not react with casting metals and will not affect the quality of the metal castings. Its low thermal expansion coefficient helps prevent the deformation of the mold shape.

In the continuous casting process, the mold must withstand high temperatures and high pressures. The high temperature oxidation resistance of graphite molds can effectively protect them from oxidation and corrosion. Besides, graphite itself has good lubricity, which can reduce the friction between the mold and the casting material, and effectively prevent adhesion between the mold and the casting material, making the casting process smoother and more efficient.

Specifications of Graphite Continuous Casting Dies

Model	Density (g/cm^3)	Particle Size (μm)	Specific Resistance (μΩ.m)	Porosity	Shore Hardness	Compressive Strength (MPa)	Flexural Strength (MPa)	CTE ($\times 10^{-6}$ ℃$^{-1}$)	Application
IS-3 (Isostatic)	1.85	10	12	13%	48	85	46	4.3	Sintering/all kinds of machining
IS-4 (Isostatic)	1.90	5	12	13%	48	85	46	4.3	Sintering/all kinds of machining

Notes :
1 MPa = 10.2 kgf/cm^2; 1 W/m.k = 0.86 ^{k}cal/cm.h.˚C
These properties are typical values and not guaranteed.

Features

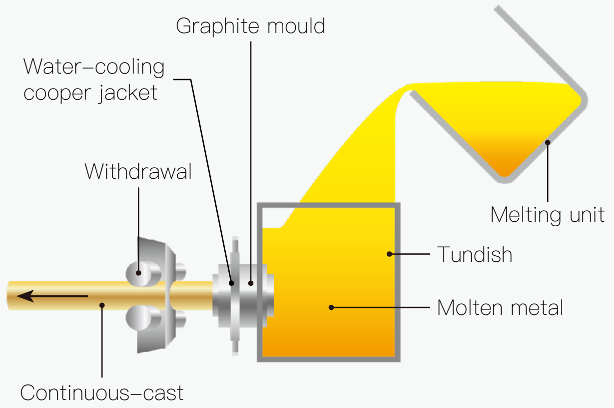
- **Low wettability:** To prevent adhesion and breakage of the castings removed from the mold, it requires that the material has poor adhesion to the solidified metal. This is achieved by low wettability of the liquid metal to the mold. Graphite is not wetted by most molten non-ferrous metals and alloys.
- **High thermal conductivity:** The heat released during the cooling and solidification of the casting metal is discharged from the mold. The magnitude of the heat transmitted through the mold per unit time determines the solidification and pulling (extrusion) speed of the casting. The higher the thermal conductivity of the mold material, the faster the heat dissipation rate.
- **Low coefficient of thermal expansion:** Casting molds are heated internally due to the entry of molten metal fluid and cooled externally by using a water-cooled copper jacket (or directly cooled with water), resulting in an extremely uneven temperature distribution throughout the mold. The low thermal expansion of the graphite material helps prevent deformation of the mold shape and ensures the geometry of the casting.
- **High thermal shock resistance:** Due to its high thermal conductivity, low coefficient of thermal expansion , low elastic modulus (1500 ksi / 10.3 GPa), and relatively high flexural strength (7500 psi / 52 MPa), graphite has excellent thermal shock resistance.
- **Self-lubrication:** Graphite is a solid lubricant. The low friction between the mold surface and the solidified metal ensures smooth extraction (removal) of the casting without cracking, and minimizes the thickness of defective peripheral surface. The specific layered crystal structure of graphite determines its self-lubricating performance, and can provide low friction without additional oil lubrication.
- **Good mechanical strength:** Compared with other materials, the mechanical strength (tensile strength, compressive strength, flexural strength) of graphite increases as temperature rises.
- **Good machinability:** Graphite is easy to machine. Complex shaped molds with precise tolerances can be obtained by milling, turning, sawing, grinding, and surface finishing. The precise machining of the inner surface of the mold (grinding or polishing) is important for reducing material wettability and friction. Good surface quality ensures minimal clearance between the mold and water-cooled jacket, enabling better heat transfer.

Process Introduction: Continuous Casting

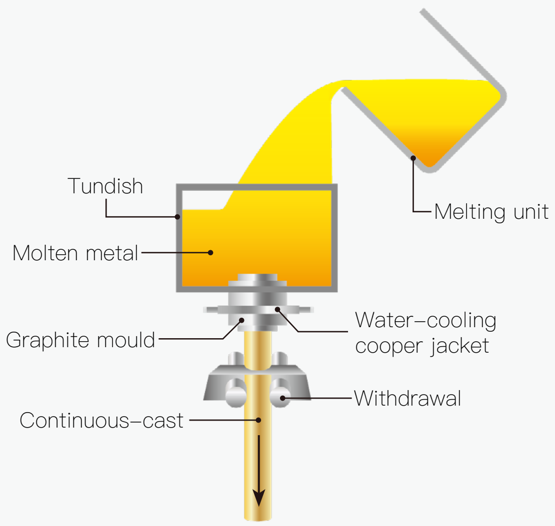
Continuous casting is a casting method used for mass production of metals with a constant cross section. It can eliminate the ingot casting and opening casting process, and produce slabs directly through extrusion or rolling. Its principle is to continuously pour molten metal into a crystallizer. The solidified (shell) casting is continuously pulled from the other end of the crystallizer, obtaining castings of any length or specific length.

Continuous casting process is divided into vertical continuous casting and horizontal continuous casting.

HORIZONTAL SCHEMATIC



VERTICAL SCHEMATIC



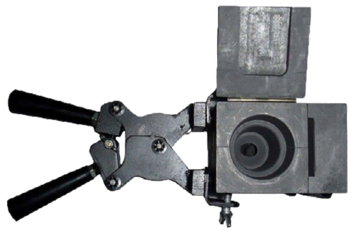
Exothermic Welding Molds

Graphite material is widely used in the production of exothermic welding molds due to its excellent thermal conductivity, high temperature resistance, high melting point, and low reactivity with molten metals.

During the exothermic welding process, a chemical reaction occurs between the welding powder and the metal to be welded, generating a large amount of heat. Graphite has an extremely high thermal conductivity and can transfer heat quickly, making the mold heat up quickly and melt the welding powder and the metal to be welded. The melted metal then fills the mold cavity and solidifies to form a strong joint. As the graphite material has a low coefficient of thermal expansion, it will not significantly expand or contract when exposed to high temperatures, which helps to maintain its shape and size during the welding process.

In addition, graphite material is easy to process and can be made into exothermic welding molds of various shapes and sizes through machining.

Features



- High thermal conductivity and high temperature resistance
- Low coefficient of thermal expansion and high heat resistance
- High strength, corrosion resistance and self-lubrication
- Very little or no reaction with most molten metals

Specifications of Exothermic Welding Molds

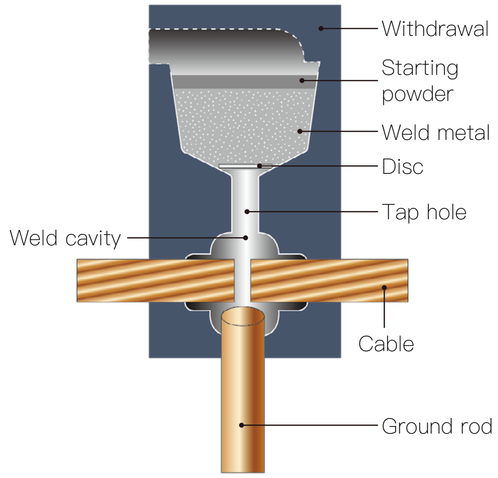
Model	Density (g/cm³)	Particle Size(mm)	Specific Resistance (μΩ.m)	Porosity	Shore Hardness	Compressive Strength (MPa)	Flexural Strength (MPa)	CTE (× 10^{-6} °C $^{-1}$)	Application
IS-2 (Isostatic)	1.76	20	15	20%	60	95	50	5.9	Heat exchanger/ all kinds of machining
IS-3 (Isostatic)	1.85	10	12	13%	48	85	46	4.3	Sintering/ all kinds of machining
IS-4 (Isostatic)	1.90	5	12	13%	48	85	46	4.3	Sintering/ all kinds of machining
MD-1 (Molded)	1.78	25	12	20%	48	80	40	5	Sintering/ all kinds of machining
MD-2 (Molded)	1.72	25	12	19%	45	60	32	5	Sintering/ all kinds of machining
MD-3 (Molded)	1.56	25	12	23%	35	38	16	5	Sintering/ all kinds of machining

Notes :
1 MPa = 10.2 kgf/cm²; 1 W/m.k = 0.86 kcal/cm.h.° C
These properties are typical values and not guaranteed.

Process Introduction: Mold Structure & Welding Forms

The exothermic welding mold is mainly composed of a crucible for holding welding metal powder, an iron outlet for the flow of molten metal, and a welding cavity for placing the metal plates to be welded.

Exothermic welding graphite molds can be used for welding various metal materials including pure copper, brass, bronze, copper-clad steel, pure iron, stainless steel, forged iron, galvanized steel, cast iron, copper alloys, and alloy steel.



8 Exothermic Welding Forms

These welding forms include cable to cable welding, cable to metal bar (strip) welding, cable to ground rod (pole) welding, cable to metal plate welding, metal bar (strip) to metal bar (strip) welding, metal bar (strip) to ground rod (pole) welding, metal bar (strip) to metal plate welding, and metal rod to metal plate welding.

Every welding form contains different connection methods. For example, cable to cable welding includes butt connection, cross connection, parallel connection, t-joint connection, etc. Every form can perform well welding.

Graphite Sintering Molds

Graphite sintering molds are important tools for manufacturing diamond alloy materials and hard alloy materials. With the rapid development of geological exploration, coal exploration and mining, oil exploration and drilling, and highway cutting, especially the rapid development of granite and marble mining and cutting industry, the demand for diamond alloy materials and hard alloy materials has increased significantly. Therefore, the demand for diamond graphite sintering molds has also increased accordingly.

Graphite itself has good electrical and thermal conductivity, does not react with most molten metals, and does not deform at high temperatures (up to 2700 ˚C). As the temperature rises, its electrical and thermal conductivity and strength will be enhanced significantly. Besides, its coefficient of thermal expansion is lower than that of metal, making it an ideal material widely used in the powder sintering industry.

Features

- Good electrical & thermal conductivity
- Good oxidation resistance
- Low coefficient of thermal expansion
- High mechanical strength and high machining accuracy
- Compact structure and low porosity

Specifications of Graphite Sintering Molds

Model	Density (g/cm^3)	Particle Size(μm)	Specific Resistance (μΩ.m)	Porosity	Shore Hardness	Compressive Strength (MPa)	Flexural Strength (MPa)	CTE (× 10^{-6} ℃ $^{-1}$)	Application
IS-2 (Isostatic)	1.76	20	15	20%	60	95	50	5.9	Heat exchanger/ all kinds of machining
IS-3 (Isostatic)	1.85	10	12	13%	48	85	46	4.3	Sintering/ all kinds of machining
IS-4 (Isostatic)	1.90	5	12	13%	48	85	46	4.3	Sintering/ all kinds of machining
MD-1 (Molded)	1.78	25	12	20%	48	80	40	5	Sintering/ all kinds of machining

Notes :
1 MPa = 10.2 kgf/cm^2; 1 W/m.k = 0.86 ^{k}cal/cm.h.˚C
These properties are typical values and not guaranteed.

Category

Among graphite sintering molds, diamond wire graphite sintering molds, diamond core bit graphite sintering molds and diamond blade graphite sintering molds occupy the most part

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Hot Pressed Molds

Hot pressing is a process that simultaneously perform pressing and sintering on metal , plastic or other materials. Hot pressed molds are molds used in the hot pressing process. Made of graphite materials, hot pr essed molds have good high temperature stability and high hardness, and can pressurize the prepared material while heating the material as a heating unit.

Generally, the heating methods used are broadly divided into two types: resistance heating and induction heating. In addition, there are other processes such as vacuum hot pressing, vibration hot pressing,equalizing hot pressing, and isostatic pressing.

Hot pressed molds have high stability, good electrical conductivity and lubricity, high thermal conductivity and heat resistance, corrosion resistance, high mechanical strength and easy processing, good plasticity, and are widely used in non-ferrous metal smelting, electronics, semiconductors, and other industries. In addition, we can also provide you with hot pressed molds for the production of boron carbide materials.

Features

- **Hot pressed products have high density and good performance:** Pressing and heating are carried out in the same procedure, and a dense sintered body can be obtained after a short time of sintering. The products have low extremely low porosity, and its density almost reaches the theoretical value. So these products have higher hardness and better wear resistance, which greatly reduce the cost.
- **It required low pressing pressure and can produce large products:** When the pressing temperature reaches 1350—1450 ˚C, the required pressure per unit is reduced to 67—100 kgf/cm2 (1/10 of the cold pressure).
- **It can produce products with complex shapes:** During hot pressing process, the powder is in a thermoplastic state with low deformation resistance, and it is easy to plastic flow and densification, so it can produce products with complex shapes.

Specifications of Hot Pressed Molds

Model	Density (g/cm^3)	Particle Size(μm)	Specific Resistance (μΩ.m)	Porosity	Shore Hardness	Compressive Strength (MPa)	Flexural Strength (MPa)	CTE (× 10^{-6} ℃ $^{-1}$)	Application
IS-3 (Isostatic)	1.85	10	12	13%	48	85	46	4.3	Sintering/ all kinds of machining
IS-4 (Isostatic)	1.90	5	12	13%	48	85	46	4.3	Sintering/ all kinds of machining
MD-1 (Molded)	1.78	25	12	20%	48	80	40	5	Sintering/ all kinds of machining

Notes :
1 MPa = 10.2 kgf/cm^2; 1 W/m.k = 0.86 ^{k}cal/cm.h.˚C
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Graphite Solutions
for Tomorrow's Innovations

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