



## **Company Introduction**

Sinosteel Maanshan Institute of Mining Research Co., Ltd., established in 1963 and directly subordinate to the former Ministry of Metallurgical Industry, is a large comprehensive research and development institution in China's metallurgical mine field. It is one of the units that was approved early by the Academic Degree Awarding Committee of the State Council to have the autogenous right to award the master academic degree and also one of the units first approved by the State Economic and Foreign Trade Ministry to have the right to import and export products.



The institute was transformed into a scientific and technological enterprise in 1999 and is now under China Sinosteel Group.

Sinosteel Maanshan Institute of Mining Research Co., Ltd. is a National Torch Program High-tech Enterprise. It has outstandingly completed a series of major national scientific and technological tasks from "the Sixth Five-year" to "the Eleventh Five-Year", and published over 2,500 academic papers at home and abroad. It owns all kinds of equipment and facilities consisting of more than 1,700 (sets), and over 50 supporting pilot plants. Sinosteel Maanshan Institute of Mining Research Co., Ltd. co-operated with the Chinese Academy of Sciences to develop an industrialized technique to produce high-performance hollow glass microspheres, filling a gap at home.

Sinosteel Maanshan Institute of Mining Research Co., Ltd. is located in Maanshan --- the National Civilized City, the National Sanitary City and the National Garden City. It's described as "a branch of flower along the Yangtze River". The glass microspheres company covers an area of 20,000 m<sup>2</sup>, where several large-scale standard plants total up to 10,000 m<sup>2</sup>, and the integrated modern office buildings are 7,000 m<sup>2</sup>. It has obtained ISO9001: 2000 quality management system certification. With a fierce market competition, the company holds the business spirit of "quality, honesty, good service", and relies on the advanced technology and strong strength to provide customers with better products and services.

### **Magic Custom-built Hollow Glass Microspheres**

To meet customer's demand, a variety of hollow glass microspheres with different particle size, density and intensity can be customized. It can help customers to improve the performance and quality of their finished product, ensuring a smooth and trouble-free production process and lower production cost.

### **Unique performance**

High-performance hollow glass microsphere is a kind of ultra-lightweight inorganic non-metallic material with hollow structure, and it is a versatile and high-performance new lightweight material developed in recent years. It will be the new composite materials at twenty-first century. Its true



density is 0.15-0.60g/cm<sup>3</sup> with 2-120μm in diameter. It owns features with light weight, large bulky, low thermal conductivity, high compressive strength, smoothly mobility etc.

It can be used in paint and coatings, rubber, plastics, FRP, artificial stone, putty and other products as filler and weight-reducing agent. It can also be used as the excellent sensitizer and stabilizer for emulsion explosives; Because of its high compressive properties, it can be used to produce high-strength, low-density cement slurry and low-density drilling fluid in oil and gas extraction industry.

### **Why should we choose high-performance hollow glass microspheres?**

Improving flow properties.

Hollow glass microsphere is a tiny sphere with high ball-type rate. Its ball-bearing effect can improve its mobility and reduce the viscosity and internal stress of resin mixture. Therefore, during processing, less heat is produced in composite materials so as to prevent inadequate lubrication and partial thermal decomposition. It is more likely to extrude when molding, which can not only reduce defects in products, but also improve the production efficiency by 15% -20%.

More substitute ability for resin.

Hollow glass microspheres occupy less surface area, low oil-absorption rate, and evenly disperse in mixture. Its easy compression and integration permit high filler loadings. It significantly reduces the consumption of resins, increases the amount of filler, and effectively reduces VOC indicators, and costs as well.

Low shrinkage and warpage.

Hollow glass microspheres have the feature of isotropism and high-filling, hence the dimensional stability of the product will be very high and it will reduce the shrinkage and warpage. With an appropriate filling ratio, the toughness of the products, impact-resistance and surface hardness can be significantly improved.

More economical by volume.

The density of high-performance hollow glass microspheres is only a fraction of that of the resin. A small amount of hollow glass microspheres will be able to replace heavier materials. When considering the cost per unit volume, rather than cost per unit weight, high-performance hollow glass microspheres can significantly reduce costs.

Adjusting the density of products .

The density of hollow glass microspheres is usually 0.20 ~ 0.60g/cm<sup>3</sup>, and the density of mineral filler is generally around 2.7 ~ 4.4 g/cm<sup>3</sup> (The data adopted is the true particle density). In order to obtain the equal size, 14 kilograms or more of talc must be used to obtain the same effect of 1 kg of hollow glass microsphere. Hence the desired ideal density can be obtained by adding appropriate proportions of hollow glass microspheres.

## **Products and Application**

Type	Color	Particle's diameter	True density	Pressure resistance
		μ m	g/cm <sup>3</sup>	MPa



T15	<b>white</b>	<b>2-120</b>	<b>0-15</b>	<b>1-5-2</b>
T20	<b>white</b>	<b>2-110</b>	<b>0-20</b>	<b>3-4</b>
T25	<b>white</b>	<b>2-110</b>	<b>0-25</b>	<b>5-7</b>
T32	<b>white</b>	<b>2-90</b>	<b>0-32</b>	<b>12-15</b>
T40	<b>white</b>	<b>2-85</b>	<b>0-40</b>	<b>28-33</b>
T46	<b>white</b>	<b>2-80</b>	<b>0-46</b>	<b>38-42</b>
T60	<b>white</b>	<b>2-65</b>	<b>0-60</b>	<b>&gt;60</b>

### **Applications**

High-performance hollow glass microsphere is a kind of ultra-lightweight inorganic non-metallic material with hollow structure, and it is a versatile and high-performance new lightweight material developed in recent years. It will be the new composite materials at twenty-first century. Its true density is 0.15-0.60g/cm<sup>3</sup> with 2-120 $\mu$ m in diameter. It owns features with light weight, large bulky, low thermal conductivity, high compressive strength, smoothly mobility etc.

### **Production Capacity**

At present, the company has more than 10 advanced production lines of the hollow glass microspheres with the annual production capacity of 15 thousand tons.

To meet the demand of customers, the company can expand production capacity as soon as possible within 20 days.

6S principles Implemented in the production systems.

### **Quality Assurance Capacity**

The company certified ISO9001: 2000 quality assurance system, and continue to carry out effectively.

We have the appropriate quality testing equipment, advanced detection methods, and specialized product development laboratory.

The product quality control covers the detection of raw materials, process control and product testing, and ensuring product consistency.

### **Technical Support and Service**

Unlike the traditional industry sales model, we greatly make an emphasis on the before sale, sale and after-sale technical support. We continuously provide technical training and our technical



support will start from the customer's product design, to after sale and service, feed back system on product quality.

Our company establishes a good relationship with CAS and other institutes. We can provide an appropriate process and the right products ratio according to the actual needs of customers.

Our company built a long-term strategic cooperation and technical support with well-known companies at home and abroad. We are not only committed to support and assist customers to know new products, but also know how to use new process and new technologies.

## **To solve industrial problems**

### **Application of hollow glass microspheres in paint**

Hollow glass microspheres have the smallest surface area and low oil absorption rate, can significantly reduce the consumption of other components in paint.

The vitrified surface of glass microspheres can realize the chemical corrosion resistant, and reflexaction on light. Therefore, the paint can prevent from fouling, corrosion, UV, yellowing and scratching etc.

Thin gas inside the hollow glass microspheres with compact arrangement, makes low thermal conductivity, so that paint coating has a very good effect on heat insulation.

Hollow glass microspheres can effectively enhance the fluidity and smoothness of coating.

Hollow glass microspheres contain gas inside, so it has a good contractility resistance to hot and cold, thus enhancing the flexibility of coating, greatly reducing the cracking and peeling of the coating due to thermal expansion and contraction.

On premise of high filling level, the viscosity of paint will not be significantly increased, thus reducing the usage of solvents. It can reduce toxic gas emissions in the process of painting, and VOC indicator can be effectively reduced.

**Dosage recommendation:** The addition is normally about 10-20% of the total weight. Adding methods are proposed as follows: Last step. The hollow glass microspheres are proposed to add at the last step, and dispersed with low-speed, low shearing force mixing equipment. Due to its good liquidity, small friction, so it will easily dispersed into mixture to completely keep wet within a short time. Through slightly extending mixing time can achieve uniform dispersion. Hollow glass microspheres are inert and non-toxic. Due to its light weight, attention should be specially paid when adding. We recommend adding the microspheres by step, that is, the addition quantity is 1 / 2 of the remaining beads each time. It can well avoid the microspheres floating into the air and make it disperse even more completely.

### **Application of hollow glass microspheres in the plastic**

Hollow glass microspheres are used as filler of ultra-high molecular polyethylene. It is not only used as solid lubricant in process, but can modify the comprehensive mechanical properties of the ultra-high molecular polyethylene to improve its strength and abrasion resistance.

Nylon 6 with hollow glass microspheres has a higher tensile strength, impact strength, hardness



and other improved mechanical properties and can prevent the material aging caused by the light and heat. With the increase of glass microspheres content, the Martin's temperature of materials rises. It can be used in the production of bearings, cameras, furniture and its accessories;

Hollow glass microspheres are added into rigid PVC to manufacture profiled materials, pipes and plates. These materials have good stability in dimension, then their rigidity, heat resistance, productivity will be improved;

Filled into ABS, this can improve the size stability of material, reduce shrinkage, improve the compressive strength and flexural modulus, and improve the performance of the surface paint. So it can be widely used in production of TV cabinet, automotive plastic parts;

Filled into epoxy resin, it can reduce the material's viscosity and improve the mechanical properties. So it can be used in production of composite foam plastic, deep-sea submarine, lifeboat, etc.

Filled into unsaturated polyester. It decreases the shrinkage and water absorption of materials, increase its wear resistance. Meanwhile, less space is produced when laminated and coated. So it can be applied in production of FRP products etc.

#### **Application of hollow glass microspheres in Putty**

Compared with the traditional putty, the new type one adding with HGS owns the advantages as follows:

Easy preparation and production, the HGS can be well mixed by a simple low-speed mixer. Its product has a feature of light weight and large volume.

Compared with the ordinary putty, new putty with 5% of hollow glass microspheres, can replace 10 ~ 20% of talc, calcium carbonate, bentonite. Its volume can also be increased 15~25% than that of ordinary putty, and saving resin about 8%.

The oil absorption rate of HGS is much less than that of talc and other fillers. So it has a significantly lower viscosity.

Putty with HGS can be easily polished with advantages of time saving, labor-saving and dust reduction.

#### **Application of hollow glass microspheres in the artificial marble products**

The products filled with hollow glass microspheres have advantages of light weight, smooth and beautiful appearance, and lower cost. Increase heat resistance;

2. Lower weight by 20% -35%;
3. Easier processing (drilling, sawing, grinding);
4. Easy polishing, high surface finish quality, lower tool wear resistance;
5. Reduce the costs of packaging and transport;
6. faster module flipping to increase productivity
7. Anti-shrinkage, warpage resistance, improving cracking resistance ability, reducing breakage rate.
8. Reduce the consumption of catalyst

#### **Application of hollow glass microspheres in Epoxy Tooling board**

The Epoxy Tooling board filled with hollow glass microspheres can provide excellent quality assurance for parts of furniture, ornaments and sculptures. In the original formula, the product density can be adjusted by adding different percentage of hollow glass microspheres.



The oil absorption rate of hollow glass microspheres is much less than others like calcium carbonate, so the viscosity of materials was reduced.

Compared with traditional filler, hollow glass microspheres have a better mobility, which are suitable for the manufacture of large area, thin wood board. The wood materials with addition of hollow glass microspheres are more easily nailed. It can avoid the phenomenon of cracking existing in the traditional formula of artificial wood in general after nailing.

#### **Hollow glass microspheres mixture:**

The filling quantity of hollow glass microsphere generally is between 5% -20%. It can be easily mixed with resin, and is proposed to be added at the final stages of mixing with a slower mixing speed. If the high-pressure pump must be required, it should be determined that whether the strength of hollow glass microspheres can meet the requirement in advance.

Note: The mixture method of hollow glass microspheres is also important, we strongly recommend that the mixing speed of adding hollow glass microspheres should be less than 100 r / min.

#### **Application of hollow glass microspheres in the synthetic foam board**

The composite material with hollow glass microspheres and resin is commonly referred as synthetic foam board, its main characteristics is low density. With high mechanical properties, it is a wide set of multifunctional composite materials for vibration damping, insulation, fire prevention. Now it is mainly used in manufacturing of aircraft, spacecraft, and ship etc. The synthetic foam with addition of hollow glass microspheres has not only the porous structure, but also makes core materials own low moisture absorption and high compressive strength due to its closed cell structure.

#### **Application of hollow glass microspheres in explosive**

The density regulators commonly used in the Emulsion explosives are expanded perlite and chemical blowing agents. The first one has shortcomings of explosive effects limited by its size, strength and oil resistance, lower explosive performance, short-term storage; The second one has the disadvantage of the density of explosives difficult to control, short-term storage and aftereffects. With addition of hollow glass microspheres in the emulsion explosive, all its shortcomings and disadvantages can be overcome. The performance of the detonation is greatly improved and the storage stability is significantly increased. It mainly adopts the sensitization of hollow glass microspheres. Hollow glass microsphere have advantages of low density, low thermal conductivity, low oil absorption rate, particle size and chemical composition control, which makes it highly suitable as emulsion explosive sensitizer. It has significantly improved with less and detonation performance, enhance the storage stability characteristics.

#### **Application of hollow glass microspheres in the exploitation of oil and gas fields**

Hollow glass microspheres itself is inert without pollution. As a continuous medium, low density drilling fluid with addition of hollow glass microspheres was incompressible, and all wells are uniform in density. Sludge cakes formed have good lubrication, reducing the risk of sticking. It is technically infeasible for drilling large deviated wells and horizontal wells since the recycled micro-foam and air drilling technology can not deliver MWD signal. However, hollow glass microspheres have an irreplaceable advantage for it can not affect the system signal.

Hollow glass microspheres have a good rolling performance, and it can increase the drilling rate,



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and significantly improve the drilling effectively.

Drilling fluid with hollow glass microspheres has feature of high temperature resistance, high pressure resistance, stability, durability, and can be recycled.

With the increase of pressure, low-density slurry cementing with hollow glass microspheres were adopted to consolidate the wells to prevent or reduce leakage, increase the cement top. It plays a significant role in increasing the exploration reserves, improving single well production, and effectively developing underground oil and gas resources so as to solve complex problems.

## **Shipment and Storage**

Our products are easy to transport and store. The high-performance **hollow glass microspheres** produced by our company can be packaged with plastic boxes or texture bags and it can be transported in bulk by various ways. Packaging weight depends on the density level of the hollow glass microspheres and the actual needs from customers.

In order to extend the storage time, it should avoid humid environment, and be stored in a cool and dry place. After opened, the bag should be firmly resealed. If the package is damaged during the process of shipment and storage, the damaged bag should be replaced by a new one in time.

Since **hollow glass microspheres** are ultra-fine powder with medium alkaline, it will stimulate the respiratory tracts, if the hollow glass microspheres exposure in air long time, So you should wear a qualified mask or respirator.

In addition: We will provide a separate package to introducing our products in details, and sufficient test samples for you.

### **Environment and Safe**

Establishing protective work environment, concerning the physical and mental health of the employees, protecting the environment.

The product conforms to national environmental laws, and environment friendly.

Safe and environment friendly.



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