The technology and application of coated fiberglass fabric

Summary
Coated fabric, which is coated material on the surface of the fabric, and to change the performance of the fabric. The fabric can be nature fiber fabric, synthetic chemical fiber fabric and inorganic fiber fabric, etc. Coating materials can be organic and synthetic polymer materials, inorganic non-metallic materials and metal materials, etc.

As the different requirements of performance, is able to get different effects to improve the performance of the fabric from the coating materials.

The characteristics of fiberglass fabric
Fiberglass with temperature, flame retardant, corrosion resistance, high strength, electrical insulation and high tensile strength, relative elongation, and the advantages of chemical stability and high elastic modulus and other characteristics. But relatively speaking, its abrasion resistance and flex resistance is poor, temperature resistance after more than 400 ℃, the strength loss and the limitations of chemical stability is large, these are its fatal drawbacks.
Coated fiberglass fabric, which with its inherent characteristics, while using the coating materials to improve the performance of fiberglass fabric or give new performance to meet the needs of various application areas.

The pretreatment of coated fabric in 2 ways
Using the special sizing agent for fiberglass wire drawing, weaving, then coat materials directly.
Fiberglass fabric under dewaxing and surface treatment, then coat materials. There are advantages and disadvantages for the above 2 methods, it should be selected according to the actual situation.

The characteristics of the common coating material
Silicone rubber
Silicone rubber has developed rapidly in recent years, and it is widely used in many areas, working temperature is between -70 to 350 ℃, excellent resistance to weather and aging, the performance is stable after 10 to 20 years, and also has excellent insulation, hydrophobic, non-stick, and other excellent performance.
High-temperature vulcanized silicone rubber, which peroxide curing agent for the

vulcanization of high-temperature molding varieties, the output is the largest, and the price is the lowest, the preparation of coating compound has certain requirements.

Room temperature vulcanized silicone rubber, which is divided to single-component and two-component(or multi-component room temperature vulcanization). The single component is air-tightly and moisture-tightly, and then vulcanized at room temperature. Two-component and multi-component components are mixed evenly, and then vulcanized at room temperature. The price of room temperature vulcanized silicone rubber is lower, but the coating process control is more difficult, at room temperature, the colloidal viscosity changes, it can not be coated of improper handling or even ahead of curing.

The liquid silicone rubber, also named two-component silicone rubber, this kind of rubber with good liquidity, curing fast, you can pour molding injection molding. Liquid silicone can be cured at room temperature, also can be cured at high temperature. High-temperature curing can be completed in a few seconds. It's the ideal fiberglass fabric coating agent, with high strength, smooth appearance.

Silicone Resin

Silicone resin has a high degree of cross-linked structure of the polyorganosiloxane, and with the dual characteristics of organic resin and inorganic materials, it also has a unique physical and chemical properties.

It is mainly used in electrical insulation paint, with good property of heat resistant, cold resistant, weather resistant, and waterproof. It's also colorless, transparent with good adhesion, wear resistance and moisture-proof hydrophobic properties.

PTFE

PTFE has excellent chemical stability and corrosion resistance, and it's showing inert, strong acid and alkali resistance, water and various organic solvents for the majority of chemicals and solvents; electrical insulation and flame retardant performance, with good anti-aging ability; surface tension is small, and without attaching any material; long-term working temperature -180 to 250 ℃. PTFE coating is generally coated with PTFE emulsion impregnation and hot pressing compound with polytetrafluoroethylene film.

PVDF

PVDF is semi-crystalline polymers under normal conditions, that has excellent chemical resistance, temperature resistance, discoloration and oxidation resistance; excellent wear resistance, flexibility, swelling strength and impact

strength; Excellent resistance to ultraviolet radiation and high-energy radiation; good hydrophobicity. Generally, PVDF is coated with a solvent by dissolving it in an adjuvant.

Polyacrylate

Due to the flexibility of the polyacrylate polymer chain, the glass transition temperature (Tg) is low, it can form a good gloss and water-resistant film, bonded firmly, not easy to peel, flexible and flexible at room temperature, with good weather resistance , but the tensile strength is not high. Now, the research and application of modified polyacrylates are very active.

Polyacrylates are typically coated with solution or emulsion.

EVA

VAE emulsion is an abbreviation of vinyl acetate-ethylene copolymer emulsion. It is a kind of high molecular emulsion made by copolymerization of vinyl acetate and ethylene monomer as raw materials and other auxiliary materials through emulsion polymerization. Has good flexibility, alkali resistance, UV aging resistance, compatibility (easy to add a variety of additives), good adhesion and film-forming.

PVC

Polyvinyl chloride (PVC) paste resin is a branch of polyvinyl chloride resin. Because of its good paste performance, and good dispersion properties. It is suitable for coating, impregnating, spraying, foaming and other processing technology. It is widely used in artificial leather, decorative material, floor leather, wall paper, industrial conveyor belt, sports field, paint, adhesive, toy, medical disposable glove, daily decorative materials, electrical instruments and electrical tools, and many other materials and products areas. Modified polyvinyl chloride can be also applied to some areas with special requirements.

PU

Polyurethane coating, with long history and rapid development, its advantages are: the coating is soft and flexible; good coating strength, and can be used as very thin coating; coating porous, with moisture and ventilation performance; wear-resistant, wet resistant , anti-dry cleaning. The disadvantages are: high cost; poor weather resistance; it will hydrolyzewater to meet water, heat and alkali.

Neoprene

Neoprene is chloroprene rubber as the main raw material for the production of synthetic rubber, and it is widely used in weathering products, viscose soles,

coatings and rocket fuel.

The fiberglass coating can be coated with neoprene latex and neoprene solution.

PF

Phenolic resin has good acid resistance, mechanical properties, heat resistance and insulation properties. Mainly used in the production of pressure plastic powder, laminated plastics, insulation materials, corrosion-resistant coatings, household decorations (soundproof, insulation materials).

PI

Polyimide is the best overall performance of organic polymer materials, resist temperature of 400 ℃ or more, long-term working temperature is between -200 to 300 ℃, no significant melting point, but with high insulation properties. It is widely used in high temperature coating and insulation coating.

Vermiculite

Vermiculite is a natural, non-toxic minerals, flake vermiculite can be rapidly expanded 6-20 times after high-temperature roasting, after expansion, the proportion is 60-180kg / m3, with a strong thermal insulation properties, Vermiculite coated glass fiber can improve the temperature resistance of the coated fabric significantly. Utilizing the ability of ion exchange of vermiculite, a stable suspension is prepared for coating.

Other coating

Conductive graphite coated fiberglass fabric.

Metallic oxide material coated fiberglass fabric, which can improve the temperature resistance, Nanoscale metal oxide material coated fiberglass fabric, with photocatalytic performance.

Coated with metal coating technology, can be made of a variety of functional glass fiber fabric (made of antimicrobial silver fabric, etc.)

Coating process

Glass fiber fabric can be designed according to the needs of different organizational structure, plain, satin, twill, warp, weft, unidirectional fabric has good application in the coating process. Different coating processes, according to the performance requirements of the product.

Impregnating process

The coating material is made of low viscosity of the mortar, glass fiber fabric in the glue

tank with the full infiltration of glue, after heat curing, then rewinding.

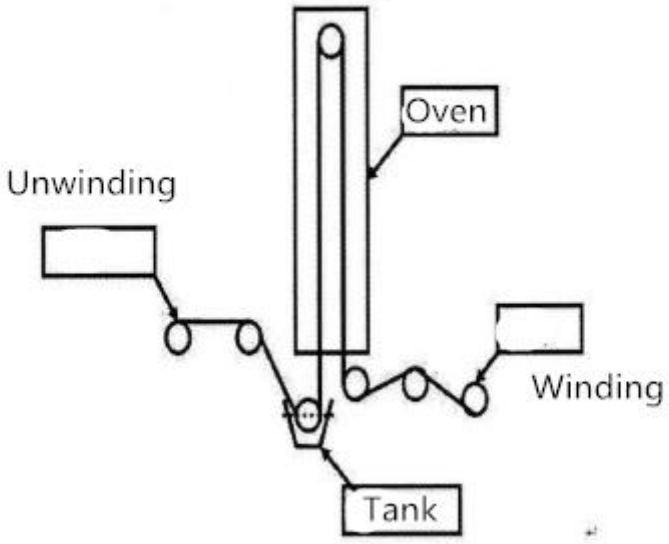


Diagram of impregnating process

Characteristics of impregnating process, glass fiber fabric and coating materials can be fully impregnated with colloidal glass fiber fabric with a close, good adhesion. The sealing and adhesion performance requirements of the product, the general use of this process.

Recommended to minimize the use of organic solvents in coating formulations.

Scraping coating process

The scarping coating process, which the coating colloid and the glass fiber fabric are coated together through the gap between the doctor blade and the coating roller. By adjusting the gap between the doctor blade and the coating roller, adjusting the shape and angle of the blade can adjust the coating amount and the apparent performance of the coated product, but also the coating material and glass fiber fabric adhesion. To overcome the glass fabric surface defects on the impact of coating products, it can also coat on the carrier at first, and then composite with the glass fiber, take it into the tank, after high-temperature vulcanization, separate the carrier, the coating material is produced successfully.

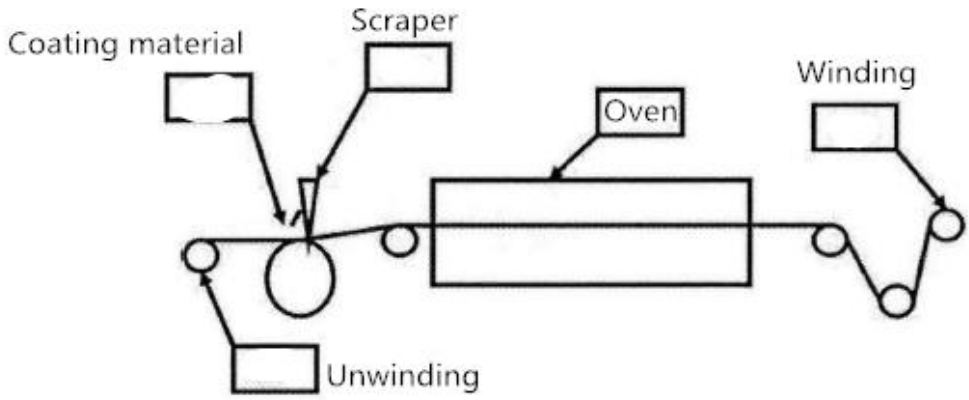


Diagram of Scraping coating process

The characteristics of scraping coating process, high production efficiency, uniform coating stability, it can be transferred through the coating method to give the product surface-specific performance (high light, matte, embossed, etc.). It's the most widely used process.

For scraping process, using less solvent, and even without solvent. For double sides coating, coating for many times.

Calendering process

The coating material is calendered to form a sheet with a three-roll or four-roll calender, composite with glass fiber fabric by pressing to form a single-side or double-side semi-finished coated fiberglass fabric products, vulcanizing by a drum vulcanizing machine, a plate vulcanizing machine or a vulcanizing tank.

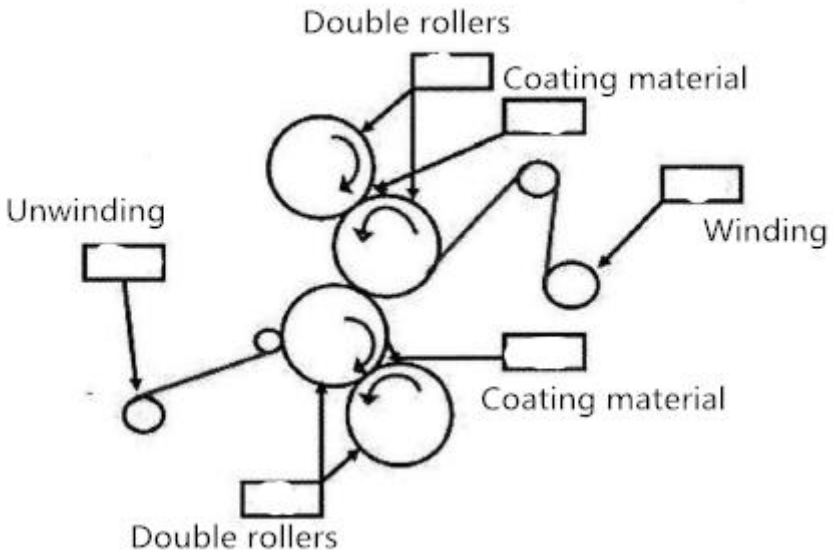


Diagram of Calendering process

The characteristics of calendering process, that apply to a large amount of coating products, the coating are hook. The pattern and finish of the product can be changed by changing the molds of the belt or flat vulcanizer of the drum vulcanizer.

The production process does not use solvents, it has no impact on the environment because of the low concentration. . Low cost of production materials. The apparent performance of the product is closer to the rubber, but the production efficiency is relatively low.

The composite process

Composite process is generally divided into non-adhesive composite process and adhesive compound process.

The non-adhesive compound process is a hot-press vulcanizing process for a semi-vulcanized coating material film and glass fiber fabric by hot pressing.

They adhesive composite process is to take the adhesive, the curing or semi-cured coating material film, the coated product is completed under the pressure bonding of roll.

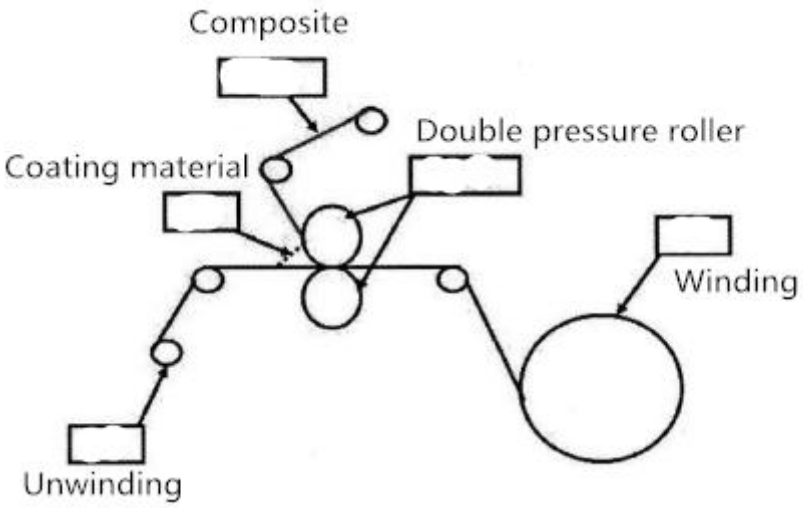


Diagram of composite process

The characteristics of composite process, the coating weight is up to the film, product quality is stable, and production efficiency. By changing the surface of the roller to achieve the apparent quality of the product requirements.

Other processes

Single yarn coating process: First, coat the fiberglass yarn, and then weaving to form a fabric. The key of the technology is the coated yarn must be able to meet the weaving process requirements.

Spraying process, the coating material was made into gel, take the spray gun to spray the coating material on the surface of the fiberglass fabric, the product was made after vulcanization. It can be made into colorful and three-dimensional coating products.

Extrusion coating process, the coating material was uniformly extruded onto the surface of the glass fiber fabric with a screw extruder, the product was made after rolling, vulcanization. The efficiency is high, and it's also a new trend.

According to product performance requirements, the above basic processes can be combined and improved to form a specific function of the production line.

The application of coated fiberglass fabric

The application of architectural decoration

Fiberglass coated products in the field of architectural decoration, mainly used in homes, public places (hotels, hospitals, schools, offices and various commercial area) and so on. Application: wall covers, shading and light film products.

Wall covers

Glass fiber woven glass fiber fabric, after coating, has been widely used in home

and public places wall covering, characteristics as below:

* Flame retardant, meet the requirements of building fire protection.
* Waterproof, can be washed directly with water.
* Easy to dye, and can repeat the color.
* Functional coatings can be introduced to achieve specific functions (sterilization, air purification, etc.)
* Strong sense of depth

Application of shade and light film products

Fiberglass fabric coated with high coverage, flame retardant coating material, can be applied to blinds, curtain cloth and outdoor shade cloth. it has:

* Flame-retardant fully meet the fireproof requirements of building.
* Dimensional stability, there is no change in size over time.
* Good weather resistance, the working life increase more than general chemical fiber products.
* Good dyeing, can be made into various colors of products.
* Strong sense of layering, changing the fabric structure and coating material properties to form different visual effects.

Light film products refers to the use of coated fabric on the effect of diffuse reflection of light, and applied to the field of decoration .Using a light-transmitting coating material coated glass fiber fabric to make light film products.

Fiberglass coated fabric has been successfully applied to projection screen cloths.

Application of fiberglass membrane structure material

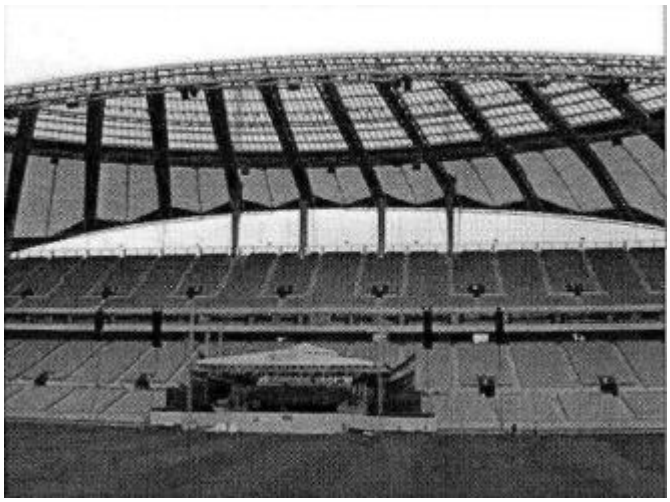
The ultra-fine fiberglass (yarn diameter 3.5μm) fabric coated with modified silicone rubber or PTFE membrane structure as a membrane material, have been widely used in large stadiums, exhibition centers, conference centers, a variety of temporary construction, large-span plant, warehouse and other buildings.

The characteristics of fiberglass membrane structure materials:

* Light weight, low cost
* Reduce energy consumption
* Beautiful shape, and time feeling
* Quick construction speed
* Safe and reliable
* Self-cleaning and anti-aging performance
* Large span structure

* Good earthquake resistance

* It’ s quite suitable for open roof structure, lightweight membrane structure roof, and it is easier than the traditional structure of the opening and closing, easier to make humans close to nature.



Glass Fiber Membrane Structure Material in Stadium

The filter material

Glass fiber filter material is in the different structure of the glass fiber fabric surface coating or composite coating of different materials to meet the filter material performance requirements.

Application of fireproof products

Coated glass fiber fabric in the application of fire products is the most extensive and most mature. By adjusting the coating material and the dosage of glue, can be made in fire products in different areas.

Application of fire blankets

Fire blanket,it can be covered fire with a fire blanket. When the fire expanded, the staff can be covered with a fire blanket to escape.

Advantages:

* Easy to use and flexible.

* Fire, flame retardant performance.

* Environmentally friendly.

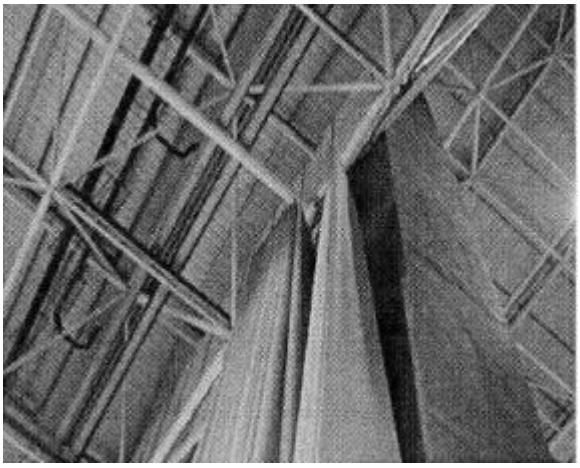
Application of fireproof and smoke curtains

Fire and smoke curtain, When a fire occurs in the building, fire and smoke control can be linked with the fire control system, Isolate the area where the fire occurs,

prevent the spread of fire and smoke. It is widely used in large exhibition halls, conference centers.

Advantage:

* Flexible installation
* Flame retardant, smoke-free
* Separate for large area
* Convenience for rescuing



Fire and smoke curtain in exhibition hall

Application of welding blankets

At present, a large number of fire is from improper welding operations, most of extraordinarily serious fire accidents are from welding. The application of welding blanket is the most effective way to prevent this kind of fire. Before welding operation , taking welding blankets to cover the surrounding environment protection to the purpose of fireproof.

Advantages:

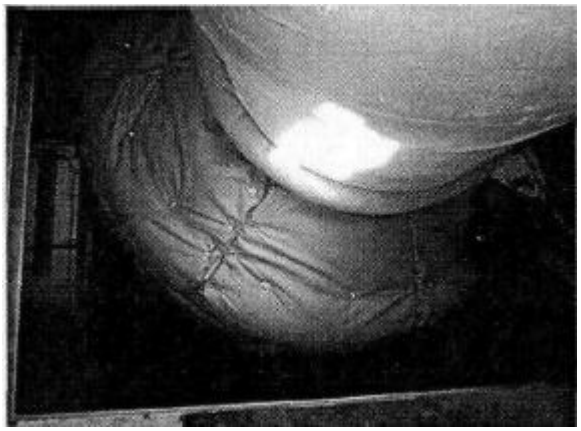
* Convenient and safe.
* Excellent performance of fireproof and anti-smoking.
* Protect against light pollution

Industrial insulation and protection

Coated glass fiber fabric can be applied to a variety of harsh environments and conditions of insulation and protection. It is widely used in the cold areas of the oil pipeline insulation, equipment protection, protection of special media storage devices.

Advantages:

* Weathering, anti-aging
* Anti-corrosion
* Insulation



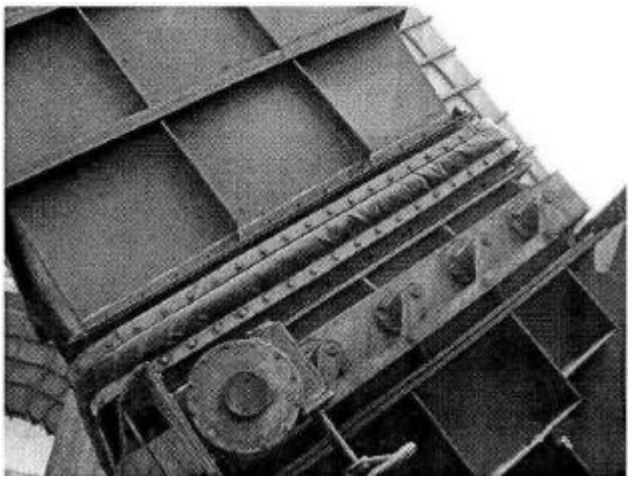
Insulation and protection of equipment

The application of fabric expansion joints

Industrial piping can create internal stresses due to temperature changes, generally use the pipeline expansion joints to compensate. To compare with metal expansion joints or U-type fabric expansion joint, that with large amount of compensation, simple and convenient installation, the low precision of pipeline construction , or U-type compensation compared . It’s widely used in power plants, steel mills, cement plants, electrolytic aluminum plants and other high-temperature boiler inlet and outlet ducts and in the desulfurization, denitrification and other environmental devices . By adding fabric expansion joints to the line, the noise and vibration of the entire piping system can also be reduced.

Advantages:

* High temperature resistance, anti-corrosion.
* Large amount of compensation.
* Easy to install.



Fabric expansion joint for industrial pipe

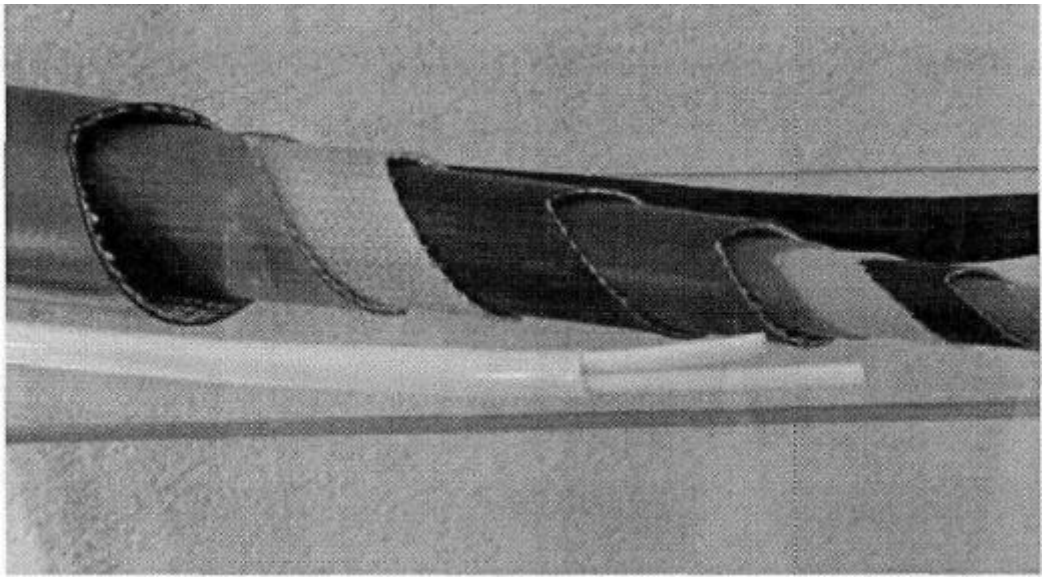
Application of electrical industry

Glass fiber coated phenolic resin, polyimide resin, with excellent electrical properties, it has unique advantages of insulation.

Between the two layers of semi-cured coating material coated glass fiber fabric, by hot pressing, curing and adding resistance heating wire, can be made to heating pad. The finished product has the flexible and controllable characteristics. It ha good applications in the pipe insulation, thermal bonding, heating of special devices. F1 car racing tires heating device is one of the most successful application examples.

Tire Heating Equipment for Car Racing

Glass fiber sleeving coated with silicone rubber, phenolic resin, polyimide and other coating materials, with excellent electrical insulation properties and high temperature performance. Widely used in high-temperature heating wire insulation protection.



Fiberglass insulation sleeving

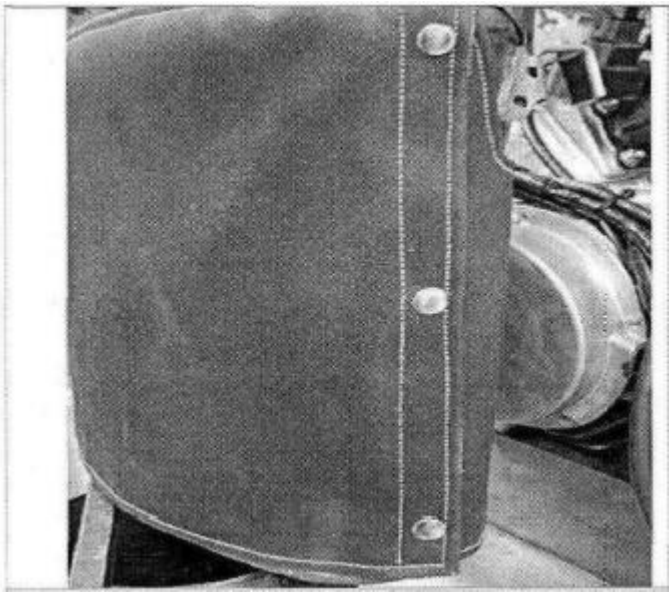
Covered cloth for transportation

Coated glass fiber fabric has good flame-retardant properties, weather ability, easy to clean and high strength. Mainly used in automobiles, ships, aircraft and other internal ceiling, sidewall insulation, soundproof, cushioning materials, coating and decoration.

Application in other special industry.

Fiberglass fabrics coated with special coating materials with excellent ablation properties, it can be used in rocket and spacecraft to launch ablative materials. It can quickly absorb a lot of energy, so as to achieve the role of protection launcher.

Fiberglass fabric coated with coating material having an infrared-absorbing property, it can be used as a heat-invisible material. The coated fabric protect the engine of car, tanks, motorcycles to achieve the purpose of heat invisibility.



Heat invisibility of engine

Several important points

Safety

Solvent treatment, solvent evaporation during coating process, with particular attention to fire prevention and anti-poisoning facilities. Formulate fire prevention measures and contingency plans.

Coating formulations should be as low toxicity, high safety components, reduce occupational hazards.

Energy saving

Learning from other industries of new energy and new technology applications.

Environmental protection

Strengthen the facility construction of exhaust gas, waste gas and solid waste to reduce environmental pollution.

Cleaning

Fiberglass fabric in the coating process, easy to produce hair to plug the exhaust pipe, and prone to accidents. Therefore, there should be target measures in the equipment design and production process.