



Manufacturing, application and development of PTFE/Teflon coated fiber glass fabric

PTFE/Teflon coated fiber glass fabric is made of glass fiber cloth as the substrate, impregnated with PTFE dispersion. Impregnated fiberglass cloth surface, coated with a thin layer of fluororesin small particles, and then through the drying, baking, sintering and other processes, the dispersion of volatile and leaving F4 tiny particles, tightly attached to the surface and pores of the fiber glass cloth, intensive continuous as a whole, to achieve the purpose of fiberglass cloth and F4 firm bonding, it become a new material which not only has the characteristics of fiber glass, but also has many excellent properties of fluorine plastic. According to different needs, in the dispersion can also be added inorganic or organic filler, to further improve its electrical properties, anti-aging properties and wear resistance, add a different pigment and then increase its excellent decorative performance.

Process Research

Raw material

A. PTFE commonly known as “plastic king”, it is one of the best performance varieties of plastic. It has excellent temperature resistance and corrosion resistance, excellent insulation properties, non-stick, non-toxic and odorless, harmless to the human body.

B. Fiberglass fabric

The substrate of the coated materials should have high temperature resistance and good tensile strength, glass fiber compared with natural fibers and chemical fiber, it has high strength, elongation is small, good chemical stability, etc., and it can make up for the lack of F4, to maintain the size of the stability.

Production process and key technology

A. Production process

Treated fiberglass fabric and F4 dispersion liquid → Impregnation → Drying → Take-up → Sintering → Take-up → Checking → Finished product packaging → Storage

B. The main key technology of the processes of fiberglass impregnated with F4 dispersion are the following three aspects.

a. F4 dispersion concentration, impregnation temperature and velocity

The concentration of F4 dispersion directly affects the surface finish, flatness, thickness and resin content of the product. High concentration, the thickness is large after each impregnation, the number of times to complete the dipping can be reduced accordingly; But if the impregnated F4 is too thick, it is easy to produce products surface cracking after drying. In order to ensure product quality, should use low concentration of dispersion, after several times impregnation is better.





The temperature distribution of the impregnation furnace is divided into three zones according to the elevation. Respectively, to complete the impregnation, drying and baking three processes.

Low temperature zone: The temperature of the first section of the lower part of the impregnation unit, it is affect the surface temperature of the dipping tank directly, and related to the liquid surface bubble burst rate and and flow marks and other defects. The temperature of the area is too high, will make the glass cloth dispersion too fast drying, thus producing bubble and flow marks. At the same time, the higher temperature of the area to radiate the bottom, so that F4 liquid surface crust, the impregnated fiberglass cloth will remain on the surface of the F4 pimple, serious damage to the fabric quality.

Medium temperature zone: When the impregnated cloth enters the second section of the middle part of the unit, it is needs to gradually complete the evaporation of water, the temperature is too low will make water evaporation is not complete, impact the effect of the next process of impregnation; Excessive temperature is not conducive to the uniform escape of water, also hindered the next section of the temperature control.

High temperature zone: When entering the upper third section, the residual moisture, the surfactant and the low molecular weight in the resin should be completely volatilized to facilitate the effect of the next impregnation process. If the temperature of this area is too high, will cause local F4 sintering, impact the effect of the next process of impregnation; If the temperature is too low, it will make the fabric sticky, the cloth will be stick together when coiling.

Although the impregnation unit is divided to three temperature zones from the bottom to the top, but they are not completely separated, but continuous gradient, there is no significant deviation between the sections. According to the test results, the temperature distribution of the longitudinal section of the impregnation unit is shown in Fig.2.

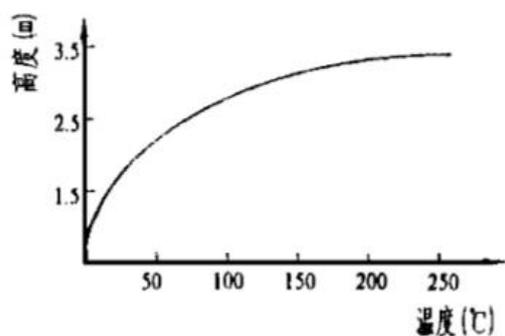


Fig.2 Temperature distribution diagram





The transmission speed of glass fiber cloth is one of the key factors affecting production efficiency and product quality. If the speed is slow, disperse evenly through the fabric, to avoid the flow marks, reduce product defects, to get good quality cloth. But if the speed is too slow will reduce production efficiency and cost will be increased. If the speed is too fast, easy to produce bubbles, flow marks and other defects, and cause dry time is not enough, dry through, causing the fabric sticky.

b. Sintering temperature and velocity

F4 resin is different from thermosetting resin, it does not have "curing" stage, but must be sintered at high temperatures. Sintering furnace is divided into two layers, The lower layer further removes the low molecular weight of the surfactant and F4 resin, and the upper layer completes the "plasticization" process of the F4 resin, which is characterized by the cloth immediately discolor, white products from pure white to soil white, black products from grey-blue into pitch-black. The upper temperature is too high or too long time in the plasticization temperature, will make the fabric brittle and performance reduction.

The choice of sintering speed must meet the temperature requirements, sintering speed and temperature are two closely related factors, must meet the temperature requirements of the premise to choose the appropriate speed, If not reached the temperature required for plasticization, speed is slow and even pause is not possible to complete the sintering, and once the plasticizing temperature is reached, the sintering is completed in just a few seconds. So the transmission speed does not affect the plasticization. At the same time, impregnated F4 glass cloth thickness uniform, and relatively thin, so heat quickly, it is easy to sintering.

c. The quality requirements of glass fiber base fabric

The requirement of PTFE products on the quality of the base fabric is extremely high, the main factors affecting the quality of the product are the glass mattress material and the technical maturity of the impregnation process. The base fabric can not exist cloth wrinkles, yarn joints, broken yarn, oil and other serious defects, the fabric flatness, density and other quality requirements are higher than the general fabric.

Application research

Glass fiber coated with PTFE products with its excellent performance widely used in aviation, electronics, textiles, food, building materials, medicine, clothing and other fields.

Architectural membrane material

This is the most promising area of PTFE/Teflon coated fiber glass products. Since the glass fiber "silver top" come out in 1975, buildings with various woven fabrics for roofs are emerging in the United States and Western Europe. "Light roof" has become a new type of soft shell structure, the





coating has become a new type of roofing materials. This new building with its simple design, easy installation, huge size, shape color changeable to get much attention. It has been widely used in large span buildings since 1980s, such as pontoon roof, inflatable dome, suspension structure hall, sports venues, amusement parks, exhibition centers, music halls and warehouses and other soft shell structure. The most widely used in this type of architectural membrane is PTFE/Teflon coated fiber glass fabric.

This kind of glass fiber is made of B grade superfine glass fiber yarn, its tensile strength is higher than steel, and has a high tear strength and elastic modulus, good dimensional stability, no combustion, and PTFE coating has long-term weather resistance, no adhesion, can be automatically cleaned. The hardness of such materials is about 10 times that of organic polymer textile fibers. The use of this new building film construction of the building has the following advantages:

- A. The weight of the roof is very light
- B. Good aging resistance
- C. Translucent and high energy efficiency
- D Safety.

Insulation Materials

The volume of glass fiber is higher than the resistance, it can be used for aviation, electrical and electronic industry in the high-frequency high-temperature conveyor belt; Because of its good air tightness, bursting high strength, can be used as a solenoid valve diaphragm to prevent the leakage of dielectric materials; Tetrafluoroethylene casing can be used as wire and cable; thin cloth can be used for printed circuit boards.

Microwave drying conveyor belt

Because it does not absorb microwave, non-stick, high temperature, good insulation properties, is the ideal material for microwave conveyor belt. The previous food machinery conveyor belt is made of canvas, but the canvas is not high temperature, not easy to clean; and than be changed into chemical fiber, but it is easy to deformation. Using PTFE/Teflon coated fiber glass anti-stick belt instead of canvas and chemical fiber, completely overcome the above disadvantages. PTFE/Teflon coated fiber glass belt is high temperature, no deformation, inert, non-toxic side effects, no-clean, can also be used as the microwave transport belt in medical machinery.

Clothing fusing machine conveyor belt

Previously, people used horse hair cloth and ironing to produce shirts and suits, but temperature uniformity is poor, not high temperature and easy to stick. Now, with the use of anti-adhesive belt, the horse hair cloth has been gradually replaced by resin lining.





Flexible compensator

Flexible compensator is a new species of compensator for the gas transport and other areas, also known as non-metallic compensator, expansion joints, bellows, etc., the market share is expanding. As the PTFE/Teflon coated glass fabric with corrosion resistance, high temperature and high pressure, it can be used as pipeline lining of compensator.

Friction material

PTFE wear, the friction coefficient is small, it can be used for oil-free lubrication in high temperature environment.

