



Application of Bio-based Material for Glass Fiber Yarns

In accordance with the production and processing methods, Glass fiber yarn can be divided into the first twist glass fiber yarn and twist glass fiber yarn, According to sizing agent type, it can be divided into starch glass fiber yarn, silane glass fiber yarn and paraffin glass fiber yarn. According to Application, it can be divided into electronic grade glass fiber yarn and industrial grade glass fiber yarn. It is suitable for electronic Base cloth, curtain line, casing, sun cloth, filter and other products manufacturing.

At present crucible method is still using paraffin-type infiltrating agent for fine yarn drawing ,Although the infiltration agent can meet the requirements of drawing and textile ,But because its main components are paraffin, stearic acid, petroleum jelly, transformer oil, flat-plus, fixing agent, In particular, the presence of the fixing agent and the incineration of wax will contaminate the rings.

From the 1990s, difficult to hot cleaning , the surface of the cloth is not clear, there are lots of brown stripes on the fabric are the major problems in post-processing, From then on, the industry's new tank kiln begin production textile yarn, Especially 7628 cloth with the G75 yarn, they are all used starch - oil agent infiltration, Starch - oil type sizing agent is easy to heat cleaning, low carbon residue on the cloth surface .

The starch - oil - based sizing agent has a good protection on the cluster of glass fiber precursor, without hair after the textile processing ,Its raw materials is non-toxic and non-irritating to the human body. Its main features are easy to heat cleaning, low decomposition temperature, After heat - chemical treatment, the surface of the cloth is white, smooth, no dark brown stripes, low carbon residue. this kind of products are widely used in electrical insulation materials, Mainly for electronic computers, electrical instruments and household electronic devices which required for printed circuit boards with copper-clad glass fiber cloth, Such as the ASTM standard 7628 cloth and 2116 series of electronic cloth.

Development of starch infiltrant in the industry

OC company and PPG company from the United States , While with the development of non-mobile starch infiltration agent, In order to make full use of the excellent film-forming and gelation characteristics of amylose, Prevent migration of the sizing agent, But also to ensure the flexibility of glass fiber, Protection a variety of process performance in the production process, Experts from the two companies found the above functions can be achieved by using a mixture with high amylose and low amylose in equal proportions.

OC company takes a non-mobile starch infiltrant, And make full use of the amylose for its





excellent film-forming and gelation characteristics, To increase its water solubility, take modified with ethylene oxide and propylene oxide, the content of hydroxyethyl is about 2% to 4%, the introduction of benzyl chloride helped the cationic modified to starch.

Saint-Gobain Company in France who takes starch and non-ionic and cationic lubricant as the infiltration agent substrate, it can provide good textile processing performance while ensuring good combination with fiberglass and thermoplastics and thermosetting plastic, A silane coupling agent which containing an alicyclic hydrocarbon or an aromatic tertiary amino group is introduced into the sizing agent, which can improve the adhesion of glass fiber and resin. This type of sizing agent can be exempted from thermal chemical cleaning, Fiberglass strength is higher than polyvinyl acetate film-forming agent

Industry studies have also shown that the starch is reacted with a compound which containing a nitrogen atom and a phosphorus atom then generating cationic starch, the mixture of cationic starch and high amylose starch has high film-forming strength, and good membrane elasticity, The sizing agent is evenly distributed on the fiber. The starch can also reduce the infiltration of the migration agent, Improve the drying performance of the film, and less breaking fiber. The amount of the infiltrant powder was low in the case of dissolution and twisting.

Other resins can be added to the starch-based infiltration agent, Such as polyamino-functional polyamides, which not only has strong adhesion of thermoplastic resin, But also has a long-term effective lubricant. The binder will not remain on the yarn guide while at higher temperatures, this is a malpractice for the general starch infiltrant starch. Polyamino functional polyamide resin is the reaction product of polyvalent carboxylic acid and polyamine. Polyamines are tetraethylene diamine and diethyl triamine, Acids are acrylic acid and formic acid, and so on. Normally we will take the core-shell structure polymerization method to do it.

