



How to adapt the glass fiber yarn textile technology to the drawing of the Tank Furnaces

Tank Furnaces drawing is the generally production mode in the industry,It can ensure glass fiber precursor stability, high quality and efficient .In this paper, combined with the current status of glass fiber textile technology, we made a few observations on fiberglass technology how to adapt to Tank Furnaces drawing , Produce high-quality glass fiber textile products .

Glass fiber quality and products

Table 1 lists the crucible drawing, drawing of two different raw materials for the tank of the basic situation of textile processing technology

It can be seen from Table 1 that the different results of the two different production methods to the drawing of raw materials for the tank glass fiber glass fiber textile processing technology produced by the quality of fiberglass products is much better than the crucible drawing raw materials for the traditional Glass fiber textile processing of the product quality.

Item	The metric number tex fluctuation value(%)	Twist (Twist / m) Fluctuation value(%)	Number of uneven rate(%)	The weight of the fabric fluctuates(%)	T Thickness Fluctuation(%)	Roll length (m / roll)
Crucible drawing (JC170—80) For basic (96)	± 10	<± 15	7	± 10	± 10	< 1000
Tank Furnaces drawing ASTM578—83 579—83	± 10	<± 10 40 below <± 20 40~ 400 above		± 6	± 5	<2000~5000
Tank Furnaces drawing JISR3414—84	± 7	<± 10 80 below <± 15 80 above	8	± 3	± 3	<2000~5000
Tank Furnaces drawing Advanced level	<± 3	<± 10 28 Twist / m	3	± 3	< ± 3	<4000~5000

Glass fiber products

With the development of glass fiber textile industry so far,To tank furnaces drawing raw materials for the modern glass fiber textile industry has developed a variety of different uses of glass fiber textile products,US AS TM D579- 83 fiberglass woven fabric has 108 kinds of specifications,Japan JISR3414-1984 has 79 kinds of specifications,In some advanced countries, for one enterprise , there are more than 1,000 kinds of textile products with different specifications.

Textile Technology

Modern fiberglass textile production has the basic characteristics of high-speed, high efficiency,





high-quality, large package.Process route fully in line with product quality requirements.

Taking the textile production process of electrical insulation cloth as an example,The basic process route is: twist strand →Withdrawal→Warping→Clearstarch yarn→Wear comprehensive →Jet weaving→ Inspection→ Pre-desizing→ Thermal desizing→ Surface coating treatment→ Test →Finished product packaging

It is the raw material of high-quality raw silk production ,it takes the characteristics of special textile equipment for the production .Which is made of the process of drawing a large package of raw silk cylinder placed in the forced unwinding of the active feeding of the yarn on the retractor machine,The yarn is twisted into yarn feeding tube by guide yarn hook and ring,The need for pultrusion and twist of the product, will be a fixed length of the bottle-type tube inserted in the twisting machine of the first twist twisting spindle by the yarn guide, feed roller, yarn guide hook to twist the twisting spindle, Ingot twisted into a bottle-type tube yarn.The yarn tube is placed on the creel of the warper, the yarn is drawn to the whole warper by the single yarn tensioner, the yarn guide and the tension roller, and the yarn is wound at constant linear speed and constant tension by the warping machine. A fixed length of the warp beam.Batch warping process is adopted.The number of warp yarns is $1/4 \sim 1/5$ of the total number of the fabric.And then a number of warping axis placed in the pulp axis frame, together traction to the slurry tank, the use of double-dip single-pressure way to sizing the warp with a slurry soaked, the warp through the hot air drying to a certain extent, in the cylinder Completely dried, in the sizing of the winding head into a certain length, single yarn pulp slurry coated axis.Slurry commonly used starch slurry and chemical PV A slurry two categories. In the wear process will healds, menopausal tablets put on, made of woven shaft.Weaving the use of jet weaving, glass fiber for the nozzle, the warp by serous protection for high-speed weaving.Weaving the use of sub-high-style large package coiling method. Post-processing using sub-processing, so that the final product quality to achieve "net, uniform, Qi" requirements.The pre-desizing machine passes the tested fabric roll through the high-temperature hot-air zone, treating the sizing agent on the yarn, the sizing agent, and the sizing agent on the weft yarn to a very low level, Dispose of cloth roll.A high-quality cloth for electric insulation containing a silane-treating agent was produced in a surface treatment coated by water washing (drying → drying) → dipping → drying (trimming) → winding.due to the use of sizing process ,the products can make good performance of yarn twist low, fabric surface smoothness, impregnation with resin .

Traditional fiberglass textile technology is produced by crucible drawing raw silk as raw materials, Using cotton spinning equipment modification, and then production.Using the following technical line: winding → raw silk withdrawal and twist → warping → wear comprehensive → weaving → inspection → post-processing → inspection → packaging.





Bending machines, and twisting machines are using roller traction, yarn free rewinding. After the friction point of yarn, the yarn become damage. The yarn is twisted through the wire guide hook ring, the diameter of the ring is small, the maximum package volume of the tube is 0.8 kg / tube yarn, and the machine control is simple. The use of sub-warping, warp tension uniformity difficult to control. The use of sub-warping, warp tension uniformity difficult to control. The creel uses the old gravity disc type tensioner, it is not suitable for the glass fiber characteristic, the tension is difficult to control. Warping length is less than 1000 meters / warp beam. The loom is a shuttle loom. Warp is not serious protection, shuttle reciprocating movement in the shed and the upper and lower openings, the warp easily damaged, weaving quality is difficult to guarantee. If the use of separate winding weaving, the roll length is up to 1000 meters. Post-processor control, the structure is relatively simple. The use of continuous processing, can not handle high-quality requirements of the glass fiber textile products. Generally, the length of the cloth after the treatment is the same as the length of the fabric.

The traditional textile processing technology because the warp is not sizing, it can not get very good protection. Therefore, only high-twist, low speed, small package for production. The production efficiency is low, the fabric surface is flat and poor, and the resin is poor.

Glass fiber textile equipment

Glass fiber textile equipment level determines the process configuration of textile production process. Table 2 lists some parameters of a fiberglass textile processing apparatus for producing electrical insulating cloths, respectively. From this we can see the profile between the traditional glass fiber textile equipment and modern fiberglass textile equipment.

Traditional fiberglass equipment, because it is not specifically designed for the glass, so there are many places not suited to glass production. There are many friction points, such as the uneven tension yarn, poor quality, low efficiency of the machine, backward technology and so on.

The basic characteristics of modern advanced fiberglass textile equipment

① retreat machine

Combined with the characteristics of glass fiber intolerance friction design, the use of active yarn, forced unwinding, constant linear speed constant tension yarn, With photoelectric breakage detection, single spindle pneumatic brake from the stop and other functions, Over the use of powder metallurgical oil ring, centralized lubrication, computer-controlled molding and process parameter settings.

② twisting machine

The first twist twisting machine uses a separate motor dragons with transmission mode, it can take the following five first twist spindle. Each spindle has a tension stabilizer, each corresponding to a twist spindle. The use of computer-controlled molding and process parameter settings, a





decapitated self-stop device. Commonly used powder governance oil-containing ring, centralized lubrication.

Table two

	Degaussing machine	Dwisting machine	Warping machine	Sizing machine	Sewing machine	Post-processing
Traditional fiberglass Textile equipment	Feeding rate <80 m / min Ring diameter < ϕ 90 Pipe winding device <800 g, Yarn process line bending point more damage.	Feeding speed <80 m / min Ring diameter < ϕ 90, Pipe winding device <800 g, Yarn process line bending point more damage.	Warping speed <creel simple Difficult to adjust the tension uneven, Warping length <1000 meters	No need	There are shuttle looms, Loom speed <200 r / min, Generally 100 to 150 r / min	Post - processing speed 5 to 10 m / min
Modern glass fiber Textile equipment	Feeding speed <250 m / min, diameter > ϕ 140, The amount of pipeline package > 3500 ~ 12000 grams Combined with glass fiber characteristics, technology Smooth route	Feeding speed <250 m / min>, Ring diameter > ϕ 165 Tube package volume > 4000 ~ 12000 grams.	Warping speed <100 ~ 250 m / min, Creel compact tension uniformity Warping length <5000 meters>, Computer control	Sizing speed 60 to 150 m / min, Computer control	Speed of loom , 400 to 800 rpm, Computer - controlled process parameters	Min Preprocessor speed 20 to 140 m / min , Surface treatment machine speed 20 to 120 m / min. Computer control

③ warping machine

Warping machine take the initiative to take rolls, constant tension winding, computer-controlled process parameter settings, General use of pneumatic and hydraulic combination to achieve a variety of actions. With yarn tension sensor, adjustable yarn tension. The whole yarn creel adopts single drum pneumatic damping tensioner, which can adjust the tension between single yarn. The creel is equipped with broken yarn display and static eliminator.





④ sizing machine

Sizing machine using active take-up, constant tension winding, computer-controlled process parameter settings, Multiple sensor detection. General use of pneumatic and hydraulic combination to achieve a variety of actions. Drying using hot air cylinder type hybrid drying method, Slurry tank heated by the steam, the axis of a pneumatic damping, electromagnetic damping, etc., Sensor detection, to ensure that the warp beam when the yarn tension evenly.

⑤ loom

After the warp beam is installed in the loom, then either rapier technology for heavy fabrics, or air jet technology for lighter fabrics is used to interlace the filling yarns at 90 degree angles to the warp ends on the loom. The fabric called greige or loom state, then wound onto a roll or steel drums called mandrels, and the weaving process is complete.

Rapier loom: Rigid rapier loom for the characteristics of glass fiber, Active take-off, active take-up. The computer sets various parameters of the loom. Centralized lubrication system. Clamping the introduction of a single latitude, the central delivery sword weft. Suitable for medium and heavy glass fiber fabric, you can use the disc or yarn carrier for weaving.

⑥ Inspection machine

Usually with a cloth edge deflector automatic device. Active take-up. The take-up shaft is generally an air lock shaft. The tension and the flatness of the cloth can be adjusted, less friction on the cloth surface. The volume of the cloth is large.

⑦ post-processor

A variety of glass fiber fabric processing unit has many purposes, It can be divided into two categories: continuous treatment of coated fabric processing unit and the gap segment processing unit. Among them, the electrical insulation with the use of sub-section of the technical of the highest requirements, the following briefly describes its characteristics.

Pre-desizing unit: Active take-up, active feed, constant speed speed to send cloth, vol cloth, cloth tension automatic detection, Control System. Gas hot air circulation system, the temperature can be automatically set to control. Generally for the vertical double storage tank system plus hot air in addition to the part of the pulp and sent to the cloth.

Braised stove: Using gas to do heat, Braised furnace cloth roll placed on the rack, High temperature air in the stew furnace after dozens of hours, the cycle of hot air to remove the residual slurry. A temperature setting, detection control system.

Surface treatment machine: Active feed, constant speed, constant tension coiling. Infrared hot air combination drying method, Speed, tension automatic detection. Double vertical storage tank, a





cloth crepe device. In the dipping can be set before washing, singeing, drying device. After dipping drying, equipped with plastic edge trimming device and storage cloth, coiling device. The entire unit was controlled by a few frequency conversion motor drive, computer coordination .

Sizing agent and treatment agent

Fiberglass-specific infiltration agent and textile processing and product applications are closely related. The traditional textile-type sizing agent takes paraffin type as the main body. A variety of textile formulations with a variety of applications. The modern fiberglass textile infiltration takes starch as the main type. Various textile formulations can use up to hundreds of hundreds of coupling agents, the two has a big gap , which is the main reasons for the general glass fiber textile products has poor enhance effect .

Production conditions and environment

Modern fiberglass textile equipment has developed into a computer-controlled, pneumatic and hydraulic technology combined with mechanical and electrical integration equipment processing group. To ensure the smooth processing and production of high-quality textile products, requiring strict production workshop has a small temperature and humidity fluctuations. The traditional glass fiber textile enterprises, only a few have workshop temperature and humidity control, from the production conditions, plant structure, air conditioning quality, it is difficult to meet the production of high quality glass fiber textile products. The vast majority of enterprises do not have such conditions .

Seen from the above points, The traditional fiberglass textile industry is matched with the modern tank Furnaces drawing, The textile industry has many difference in many aspects .it can not adapt to the tank Furnaces drawing technology, which has attracted the attention of the industry.

