High-tech fiberglass mesh

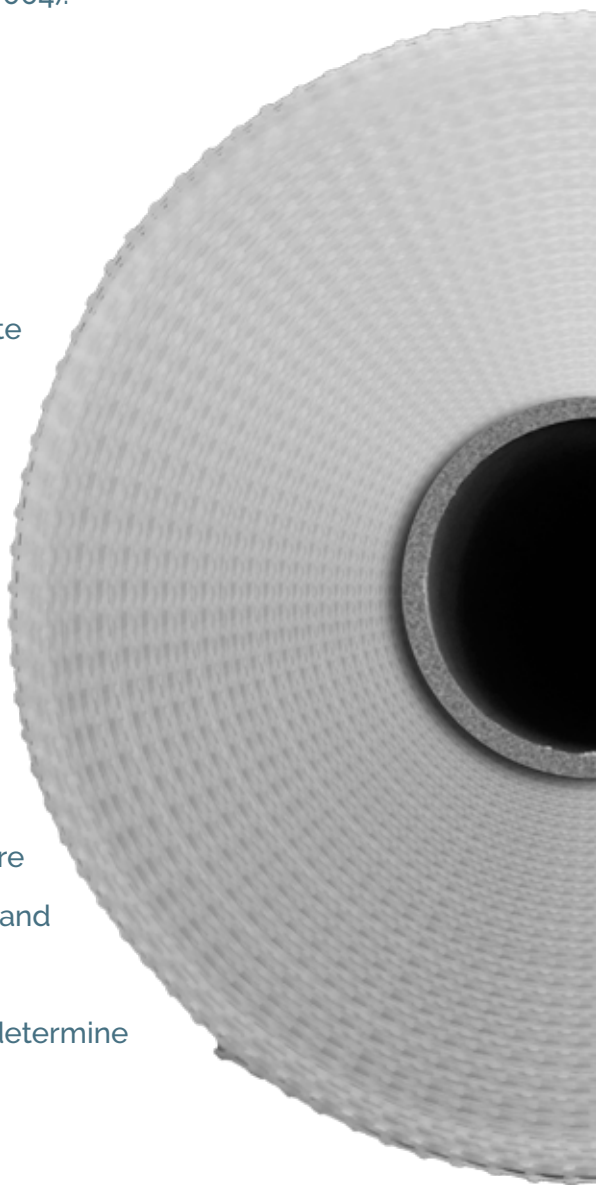
Technical study edited by Giuseppe Lerna

The modern building industry has seen the rapid emergence of the fiberglass meshes intended for specific uses, such as the reinforcement of plasters, new or to be renovated both for interior and outdoor applications, or integrated into the external wall insulation systems for energy saving.

ETAG 004

Gruppo Stamplast S.p.a. through Vitrex brand is specialized in the production of reinforcement for building coatings completely made in Italy in accordance with the most rigorous technical standards required by European directives (Guide ETAG 004).

Features of a fiberglass mesh



The function of a fiberglass mesh is to absorb and evenly distribute the mechanical stresses to which the façade may be subjected, such as settling movements, shrinkage phenomena, temperature ranges and external agents, preventing the risk of superficial cracks.

The fiberglass meshes are capable of withstanding high tensions, they are indifferent to thermal changes and do not stretch to traction, and the treatment with alkali resisting primer protects the fiber against alkalis contained in mortars and cement.

For this reason the main properties required of a fiberglass mesh are the high mechanical strength, resistance to aggressive chemicals and micro-organisms and durability.

These characteristics are certified through laboratory tests to determine the tensile strength and alkali resistance values.

The tensile strength is tested through a dynamometer that measures the maximum elongation on mesh samples measuring between 50 and 300 mm and must contain at least 5 yarns in width.
The samples have to be sufficiently rigid to resist deformation imposed by the machine during a test in which the tensile strength is increased at constant speed up to the breaking point of the fabric.
It is also important the durability to the aggression of concentrated alkalis contained in the lime or in the cement. The alkali resistance test is performed by subjecting the fiberglass mesh to a process of artificial ageing by dipping it in an alkaline solution for 28 days.
At the end, the mesh is subjected to a new tensile strength test; the loss of resistance after such treatment should not exceed fifty percent compared to the values obtained on the mesh before carrying out the alkali resistance test.

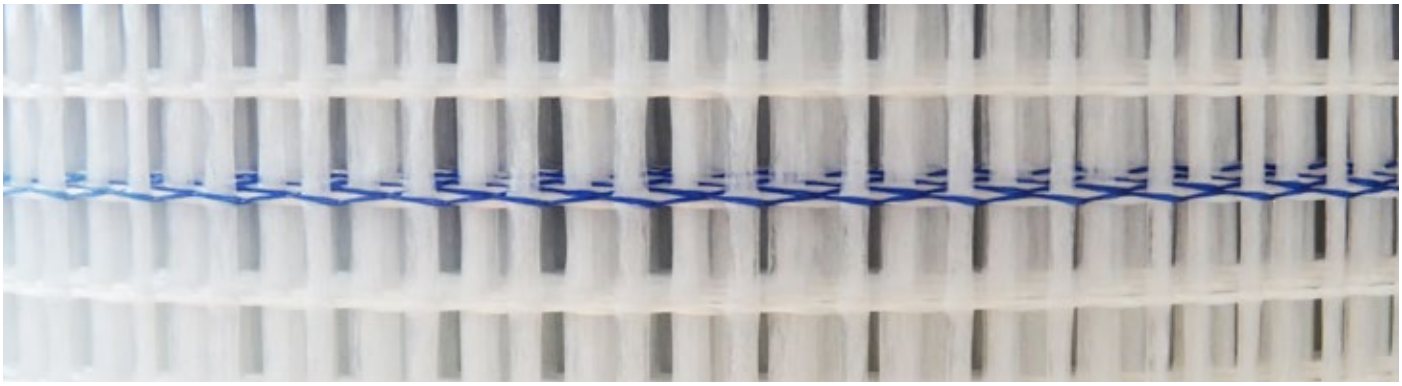
Production quality

> ***Essential for the quality of the finished product is the choice of carefully selected raw materials***

The use of quality products is essential to obtain a finished product with high performances.
Gruppo Stamplast SpA as a qualified manufacturer of fiberglass meshes uses only top quality materials, getting supplies from the main multinational companies of glass yarn.
The raw material used is the so-called "**E-glass**", so named because of its quality of electric insulation and that is obtained from renewable raw materials and easily available in nature, such as kaolin, alumina, silica and others whose chemical composition creates a yarn with workability characteristics suitable for the production of technical fabrics for industrial use; in contrast to the majority of Far Eastern producers who use the cheapest "C-glass" that is not at all able to guarantee comparable performance.
Furthermore only qualified producers can rely on advanced chemical laboratories always searching for cutting-edge resins to ensure ever higher performance for the product.

European directives also require western producers to use SBR water-based resins and free of solvents harmful to the environment, non-toxic and anticarcinogenic, which are diluted according to strict procedures with the aim of maximizing alkali resistance. This unlike the oriental producers, not bound by the strict European regulations, all this with obvious repercussions both on the final quality of the product and on the guarantees offered by the item in terms of environmental protection and respect for health.

How a **mesh** is made



The basic fiber glass is obtained with the fiber technique (tecnica del fibraggio). Glass fibers are obtained by reacting mixtures of inorganic materials at temperatures above 1000 ° C using special furnaces. When the melted glass comes out the furnace it is processed in platinum chains through which it is stretched in the desired diameter so as to obtain a very small diameter filament. Yarn is obtained by the combination of a series of filaments.

The glass fiber yarn has many physical and chemical properties nearly identical to those of solid glass: specific weight, electrical resistivity, absolute fire resistance, thermal conductivity and chemical inertia.

Furthermore, through this process, the tensile strength of the fibers is many times higher than that of the solid glass, reaching values three times higher than the steel tensile strength.

Equally important is the coating process whereby each yarn is processed with a primer consisting of organic materials dissolved in water, polymers or different tipes of resins, which cover the entire surface of the fiber glass. This process, in which the meshes are impregnated with a mixture of synthetic resins, is designed to give the glass yarn the characteristics necessary for the final processing, helping to improve the mechanical properties of composite materials and their resistance to ageing, preserving the glass from the aggression of concentrated alkalis.

This coating process is called “Sizing” and defines some characteristics of fiber glass. In fact, depending on the pigment chosen by the company, it determines the color of the mesh; it allows the workability (weaving) of the fiber, therefore it affects the subsequent weaving of the mesh; it allows the maintenance of its characteristics during the application, its compatibility with different tipes of materials such as resins, the maintenance of the cohesion of the yarns that make up the fabric and ultimately the optimization of its resistance.

The importance of the coating process for mesh quality is therefore clear since resin the gives also the finished product dimensional stability and consistency in order to make it suitable for installation. In fact, different formulations of the coating, according to the use of various additives or mixing percentages, can give the mesh a different consistency, more or less soft, also determined according to the climatic characteristics of the place where it will have to be applied.

The subsequent production of the mesh is carried out starting from a direct roving, from a yarn or cut yarns. The fabric or mesh is obtained by weaving, generally orthogonally, a set of weft yarns in a set of warp yarns by means of a loom, all according to a precise system of weaving patterns known as reinforcement.

In the industrial field the main problems related to glass weaving concern the quality of the yarns. In fact the high working speed of automated looms requires the use of yarns absolutely free of impurities, knots or irregularities.

The quality of the yarn therefore derives not only from the use of virgin raw materials selected originally, but also from the precision in the control of production variables.

The importance of a **coated mesh**

The resulting material is further coated with a “coating” which can be composed of bitumen or polyester, vinylester, epoxy or hybrid resins.

The function of this second coating is to improve the protection of the material and resistance to ageing, particularly for the “C” glass, which in its own endless combinations of weight and mesh size, remains the most used type.

In fact, glass does not rust, cannot be attacked by biological agents, has no problems with ageing or deterioration, but “C” glass fears the aggression of concentrated alkalis; therefore having to prove to be resistant to the alkaline environment generated by the lime or concrete, the surface treatment of the mesh must guarantee a perfect protection of the fiber from such environments.

It is about a highly technological product whose quality must be guaranteed by rigorous technical tests to verify both the mechanical strength of hundreds of fibers glass constituting the yarn and their perfect integration into the final consistency of the mesh.

These processes are essential to guarantee a high-quality product that can exploit the potentialities given by the exceptional final characteristics of the glass yarn.

This, in building applications, where this type of reinforcement is significantly higher than other natural fibers as it combines strength, lightness, ecological compatibility, the ability to replace, in many applications other materials such as metals, asbestos and in particular impressive mechanical capacity, with a tensile strength of about 200kg per 5 cm of fabric.

GRUPPO STAMPLAST SPA - P.le Marcellino Champagnat, 2 - 00144 Roma - info@gruppostamplast.it - www.gruppostamplast.it