STEEL NET G® SRG-SRP SYSTEM

Tech. Sh. FS03G
STEEL NET LINE
SRG-SRP SYSTEM
Structural consolidation

STEEL NET®

Unidirectional fabric in very high-resistance UHTSS steel fibre for structural reinforcement

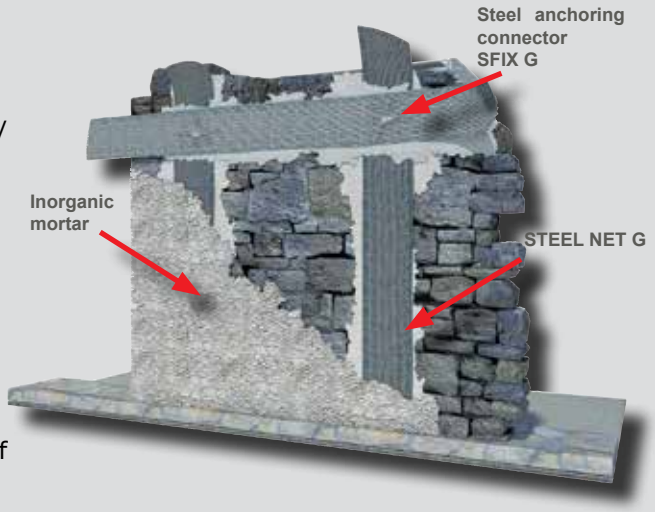
DESCRIPTION

The use of structural reinforcements in the form of UHTSS very high-resistance STEEL NET fabrics immersed in an organic (SRP) and inorganic (SRG) matrix is a versatile technology, with reduced weights and thicknesses, which allows for the structural consolidation of elements in reinforced concrete, prestressed reinforced concrete, concrete, masonry with high levels of static effectiveness in functional requalification and in the seismic improvement of weakly-reinforced, impaired or uneven and deteriorated structures. Once adopted, this technology, which has been proposed by G&P intech in the international market in recent years, in fact enables a general improvement of the mechanical characteristics of structures, especially if they are deteriorated and subject to seismic action, through reinforcement with steel fibres and with high orthogonal resistance to the same, designed and commensurate with acting stresses particularly with respect to bending, shear and confinement.

Thanks to its considerable versatility, the STEEL NET system may be adopted for the reinforcement of construction elements in concrete, reinforced concrete and prestressed reinforced concrete for wall panelling, curtain walls, pillars and masonry roofing/vaulting in brickwork and natural stone, for the creation of beading in reinforced concrete for the confinement of structures which have manifested various degrees of deterioration and impairment and which have to be restored with a technology presenting a limited degree of invasiveness, with reduced thickness and compatible with the various requirements relating to the structural consolidation and conservation of historical buildings. G&P intech has conducted and is currently carrying out studies and experimentation at the national and international level which bear witness to the validity of the system for the specific area in which it may be adopted.
Our company moreover offers and is developing an important engineering consultancy service reserved for public administration bodies, companies, designers and technicians in this sector.

Uses

The main uses of the STEEL NET G reinforcement system are:
- Reinforcement of elements in concrete, reinforced concrete and prestressed reinforced concrete, such as beams, pillars, flooring system slabs, support walls and vaulted/roofed surfaces (tunnels/ galleries).
- Increase of resistance in load-bearing wall panels, pillars, arches and roofing/vaults in masonry.
- Reinforcement with combined compressive and bending stress and the shear of wall panels.
- Confinement of structural elements.
- Creation of beading in reinforced masonry.
- Connection of composite-action elements also by means o prestressing.



Advantages

High resistance to tensile stress and shear , improvement of structural ductility.
High resistance, orthogonal to the direction of fibres.
Possibility to prestress STEEL NET G steel fibre.
Reduced thicknesses, weight and invasiveness for works to be consolidated and for historic buildings.
Given the versatility of the STEEL NET G system used with organic and inorganic matrices for the various substrates, reinforced surfaces are obtained with superior adhesion, minimal thicknesses and high transpiration properties.
High resistance to impact, such as collision, explosions, and actions orthogonal to the direction of the fibres.
Applicable on surfaces which may also be irregular, with reduced levelling requirements, in particular with the use of inorganic matrices (SRG).
Better resistance fireproof with the use of inorganic matrices (SRG).
Compatibility and reversibility of the system in the 'cultural assets' sector.
Fewer construction-site requirements.

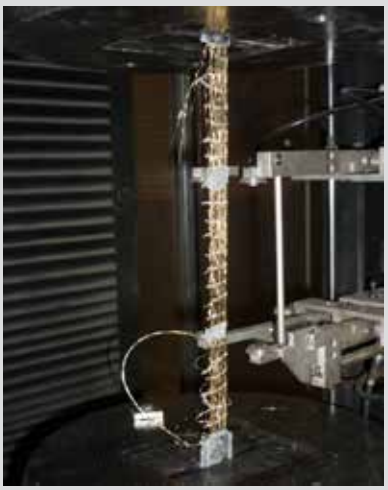
Technical Data

The uni-directional fabric in STEEL NET G UHTSS galvanized steel is produced in standard dimensions and weight and, more specifically STEEL NET G 350 with 3500 g/m², STEEL NET G 220 with 2200 g/m², STEEL NET G 135 with 1350 g/m² and STEEL NET G 80 with 700 g/m², produced in rolls of variable width from 10 to 30 cm. Production flexibility allows for the execution of orders for different types of products in terms of weight and roll dimensions. Please refer to our sales department for specific requests.

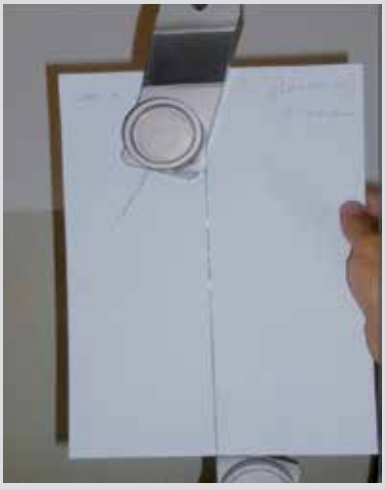
Technical characteristics	STEEL NET G 350	STEEL NET G 220	STEEL NET G 135	STEEL NET G 80
Weight of galvanized UHTSS steel fabric	3500 g/m²	2200 g/m²	1350 g/m²	700 g/m²
Unit section of the strip	4,40 mm²/cm	2,72 mm²/cm	1,69 mm²/cm	0,86 mm²/cm
Equivalent calculation thickness of the strip	0,44 mm	0,27 mm	0,169 mm	0,086 mm
Ultimate unit tensile strength of strip	11200 N/cm	6980 N/cm	4320 N/cm	2200 N/cm
Strip elastic modulus	190 GPa	190 GPa	190 GPa	190 GPa
Ultimate strain of strip	> 1,7%	> 1,7%	> 1,7%	> 1,7%
roll width	10 - 15 - 20 - 30 cm			

INORGANIC MATRICES FOR STEEL NET G GALVANIZED STEEL (SRG-FRCM)

The main inorganic matrices for the STEEL NET G galvanized steel fibres are:
CONCRETE ROCK V-V2 for concrete structures: reactive one-two components cement-based mortar with high resistance and adhesion to the supporting substrate, resistant to sulphates (compliant with EN 1504-3 Class R4 European Norm).



Tensile strength test



CONCRETE ROCK S for masonry structures: pozzolanic-reaction mortars (compliant with EN 1504-3 Class R2 European Norm).
LIMECRETE for masonry structures: lime-pozzolanic-reaction mortars M15 (compliant with EN 998/2 European Norm).
LIMECRETE IR for connectors: grout for injection and grouting in hydraulic lime M15 (compliant with EN 998-2 European Norm).

ORGANIC MATRICES FOR STEEL NET G GALVANIZED STEEL (SRP)
The main organic matrices for STEEL NET steel fibres are:
Adhesives: RESIN PRIMER, RESIN 90 (compliant with EN 1504-4 European Norm).
For the technical characteristics of the adhesives see the product data sheets (FS Line).

Instructions for use

STEEL NET G – GALVANIZED STEEL WITH ADHESIVES (SRP)

Application of STEEL NET G structural reinforcement requires careful and precise preparation of the surface to be treated. For work on concrete the substrate must be prepared checking the state of deterioration of the surface to be treated. If the surface is deteriorated, remove the weakened layer by scraping, sandblastering, hydro-demolition or using other methods, and then restore the metal reinforcement rods and concrete with a restoration cycle, using CONCRETE ROCK V-V2 fibro-reinforced mortars on moist surface and FERROSAN anti-corrosion system to protect reinforced metal. In the case of levelling/smoothing of concrete, use the CONCRETE ROCK mortars or RESIN PRIMER + RESIN 90 epoxy levelling skim coat. If necessary to improve adhesion a previous hand of adhesive RESIN 78 can be applied on the substrate before mortar levelling.
For intervention and operation on masonry and vaults, it is important to remove any loose or crumbling parts first. The surface must then be brushed and all dust removed. Remove all traces of grease or oil. Any cracks and voids must be saturated with LIMECRETE or with lime-base slurries. In the case of levelling/smoothing of surface, use the CONCRETE ROCK S or LIMECRETE mortars or RESIN PRIMER + RESIN 90 epoxy levelling skim coats. If necessary a previous hand of adhesive RESIN 78 can be applied before mortar levelling.
Before application of the STEEL NET reinforcement system in any case remove all traces of oil, grease and dust.
The subsequent operation will be the priming of the support surface regularised with a RESIN PRIMER, using a brush or roller, and with a quantity suitable for the absorption of the support (this operation must in any case be carried out before levelling/smoothing, if required, with RESIN 90 epoxy adhesive as above reported). After becoming touch-dry and in any case within the next 24 hours RESIN 90 epoxy adhesive is applied using a spatula. Lay out in a precise manner the STEEL NET G steel reinforcement in accordance with the project orientation requirements and exercise constant pressure with a roller or manually until complete impregnation of the fibres has occurred, avoiding the formation of wrinkling or air bubbles. After a few hours and in any case within 24-48 hours lay a second coat of adhesive allowing for complete encapsulation of the steel fabric in the resin matrix. Repeat the cycle if various reinforcement layers are required. Quartz sand may be applied over the final adhesive coating wet-on-wet if plaster or further adherent coverings are to be subsequently executed. In the presence of anchoring systems such as SFIX G connectors or other types of metal connectors the connection with the steel fabric must be carried out with suitable adhesive systems involving bonding or mechanical methods. Users may refer to the technical office for further details.
The final protection of the steel fabric , if provided for as RESINCOLOR coating, is applied after the adhesive has become touch dry.
Furthermore, it is good practice to let the steel fibre reinforcements overlap by at least 20 cm in the direction of the fibre itself. For bending and shear reinforcement follow the specific technical plan requirements.
The application temperature will be in the range of +10°C +35°C. Avoid application during the hotter hours on summer days, while it is raining or in the presence of frozen surfaces.

STEEL NET G – GALVANIZED STEEL WITH MORTARS (SRG)
Before starting an application cycle for structural reinforcement by means of cementitious, reactive, inorganic lime/pozzolanic matrices the support must be accurately prepared. See previous section also. Pre-existing plaster and any paint, varnish, oils and grease must be removed by scrub-brushing, power-washing or suitable and approved methods for surface roughening and specifically within the sector of cultural assets. If there are any missing sections or cavities in the surface and in the presence of serious irregularities or damage, these areas will have to be restored with suitable mortars, such as CONCRETE ROCK S or LIMECRETE.
Thoroughly moisten the support until it is saturated. This operation allows for a reduction in the transfer of water from the mortar, avoiding the formation of fissures and poor adhesion to the support.
For greater thicknesses of regularisation in roofed/vaulted and concrete tunnel structures a layer of gunite may be applied.
Apply the most suitable type of mortar for the work to be carried out for the required thickness, using a metal float, trowel or spray (CONCRETE ROCK V-V2 for concrete structures, CONCRETE ROCK S or LIMECRETE for masonry). The average thickness is 10 mm approx.
Position the STEEL NET G steel fabric in the fresh mortar, making sure the fabric is perfectly impregnated, and avoiding the creation of air bubbles. Then, apply a second layer of mortar totally covering the fabric and not waiting until first layer of the mortar is completely hardened. For the application of various layers of steel fabric it is necessary to proceed applying the materials on a fresh underlying layer as in the previous cycle. For the overlays follow the project requirements, however with a minimum of 20 cm in the direction of the fibre.
A reinforced surface may subsequently undergo further treatment, such as plastering, protection against external agents, etc.
In the presence of anchoring systems such as SFIX G connectors or other types of metal connector the connection with the steel fabric must be carried out with suitable adhesive or mortar systems involving bonding or mechanical methods. Users may refer to the technical office for further details.
The application temperature must be within the range +5°C +35°C. Avoid application during hot hours in the summer months and in the presence of a strong wind or frozen surfaces. The curing of the mortar must be facilitated with suitable forms of protection or curing systems in the presence of significant exposure to sunlight, wind and rain.

General rules to be followed during application
The final performance results of the structural reinforcement are closely linked to correct planning, the technical conformity of the materials, the care with which the cycle application phases are carried out and the quality of the laying procedure entrusted to specialized firms. In particular, with regard to application, attention must be paid to the following aspects:
• Carefully respect application times, temperatures and project requirements;
• Carry out correct preparation and regularization of the support;
• Perform a sight-check to verify perfect impregnation of the steel fabric in the mortar and adhesives;
• Do not allow the fabric to rise or become loosened, which may initiate local peeling and/or damage;
• Smooth out any significant pre-existing rough points or areas;
• Check for correct execution of anchoring that has been performed if required;
• Application in particularly aggressive environments requires an adequate protection of the system.

Refer to the technical department for any queries or further information.

Yield
Consumption is closely linked to project requirements, the condition of the support and the type of mortar and adhesive used. It is advisable to carry out on-site tests. Consult also the technical department.

Packing
STEEL NET G uni-directional, UHTSS steel fabric available in rolls 10, 15, 20 and 30 cm wide, with variable lengths depending on the type of product. Connectors SFIX G, diameter 10-12 mm in 10 m roll. Refer to the sales department for any queries or further information.

MATRICES
CONCRETE ROCK V-V2 reactive one-two components cement-based mortar in bags. CONCRETE ROCK S pozzolanic-reaction mortar in bags.
LIMECRETE pozzolanic-lime mortar in bags.
RESIN PRIMER, RESIN 90 bi-component epoxy adhesives in pails.

SFIX - G STEEL CONNECTOR

STEEL NET G UHTSS GALVANIZED STEEL

Caution

Apply the reinforcement systems within the temperature ranges indicated on the technical/data sheet.
Avoid application of the mortar system in direct sunlight, during the hotter hours in the summer period and in the presence of a strong wind. Adopt suitable methods to protect the curing of the mortar in environments with strong ventilation and exposure to light. Do not use the reinforcement systems in the presence of rainwater and in freezing weather.
Use protective gloves during application of the materials. The mortars and resin must not come into contact with the skin, mucous membranes and eyes. Use an impact-resistant mask or glasses.
All products and packing are strictly designed for professional use.
For further information refer to the technical/data sheets of the mortars and adhesives and to the corresponding safety information.

Storage

The STEEL NET G and SFIX G connectors can be stored for an unlimited period of time when fully protected. The adhesives and the mortars can be stored for at least 12 months when kept in their original sealed packaging in a warm environment.
The resins must be protected against freezing.



Concrete STEEL NET G reinforcement beam, column, tunnel



Masonry STEEL NET G reinforcement wall, vault, panel

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