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**FRP SYSTEM®**

**FRCM-SRG SYSTEM®**

Technology for structural reinforcement by composite systems carbon, glass, aramid, steel fiber with organic and inorganic matrix.

**OVERVIEW**

The term composite system FRP refers to materials composed of high-resistance, continuous fiber fabrics immersed in a polymeric matrix. Since the nineteen-fifties, these materials have been used worldwide on a large scale in aeronautical and mechanical engineering because of their very high level of mechanical performance. More recently, they have been used in other industrial sectors, and especially in the field of structural reinforcement of concrete, metal and masonry for civil and industrial buildings, bridges, tunnels, monuments.

The principle characteristics of the composite systems are high resistance to tensile strength, very good ductility and resistance to corrosion, high flexibility and very limited weight and thickness.

In the last years have been introduced in the international market different composites system like FRCM (carbon and AR glass grid) and SRG (UHTSS high resistance steel fabric) used with an inorganic matrix (like cementitious or structural lime) for structural reinforcement of building. The main advantages of these systems are high resistance, ductility, fire resistance, easy application on rough and moist surfaces.

**DESCRIPTION**

The FRP SYSTEM are wet lay up system using high-density carbon-fiber and pultruded laminate, E-AR glass or aramid strips glued to supports with special structural adhesives RESIN with superior mechanical characteristics. With both the plating and the wrapping methods of application, the system reinforces the structure where it is necessary to improve or restore static conditions, by increasing their resistance, load-bearing qualities and ductility, but without overloading the structure.

The FRCM-SRG SYSTEM are composite materials using carbon (C-NET), AR glass (G-NET) grids and steel fabric (STEEL NET) applied with special high resistance and adhesive mortar CONCRETE ROCK and LIMECRETE. These systems are particularly suitable for structures reinforcing with uneven, rough and moist surfaces (concrete and masonry), for fire resistance and with reduced weight and thickness. These systems are also compatible with historical building and monuments.

**MAIN USES**

The main applications of the FRP-FRCM-SRG SYSTEMS are in the following areas:

- Reinforcement of deflected structures like beams, slabs, knots, pillars:
  -- Reduction of loaded deflection, increase of load-bearing capacity, reduction of cracks under loading.

- Reinforcement of compressed structures like walls, pillars, columns, chimney stacks:
  -- Increase of compressive strength, flexural-compressive strength and ductility.

- Improvement of structures in seismic zones without increasing weight.

- Reinforcement and consolidation of weakened and damaged structures.

- Suitable for restoration of historical building like vaults, arches, domes, deflected masonry panels, etc.

In general, the reinforcing systems are suitable for concrete such as civil and industrial buildings, viaducts, bridges, car-parks, tunnels, hospitals, for masonry such as constructions, historical buildings and monuments, places of worship, for wood and metal structures.

**ADVANTAGES**

According with the system used many advantages are manifested:

- High level of mechanical characteristics and performances
- High chemical resistance to corrosion
- Increase of resistance to stress
- Reliability and long-life of the reinforced building
- Excellent applicability in moist environments
- High tear resistance also on rough and uneven substrates
- Reduced weight and thickness of the reinforcement
- Easily draped of fabrics and grids over structures and adapted to complex forms and uneven surfaces
- Easy application of the system without complex on-site management
- Limited reduction of permeability in frescoed vaults and walls
- Reduced time and costs of the works

**ENGINEERING AND TECHNICAL SUPPORT**

G&P intech has a worldwide and long term experience more than 30 years in the specific field of structural reinforcing. The Company has developed and designed through its R&D specific products and solutions tested in University Labs. and applied in thousands of works in different fields infrastructures, civil and industrial buildings, historical palaces and monuments. The Company gives to general contractors, engineers, designers, public administration, private contractors, specific and high qualified assistance and technical support for feasibility, project and realization on site. All materials and technologies supplied by the Company are certified and referenced according with the majors international norms DIN, ASTM, BS, ACI, CNR DT 200.
The main applications of the FRP-FRCM-SRG SYSTEMS are in the field of structural reinforcement of concrete, metal and monuments. The systems are particularly suitable for structures reinforcing with mortar CONCRETE ROCK and LIMECRETE. These systems consist of carbon-fiber and pultruded laminate, E-AR glass or aramid grids and steel fabric, laminates and rods with high-resistance, continuous fiber fabrics immersed in high-density RESIN with superior mechanical characteristics.

The FRP SYSTEM are wet lay up system using certified and referenced according with the majors international standards. All materials and technologies supplied by the Company are guaranteed according with quality support for feasibility, project and realization on site.

The Company has developed and designed through its R&D programs, with the assistance of contractors, specific and high qualified assistance and technical support for feasibility, project and realization on site. The Company gives to general contractors, specific and high qualified assistance and technical support for feasibility, project and realization on site.

The principle characteristics of the composite systems are reducing weight and thickness of the reinforcement. Excellent applicability in moist environments. High level of mechanical characteristics and performances.

The following inorganic matrix are technically approuved and certified to be used with carbon, glass, aramid and steel fabrics, laminates and rods.

<table>
<thead>
<tr>
<th>Type</th>
<th>Name</th>
<th>Weight (g/m²)</th>
<th>Elastic Modulus (GPa)</th>
<th>Tensile Strength (MPa)</th>
<th>Elongation at Break (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon pultruded rods</td>
<td>unnotched and improved bond</td>
<td>6-8-10-12</td>
<td>&gt; 150</td>
<td>&gt; 2300</td>
<td>&gt; 1,3-1,5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon pultruded laminates</td>
<td>LAMELLA</td>
<td>1,2-1,4</td>
<td>240-390-640</td>
<td>2600-3000-3800</td>
<td>0,4-0,8-1,5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon, Glass grids</td>
<td>un-bi directional</td>
<td>300-400</td>
<td>120</td>
<td>2900</td>
<td>2,5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aramid fabric</td>
<td>uni-bi directional</td>
<td>350-800</td>
<td>73</td>
<td>3400</td>
<td>4,5</td>
</tr>
<tr>
<td></td>
<td>A-SHEET</td>
<td></td>
<td>65</td>
<td>3000</td>
<td>4,3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steel fabric</td>
<td>uni-directional</td>
<td>765</td>
<td>190</td>
<td>3345</td>
<td>&gt;2,2</td>
</tr>
<tr>
<td></td>
<td>STEEL NET</td>
<td>1910</td>
<td>190</td>
<td>3345</td>
<td>&gt;2,2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anchoring system connector</td>
<td>aramid fiber AFFIX</td>
<td>6-8-10-12</td>
<td>110</td>
<td>1600</td>
<td>1,5</td>
</tr>
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<td></td>
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</tr>
</tbody>
</table>

**MAIN ADHESIVES**

The following adhesives are technically approuved and certified to be used with carbon, glass, aramid and steel fabrics, laminates and rods. The adhesives are produced according with EN 1504-4 european norm.

**RESIN PRIMER** primer bicomponent for porous surface.
**RESIN PRIMER** E primer bicomponent without solvent for any surface.
**RESIN 90** special bicomponent adhesive to smooth surface and glue steel and laminate.
**RESIN 75** special bicomponent adhesive to glue and impregnate fabric.

**MAIN USES**

- Improvement of structures in seismic zones without increasing weight.
- Increase of compressive strength, flexural-compressive columns, chimney stacks.
- Reinforcement of compressed structures like walls, pillars, arches, masonry and historical building.
- Concrete repair.
- Transportation, specific and high qualified assistance and technical support for feasibility, project and realization on site.

**OVERVIEW**

The term composite system FRP refers to materials composed of high-density RESIN with superior mechanical characteristics. With both carbon-fiber and pultruded laminate, E-AR glass or aramid grids and steel fabric, laminates and rods, the FRP SYSTEM are wet lay up system using certified and referenced according with the majors international standards.

**PROTECTION**

Protection products for installed fabrics, laminate, steel.
**RESINLAST** bicomponent elastic paint.
**RESINCOLOR** anticarbonation paint.

*Please check Company sales dept for exact type of products available on production (weight, roll width, packaging).*

info@gpintech.com
FRCM-SRG SYSTEM®

Carbon, Glass grids and Steel fabric with grouts certified systems

FRCM-SRG SYSTEM (*)

Grids and steel fabric to be used with inorganic matrix (cementitious CONCRETE ROCK and structural lime LIMECRETE).

Carbon grid uni-bi directional C-NET (filament)

<table>
<thead>
<tr>
<th></th>
<th>weight g/m²</th>
<th>Elastic modulus GPa</th>
<th>Tensile Strength MPa</th>
<th>Elongation at break %</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>100-170</td>
<td>240</td>
<td>&gt;4500</td>
<td>&gt;1,5</td>
</tr>
<tr>
<td>200</td>
<td>200-220</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>220</td>
<td>220-240</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

AR Glass grid bidirectional G-NET (filament)

<table>
<thead>
<tr>
<th></th>
<th>weight g/m²</th>
<th>Elastic modulus GPa</th>
<th>Tensile Strength MPa</th>
<th>Elongation at break %</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>120-220</td>
<td>65-74</td>
<td>&gt;3000</td>
<td>&gt;3</td>
</tr>
<tr>
<td>220</td>
<td>220-320</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

STEEL FABRIC UHTSS uni-directional STEEL NET

<table>
<thead>
<tr>
<th>TYPE</th>
<th>weight g/m²</th>
<th>Elastic modulus GPa</th>
<th>Tensile Strength MPa</th>
<th>Elongation at break %</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>80-190</td>
<td>190</td>
<td>3345</td>
<td>&gt;2,2</td>
</tr>
<tr>
<td>190</td>
<td>190-3345</td>
<td>190</td>
<td>3345</td>
<td>&gt;2,2</td>
</tr>
</tbody>
</table>

Anchoring system connector aramid fiber AFIX

<table>
<thead>
<tr>
<th></th>
<th>diameter mm</th>
<th>Elastic modulus GPa</th>
<th>Tensile Strength MPa</th>
<th>Elongation at break %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>6-8-10-12</td>
<td>110</td>
<td>1600</td>
<td>1,5</td>
</tr>
<tr>
<td>8</td>
<td></td>
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<td>10</td>
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<tr>
<td>12</td>
<td></td>
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</tbody>
</table>

Upon request are available different connectors on carbon, glass, steel fiber (CFIX-GFIX-SFIX).

INORGANIC MATRIX

The following inorganic matrix are technically approved and certified to be used with carbon and glass grids and steel fabrics. The matrix are produced according with EN 1504-3 R4 for cementitious mortar and EN 998-2 for lime mortar (European norm).

CONCRETE ROCK W cementitious mortar with reactive nano compound additives specific for low thickness, no-shrinking, high resistance and adhesion to the support, sulphates resistant.

CONCRETE ROCK V-V2 cementitious mortar one or two components no-shrinking with high resistance for concrete repair.

LIMECRETE lime hydraulic mortar and render with high resistance and adhesion to the support for masonry and historical building.

LIMECRETE FR lime hydraulic mortar and render for low thickness with high resistance and adhesion to the support for masonry and historical building.

*Please check Company sales dept for exact types of products available on production (weight, roll width, packaging).

info@gpintech.com

For any additional information on the products please contact the Company or consult the web site: www.english.gpintech.com.
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