



**COMPOSITE
GROUP**
CHELYABINSK

**WORKING WITH US IS EASY!
IN FACT, IT'S EVEN EASIER THAN THAT!**

Designer and manufacturer of composite
construction materials.

ABOUT US:

Composite Group Chelyabinsk, LLC — the research and production company, producer of composite construction materials for industrial, civil and road engineering;

- We are ranked among the five of the largest companies in Russia, producing composite construction materials;
- The products of Composite Group Chelyabinsk, LLC are manufactured according to state standard of the Russian Federation (GOST 31938-2012) and has all necessary certificates, conforming quality, compliance to fire norms and compliances of products to uniform sanitary and epidemiologic and hygienic requirements to goods;
- 35% of our products are shipped for export;
- We deliver to the largest federal DIY networks in Russia: Leroy Merlin and Saturn;
- We are the one and only producer of composite rebar and mesh in Russia with the implemented ISO 9001:2015 management system with compliance certificate issued by the

German expert organization TÜV SÜD, the world leader in the field of examination, tests and certification;

- We provide a guarantee for the product as we have a contract of insurance of responsibility for the quality of the manufactured products;
- We were at the origin of the production of glass - and basalt fiber reinforces polymer in Russia since 2012;
- We deliver to the objects with public funding;
- We release one new product at least once a year, constantly expanding a line of the products;
- We are one of five companies in Russia having experience of implementation of composite construction materials in projects of high-rise building construction;
- We get support from the Government of the Russian Federation at the regional and federal levels;
- We hold patents for the inventions confirming uniqueness of our technology.
- We are one of three companies in Russia having all evidential base of efficiency of application of a composite masonry grid in the high-floor construction.



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WHY COMPOSITE REINFORCEMENT?

1. Up to 50% cheaper than an equal in strength steel analog, economy is reached due to reduction of expenses not only for material, but also expenses for delivery, assembly, and handling operations;
2. Lighter than steel by 3.5-4 times with an equal diameter and by 8-10 times with an equal in strength diameter;
3. Stronger than steel rebar in terms of tensile strength by 3 times;
4. Does not corrode. It is resistant to corrosion, alkalis, acids, which guarantees lack of cracks and destruction of concrete structures owing to the internal tension arising at corrosion of steel reinforcement.
5. It is durable. The term of operation is not less than 80 years.
6. The best indicators of thermal insulation and energy efficiency. Heat conductivity of composite reinforcement is equal to 0.46 W/sq.m, and of metal one - 40-60 W/sq.m, i.e. 100 times higher - composite reinforcement unlike metal one do not create cold bridges and, as a result, increases energy efficiency of construction;
7. It is waste-free since it is delivered in coils of 50/100 running meters and it is cut into necessary size, it allows to save up to 5% of the total amount of reinforcement on overlaps.
8. More simply and more economically in transportation, reinforcement with diameter up to 10 millimeters is delivered twisted in coils weighing about 8-10 kilograms. In such form reinforcements are transported in a luggage boot of a passenger car or by a light commercial vehicle.
9. More simply at installation and cutting. Workers with the minimum use of materials and tools can make knitting of reinforcement. Composite reinforcement is possible to cut with cutoff tool, and small diameters are cut by scissors or nippers.
10. Does not create electromagnetic interference. It is radiotransparent and a nonconductor of electricity.
11. Its thermal-expansion coefficient is similar to that of concrete, therefore composite rebar does not destroy concrete, unlike metal rebar, which gradually distorts concrete at temperature increase due to the difference of thermal expansion coefficients.
12. It is eco-friendly. At production of composite reinforcement a carbon dioxide is emitted by 40 times less, than at production of metal.
13. Does not lose durability under low temperature impact. Range of operational temperatures is from -70 °C to +100 °C.
14. It is steady against seismological activity of the earth. Fiber reinforcement do not lose its main technical characteristics even at the earthquake, so it is the best choice for reinforcing of concrete pavements.
15. Increases bearing capacity of a bricklaying. The last tests proved that the composite masonry mesh increases bearing capacity of a bricklaying.



EQUAL IN STRENGTH SUBSTITUTION

The term “diameter of composite rebar equal in terms of strength” means the outer diameter of composite rebar corresponding to steel rebar of a given diameter in terms of strength.

Metal-to-Fiberglass Reinforcement Substitution Table

Metal (class A-III (A400C))	Composite polymer fiberglass reinforcement (CFR)
6 A-III	4 FRP
8 A-III	5,5 FRP
10 A-III	6 FRP
12 A-III	8 FRP
14 A-III	10 FRP
16 A-III	12 FRP
18 A-III	14 FRP
20 A-III	16 FRP

Comparative Characteristics of Fiberglass and Steel Reinforcement Bars

Characteristics	Metal (class A-III (A400C))	Fiber Reinforced Polymer bar (FRP)
Material	Steel	Glass roving, epoxy resin based polymer
Tensile Strength, MPa	390	1,000 – 1,300
Modulus of elasticity, Mpa	200,000	50,000
Relative extension, %	25	2.2
Density t/m ³	7	1.9
Coefficient of linear expansion at*10-5/°C	13-15	9-12
Temporary tensile strength, MPa	360	From 750
Corrosion resistance	Corroding	Non-corroding material, 1st group of chemical resistance, including the alkaline environment of concrete
Thermal conductivity	Transcalent	Non- transcalent
Electrical conductivity	electroconductive	Non-electroconductive dielectric
Available profiles, mm	6-80	4-20
Rebar length, m	6-12	Any manufactured length, available in rods and coils
Environmental friendliness	Environmentally friendly	No harmful and toxic substances emission
Lifetime	According to building standards about 50 years	Not less than 100 years (estimated)
Parameters of equally efficient reinforcing frame with a load of 25 t / m ²	For 8 A-III steel rebar the cell size is 14 x 14 cm, the weight is 5,5 kg/m ²	For 8 FRP the cell size is 23 x 23 cm, the weight is 0,61 kg/m ² (9 times less)

Application

- In concrete frames of buildings and structures for various purposes;
- For light and heavy concrete (foam concrete, cover slabs, floor slabs, and monolithic foundations);
- For layered brickwork;
- As anchors for fastening external thermal wall insulation for buildings;
- For foundations below the grade level;
- As meshes and bars in structures;
- As flexible bracings for three-layer stone walls of civil, industrial, and agricultural buildings and structures where such walls include a base layer, a veneered layer, and a layer of rigid insulation;
- For strengthening the shoreline;
- For construction of maritime and port facilities;
- For installation of drainage, reclamation, and sanitation networks;
- For installation of the roadbed and fencing structures;
- For construction of research centers and medical institutions that may require the use of equipment that is sensitive to electromagnetic oscillations;



Composite masonry mesh

Composite masonry mesh, produced by the Composite Group Chelyabinsk, LLC— one of the best offers which replaced steel reinforcements. The difficulties connected with use of metal reinforcements laid the foundation of search for alternative materials. Corrosion of steel reinforcements in concrete due to the humid environment, influence of chemicals and salts leads to severe damages and destruction of reinforced concrete structures. Concrete coatings, rooms with the increased humidity, port structures, industrial floors, pavings made of concrete, etc. belong to such structures.

Composite masonry mesh is a product manufactured of corrosion-resistant composite basalt fiber or glass fiber reinforcing circular section rods with a diameter from 2,5 to 6 mm crossed and fastened with each other at a right angle. The sizes of formed cells can be 50x50, 100x100, 150x150 millimeters. The mesh is delivered in the form of special sheets (plates) with sizes 1500x380, 1500x500, 2000x500 and 2000x1000 millimeters or coils of 15, 25, 50 or 100 meters in length.

Application

Reinforcing at Housing and civil engineering:

- manufactured concrete structures: internal and external wall panels, including multilayered concrete wall panels (sandwich panels), floor slab panels, beams;
- concrete floors;
- horizontal seams in a laying of building and construction walls;
- connection of layers from brick facing with the main layer of cellular blocks;
- decorative concrete and gypsum elements;
- a plaster layer at construction of facades of buildings;
- other construction elements based on concrete, plaster.

Reinforcing at industrial engineering:

- manufactured concrete structures: internal and external wall panels, including multilayered concrete wall panels (sandwich panels), floor slab panels, beams;
- concrete floors;
- hydraulic structures, coastal constructions;
- brick and stone walls of buildings and constructions;
- decorative concrete and gypsum elements;
- other construction elements based on concrete, plaster.

Reinforcing at road construction:

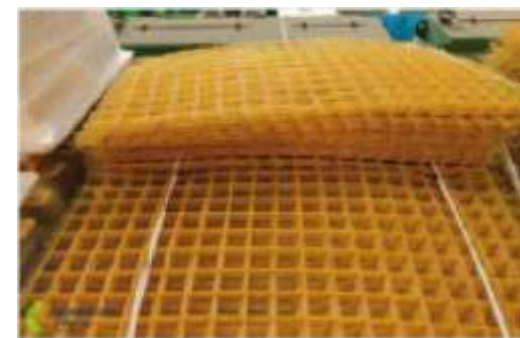
- road slabs;
- motor ways, bridges.



Advantages

- high strength: having an identical diameter of a rod with metal mesh, the composite one is capable to maintain higher loads of stretching, bending and pulling out of a wall, i.e. it is 3-4 times stronger; High corrosion and chemical resistance: high capacity to resist chemicals, salts and corrosion even under conditions of high humidity and hostile environment;
- light: the weight of the most widespread metal mesh (50*50*3 mm, 0.5*2 m) is equal to 2.22 kg, the similar mesh made from composite reinforcement (50*50*2.5 mm, 0.5*2 m) weighs 272 gs, i.e. it is 8 times lighter;
- low heat conductivity - 0.46 W/sq.m, while for metal this indicator is equal to 40-60 W/sq.m, that is about 100 times higher. It means that metal meshes being inside a wall act as cold bridges and reduce energy efficiency of designs. Application of a composite mesh allows eliminating this defect;
- reliability and durability: according to research reports, the factor of strength reduction under humidity conditions over a period of 100 years is equal to 1.25 that corresponds to strength retention by 79.6%;
- high bond strength with concrete due to a periodic profile of a bar;
- dielectric;
- do not magnetize;
- environmental friendliness: at production of a composite masonry mesh a carbon dioxide is emitted by 40 times less, than at production metal;

At disturbance of a concrete structure holds its shape, preventing further destruction of an object.



Comparative Features of Composite Fiberglass Mesh Reinforcement and metal mesh

Characteristics	Composite reinforcement mesh	Metal wire mesh
Cell size, mm	50x50, 100x100	
Diameter of the rod (wire), mm	2,5	4,0
Breaking strength, Mpa	1300	570
Breaking tension of the rod, kgf	600	720
Coefficient of elongation, %	2,50	2,50
Coefficient of heat conductivity, W/(m*°C)	0,46	56,00
Mass of unit area, g/m2	272	2220
Mesh width, mm	to 2000	-
Electric conductivity	dielectric	conductor
Corrosion resistance	stable	Susceptible to corrosion
Magnetic characteristics	does not magnetize	susceptible to magnetization
Bonding strength, kgf		
- shear strength	30	not subject to regulation
- pull-out strength	20	not subject to regulation



Reinforcement frame START SYSTEM

Reinforcement frame START SYSTEM have been developed as a replacement for a heavy reinforcing mesh used in construction, and for conventional reinforcement with long and expensive process of “knitting” at the building site .

Origin of technology

Initially, START SYSTEM composite frames were developed by order of a major construction company from the Netherlands. But over time, due to its unique qualities (ideal geometry, strength, lightness and quick operation with the START SYSTEM frame), these products have become increasingly used by construction companies in Russia. In the process of development, the technical specialists of COMPOSITE GROUP Chelyabinsk have developed a unique system of free ends, with the help of which the frames are very easily fastened together according to the Lego principle. In 2016, COMPOSITE GROUP Chelyabinsk LLC received patents for utility model No. 171315 and No. 171313 for the manufactured START SYSTEM frames.



Manufacturing technique

High-precision made in Russia equipment enables perpendicular tying of FRP rods by means of Thermal Welding technology. Tying does not deform bars and enables flatness and rigidity of the frame geometry. Rods are typically made of ribbed or sand-coated FRP rebar for better adhesion with concrete.

Application and Advantages

Composite reinforcement frames START SYSTEM functionally replace steel reinforcement with a bigger diameter of rod in reinforcing of concrete structures in a variety of applications. The advantages are as follows:

- ~35% cost-cutting compared to heavier pre-welded steel frames
- FRP frames are pre-welded so there is no need to tie rebar on-site
- up to 9 times lighter if used with an equal in strength diameter of FRP
- up to three times stronger in terms of tensile strength
- FRP frames do not corrode and efficiently resist to concrete's alkaline environment
- free ends enable fast and efficient connection of sheets to form vast even surfaces
- enhanced adhesion with concrete due to ribbed/sanded shape of rods
- frames may be up to 12 meters long which enables enormous speed of installation
- improved, less time-consuming, more comfortable and more cost-efficient logistics with much faster mobility around the construction site
- This technology was widely used by private developers. They use it to accelerate the process of "knitting" of the frame when reinforcing the strip foundation.



Composite flexible ties

Flexible ties are glass-fiber (with a periodic profile) or basalt-fiber (covered with a continuous layer of quartz sand or having a sand coating at the ends of a flexible connection) reinforcing bars of circular cross section. Thanks to periodic profiles or a sand coating that has good adhesion to the brick masonry mortar, a flexible tie is firmly fixed in the brickwork. In addition, the sand coating significantly increases the corrosion resistance of the tie surface.

Application and Advantages

The role of flexible tie is to connect the inner wall through the thermal insulation and/or air gap with the facing wall into a single whole.

- When using flexible ties from composite materials, they do not act as “cold bridges” unlike steel ones and heat losses are reduced up to 34%, which significantly reduces the heating cost of buildings and structures. Composite materials conduct 0.46 W / m^2 of heat, while metal - 56 W / m^2 , i.e. composite flexible connections, conduct more than a hundred times less heat in comparison with elements based on metal;
- Flexible connections do not rust and are not subject to corrosion.
- Low density. Composite ties are three times lighter compared to metal ties, this allows to reduce the load on the foundation of the structure
- Service life and reliability. Flexible ties 3 times stronger than metal-based structures and retain their characteristics even in hostile operational environments;
- Financial gain. Flexible connections are cheaper than metal analogues.
- Fire safety. According to the results of the studies, the structures fully comply with GOST 30247.0–94 30247.1–97 in terms of fire safety and fire resistance.



Types of flexible ties

Flexible ties are available in diameters of 4, 5.5 and 6 mm, lengths from 100 to 600 mm, depending on the project.

- flexible ties for single-level brickwork
- flexible ties for insulation of monolithic buildings
- flexible ties for warming buildings from aerated concrete, foam concrete, silicate or ceramic bricks with the creation of a ventilated gap and without it
- flexible ties for the production of TEPLOSTEN blocks



Dowel for insulation (mushroom) IZS

Dowel for fastening of thermal insulation with a glass-fiber nail.

Material: dowel - impact resistant polypropylene, nail – glass-fiber flexible tie.

It is used for fastening heat-insulating materials to concrete, solid and hollow bricks, stone, foam concrete. It consists of a dowel with a two-segment spacer, which has an enlarged pressure washer with a diameter of 60 mm and a glass-fiber nail that prevents the formation of such phenomenon as a cold bridge. It is used at installing heavy types of insulation or overthick insulation.



Application Portfolio

Transportation and Logistics Complex Yuzhnouralsky, Chelyabinsk region, Uvelsky district

Reinforcing of a foundation plate more than 77000 sq.m in area was made



Housing estate of enhanced comfort category.

Reinforcing of an underground parking foundation plate



Reinforcing of a floating floor screed at the first floor of premises



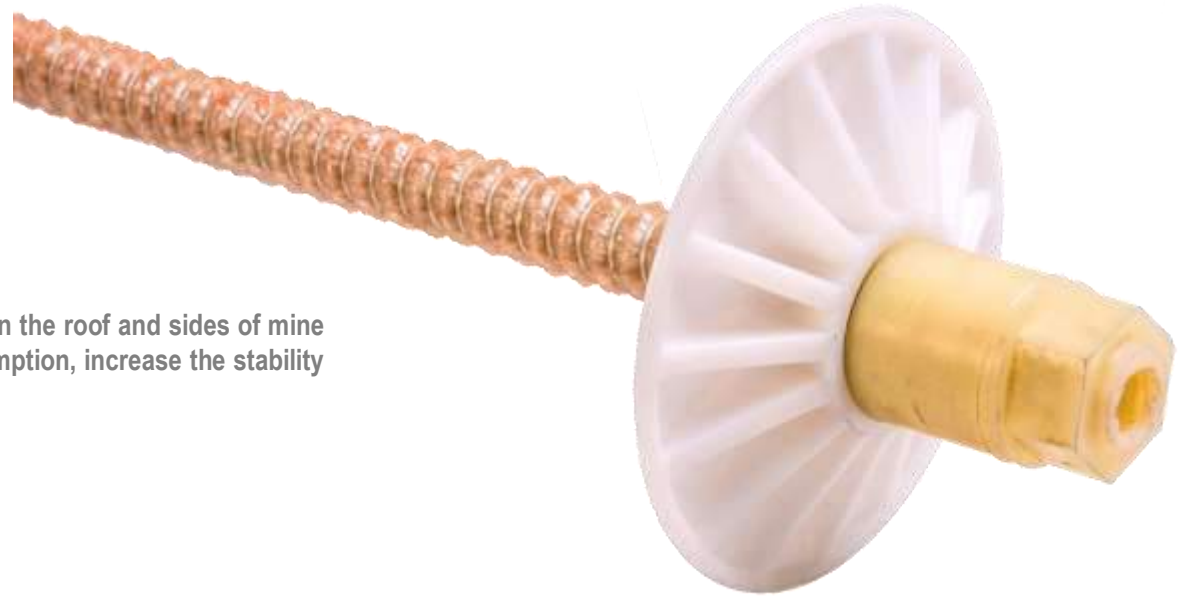
Application of flexible ties for arrangement of a three-layer brickwork with thermal insulation



Modern housing estate of enhanced comfort category. Kazakhstan, Astana. Reinforcing of floor screeds in living and technical rooms



Glass Fiber Reinforced Polymer Rock Anchor (pit barring)



GFRP Rock Anchor is designed for binding and strengthening the array in the roof and sides of mine workings. The use of rock anchors can significantly reduce metal consumption, increase the stability of workings, reduce labor intensity and increase the speed of workings.

The main advantages of the GFRP Rock Anchor are the following:

- The tensile strength of the composite GFRP Rock Anchor is 2 times higher than that of the steel counterpart;
- Composite GFRP Rock Anchor is 4 times lighter than steel, which makes it easier to transport and install;
- The presence of a cut-off membrane on the nut greatly simplifies the installation process of the Anchor;
- The complete absence of metal in the structure of the support eliminates the possibility of friction sparking;
- GFRP Anchor elements are easily destroyed by the executive bodies of combines without damaging the mechanisms and conveyors; - High corrosion and chemical resistance of the Anchor allows it to be used for a long time in aggressive environments;
- Lower price compared to steel counterparts.



Application Portfolio

GFRP Rock Anchors in apatite mines



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Russian regulatory documents providing rules for usage of composite materials in construction

1. GOST 31938-2012 Fiber-Reinforced Polymer Bar for Concrete Reinforcement. General Specifications.
2. SP 295 1325800.2017 Concrete Structures Reinforced With Polymer Composite Rebar (Fiberglass Reinforced Plastic - FRP).Regulations On Design
3. SP 63.13330.2012 Concrete and reinforced concrete structures. Basic provisions. The revised edition of Construction Norms and Regulations 52-01-2003 (with modification No. 1) Calculation of designs with composite polymeric fittings.
4. SP 15.13330.2012 Masonry and Reinforced Masonry Constructions
5. SP 28.13330.29012 Protection of Building Constructions Against Corrosion



Product Documentation

1. Certificate of Quality Conformity to GOST 31938–2012 certifying composite fiberglass rebar;
2. Report on Scientific and Research Activity “Testing of composite fiberglass reinforcement of FRP of Ø8 mm grade for compliance with GOST 31938 requirements”;
3. Conformity Certificate to requirements of Technical Specifications TU 2296-001-21638592-2015, certifying composite mesh reinforcement;
4. Conformity Certificate to GOST54923-2012 certifying composite flexible ties for multilayered enclosing structures;
5. Conformity Certificate to a Quality Management System for Design, Development and Production Of Composite Polymer Products Intended for Reinforcement of Building Structures and Elements in Civil, Industrial, Road Construction, issued by the Certification Body of TÜV SÜD Management Service GmbH;
6. Conformity Certificate to Fire-Hazard Regulations



Quality Control of Products Manufactured by COMPOSITE GROUP CHELYABINSK

It is recognized that the major characteristic of composite rebar is its tensile strength, and by this parameter the composite rebar is three times better than the metal one. But hardly anybody make account of the fact that breaking properties of the finished product are based on the roving used for manufacturing of composite rebar. It is the roving that gives composite rebar such properties, for this reason we test breaking properties first of all before using a certain raw material in production. All raw materials that arrive to the Company passes quality control at the laboratory operating at the same manufacturing site. The laboratory is run by our business partner, the company "MELTROC" (meltrock.ru).

All output products are examined by the Quality Control Department of our company for their external characteristics. Besides, we constantly perform product tests of samples, conduct laboratory tests. For this purpose we have permanent agreements with the Research and Development Institute of Construction Materials and the Laboratory of Construction Materials of the South Ural State University.

Quality Management System ISO 9001-2015 is implemented in our company. In 2017, following the development strategy adopted at the Company, COMPOSITE GROUP CHELYABINSK initiated implementation and application of the quality management system of ISO 9001:2015.

The most authoritative company in the field of examination, tests and certification in the world, the German expert entity TÜV SÜD was engaged as the expert auditor. TÜV SÜD has a 150-year history. On December 21, 2017, COMPOSITE GROUP CHELYABINSK received a certificate for the following scope: Design, development, production and sale of composite polymeric products intended for reinforcing of building structures and elements in civil, industrial, and road construction.



Report of composite reinforcement tests at the South Ural State University



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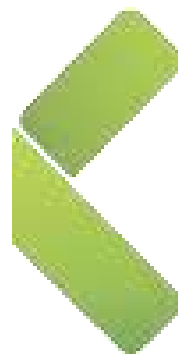
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