



Fibre-reinforced plastic rebar is an innovative construction material

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COMPOSITE GRID DESCRIPTION

Perm

Introduction

High-tensile nonmetallic grid of composite materials is a new reinforcing element for construction works.

Fiberglass grid constitutes an extra strong rods from 2 to 6 mm in diameter, bound in meshes from 50 to 200 mm. The width of output forms makes up from 500 to 1000 mm. The length of finished grid can reach 50 meters (composite grid of such length is produced in rolls).

The composite fiberglass grid is designed for application in concrete structures instead of traditional steel one.

Field of application

1. Composite grid is applied in accordance with the requirements of project documentation for structures of buildings and constructions of different purposes.
2. Composite grid is designed for application in industrial-civil, road construction.
3. Application in concrete structures of buildings and constructions of various purposes.
4. For use in light and heavy concretes (foam concretes, floor slabs, roof slabs, in monolithic foundations).
5. As coil mesh when erecting stone walls of buildings in civil, industrial and agricultural construction.
6. Bank protection.
7. Offshore and dock-side structures.
8. Sewage, reclamation and water removal.
9. Nonmetallic composite grid can be applied in structures designed for operation in aggressive mediums and under conditions of ground currents influence.
10. Road pavement and guardrail.
11. Chemical industry infrastructure components.
12. When erecting houses of fixed shutters.
13. Temperature range of operation of structures made of concrete with composite grid is from -50°C to +60 °C.
14. Composite grid can be applied in underground constructions structures, erected in cut-and cover manner.

Nonmetallic composite grid application increases the structure operation term 2-3 times in comparison with metallic one application, especially when aggressive mediums influence on them, including containing chloride salts, caustics and acids.

Metallic grid constituting reinforced concrete products and structures – is the most responsible, and also the most weak and vulnerable chain. Under the influence of moisture and concrete caustic medium, the caustic grid starts to corrode that results in limitations in service life, necessity to perform repairs and finally in reinforced concrete products destruction. At this, to provide the reinforced concrete structures service life, they apply fiberglass grid that allows to increase the service life of the erected construction facilities.

General requirements to concrete structures with nonmetallic grid

In concrete structures the nonmetallic composite grid can be applied in the form of flat grid, massive frames.

In terms of corresponding technical and economical assessment it is allowed to apply a mixed reinforcement (nonmetallic and metallic grid).

In case of concrete autoclaved hardening with composite grid the thermal and moisture treatment should be performed at the temperature 80-85°C.

Concrete structures with nonmetallic grid should be supplied with the required reliability from arising of all types of limit states by calculation, materials selection, sizing and construction according

to the requirements. At this they should observe technological requirements when manufacturing the structures, requirements on operation of buildings and constructions set by corresponding regulatory documents.

Grid designation

In grid designation – Fiberglass grid (diameter), mm, mesh (mesh size).

Composite grid parameters.

Indexes	Nominal value	Designation of test assessment reference	Test results
1	2	3	4
Deviation from nominal sizes: -Mesh length, mm -Mesh width, mm	±3	GOST10922-2012	от -2 до +3 от -2 до +2
Deviation from linearity longitudinal and cross bars in grid	not more than 6 m at 1 m rod length		corresponds
Number of unfixed bar crosses at the area of 1 m ² of the grid.	not more than 2.0		corresponds
Polymer glass-composite reinforcement of deformed section with 2 mm diameter			
Physical form figures	Spalls, segregation, cavities, scuffing with coiling tear, pinchers from mechanical effect with the damage of fibers – not allowed	GOST31938-2012	corresponds
Tensile strength, MPa	not less than 800		aver. 806,9
Modulus of elasticity in tension, GPa	not less than 50		aver. 51,87
Compression resistance, MPa	not less than 300		aver. 305,7
Polymer glass-composite reinforcement of deformed section with 2,5 mm diameter			
Physical form figures	Spalls, segregation, cavities, scuffing with coiling tear, pinchers from mechanical effect with the damage of fibers – not allowed	GOST31938-2012	corresponds
Tensile strength, MPa	not less than 800		aver. 807,9
Modulus of elasticity in tension, GPa	not less than 50		aver. 51,1
Compression resistance, MPa	not less than 300		aver. 307,9

Ser. No	Parameter	
1	Density, kg/m ³	1950
2	Elongation at fracture, %	2.2
3	Thermal expansion coefficient 1/°C	1x10 ⁻⁵
6	Static transverse rupture stress, MPa	800
8	Specific electrical resistance, Ohm·m	1x10 ¹⁵
9	Electric strength, kV/mm	14
10	Coefficient of heat conductivity, W /m° K	0.45

Materials for concrete structures with nonmetallic grid

Concrete

For concrete structures with nonmetallic grid on should apply heavy and light concretes of the following classes and grades:

Class on compressive strength: B7,5; B10; B15; B20; B25; B30; B35; B40; B45; B50; B55; B60

Class on direct tensile strength: B_t0,8; B_t1,2; B_tJ,6; B_t2,0; B_t2,4; B_t2,8; B_t3,2;

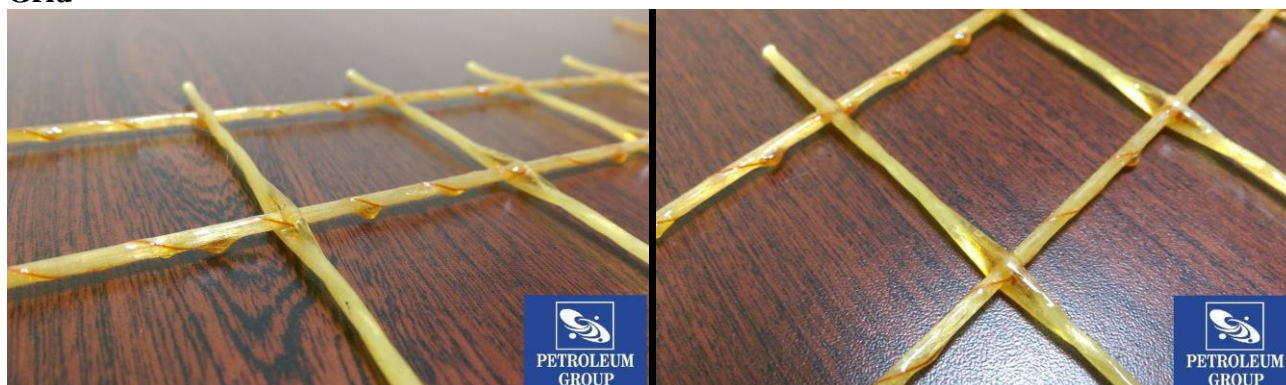
Grades on freeze-thaw resistance: F50; F75; F100; F150; F200; F300; F400; F500;

Grades on waterproof: W2; W4; W6; W8; W10; W12.

Concrete grade on freeze-thaw resistance: for above ground structures, at average negative temperature of outer air in winter time from minus 5 to minus 40 °C, accept not lower than F75; when the average negative temperature below minus 40°C, concrete grade on freeze-thaw resistance is set with a special ground, when the average temperature above minus 5°C, concrete grade is not rated.

Concrete grade on waterproof for above ground structures, when the average negative temperature of outer air in winter time is above minus 40°C, and also for external walls of heated buildings is not rated.

Grid



Nonmetallic composite grid constitutes a bundle of fibers (glass or basalt), located along the rod and interconnected one with another with a polymer (solidified thermosetting material), fixed into the meshes from 50 mm to 200mm.

Nonmetallic composite grid is supplied in rolls and froms.