

COMPOSITES FOR CONSTRUCTION

The State Atomic
Energy Corporation
ROSATOM



ROSATOM

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Compozit company is an official partner of ROSATOM which incorporates Russia's unique industrial sites for carbon fiber manufacture.

COMPOSITE MATERIALS FOR STRUCTURAL REHABILITATION AND STRENGTHENING

EXTERIOR REINFORCEMENT SYSTEM

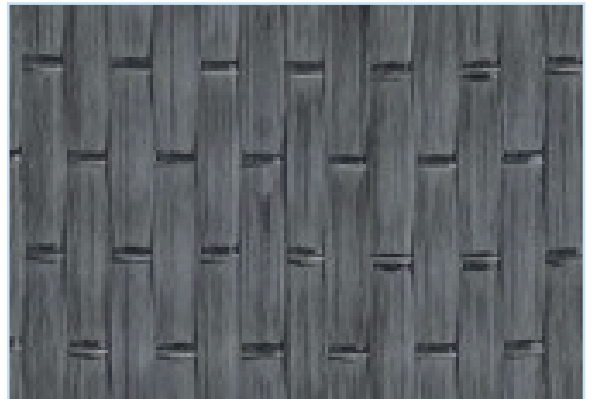
Exterior reinforcement with carbon fibrous composite materials is used to repair and enhance load-bearing structures in buildings.

Advantages:

- Easy to use
- Light weight
- High strength
- Corrosion resistance
- High durability
- Reduced time and labour consumption for repairs
- No need to suspend the use of buildings for repairs

+1,000 buildings and structures in Russia have been renovated with Exterior Reinforcement Systems. One of the components in Exterior Reinforcement System is unidirectional fabrics.

Unidirectional carbon tapes are textiles with 75% of their fibers oriented in the same direction. This improves structural performance with loads applied along the predefined vector.



Carbon fiber FibArm Tape-230/150
 Carbon fiber FibArm Tape-230/300
 Carbon fiber FibArm Tape-230/600
 Carbon fiber FibArm Tape-530/150
 Carbon fiber FibArm Tape-530/300
 Carbon fiber FibArm Tape-530/600



Structural Reinforcement System on the base of carbon fiber tapes

Type	Unidirectional Carbon fiber Tape for Structural Reinforcement System		
Application	<ul style="list-style-type: none"> Structural strengthening, restoration, reconstruction, repair, seismic retrofitting of reinforced concrete / concrete, masonry, metal (steel), wood constructions Increasing the load capacity of reinforced concrete / concrete, masonry, metallic and wooden structures (including complex geometric shapes, as well as in confined spaces) without increasing their weight Increased seismic resistance 		
Features	<ul style="list-style-type: none"> Wide range of application Universality of application, including corner joints, as well as on curved surfaces Lightweight, system does not create an additional load on construction Corrosion resistance Minimum labor and time spent on work Ability to perform repairs without interrupting the operation of buildings or structures No additional costs for further operation 		
Documents	1916-018-61664530-2013		
Technical details	Fiber type	High strength CF	
	Width, mm	150	300 600
	Fiber Direction	0°	
	Weaving style	plain	
	Areal weight, g/m²	230 / 530 ± 10%	
	Warp	12K / 24K Carbon	
	Weft	Glass fiber (thermo fixed)	
	Thickness, mm	0,128 / 0,294	
	Ends warp, 10 cm.	64 ± 1 (12K) / 32 ± 1 (24K)	
	Ends weft, 10 cm	10 ± 1	
	Tensile strength (fiber), Gpa	≥ 4,9	
	E-modulus (fiber), Gpa	≥ 245	
	Elongation at break, %	≥ 1,8	
	Roll length, m	50	
Package	1 roll in cardboard		
Best before	No limited		

FibArm Lamel HS 12/50
 FibArm Lamel HS 14/50
 FibArm Lamel HS 12/100
 FibArm Lamel HS 14/100



Structural Reinforcement System on the base of carbon fiber laminates

Type	High strength carbon fiber laminates for Structural Reinforcement System FibArm				
Application	<ul style="list-style-type: none"> Structural strengthening, restoration, reconstruction, repair, seismic retrofitting of reinforced concrete / concrete, masonry, metal (steel), wood constructions Increasing the load capacity of reinforced concrete / concrete, masonry, metallic and wooden structures (including complex geometric shapes, as well as in confined spaces) without increasing their weight Increased seismic resistance Structural strengthening of bridges 				
Features	<ul style="list-style-type: none"> High mechanical characteristics Wide range of application Lightweight, system does not create an additional load on construction Corrosion resistance Minimum labor and time spent on work Low transportation cost Ability to perform repairs without interrupting the operation of buildings or structures No additional costs for further operation 				
Documents	TY 2256-063-61664530-2015				
Technical details	Fiber type	High strength CF			
	Resin	Epoxy			
	Fiber content, %	> 65			
	Fiber Direction	0°			
	FibArm Lamel HS	12/50	14/50	12/100	14/100
	Width, mm	50	50	100	100
	Thickness, mm	1,2	1,4	1,2	1,4
	Cross section, mm²	60	70	120	140
	Tensile strength, MPa	≥ 3500			
	E-modulus, GPa	≥ 170			
	Roll length, m	100 (or upon request)			
	Package	1 roll in cardboard			
	Best before	No limited			

FibArm Resin 230+

Two-component epoxy system for impregnation and bonding.

Use for structural reinforcement in construction



Application	<ul style="list-style-type: none"> Structural adhesive with high wettability, suitable for bonding tapes and fabrics of carbon, glass, aramid, basalt fiber, pultruded and high resistance steel plates Suitable for application on vertical or overhead Limitation for fabrics and tapes by areal weight – up to 300 g/m² 		
Processing	Mechanical mixing at low speed or manual mixing until complete homogenization of the two components. Application by roller or brush. The treatment with a primer is not necessary, but the surfaces must be properly prepared by removing all the unstable parts and appropriately regularized. Do not use on wet surfaces		
Description	Two-component epoxy filled system, medium viscosity. Easy to use 2:1 ratio by weight and by volume. After mixing the two components gives a thixotropic system with excellent vertical hold. The coloration in contrast allows to easily highlight the correct mixing. The system cure even at low temperatures (still above 10°C) and presents no surface oiliness		
EN 1504-4	FibArm Resin 230+ meets the performance requirements of legislation EN 1504-4 for bonding and structural reinforcement		
Features	<ul style="list-style-type: none"> Composition with improved mechanical characteristics Easy application and mixing – the ratio of 2:1 by volume and weight Designed specifically for the FibArm system High mechanical properties High adhesion to different surfaces: concrete, masonry, metal, wood, stone Convenient for impregnating tapes and fabrics manually Does not require a primer Solvent free 		
System specification		Resin	Hardener
	Colour	White-Ivory	Dark grey
	Viscosity (25°C), mPas	65 000-110 000	45 000-85 000
	Density (25°C), g/ml	1,27-1,31	1,25-1,29
	Mixing ratio (Wt/Wt)	2	1
	Pot life (200 ml; 50mm), min	20-25	
	Compressive strength (EN 12190), MN/m²	65-97	

Typical system characteristics	Mix viscosity	Thixotropic
	Maximum applicable thickness (EN 1799), mm	9
	Open time of bonding (EN 12189), min	65-105
	Working time (6 kg of mixed system on 4 cm of thickness) EN ISO 9514, min	+10°C: 85-95
		+20°C: 35-40
		+30°C: 20-25
	Suggested application temperature	10-35°C
	Curing time, days	+10°C: 15
+20°C: 5		
+30°C: 3		
Waiting time for over-application with chemical adhesion, hrs	+10°C: 12-24*	
	+20°C: 6-18*	
	+30°C: 3-12*	
* Working times are influenced by site conditions		
Properties determined on standard specimens cured 7 days at room temperature	System colour	Light grey
	System density (25°C), g/ml (ASTM D792)	1,28-1,35
	Flexural Modulus of Elasticity (25°C), MPa (EN ISO 178 / ASTM D790)	2500-3100
	Shear strength (snatch, plate-plate steel, 25°C), MPa (EN 12188)	>14
	Glass transition temperature (ASTM D3418)	54-60°C
	Maximum using temperature in continuous	45-50°C
	Total shrinkage for structural system, % (EN 12617-3)	<0,1
Sales Package	System is sold in packs Component A: 18 kg Component B: 9 kg	
Instructions	Add the appropriate amount of hardener to the resin and mix thoroughly by hand or machine in low speed, using waterproof gloves and goggles. The product reacts more rapidly in mass, therefore it is recommended after mixing of the sales packages to transfer the product into a wide basin to increase, if necessary, the working time. Apply with roller or spatula	
Requirements for tapes and fabrics	Apply with a roller or trowel on the surface to be strengthened, properly prepared and not wet. Applying the reinforcement tape or fabric, taking care to arrange the fibers taut and wrinkle free, protect hands with waterproof gloves. Roll the surface with spiked rollers ensuring the proper impregnation. Install a second resin layer to complete saturation and incorporation of the reinforcement. Repeat several times stratification as defined in the project. Do not exceed recommended maximum thickness provided for this product. Any overlap must be carried out on partially hardened system within the times reported in this TDS to ensure chemical bond between the two layers. Where it's necessary to adhere to the cured reinforcement system with plaster or other building systems, add dusting granulated quartz (0,7-1,2 mm) to the system surface when is not completely hardened	
Precautions	Consult the safety precaution and comply with the provisions relating to industrial hygiene and waste disposal	

FibArm Resin 530+

Two-component epoxy system for impregnation and bonding.

Use for structural reinforcement in construction



Application	<ul style="list-style-type: none"> Structural adhesive with high wettability, suitable for bonding tapes and fabrics of carbon, glass, aramid, basalt fiber Suitable for application on vertical or overhead Use with tapes and fabrics with high areal weight 		
Processing	Mechanical mixing at low speed or manual mixing until complete homogenization of the two components. Application by roller or brush. The treatment with a primer is not necessary, but the surfaces must be properly prepared by removing all the unstable parts and appropriately regularized. Do not use on wet surfaces		
Description	Two-component epoxy unfilled system, low viscosity. Recommended to use saturator for impregnating of the tapes and fabrics with high areal weight		
EN 1504-4	FibArm Resin 530+ meets the performance requirements of legislation EN 1504-4 for bonding and structural reinforcement		
Features	<ul style="list-style-type: none"> Composition with improved mechanical characteristics Designed specifically for the FibArm system High mechanical properties High adhesion to different surfaces: concrete, masonry, metal, wood, stone Convenient for impregnating tapes and fabrics with high areal weight manually Does not require a primer Solvent free 		
System specification		Resin	Hardener
	Colour	Light	Light
	Viscosity (25°C), cps (LVT#4 60rpm)	2300-3200 (LVT#4 60rpm)	10-40 (LVT#1 60rpm)
	Density (25°C), g/ml	1,10-1,20	1,00-1,10
	Mixing ratio A/B (Wt/Wt)	100	30

System specification	Maximum applicable thickness (EN 1799), mm	3
	Open time of bonding (EN 12189), min	80-150
	Working time (6 kg of mixed system on 4 cm of thickness) EN ISO 9514, min	+10°C: >100
		+20°C: >50
		+30°C: >30
	Suggested application temperature	10-35°C
	Curing time, days	+10°C: 15
+20°C: 7		
+30°C: 5		
Waiting time for over-application with chemical adhesion, hrs	+10°C: 12-24*	
	+20°C: 6-18*	
	+30°C: 3-12*	
* Working times are influenced by site conditions		
Properties determined on standard specimens cured 24 hours at room temperature + post curing at 80°C for 8 hrs	System colour	Light yellow
	Tensile strength, MPa (ASTM D638/ISO527)	72-87
	Tensile Modulus, MPa (ASTM D638/ISO527)	2900-3500
	Shear strength (snatch, plate-plate steel, 25°C), MPa (EN 12188)	>10
	Glass transition temperature (ASTM D3418)	73-88°C
	Maximum using temperature in continuous	45-50°C
Sales Package	System is sold in packs Component A: 15 kg Component B: 4,5 kg	
Instructions	Add the appropriate amount of hardener to the resin and mix thoroughly by hand or machine in low speed, using waterproof gloves and goggles. The product reacts more rapidly in mass, therefore it is recommended after mixing of the sales packages to transfer the product into a wide basin to increase, if necessary, the working time. Apply with roller or spatula	
Requirements for tapes and fabrics	Apply with a roller or trowel on the surface to be strengthened, properly prepared and not wet. For fabrics impregnation is recommended to use saturator. Applying the reinforcement tape or fabric, taking care to arrange the fibers taut and wrinkle free, protect hands with waterproof gloves. Roll the surface with spiked rollers ensuring the proper impregnation. Install a second resin layer to complete saturation and incorporation of the reinforcement. Repeat several times stratification as defined in the project. Do not exceed recommended maximum thickness provided for this product. Any overlap must be carried out on partially hardened system within the times reported in this TDS to ensure chemical bond between the two layers. Where it's necessary to adhere to the cured reinforcement system with plaster or other building systems, add dusting granulated quartz (0,7-1,2 mm) to the system surface when is not completely hardened	
Precautions	Consult the safety precaution and comply with the provisions relating to industrial hygiene and waste disposal	

FibArm Resin Laminate+

Two-component epoxy system for bonding laminates.

Use for structural reinforcement in construction



Application	<ul style="list-style-type: none">Structural adhesive with high wettability, suitable for bonding pultruded and high resistance steel platesSuitable for application on vertical or overhead		
Processing	Mechanical mixing at low speed or manual mixing until complete homogenization of the two components. Application by roll, spatula or face casting. The treatment with a primer is not necessary, but the surfaces must be properly prepared by removing all the unstable parts and appropriately regularized. Do not use on wet surfaces		
Description	Two-component epoxy filled system. The contrasting color between resin and hardener allows an easy control of the correctness of the mixing, The system cures at room temperature even with high relative moisture		
EN 1504-4	FibArm Resin Laminate+ meets the performance requirements of legislation EN 1504-4 for bonding and structural reinforcement		
Features	<ul style="list-style-type: none">Composition with improved mechanical characteristicsDesigned specifically for the FibArm systemHigh mechanical propertiesHigh adhesion to different surfaces: concrete, masonry, metal, wood, stoneDoes not require a primerSolvent free		
System specification		Resin	Hardener
	Colour	White	Black
	Viscosity (25°C), Pas (EN 13702-2)	280-380	500-1200
	Density (25°C), g/ml	1,75-1,85	1,50-1,60
	Mixing ratio (Wt/Wt)	100	25
	Pot life (500 ml, 25°C), min	30-40	

Properties determined on standard specimens cured 24 hours at room temperature + 15 hours 60oC	System colour	grey
	System density (25°C), g/ml (ASTM D792)	1,73-1,77
	Flexural strength, MPa (ASTM D790)	45-50
	Flexural Modulus of Elasticity (25°C), MPa (EN ISO 178 / ASTM D790)	6500-7500
	Shear strength (snatch, plate-plate steel, 25°C), MPa (EN 12188)	>14
	Glass transition temperature (ASTM D3418)	52-58°C
Sales Package	System is sold in packs Component A: 24 kg Component B: 6 kg	
Instructions	Add the appropriate amount of hardener to the resin and mix thoroughly by hand or machine in low speed, using waterproof gloves and goggles. The product reacts more rapidly in mass, therefore it is recommended after mixing of the sales packages to transfer the product into a wide basin to increase, if necessary, the working time. Apply with spatula	
Precautions	Consult the safety precaution and comply with the provisions relating to industrial hygiene and waste disposal	

FibArm Resin HT+

Two-component epoxy system for impregnation and bonding with high thermal resistance.

Use for structural reinforcement in construction



Application	<ul style="list-style-type: none"> ■ Structural adhesive with high wettability, suitable for bonding tapes and fabrics of carbon, glass, aramid, basalt fiber ■ Suitable for application on vertical or overhead ■ Heated surfaces up to 110°C 		
Processing	Mechanical mixing at low speed or manual mixing until complete homogenization of the two components. Application by roller or brush. The treatment with a primer is not necessary, but the surfaces must be properly prepared by removing all the unstable parts and appropriately regularized. Apply on dry surfaces		
Description	Two-component epoxy unfilled system, low viscosity with high elastic modulus. Long pot life. The curing at moderate temperature is suggested to obtain the best system performance		
EN 1504-4	FibArm Resin HT+ meets the performance requirements of legislation EN 1504-4 for bonding and structural reinforcement		
Features	<ul style="list-style-type: none"> ■ High thermal resistance ■ Composition with improved mechanical characteristics ■ Designed specifically for the FibArm system ■ High mechanical properties ■ High adhesion to different surfaces: concrete, masonry, metal, wood, stone ■ Convenient for impregnating tapes and fabrics manually ■ Does not require a primer ■ Solvent free 		
Typical system characteristics		Resin	Hardener
	Colour	Pale/yellow	Pale/yellow
	Viscosity (25°C), mPas	6000-8000	50-100
	Density (25°C), g/ml	1,13-1,17	0,93-0,97
	Mixing ratio (Wt/Wt)	100	35
	Pot life (100 ml; 40mm), min	240-280	
	Suggested curing cycles	6h 85°C	

Properties determined on standard specimens cured 6 h 85°C	System colour	Pale yellow
	System density (25°C), g/ml (ASTM D792)	1,12-1,16
	Max. recommended operating temperature	100°C
	Flexural strength (25°C), MPa (ASTM D790)	120-130
	Flexural Modulus of Elasticity (25°C), MPa (ASTM D790)	2900-3200
	Shear strength (snatch, plate-plate steel,25°C), MPa (EN 12188)	>14
	Glass transition temperature (ASTM D3418)	107-113°C
	Maximum Tg (15h 120oC)	117-123°C
Sales Package	System is sold in packs Component A: 20 kg Component B: 7 kg	
Instructions	Add the appropriate amount of hardener to the resin and mix thoroughly by hand or machine in low speed, using waterproof gloves and goggles. The product reacts more rapidly in mass. Apply with roller	
Requirements for tapes and fabrics	Apply with a roller or trowel on the surface to be strengthened, properly prepared and not wet. Applying the reinforcement tape or fabric, taking care to arrange the fibers taut and wrinkle free, protect hands with waterproof gloves. Roll the surface with spiked rollers ensuring the proper impregnation. Install a second resin layer to complete saturation and incorporation of the reinforcement. Repeat several times stratification as defined in the project. Do not exceed recommended maximum thickness provided for this product. Any overlap must be carried out on partially hardened system within the times reported in this TDS to ensure chemical bond between the two layers. Where it's necessary to adhere to the cured reinforcement system with plaster or other building systems, add dusting granulated quartz (0,7-1,2 mm) to the system surface when is not completely hardened	
Precautions	Consult the safety precaution and comply with the provisions relating to industrial hygiene and waste disposal	

FibArm Resin WS+

Two-component epoxy system for impregnation and bonding on wet surfaces.

Use for structural reinforcement in construction



Application	<ul style="list-style-type: none"> ■ Structural adhesive with high wettability, suitable for bonding tapes and fabrics of carbon, glass, aramid, basalt fiber, pultruded and high resistance steel plates ■ Suitable for application on vertical or overhead ■ Limitation for fabrics and tapes by areal weight – up to 300 g/m² ■ Wet surfaces 	
Processing	Mechanical mixing at low speed or manual mixing until complete homogenization of the two components. Application by roller or brush. The treatment with a primer is not necessary, but the surfaces must be properly prepared by removing all the unstable parts and appropriately regularized	
Description	Two-component epoxy filled system, medium viscosity. Easy to use 2:1 ratio by weight and by volume. After mixing the two components gives a thixotropic system with excellent vertical hold. The coloration in contrast allows to easily highlight the correct mixing. The system cure even at low temperatures (still above 10°C) and presents no surface oiliness	
EN 1504-4	FibArm Resin WS+ meets the performance requirements of legislation EN 1504-4 for bonding and structural reinforcement	
Features	<ul style="list-style-type: none"> ■ Wet surfaces application ■ Composition with improved mechanical characteristics ■ Easy application and mixing - the ratio of 2:1 by volume and weight ■ Designed specifically for the FibArm system ■ High mechanical properties ■ High adhesion to different surfaces: concrete, masonry, metal, wood, stone ■ Convenient for impregnating tapes and fabrics manually ■ Does not require a primer ■ Solvent free 	
System specification	Resin	Hardener
	Colour	Grey
	Viscosity (25°C), mPas	25 000-85 000
	Density (25°C), g/ml	1,59-1,63
	Mixing ratio (Wt/Wt)	1
	Pot life (100 ml; 40mm), min	
	40-50	

Properties determined on standard specimens cured 24h at room temperature + 15 h 60°C	System colour	Light grey
	System density (25°C), g/ml (ASTM D792)	1,58-1,62
	Flexural strength (25°C), MPa (ASTM D790)	70-80
	Flexural Modulus of Elasticity (25°C), MPa (ASTM D790)	6500-7500
	Shear strength (snatch, plate-plate steel, 25°C), MPa (EN 12188)	>14
	Glass transition temperature (ASTM D3418)	80-85°C
Sales Package	System is sold in packs Component A: 10 kg Component B: 5 kg	
Instructions	Add the appropriate amount of hardener to the resin and mix thoroughly by hand or machine in low speed, using waterproof gloves and goggles. The product reacts more rapidly in mass, therefore it is recommended after mixing of the sales packages to transfer the product into a wide basin to increase, if necessary, the working time. Apply with roller or spatula	
Requirements for tapes and fabrics	Apply with a roller or trowel on the surface to be strengthened, properly prepared. Applying the reinforcement tape or fabric, taking care to arrange the fibers taut and wrinkle free, protect hands with waterproof gloves. Roll the surface with spiked rollers ensuring the proper impregnation. Install a second resin layer to complete saturation and incorporation of the reinforcement. Repeat several times stratification as defined in the project. Do not exceed recommended maximum thickness provided for this product. Any overlap must be carried out on partially hardened system within the times reported in this TDS to ensure chemical bond between the two layers. Where it's necessary to adhere to the cured reinforcement system with plaster or other building systems, add dusting granulated quartz (0,7-1,2 mm) to the system surface when is not completely hardened	
Precautions	Consult the safety precaution and comply with the provisions relating to industrial hygiene and waste disposal	

Carbon fiber FibArm Grid 150/1200
 Carbon fiber FibArm Grid 260/1200
 Carbon fiber FibArm Grid 600/1000
 Carbon fiber FibArm Grid HS 600/1000



Structural Reinforcement System on the base of carbon fiber grids

Type	Carbon fiber Grid for Structural Reinforcement System FibArm				
Application	<ul style="list-style-type: none"> Structural strengthening, restoration, reconstruction, repair, seismic retrofitting of reinforced concrete / concrete, masonry, metal (steel), wood constructions Increasing the load capacity of reinforced concrete / concrete, masonry, metallic and wooden structures (including complex geometric shapes, as well as in confined spaces) without increasing their weight Increased seismic resistance 				
Features	<ul style="list-style-type: none"> Wide range of application Universality of application, including corner joints, as well as on curved surfaces Lightweight, system does not create an additional load on construction Corrosion resistance Minimum labor and time spent on work Ability to perform repairs without interrupting the operation of buildings or structures No additional costs for further operation Non flammable 				
Documents	1916-020-61664530-2013				
Technical details	Name	FibArm Grid 150/1200	FibArm Grid 260/1200	FibArm Grid 600/1000	FibArm Grid HS 600/1000
	Fiber type	High strength CF			
	Cell size, mm	10 x 20			
	Fiber Direction	0° / 90°			
	Areal weight, g/m²	150 ±10%	260 ±10%	600 ±10%	600 ±10%
	Width, mm	1200	1200	1000	1000
	Warp	12K	24K	50K	50K
	Weft	12K	24K	48K	48K
	Tensile strength(warp),MPa*	2600	2600	1900	2300
	Tensile strength (weft),MPa*	2100	2100	2900	2300
	Tensile strength (fiber), GPa	≥ 4,9**			
	E-modulus (fiber), GPa	≥ 245			
	Elongation at break, %	≥1,8			
	Roll length,m	50			
	Package	1 roll in cardboard			
Best before	No limited				

* Prepreg-ACM test method

** Tensile strength (fiber) for the warp of FibArm Grid 600/1000 -4,3 GPa

COMPOSITE REINFORCEMENT BARS

Round reinforcement bars (rebars) are sand-coated rods. The reinforcing material for composite rebars can be as follows:

- Carbon fiber
- Glass fiber
- Basalt fiber
- Hybrid solution (combination of the above)

Applications:

- Chemical plant infrastructure
- Concrete frameworks of buildings
- Construction of various-purpose foundations
- Reinforcement of buildings' brickwork
- Reinforcement of floors
- Road construction
- Marine and port-based facilities
- Seawater supply conduits

Results of use:

- Tensile strength 3 times as high as A400 steel rebars
- Corrosion resistance
- High durability
- Low thermal conductivity
- Linear expansion coefficient similar to that of concrete
- 9 times as light as steel (with equally efficient replacement)

Economic benefits:

- Logistic costs reduced 5-9 times due to light weight
- Composite rebars need no dedicated machinery for installation
- Reduced installation time
- Fabrication can be moved closer to a major industrial site (nuclear energy industry as an example)



DISCONTINUOUS CARBON FIBER

Discontinuous carbon fiber is fine-cut fibers 10 ± 5 mm long; shredded fiber with fragment lengths ranging from 0 to 3 mm, 6 mm, 12 mm, 20 mm.

Applications:

- Civil and industrial construction
- Waterworks, tunnels
- Dry mix ingredient (repairs, mortaring)
- Industrial floors and surface cast
- Roadbuilding: asphalt concrete

Results of use:

- Enhanced compressive, tensile and bending strength of concrete
- No shrinkage fracturing
- Improved frost resistance
- Enhanced shock resistance

Economic benefits:

- Cheaper concrete with better structural performance
- Reduced weight of structures



MODULAR POLYMERIC ROAD SURFACES

Plastic road plates are a structural polymeric material with high stress-strain performance and unique snap-fit joints, which makes it a perfect substitute for concrete slabs.

Applications:

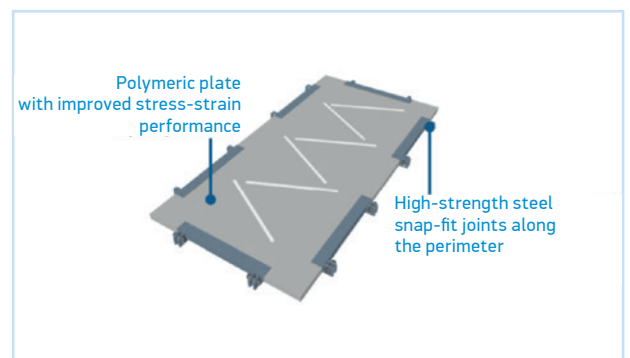
- Arrangement of quick-to-make passageways
- Construction of temporary service roads
- Setting up drilling sites
- Parking lot for special-purpose machinery
- Helipads

Results of use:

- Manual installation as an option - mobility
- Reduced dismantling time; easy relocation of plates
- Minimum preparation required for the groundwork base
- Turnover: 50 times
- Repairability

Economic benefits:

- Sustainable use of natural resources — recycling
- Resistance to aggressive environment



COMPOSITE SHEET PILES

Sheet piles are structural elements with shaped cross-section geometry and snap-fit joints against lateral soil load.

Applications:

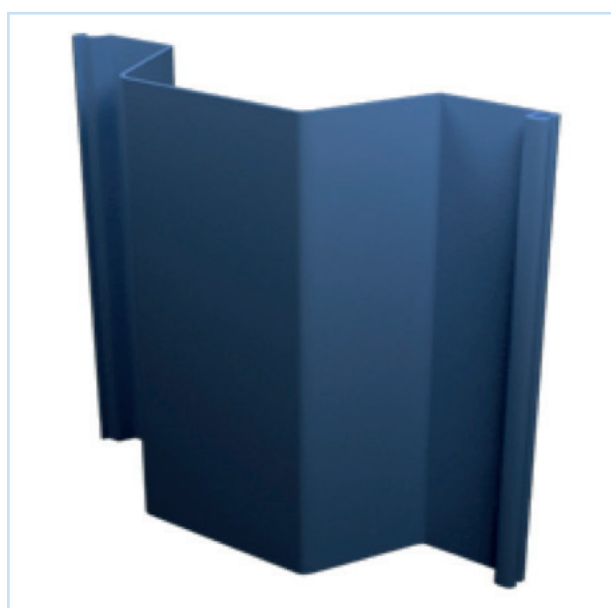
- Groundwater cut-off curtain
- Protection against snowmelt water and floods
- Moorage and jetty construction
- Setting up manmade areas
- Dykes to divide and distribute streams

Results of use:

- Light weight - 4 times as light as equivalent
- High corrosion resistance
- Easy to install
- Fabrication can be set up at a capital construction site, e.g. in nuclear energy industry

Economic benefits:

- 30% cost saving on the material adopted in a design solution
- 50 years' service life
- Delivery to hard-to-reach locations



COMPOSITE LIGHT POLES

A composite light pole is a tubular load-bearing element of a lamppost. It can substitute items made of conventional materials, such as zinc and concrete.

Applications:

- Light pole
- Road sign support

Results of use:

- Resistance to road dressing chemicals
- Manual relocation enables installation on hard-to-reach slopes
- Corrosion free
- High UV resistance
- Pleasing aesthetics

Economic benefits:

- 30% cost saving on the material adopted in the design solution
- +50 years' service life
- Delivery to hard-to-reach location



ASSORTED STRUCTURAL SHAPES

A structural shape is a bar of diverse geometry, which, in terms of strength, can substitute its equivalents made of steel, like

- Channel beam
- H-beam
- Shaped, round, corrugated tube
- Plate with or without snap-fit joints
- Angle bar

Applications:

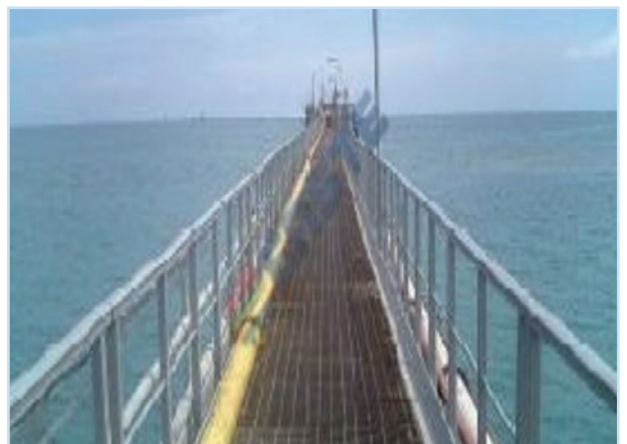
- Stairwells
- Noise-control screens
- Ladders
- Radio masts
- Fencing
- Dielectric elements

Results of use:

- High durability
- Light weight, specific weight 4 times less than steel
- High chemical resistance
- Easy to assemble
- Radiolucent

Economic benefits:

- Modular design
- Reduced time for construction
- Extended failure-free service
- Cost saving when adopted in a design solution



POLYMER COMPOSITE ITEMS

Items made of polymer composite shapes are a solution leveraging the geometrical diversity of structural shapes:

- Handrails
- Cooling tower fencing
- Mast-mounted structures
- Stairwells

Rich potential to fabricate structures of unique geometry and sophistication, deploying such features as

- Radiolucency
- Radiation shielding
- No corrosion
- High frost resistance
- Enhanced structural strength
- Adjustable stress-strain performance without changing the geometry



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