

Durostone® FRP Rebar

Fibre-reinforced composite rebars

For corrosion-free, high strength, durable and very economic structures



Building industry

New

In cooperation with



ASA.TEC



Durostone® FRP Rebar

High performance reinforcement bars

Durostone® FRP Rebar. The new generation of fibre-reinforced composite reinforcement bars. Combine extremely high strengths with low weight and longer service life. Specially developed for demanding applications that require high mechanical stability and corrosion resistance from reinforcement bars.

Available as:

- Durostone® GFRP Rebar – Glass-fibre-reinforced plastic (GFRP)
- Durostone® BFRP Rebar – Basalt-fibre-reinforced plastic (BFRP)

Significantly reduced maintenance and service life costs compared to conventional steel rebars.

FRP REBAR
Fiber Reinforced Polymer Reinforcement Bar



Durostone® BFRP Rebar

Reference projects



Project Tangier – Morocco

Establishment of a container harbour on the Atlantic coast of Morocco. Durostone® BFRP Rebars were used in concrete slabs as near surface reinforcement. This position is most exposed to sea water and as a result the area most susceptible to corrosion. The slabs form the upper termination of a 2.6 km quay wall.



Port of Miami tunnel project

Construction of two tunnel tubes and connection to the existing road network. The tunnel connects Watson Island with the container and cruise ship harbour of Miami to Dodge Island. Durostone® BFRP Rebars were used to reinforce two retaining walls, which withhold high impact loads in the entry and exit area of the Watson Island side of the tunnel in the event of accidents.

For demanding fields of application

Durostone® FRP Rebars were especially developed for demanding fields of application in aggressive environments, where reinforcement bars have to withstand permanently high mechanical and corrosive loads. Durostone® FRP Rebars have outstanding properties for such requirements. For example:

Corrosion resistance



Building structures next to sea and in coastal regions which are exposed to severe corrosion:

harbour installations, docks, underwater tunnels, desalination plants, breakwaters, embankments, quay walls, windmills, roads and buildings and concrete roadbases exposed to sea spray

Alkali-resistance & durability



All concrete structures and transport routes exposed to frost and thawing saltwater:

bridge decks, road construction, air fields, concrete casings, flood protection walls; canals and harbour basins (fresh water engineering), lock walls, dam projects

Chemical resistance



Structures in aggressive chemical media environments:

Sewage treatment and biogas plants, refineries, paper mills, sewer systems, underground garages also without floor coatings, industrial floor slabs, agrarian buildings such as silage and fertiliser silos

Easy machinability



Special civil engineering, tunnel construction, mining and inner-city infrastructure buildings:

temporary and permanent anchors. Easy cuttability for tunnel-boring machines (TBM) in soft eyes, concrete reinforcement for underground railway construction and road tunnels, rock face stabilisation, soil nails, anchor pins, diaphragm walls, bored piles

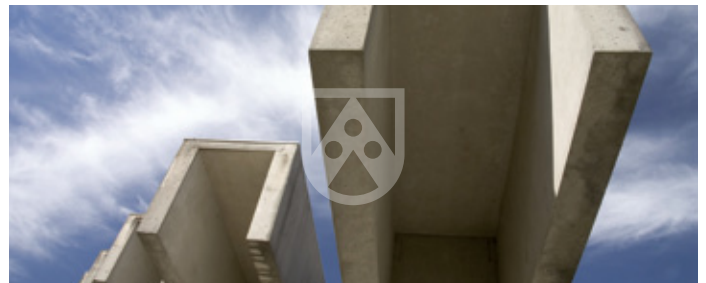
No conductivity & no frequency disturbance



Sensitive functional areas in which electric and thermally non-conductive, induction-free, non-magnetic or signal-permeable reinforcements are necessary:

high voltage installations, transformer buildings, railway and airport structures, slab roadways, frequency sensitive switching and control installations, telecommunications infrastructures, industrial systems with driverless transport systems, medical and research institutions

High tensile strength & minimum component thickness



Prestressing technology:

Durostone® BFRP Rebars with basalt fibre reinforcing are especially suitable for prestressing technology with very high tensile strength

Filigree and solid prefabricated concrete parts:

lightweight material for core-insulated double walls, sandwich elements, solid concrete panels and façade elements with high quality design surfaces. Concrete preformed structures in tunnel construction, sewer pipes, shaft accesses, concrete sleepers

Your advantages when using fibre-reinforced Durostone® FRP Rebars in your construction projects



High corrosion resistance – NO RUST

- Permanent alkali and chemical resistance and high acid resistance, also in very demanding environments
- Resistant to concrete carbonation and in the event of acidic impact, e. g. aggressive mountain water or industrial waste water
- Prevents concrete spalling and protects static structural parts



High economic efficiency – REDUCTION OF LIFE CYCLE COSTS

- Significantly reduced maintenance and service life costs
- Considerably lower to no repair and replacement costs
- More quality, but no higher construction costs; instead, savings potential compared to steel
- Cost reduction of structures through minimal requirements for concrete covering (rod diameter + 10 mm), through possible use of conventional concrete qualities or through elimination of expensive additives and protective coatings
- Up to fourfold savings in transport costs due to 73 % lower deadweight



Greater mechanical stability with low weight – HIGH STRENGTH

- Enormous tensile strength and first class durability of mechanical properties
- Very good bond strength properties for ideal force transmission
- Lightweight material with only 27 % of the weight of steel
- Minimised deadweight of concrete structures. Permits filigree structures
- Much easier and less dangerous handling on building sites



High safety and functionality

- No electric or electromagnetic conductivity
- No magnetism and no disruption of sensitive electronic installations
- Transparent for radar and radio waves
- Very low heat conductivity, as a result avoidance of thermal bridges
- Easy machinability. Easy cutting properties of the reinforcement prevents damage to tools and machinery in civil engineering and tunnel construction



Long service life and extremely high quality – SUSTAINABLE

- High quality corrosion resistant fibres and highly durable quality resins and the precise Durostone® FRP Rebar manufacturing process ensure outstanding qualities and an innovative building material with uniquely bundled properties
- Sturdy, durable composite reinforcement in concrete
- Much longer service life for heavily stressed structures



Production range

- Standard sizes: 10 mm, 13 mm, 16 mm, 19 mm, 25 mm, 32 mm
- Other tailor-made sizes available on request

Durostone® FRP Rebar

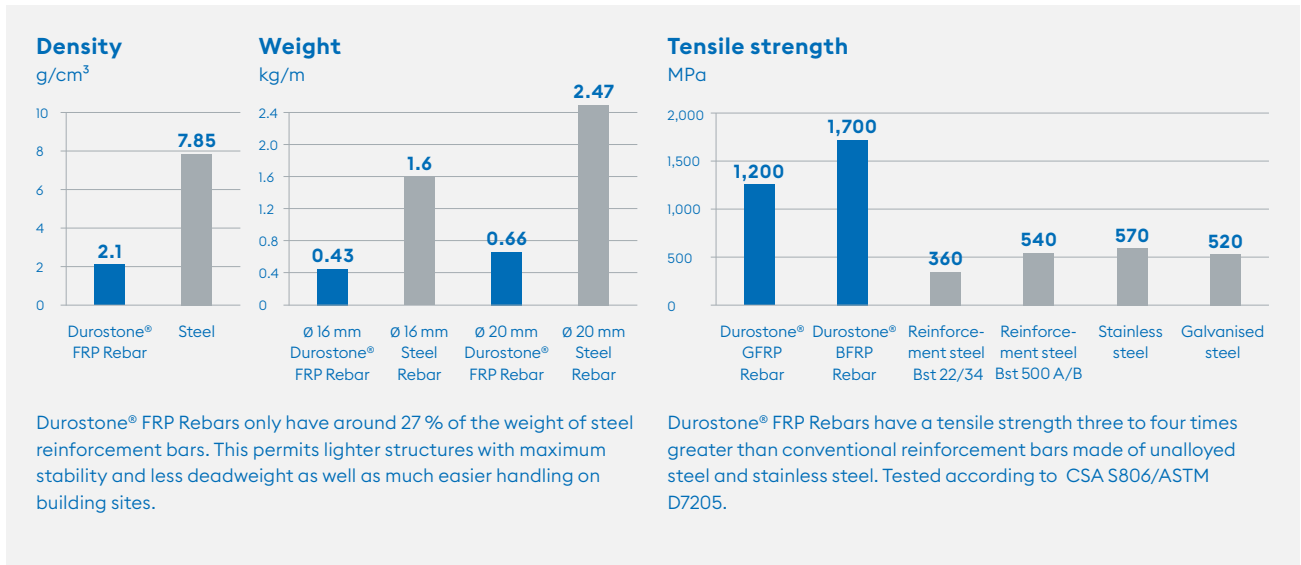
High performance replacement for reinforcement bars made of:

- **Inox stainless steel**
- **Epoxy coated steel**
- **Galvanised steel**
- **Black steel/ reinforcement steel**



Advantages of Durostone® FRP Rebar non-metallic reinforcement

Durostone® FRP Rebar fibre-reinforced reinforcement bars possess a range of properties that are much better than those of steel, such as **resilience – lightness – mechanical strengths – durability...**



Technical data – Durostone® GFRP Rebar

	Norm	Imperial Metric	#3 [10 mm]	#4 [13 mm]	#5 [16 mm]	#6 [19 mm]	#8 [25 mm]	#9 [32 mm]
Tensile strengths*	CSA S806	MPa	> 1,200	> 1,200	> 1,200	> 1,200	> 1,000	> 1,000
	ASTM D7205	ksi	174.0	174.0	174.0	174.0	159.5	159.5
Minimum modulus of elasticity*	CSA S806	GPa	> 63					
	ASTM D7205	ksi	9,137					
Breaking elongation	ASTM D7205	%	1.7 % – 2.3 %					
Shear strength	CSA S806	MPa	> 185					
	ASTM D7617	ksi	26.8					
Bond strength to concrete	CSA S806	MPa	> 20					
	ASTM D7913	psi	> 2,610					
Resin matrix			Vinylester					
Weight/length		g/m	193	312	489	711	1,191	1,806
		lb/ft	0.130	0.2093	0.328	0.478	0.801	1.214
Cross-sectional area	CSA S806	mm ²	92	148	233	339	567	860
	ASTM D7205	in ²	0.143	0.230	0.361	0.525	0.879	1.333
Nominal cross-sectional area	CSA S807	mm ²	71	129	199	284	510	819
	ASTM D7957	in ²	0.110	0.200	0.308	0.440	0.791	1.269

* According to ASTM D7205, the "tensile strength" is defined as the average tensile strength of a defined production unit minus three-times the standard deviation.

**According to ASTM D7205, "minimum elasticity module" is defined as the average module of a defined production unit.

We reserve the right to improve the product and process, which could lead to advantages or changes in particular physical-mechanical properties. To obtain the latest updates of this technical data sheet, designers, civil engineers and surveyors are requested to contact Röchling Industrial.

The information in this publication and our declarations in connection with this publication do not constitute assumption of a guarantee or warranted characteristic. The data stated above represent average values verified on the basis of regular statistical tests and controls. All information in this publication is based on current technical knowledge and experience. Due to the large number of possible influences during processing and application, it does not exempt the user/processor from carrying out their own tests and trials. Responsibility for the evaluation of the end product for the intended use and compliance with the applicable relevant legal requirements lies exclusively with the user/processor as well as the distributor of the respective product/end product. Suggested uses do not constitute any assurance of suitability for the recommended purpose.

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