REBARMAT PRO 6MM

Unidirectional composite rebar for concrete reinforcement

ETA 23/1022

Shape	Profiled round bar
Surface structure	Additive profiling
Geometry of profiling	Rib
Fiber material core	ECR-glass fiber
Impregnant material	Epoxy resin
Color	Greenish

Geometry and structure

	Unit	Value	Tolerance	Standard
Nominal diameter	[mm]	6,00	± 0,2 mm	EAD 260023-00-0301
Outer diameter	[mm]	7,38	± 0,5 mm	EAD 260023-00-0301
Static cross-sectional area	[mm²]	32,08	-	EAD 260023-00-0301
Weight per meter	[g/m]	66,29	± 4 %	EAD 260023-00-0301

Material properties

		Unit	Value	Tolerance	Standard
Glass transition temperature (DSC)		[°C]	≥ 100	-	EN ISO 11357-2
Bulk density of the fiber composite		[g/cm³]	2,2	2,15 - 2,25	ISO 1183-1
Coefficient of thermal expansion αsp	longitudinal	[10^{-6} K^{-1}]	5,4	± 0,6	ISO 11359-2
	transversal	[10^{-6} K^{-1}]	2,1	± 0,4	ISO 11359-2
Residual strength rate (alkali resistance)		[%]	≥ 23	-	EAD 260023-00-0301
Building material class		[-]	E	-	EN 13501-1

Mechanical properties

		Unit	Value	Standard
Average short-time tensile strength regarding to nominal cross-sectional area		[N/mm²]	≥ 1140	EAD 260023-00-0301
Characteristic short-time tensile strength regarding to nominal cross-sectional area		[N/mm²]	≥ 1060	EAD 260023-00-0301
Average modulus of elasticity regarding to nominal cross-sectional area		[N/mm²]	≥ 51000	EAD 260023-00-0301
Characteristic elongation at break		[%]	≥ 2,2	EAD 260023-00-0301
Characteristic maximum service temperature		[Tmax °C]	70	EAD 260023-00-0301
Average compressive strength		[N/mm²]	360	ASTM D695-10
Average compressive modulus		[N/mm²]	50700	ASTM D695-10
Average shear strength	longitudinal	[N/mm²]	≥ 57	EAD 260023-00-0301
	transversal	[N/mm²]	≥ 240	EAD 260023-00-0301
Average short-term bond strength	for ≥ C20/25	[N/mm²]	16,4	EAD 260023-00-0301
Average short-term bond strength at (Tmax)	for ≥ C20/25	[N/mm²]	16,6	EAD 260023-00-0301
Characteristic resisting force		[kN]	34	EAD 260023-00-0301

Delivery forms

		Unit	Value	Tolerance
Bar (standard)	Length	[m]	6,0-12,0	0,02
Coil (min-max length)	Length	[m]	50 - 200	0,05

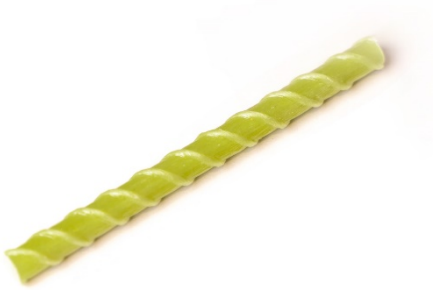
Storage conditions

Protect from direct sunlight.

REBARMAT PRO 8MM

Unidirectional composite rebar for concrete reinforcement

ETA 23/1022



Shape	Profiled round bar
Surface structure	Additive profiling
Geometry of profiling	Rib
Fiber material core	ECR-glass fiber
Impregnant material	Epoxy resin
Color	Greenish

Geometry and structure		Unit	Value	Tolerance	Standard
Nominal diameter		[mm]	8,00	± 0,2 mm	EAD 260023-00-0301
Outer diameter		[mm]	9,57	± 0,5 mm	EAD 260023-00-0301
Static cross-sectional area		[mm²]	53,64	-	EAD 260023-00-0301
Weight per meter		[g/m]	112,7	± 4 %	EAD 260023-00-0301

Material properties		Unit	Value	Tolerance	Standard
Glass transition temperature (DSC)		[°C]	≥ 100	-	EN ISO 11357-2
Bulk density of the fiber composite		[g/cm³]	2,2	2,15 - 2,25	ISO 1183-1
Coefficient of thermal expansion α_{sp}	longitudinal	[10^{-6} K^{-1}]	5,4	± 0,6	ISO 11359-2
	transversal	[10^{-6} K^{-1}]	2,1	± 0,4	ISO 11359-2
Residual strength rate (alkali resistance)		[%]	≥ 45	-	EAD 260023-00-0301
Building material class		[-]	E	-	EN 13501-1

Mechanical properties		Unit	Value	Standard
Average short-time tensile strength regarding to nominal cross-sectional area		[N/mm²]	≥ 1100	EAD 260023-00-0301
Characteristic short-time tensile strength regarding to nominal cross-sectional area		[N/mm²]	≥ 1040	EAD 260023-00-0301
Average modulus of elasticity regarding to nominal cross-sectional area		[N/mm²]	≥ 51000	EAD 260023-00-0301
Characteristic elongation at break		[%]	≥ 2,1	EAD 260023-00-0301
Characteristic maximum service temperature		[Tmax °C]	70	EAD 260023-00-0301
Average compressive strength		[N/mm²]	485	ASTM D695-10
Average compressive modulus		[N/mm²]	49400	ASTM D695-10
Average shear strength	longitudinal	[N/mm²]	≥ 52	EAD 260023-00-0301
	transversal	[N/mm²]	≥ 228	EAD 260023-00-0301
Average short-term bond strength	for ≥ C20/25	[N/mm²]	12	EAD 260023-00-0301
Average short-term bond strength at (Tmax)	for ≥ C20/25	[N/mm²]	11,8	EAD 260023-00-0301
Characteristic resisting force		[kN]	57	EAD 260023-00-0301

Delivery forms		Unit	Value	Tolerance
Bar (standard)	Length	[m]	6,0-12,0	0,02
Coil (min-max length)	Length	[m]	50 - 200	0,05

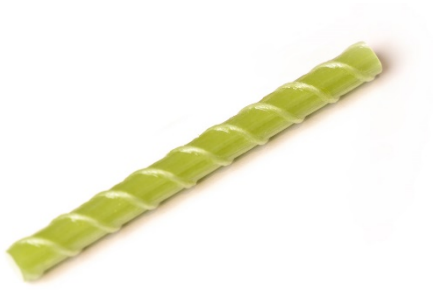
Storage conditions

Protect from direct sunlight.

REBARMAT PRO 10MM

Unidirectional composite rebar for concrete reinforcement

ETA 23/1022



Shape	Profiled round bar
Surface structure	Additive profiling
Geometry of profiling	Rib
Fiber material core	ECR-glass fiber
Impregnant material	Epoxy resin
Color	Greenish

Geometry and structure

	Unit	Value	Tolerance	Standard
Nominal diameter	[mm]	10,00	± 0,2 mm	EAD 260023-00-0301
Outer diameter	[mm]	11,46	± 0,5 mm	EAD 260023-00-0301
Static cross-sectional area	[mm²]	82,11	-	EAD 260023-00-0301
Weight per meter	[g/m]	172,2	± 4 %	EAD 260023-00-0301

Material properties

		Unit	Value	Tolerance	Standard
Glass transition temperature (DSC)		[°C]	≥ 100	-	EN ISO 11357-2
Bulk density of the fiber composite		[g/cm³]	2,2	2,15 - 2,25	ISO 1183-1
Coefficient of thermal expansion αsp	longitudinal	[10^{-6} K^{-1}]	4,5	± 0,6	ISO 11359-2
	transversal	[10^{-6} K^{-1}]	1,6	± 0,4	ISO 11359-2
Residual strength rate (alkali resistance)		[%]	≥ 49	-	EAD 260023-00-0301
Building material class		[-]	E	-	EN 13501-1

Mechanical properties

		Unit	Value	Standard
Average short-time tensile strength regarding to nominal cross-sectional area		[N/mm²]	≥ 1100	EAD 260023-00-0301
Characteristic short-time tensile strength regarding to nominal cross-sectional area		[N/mm²]	≥ 1070	EAD 260023-00-0301
Average modulus of elasticity regarding to nominal cross-sectional area		[N/mm²]	≥ 52000	EAD 260023-00-0301
Characteristic elongation at break		[%]	≥ 2,2	EAD 260023-00-0301
Characteristic maximum service temperature		[Tmax °C]	70	EAD 260023-00-0301
Average compressive strength		[N/mm²]	565	ASTM D695-10
Average compressive modulus		[N/mm²]	51500	ASTM D695-10
Average shear strength	longitudinal	[N/mm²]	≥ 49	EAD 260023-00-0301
	transversal	[N/mm²]	≥ 248	EAD 260023-00-0301
Average short-term bond strength	for ≥ C20/25	[N/mm²]	11	EAD 260023-00-0301
Average short-term bond strength at (Tmax)	for ≥ C20/25	[N/mm²]	11	EAD 260023-00-0301
Characteristic resisting force		[kN]	88	EAD 260023-00-0301

Delivery forms

		Unit	Value	Tolerance
Bar (standard)	Length	[m]	6,0-12,0	0,02
Coil (min-max length)	Length	[m]	50 - 150	0,05

Storage conditions

Protect from direct sunlight

REBARMAT PRO 12MM

Unidirectional composite rebar for concrete reinforcement

ETA 23/1022

Shape	Profiled round bar
Surface structure	Additive profiling
Geometry of profiling	Rib
Fiber material core	ECR-glass fiber
Impregnant material	Epoxy resin
Color	Greenish

Geometry and structure		Unit	Value	Tolerance	Standard
Nominal diameter		[mm]	12,00	± 0,2 mm	EAD 260023-00-0301
Outer diameter		[mm]	13,36	± 0,5 mm	EAD 260023-00-0301
Static cross-sectional area		[mm²]	116,24	-	EAD 260023-00-0301
Weight per meter		[g/m]	242,2	± 4 %	EAD 260023-00-0301

Material properties		Unit	Value	Tolerance	Standard
Glass transition temperature (DSC)		[°C]	≥ 100	-	EN ISO 11357-2
Bulk density of the fiber composite		[g/cm³]	2,2	2,15 - 2,25	ISO 1183-1
Coefficient of thermal expansion αsp	longitudinal	[10^{-6} K^{-1}]	5	± 0,6	ISO 11359-2
	transversal	[10^{-6} K^{-1}]	2,2	± 0,4	ISO 11359-2
Residual strength rate (alkali resistance)		[%]	≥ 61	-	EAD 260023-00-0301
Building material class		[-]	E	-	EN 13501-1

Mechanical properties		Unit	Value	Standard
Average short-time tensile strength regarding to nominal cross-sectional area		[N/mm²]	≥ 1200	EAD 260023-00-0301
Characteristic short-time tensile strength regarding to nominal cross-sectional area		[N/mm²]	≥ 1100	EAD 260023-00-0301
Average modulus of elasticity regarding to nominal cross-sectional area		[N/mm²]	≥ 52000	EAD 260023-00-0301
Characteristic elongation at break		[%]	≥ 2,2	EAD 260023-00-0301
Characteristic maximum service temperature		[Tmax °C]	70	EAD 260023-00-0301
Average compressive strength		[N/mm²]	546	ASTM D695-10
Average compressive modulus		[N/mm²]	52200	ASTM D695-10
Average shear strength	longitudinal	[N/mm²]	≥ 56	EAD 260023-00-0301
	transversal	[N/mm²]	≥ 241	EAD 260023-00-0301
Average short-term bond strength	for ≥ C20/25	[N/mm²]	9,8	EAD 260023-00-0301
Average short-term bond strength	for ≥ C50/60	[N/mm²]	14,8	EAD 260023-00-0301
Average short-term bond strength at (Tmax)	for ≥ C20/25	[N/mm²]	9,2	EAD 260023-00-0301
Characteristic resisting force		[kN]	127	EAD 260023-00-0301

Delivery forms		Unit	Value	Tolerance
Bar (standard)	Length	[m]	6,0-12,0	0,02
Coil (min-max length)	Length	[m]	50 - 150	0,05

Storage conditions

Protect from direct sunlight.

Main Benefits of Rebarmat GFRP Rebars:

1. **Reduced Service Expenses:** Rebarmat GFRP rebars significantly lower long-term maintenance costs due to their durability and corrosion resistance. Structures reinforced with GFRP require less frequent repairs or replacements, especially in corrosive or harsh environments.
2. **Superior Corrosion Resistance:** Unlike traditional steel, GFRP rebars do not corrode, which is crucial for concrete durability in challenging environments, such as coastal areas, industrial zones, or regions exposed to de-icing salts. This improves the lifespan of concrete structures.
3. **Lightweight Advantage:** GFRP rebars are much lighter than steel, easing handling and installation while reducing transportation costs. This is especially beneficial in large-scale projects and remote locations.
4. **High Strength-to-Weight Ratio:** Despite being lightweight, GFRP rebars offer substantial tensile strength, contributing to the overall structural integrity and reducing the need for additional reinforcement.
5. **Non-Magnetic and Non-Conductive Properties:** GFRP rebars are non-magnetic and non-conductive, making them ideal for applications where electromagnetic interference or electrical conductivity must be minimized, such as hospitals, power plants, and sensitive research facilities.
6. **Reduced Protective Concrete Layer:** Due to the specific properties of GFRP, the required protective concrete layer can be minimized to approximately 10mm, optimizing the structural design without compromising durability.

Applications of Rebarmat GFRP Rebars:

- **Concrete Foundations and Footings:** GFRP rebars reinforce foundations and footings, providing corrosion resistance and reducing maintenance needs in structures exposed to moisture or chemicals.
- **Bridge Decks and Coastal Structures:** Ideal for bridges and marine structures where GFRP's corrosion resistance prolongs the lifespan, lowering maintenance costs in saltwater or high-humidity environments.
- **Retaining Walls and Slabs:** GFRP rebars provide effective reinforcement for retaining walls and concrete slabs, especially in areas with freeze-thaw cycles or aggressive soils.
- **Roads and Pavements:** Used in roadways, sidewalks, and other concrete pavements, GFRP rebars extend the service life by preventing cracks and reducing deterioration in heavy traffic or corrosive settings.
- **Tunnels and Underground Structures:** GFRP rebars are suitable for tunnels, subways, and other subterranean applications where corrosion resistance is critical.

Installation and Best Practices:

1. **Correct Placement:** Ensure GFRP rebars are positioned within the concrete's tensile zone where cracks are most likely to form, maximizing their effectiveness.
2. **Adequate Concrete Cover:** In compliance with CNR-DT 203/2006 guidelines, GFRP rebars should have a minimum concrete cover of **bar diameter (df) + 10 mm for cast-in-place elements** and **bar diameter (df) + 5 mm for precast elements** across all exposure classes. This minimum cover ensures sufficient bond and protection, preserving the rebar's structural integrity and durability even in aggressive environments. These values are consistent with EC2 standards for exposure class XC1, offering reliable performance without compromising on long-term durability.
3. **Secure Fixing:** Securely fix rebars in place to prevent shifting during concrete pouring and compaction, ensuring even reinforcement throughout.

4. **Joint Overlap:** According to CNR-DT 203/2006, the overlap length for GFRP rebar should typically be between **40 to 60 times the bar diameter**, depending on specific factors such as bar diameter, concrete strength, and environmental exposure conditions. This overlap length provides the necessary bond strength to maintain reinforcement continuity under load. Adjustments may be required depending on project specifications to optimize bond strength and durability.

Rebarmat GFRP Rebars in UHPC (Ultra-High-Performance Concrete) Applications:

For Rebarmat GFRP rebars in UHPC applications, the concrete cover could potentially be reduced below the typical 10mm due to UHPC's dense matrix and superior compressive strength, offering enhanced protection to embedded materials compared to conventional concrete.

Considerations for Reducing Cover in UHPC:

1. **Enhanced Durability:** UHPC's high density and reduced permeability significantly limit moisture and chemical penetration, which typically necessitates greater cover in conventional concrete.
2. **Bond Strength:** With GFRP rebars, bond performance depends more on the adhesive interaction with the UHPC mix than on cover thickness. A high-performance mix may allow for a thinner cover without compromising strength.
3. **Potential Cover Reduction:** Depending on the project specifications and environmental exposure, it may be feasible to reduce the cover slightly. We recommend consulting with a structural engineer experienced in UHPC to confirm the optimal cover thickness to balance bond strength and durability for your specific application.

By integrating Rebarmat GFRP rebars into your concrete projects, you can achieve long-term durability, minimized maintenance expenses, and high performance in demanding environments.

Measurement

The identified values have been determined directly from the product. Variations in these properties might be observed in the structural element or throughout its processing. It is advised to validate these values through appropriate tests on the structural component, using the specific formulation employed in each instance.

Country-specific regulations

The application of this product is subject to the relevant national regulations in the country of use. Design processes are conducted following the standards applicable to reinforced concrete components. This includes adherence to EU EN 1992 Eurocode 2 and the forthcoming Annex R, which pertains to Embedded FRP (Fiber-Reinforced Polymer) reinforcement.

Processing information

Only qualified and trained personnel should install GFRP. Do not use damaged rebars, as this compromises load-bearing capacity. The product's specified values, especially tensile strength, are valid only when used as intended.

Ecology and health protection

This product is classified as an 'article' under Article 3 of Regulation (EC) No 1907/2006 (REACH) and does not release substances during normal usage. Consequently, a safety data sheet as per Article 31 is not necessary for its marketing, transportation, or usage. Adherence to the guidelines in this data sheet is essential for safe use. Based on current knowledge, the product does not contain any Substances of Very High Concern (SVHC) listed in Annex XIV of REACH or on the European Chemicals Agency's Candidate List in concentrations exceeding 0.1% (w/w).

Industrial safety and health

When cutting, sanding, or drilling fiber composites, fine particles and fibers can be released into the air. These can be harmful if inhaled or if they come into contact with the skin or eyes. Thus, proper personal protective equipment (PPE) like masks, safety goggles, and gloves are essential. Good ventilation or extraction systems are also important in work areas. Special tools and techniques are often required for cutting and machining fiber composites. Standard tools can wear out quickly due to the abrasive nature of the fibers. Diamond-coated tools are recommended to be used.

Legal information

This information is grounded in our expertise and experience, assuming the product is correctly transported, stored, used, and processed as per the guidelines in this Product Data Sheet and the Technical Information for our REBARMAT PRO reinforcement bars. The effectiveness of our products largely depends on their usage and processing. It is your responsibility to verify the product's appropriateness for your specific application.

As most countries do not yet have building regulations for non-metallic reinforcements, it is vital to consult with planners, specialists, building authorities, structural engineers, and experts for load-bearing structures, and adhere to country-specific regulations (like obtaining individual approvals, where necessary). Non-load-bearing use is generally less regulated, but it's still crucial to ensure compliance with local standards and safety norms to guarantee the integrity and longevity of the project.

We retain the authority to modify product specifications. Any existing third-party industrial property rights should be respected. Our standard terms and conditions of sale and delivery apply in all other aspects. The most recent technical product data sheet at the time of your product purchase is applicable.

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Certified by: