

ARMOSHIELD C-B

STRUCTURAL REINFORCEMENT SYSTEM USING VERY FLAT AND RESISTANT BIDIRECTIONAL CARBON FIBRE FABRIC AND EPOXY RESIN

Technical Assessment Certificate (CVT) pursuant to Chapter 11, point 11.1, letter c) of Ministerial Decree 17.1.2018



ARMOSHIELD C-B is an extremely flat bidirectional fabric, made of carbon fibre and high-density FRP composite materials, with excellent elastic modulus and superior mechanical resistances to be used in combination with the specific **ARMOFIX MTX** epoxy resin to consolidate and improve building stability without increasing load. **ARMOSHIELD C-B** fabrics are strips of top-quality carbon fibres positioned bidirectionally, ideal for restoring shear strength sections or sections that require the integration of longitudinal rebars.



Products used: **ARMOSHIELD C-B - ARMOFIX MTX - ARMOPRIMER 100**

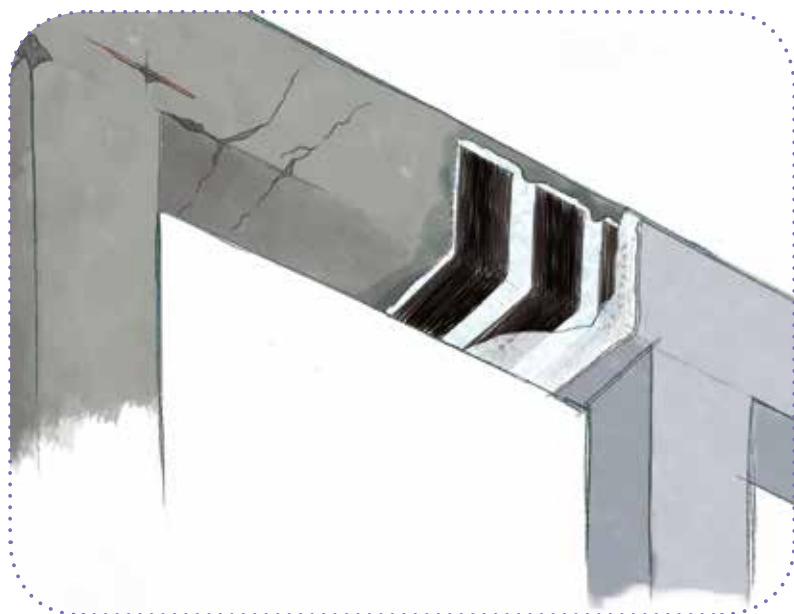
BENEFITS

Specific product characteristics include:

- ✓ **Superior** chemical and **mechanical resistance** and resistance to corrosion.
- ✓ Improved tensile strength **with no increase in weight**.
- ✓ **Flexible and light**, can be installed quickly and easily.
- ✓ **Easy to install** even on complex shapes or curved surfaces.
- ✓ High **tear resistance** even on irregular substrates.
- ✓ **Reliable and durable** system.
- ✓ **Replaces traditional strengthening techniques** such as the beton-plaque, significantly reducing the weight of reinforcement elements and installation time.

IDEAL FOR

- ✓ Structural reinforcement to increase load-bearing capacity and the tensile and shear strength of structures and buildings that have deteriorated or been damaged.
- ✓ Reinforcement and seismic retrofitting of damaged reinforced concrete, pre-stressed reinforced concrete, brick, steel or timber structures.
- ✓ Restoration and refurbishment of buildings and monuments of artistic and historical importance, masonry vaults and arches, wooden slabs and buildings, etc. without increasing weight.
- ✓ Increasing resistance and integration of longitudinal rebars by confining concrete elements subject to compression and buckling stress.



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APPLICATION

SUBSTRATE PREPARATION

The ARMOSHIELD structural strengthening application cycle requires careful surface preparation.

CLEANING AND REPAIR

- ▶ **Remove all loose** or friable particles from the area to be treated, taking care not to damage the structures.
- ▶ **Remove spots, efflorescence or soaked-in stains** of oil, grease, paint, dust, dirt, concrete release agents, etc.
- ▶ When **installing on masonry and vaults**, the surface must be brushed and all traces of dust removed. Any cracks must be filled with ARMOLIME or lime-based mortars. **Fibre-reinforced mortar tracks should be created to house** the carbon fibre **fabrics**; these will vary in thickness, depending on the irregularity of the wall texture.
- ▶ If the **concrete surface** is in good condition, it is sufficient to simply sandblast it. If the surface has deteriorated, the damaged layer must be removed by scarification or high pressure water jetting. The surface should then be repaired by treating the rebars with DRACOSTEEL anti-corrosion treatment and the volume of concrete should be reconstructed using FLUECO mortars. In the event of cracks or splits, restore the load-bearing capacity and integrity of the concrete structure by injecting special dispersive resins. Depending on internal temperature and ventilation, wait 1-2 weeks before installing the fabrics.

PRIMING

Apply ARMOPRIMER 100 primer to a dry surface, using either a brush or roller.

LEVELLING

Levelling is necessary if surfaces are uneven or not flat. Levelling must be carried out once the primer is past touch dry, but no later than 24 hours after application, using an epoxy adhesive paste applied using either a trowel or float (EP FIX or ARMOFIX MTL).

ADHESIVE APPLICATION

Ensure the surface is clean and dry (with humidity below 5%) then use a trowel to apply a first layer of ARMOFIX MTX resin adhesive, roughly 1mm thick.

FABRIC APPLICATION

Place the ARMOSHIELD C - B carbon fibre fabric over the still-fresh resin adhesive, turning the weave in the direction indicated in the plan. Check the fabric is well stretched out, without any creases or wrinkles, then apply pressure using an ARMOROLLER spiked roller to ensure the fibres are completely impregnated and there are no air bubbles. After roughly 1 hour, apply another layer of adhesive. Repeat the cycle if several reinforcement layers are envisaged. Quartz sand can be sprinkled on the last layer of adhesive, fresh-on-fresh, if plaster or another coating is to be applied on top. If required, a final protection coat can be applied once the adhesive is past touch dry.

JOINTS AND EDGES: particular care should be taken when treating sharp areas that could hinder the performance of the reinforcement. In these cases, before application, skim or smooth the edges with an angle grinder or alternative tool (minimum radius ≥ 2 cm).

OVERLAPS: on the containment sections of columns or cornerstones, we recommend overlapping the edges of the fabric by 15-20 cm in the direction of the fibre itself and by 2-3 cm at the sides.

FINISH

When a final protection coating is required for the reinforcement, apply a flexible protective coating that is resistant to UV rays using either MAGIFLEX BRAVO elastic cement coating or ACRIFLEX acrylic resin-based flexible paint. The coating must only be applied once the epoxy systems used have completely set (1-2 days depending on the temperature).

FABRIC SPECIFICATIONS	
APPEARANCE	Bidirectional fabric
TYPE OF FIBRE	High-resistance carbon
AVAILABLE GRAMMAGE (g/m ²)	300
AVAILABLE WIDTHS (cm)	10-20-50
PACKAGING	50 m rolls

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GENERAL RULES FOR APPLICATION

The performance of ARMOSHIELD structural reinforcement is directly linked to the care taken in the various stages of application. Particular attention should be paid to the following aspects:

- ▶ Carefully and closely comply with application times and the project specifications.
- ▶ Before applying the ARMOSHIELD system ensure the tear resistance of the surface is at least 1.5 MPa; otherwise, proceed with strengthening. Also check humidity is below 5%.
- ▶ Cut the carbon fabric sheets with suitable scissors or a cutter.
- ▶ Prepare the substrate correctly.
- ▶ Smooth any corners or rough edges (minimum radius ≥ 2 cm).
- ▶ It is advisable to install at temperatures of $\geq +5^{\circ}\text{C}$ and $\leq +35^{\circ}\text{C}$.
- ▶ Minimum and maximum temperatures of use: -10°C / $+38^{\circ}\text{C}$.
- ▶ Check complete impregnation through the entire section of reinforcement fabric and the absence of air bubbles, dry patches or areas not fully impregnated.
- ▶ Fabric must be properly laid out and securely anchored so that stress is correctly transferred.
- ▶ Use specific resin or protective treatments to prevent the fabric protruding at the edges as this could lead to peeling.
- ▶ Protect impregnated fabrics from dust and rain.
- ▶ Keep treated surfaces at a temperature of $\geq +5^{\circ}\text{C}$.

PRECAUTIONS

Use waterproof rubber gloves during application and ensure resin does not come into contact with the skin, mucous membranes or eyes. In the event of accidental contact, wash with plenty of water and neutral soap. Use safety goggles and a mask. For further information, check the safety data sheet.

ARMOSHIELD C-B comes in 50 m rolls and is available in the following versions:

FABRIC	GRAMMAGE (g/m ²)	WIDTH (cm)	SURF. AREA (m ² /m)	SURF. AREA (m ² /roll)
ARMOSHIELD C - B 300/250	300	10	0.1	5
		20	0.2	10
		50	0.5	25

GEOMETRIC AND PHYSICAL PROPERTIES		TEST METHOD	
PROPERTY	REFERENCE STANDARD	ARMOSHIELD C-B 300/250	
Fibre density, ρ_{fb} (g/cm ³)	ASTM D 4018	1.81	
Mass of the fabric per unit area, ρ_x (g/m ²)	ISO 3374	310	
Density of resin, ρ_m (g/cm ³)	ISO 1675	1.075	
Equivalent area (per fabric layer), A_{rt} (mm ² /m)	UNI EN 2561	82.873 (at 0° and 90°)	
Equivalent thickness (per fabric layer), t_{eq} (mm)	UNI EN 2561	0.829 (at 0° and 90°)	
Fibre weight fraction in the composite (%)	ASTM D2734	21.09	
Fibre volume fraction in the composite (%)	ISO 1172	17	
Glass transition temperature of primer, T_g (°C)	EN 12614	+58	
Glass transition temperature of resin, T_g (°C)	EN 12614	+53	
Minimum and maximum temperatures of use	CNR DT200-R1/2013	-10/+38	
Application temperature of the system (°C)	-	+5/+35	
Reaction to fire of resin	ISO EN 13501-1	E	
Fire resistance of resin	ISO EN 13501-2	NPD	
DRY FABRIC MECHANICAL PROPERTIES		ARMOSHIELD C-B 300/250	
TENSILE STRENGTH (MPa)		4800-5000	
LOAD RESISTANT AREA PER UNIT WIDTH (mm ² /m)		82.873 (at 0° and 90°)	

ARMOSHIELD C-B MECHANICAL PROPERTIES PURSUANT TO ASSESSMENT CERTIFICATE CVT NO. 11.25-01-19			
FABRIC		ARMOSHIELD C-B 300/250	
CLASS CATEGORY ACCORDING TO GUIDELINES		CLASS 210C	
Laminate YOUNG'S MODULUS based on fibre net area (table value)		210 GPa	
Laminate TENSILE STRENGTH based on fibre net area (table value)		2700 MPa	
MECHANICAL PROPERTIES	TEST METHOD REF. STANDARD	ARMOSHIELD C-B 300/250	
		1 layer	3 layers
Laminate YOUNG'S MODULUS based on fibre net area, E_f (GPa) average value	UNI EN 2561	253	272
Laminate TENSILE STRENGTH based on fibre net area, f_{fb} (MPa) average value	UNI EN 2561	3305	3697
Laminate TENSILE STRENGTH based on the fibre net area, f_{fb} (MPa) characteristic value	UNI EN 2561	2811	3383
ELONGATION AT FAILURE, ϵ_{fb} (%)	UNI EN 2561	1.31	1.36

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CONSUMPTION OF EPOXY SYSTEMS

PRIMING	ARMOPRIMER 100	approx. 200 - 300 g/m ² depending on surface porosity
LEVELLING/ SMOOTHING	ARMOFIX MTL / EP FIX	1.4 - 1.6 kg/m ² per layer; average thickness approx. 1 mm (only if necessary)

CONSUMPTION OF ARMOFIX MTL AS ADHESIVE AND PRIMER OF ARMOSHIELD C-B FABRICS

Adhesive	Fabric grammage (g/m ²)	Consumption (kg/m ²)	Fabric width (cm)	Consumption per metre (g/m)
ARMOFIX MTL	300	1.1	10	110
			20	220
			50	550

PACKAGING AND STORAGE

ARMOSHIELD C - B carbon-fibre fabrics are available in 50 m rolls and in different widths (check table).

ARMOSHIELD C - B fabrics can be stored indoors for an unlimited period of time.



Legal notes - SLCMP version of 01.03.2017

Draco Italiana s.p.a. has adopted the parameters indicated in this data sheet and the related standards for the calculation of the values and technical data contained herein.

Customers shall verify that this data sheet and the values indicated herein apply to their product batch and have not been superseded by later editions. In if doubt, verify that the sheet corresponds to the one available on the website www.draco-edilizia.it at the time the sales contract was executed and/or by previously contacting the Technical Department.

Any suggestions on the use of the Products provided by our personnel either orally or in writing upon the Customer's request do not constitute additional obligations to the purchase contract and do not imply a contractual obligation for the company. They are based on our experience and limited to the current state of practical and/or scientific knowledge. They are not binding for the client or for the installer. It is the Customer's responsibility to test our products and verify they are suitable for the type of application and use envisaged.