ARMOSHIELD C - SHEET

VERY FLAT, UNIDIRECTIONAL CARBON-FIBRE FABRIC WITH SUPERIOR STRENGTH FOR STRUCTURAL REINFORCEMENT

DRACO

REFURBISHMENT and PROTECTION LINE

FRP (FIBRE-REINFORCED POLYMER FOR THE STRENGTHENING AND REINFORCEMENT OF STRUCTURES)

ARMOSHIELD C - SHEET is a very flat, unidirectional fabric in carbon-fibre and high density FRP composite materials with high modulus of elasticity and superior mechanical strength that is used in combination with the specific ARMOFIX resins to increase and adjust building stability without any increase in load.

The **ARMOSHIELD C-SHEET** fabric is made of top quality carbon fibres that are placed in a single direction and lie perfectly flat. They are particularly suitable for confining structures exposed to compression and bending, such as beams and columns and for reinforcing cutting beams.

BENEFITS

The specific characteristics of the product are:

- ✓ Superior chemical and mechanical resistance and resistance to corrosion.
- ✓ Increased tensile strength with no increase in weight.
- ✓ Light and flexible, they can be applied quickly and easily.
- ✓ Easy to lay even on complex or curved structures.
- ✓ Superior tear resistance even on irregular surfaces.
- ✓ Reliability and durability of the system.
- ✓ Replaces beton plaque techniques with significant reduction in weight and installation times.

USES

- ✓ Reinforcing buildings to increase load-bearing capacity and tensile and shear strength of buildings that have deteriorated or been damaged.
- ✓ Reinforcing and seismic retrofitting of damaged buildings made of reinforced concrete, pre-stressed reinforced concrete, bricks, steel, and wood.
- ✓ Increasing compression strength and buckling strength by confinement of concrete elements.
- ✓ Restoration of historical buildings and monuments, brickwork vaults and arches, screeds, wood buildings etc. with no weight increase.

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APPLICATION PROCEDURE

PREPARATION OF SUBSTRATE

The ARMOSHIELD strengthening cycle requires a thorough preparation of the substrate.

CLEANING AND REPAIR

- **Remove all loose or flaking parts** in the area to be repaired taking care not to damage the structures.
- **Remove stains, efflorescence, dust or dirt etc.**
- When **installing on brickwork or arches** the surface must be brushed and all traces of dust removed. Any cracks must be saturated with ARMOLIME or a lime-based mortar.
- If the **concrete substrate** is in good condition it is sufficient to sand the surface. Where the substrate is deteriorated you must first remove the damaged layer by bush-hammering or pressure washing. Then repair the structure by treating the rebars with the anti-corrosion agent DRACOSTEEL and build up the concrete using mortars from the FLUECO line. The load-bearing capacity and monolithicity of the structure must be restored by injecting special wide- dispersion resins. Wait one to two weeks before installing the fabric, depending on the temperature and ventilation inside the buildings.

PRIMING

Apply ARMOPRIMER 100 primer on the dry substrate using either a brush or roller. If the substrate is fragile or porous use PRIMER ES40.

RENDERING

Rendering is necessary if the substrate is irregular or not flat. The render must be carried out when the primer is past touch dry, but no later than 24 hours after its application using the epoxy adhesive paste EP FIX applied with either a spatula or float.

APPLYING THE ADHESIVE

Apply a first coat of the resin adhesive ARMOFIX (MTX or TS according to the type of substrate) at a thickness of roughly 1mm.

APPLYING THE SHEETS

Place the carbon-based ARMOSHIELD C-SHEET fabric over the fresh layer of adhesive in the direction envisaged in the project. Check that the fabric is laid well and that there are no wrinkles or folds, then apply pressure with a spiked roller to ensure that the fibres are completely impregnated and there are no air-bubbles. After roughly one hour apply a second layer of adhesive. Repeat the cycle if there is to be more than one layer of reinforcement. You can sprinkle quartz sand over the last layer of adhesive fresh-on-fresh if plaster or other coatings are to be applied over the top. If a protection coat is to be applied this should be done when the adhesive is no longer touch dry.

JOINTS AND EDGES: particular care must be taken when installing over corners and rough edges which can hinder product performance. Before application render or smooth the edge with an angle grinder or alternative tool (radius of curvature ≥ 2 cm).

OVERLAPS: At the confinement sections on columns or beams it is advisable to overlap the edges of the sheets by 15 - 20 cm in the direction as the laying of the sheet and by 2 - 3 cm at the sides.

FINISHING

Where a final protection coating of the reinforcement is to be applied you must apply a flexible coating that is resistant to UV rays using either the elastic cement coating MAGIFLEX BRAVO, or the acrylic-based flexible paint ACRIFLEX, or the intumescent coating DRACOFIRE (REI 180). The coating must only be applied after the complete hardening of the epoxy systems used (1 - 2 days according to the temperature).

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GENERAL RULES THAT MUST BE FOLLOWED DURING THE APPLICATION

The performance of the ARMOSHIELD C structural reinforcement is directly linked to the care with which the various stages of the application cycle are followed. Particular attention should be taken regarding the following:

- Respect application times and project design closely.
- Before installing the ARMOSHIELD system make sure the tear resistance of the substrate is at least 1.5 MPa; otherwise strengthen the substrate.
- Cut the fabric sheets with suitable scissors or cutter.
- Prepare the substrate as required.
- Smooth pre-existing corners or rough edges (radius of curvature ≥ 2 cm).
- It is advisable to install at temperatures of ≥ + 5°C.
- Check the complete penetration of adhesive through all the reinforcement fabric and the absence of air-bubbles, dry areas or incomplete penetration of the resin.
- The fabric must be spread out well and securely anchored so that all stress is correctly transmitted.
- Avoid any protruding parts of fabric at the edges that could lead to peeling by using specific resin or protective treatments.
- Protect the impregnated fabric from dust or rain.
- Maintain the treated surfaces at a temperature of ≥ + 5°C.

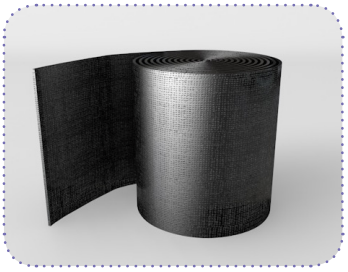
PRECAUTIONS

During application use impermeable rubber gloves and avoid contact of the resins with skin, eyes or mucous membranes. In case of contact wash thoroughly with water and neutral soap. Use protective eye-wear and masks. For further information consult the safety sheet.

PACKAGING AND STORAGE

The carbon-fibre **ARMOSHIELD C-SHEET** fabric is available in 100 m- rolls of differing widths.

The **ARMOSHIELD C-SHEET** if properly stored will maintain its characteristics indefinitely.



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PRODUCT CHARACTERISTICS

APPEARANCE	Very flat unidirectional fabric
FIBRE TYPE	High resistance carbon
SPECIFIC GRAVITY	1.80 g/cm^3
AVAILABLE WIDTHS	10 - 50
AVAILABLE WEIGHTS (g/m^2)	200- 300 - 600
PACKAGING	100 m roll

TECHNICAL SPECIFICATIONS

FEATURES	WIDE MODULUS			VERY WIDE MODULUS	
ELASTIC MODULUS (GPa)	240			390	
WEIGHT (g/m^2)	200	300	600	300	600
EQUIVALENT THICKNESS OF DRY FABRIC (mm)	0.111	0.164	0.328	0.165	0.33
TENSILE STRENGTH (MPa)	4900	4900	4900	4410	4410
RESISTANT SURFACE PER WIDTH UNIT (mm^2/m)	110	164	328	165	328
MAXIMUM LOAD PER WIDTH UNIT (kN/m)	> 600	> 800	>1600	> 700	>1400
ELONGATION TO FAILURE (%)	2.1			1.2	
AVAILABLE WIDTHS (cm)	10 - 50				
FINAL PERFORMANCE					
ADHESION TO CONCRETE (MPa)	>3 (substrate failure)				

DRACO Italiana SpA • via Monte Grappa, 11 D-E • 20067 Tribiano (MI) t. +39 02 90632917 • f. +39 02 90631976 • info@draco-edilizia.it

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CONSUMPTION

CONSUMPTION OF APPLICATION CYCLE		
PRIMING	ARMOPRIMER	approx. 200/300 g/m² according to substrate porosity
LEVELLING/RENDER	ARMOFIX MTL OR EP/FIX	1.4 - 1.6 kg/m² per coat. Average thickness approx. 1 mm

CONSUMPTION OF ARMOFIX MTL/TS FOR IMPREGNATION OF WIDE OR VERY WIDE FABRIC				
ADHESIVE	WEIGHT(g/m²)	CONSUMPTION (g/m²)	WIDTH (g/m²)	CONSUMPTION (g/m)
ARMOFIX MTX	200	1100	10	110
		1000	50	500
	300	1100	10	110
		1100	50	550
	600	1400	10	140
		1400	50	700

Consumption refers to the gluing and impregnation of one layer of ARMOSHIELD fabric. Overall average thickness approx. 1mm

TECHNICAL SPECIFICATIONS

TYPE OF INSTALLATION

The installation of **ARMOSHIELD C-SHEET**, produced by **DRACO Italiana SpA**, for the structural reinforcing and seismic retrofitting of reinforced concrete and the confinement of structures exposed to compression and bending using unidirectional fabric in carbon-fibre with high or very high modulus of elasticity and superior mechanical strength.

APPLICATION

- Smoothing of any corners with radius of curvature ≥ 2 cm.
  - Preparation of the substrate: elimination of grout or any residual concrete as well as any damaged parts, stains, efflorescence, dust or dirt;
  - Levelling of substrate: removal of protuberances and filling of any holes in the area of gluing;
  - Application of a primer such as ARMOPRIMER 100;
  - Rendering of the substrate and application of an adhesive such as ARMOFIX MTS/TS.
- Application of a unidirectional carbon-fibre fabric such as **ARMOSHIELD C-SHEET** and impregnation with a spiked roller.
- More than one layer may be applied in accordance with the requirements of the project design.

Possible application of a protective coating over the area reinforced or sprinkling of quartz sand prior to final plaster coat.

The size of the fabric to be used will be decided according to the project requirements and type of intervention.