



## C-MATRIX SYSTEM C-MATRIX G320C40-H

**FRCM (FIBER REINFORCED CEMENTITIOUS MATRIX)  
REINFORCEMENT SYSTEM FOR THE RESTORATION AND  
STRUCTURAL STRENGTHENING OF MASONRY BUILDINGS**

**C-MATRIX G320C40-H** is an FRCM (Fiber Reinforced Cementitious Matrix) reinforcement system that combines the performance of an AR glass fiber bidirectional mesh with an inorganic cementitious matrix. The system provides excellent chemical-physical and elastomechanical properties, ensuring optimal compatibility with substrate materials.

### System components:

- **FB-VAR320R16S:** A bidirectional AR (Alkali-Resistant) glass fiber mesh impregnated with an organic matrix, with a dry weight of 300 g/m<sup>2</sup>. This component delivers good tensile strength to the overall system and ensures proper distribution of static and seismic stresses.
- **STRUTTURA RASO FINO – RF248:** A pre-mixed, single-component, polymer-modified PCC-type cementitious mortar with thixotropic properties, reinforced with synthetic fibers. It features normal setting, fine grain, and compressive strength  $\geq 40$  MPa, enabling effective stress transfer through excellent adhesion between the system and the substrate.

The AR glass fiber bidirectional mesh, characterized by its flexibility, adaptability to irregular surfaces, and good mechanical resistance, synergizes with the inorganic matrix to form a homogeneous, thin reinforcement layer. This layer does not alter the mass distribution or the structural stiffness. The system integrates seamlessly with existing masonry, enhancing the structure's strength and ductility, particularly in seismically hazardous contexts.

**C-MATRIX G320C40-H** ensures excellent chemical and mechanical compatibility with traditional construction materials. Interventions carried out with this reinforcement system are structurally effective while minimally invasive, preserving the architectural value of existing structures.

In compliance with the provisions of EAD 340275-00-0104, "Externally Bonded Composite Systems with Inorganic Matrix for Strengthening of Concrete and Masonry Structures", C-MATRIX G320C40-H is CE-marked for structural strengthening applications.

### APPLICATION FIELDS

- Structural strengthening and seismic improvement of existing masonry with a high-quality masonry index.
- Enhancement of structural strength and ductility.
- Prevention of local and/or global collapses.
- Reinforcement of masonry arches and vaults, including those with reduced thickness.
- Confinement and reinforcement of masonry columns.
- Anti-overturning measures and reinforcement of non-structural elements (NSEs), e.g., infill walls in framed structures.
- Construction of reinforced masonry bond beams at the top of walls.

### MAIN ADVANTAGES

1. **High performance:** The system enhances the tensile strength of masonry, ensuring structural safety even in seismic contexts and under high-stress conditions without increasing the stiffness or mass of the structure.
2. **Durability and compatibility:** The matrix-reinforcement system provides optimal chemical and physical compatibility with masonry, ensuring the longevity of the intervention.
3. **Ease of application:** The AR glass fiber bidirectional mesh is lightweight, flexible, easy to handle, and simple to install. The "wet-on-wet" application technique, combined with the properties of the mesh, reduces reinforcement implementation time.
4. **Environmental sustainability and living comfort:** Thanks to the use of a cementitious matrix, the system is eco-friendly and has a low environmental impact.
5. **Versatile solution:** Suitable for both historical buildings (not protected by heritage restrictions) and modern masonry structures, C-MATRIX G320C40-H is a thin, non-invasive reinforcement solution. It is ideal for application on various types of substrates, including uneven surfaces like vaults, arches, and columns.
6. **Reversibility of the intervention:** The **C-MATRIX G320C40-H** system meets reversibility criteria, ensuring non-invasive and easily removable interventions.

## TECHNICAL DATA OF THE SYSTEM

	System Description
Commercial Name	<b>C-MATRIX G320C40-H</b>
Manufacturer	Fibre Net SpA
Type of reinforcement	FB-VAR320R16S AR impregnated bidirectional glass fiber mesh
Type of matrix	STRUTTURA RASO FINO - RF248 Single-component PCC mortar
Nominal thickness of the reinforcement system	8 mm

## MECHANICAL CHARACTERISTICS OF THE SYSTEM

Pull-off tests	Support: brick masonry		U.M.	Ref.
	Value average	Value characteristic		
(*) Conventional limit tension $\sigma_{lim,conv}$	894	660	MPa	EAD 340275-00- 0104
(*) Conventional limit strain $\varepsilon_{lim,conv}$	1,07	-	%	
	Support: stone masonry			
Conventional limit tension $\sigma_{lim,conv}$	1180	1104	MPa	
Conventional limit strain $\varepsilon_{lim,conv}$	1,41	-	%	
	Support: tuff masonry			
(*) Conventional limit tension $\sigma_{lim,conv}$	1068	747	MPa	
(*) Conventional limit strain $\varepsilon_{lim,conv}$	1,28	-	%	
Tensile tests	Value average	Value characteristic	U.M.	
Ultimate stress $\sigma_u$ of the composite	810	612	MPa	
Ultimate strain $\varepsilon_u$ of the composite	1,21	0,73	%	
Stiffness modulus $E_1$ , in stage A	1801	-	GPa	
Effective lap shear stress (l=150mm) $\sigma_{lap}$	-	> 90% $\sigma_{u,k}$	-	LG 2022 FRCM quali- fication
Effective lap shear stress (l=200mm) $\sigma_{lap}$	-	> 90% $\sigma_{u,k}$	-	

## GEOMETRIC, MECHANICAL AND PHYSICAL DATA OF THE REINFORCEMENT

Properties	Description	Ref.
Commercial name	<b>FB-VAR320R16S</b>	
Weight of the mesh (dry) in warp	150 g/m <sup>2</sup>	ISO 11667:1997
Weight of the mesh (dry) in weft	150 g/m <sup>2</sup>	
Equivalent thickness of the reinforcement mesh in both directions	0.057 mm	EAD 340275-00-0104
Density of the material constituting the reinforcement mesh	2.65 g/cm <sup>3</sup>	
Mesh size	16x16 mm	Internal method

Tensile tests	Average value	Characteristic value	U.M.	Ref.
Ultimate stress $\sigma_{uf}$ of the mesh	899	454	MPa	EAD 340275-00- 0104
Elastic modulus $E_f$ of the mesh	83,5	71,4	GPa	
Ultimate tensile strain $\varepsilon_{uf}$ of the mesh	1,08	-	%	

## MECHANICAL PROPERTIES OF THE MORTAR

Properties	Description	Ref.
Commercial name	STRUTTURA RASO FINO-RF248	
Classe	R3	EN 1504-3
Compressive strength at 28 days	≥ 40 MPa	EAD 340275-00-0104
Elastic modulus at 28 days	≥ 20 GPa	
Adhesion to the brick substrate	≥ 0.5 MPa (FP:A)	EN 1015-12
Weight percentage of organic components	< 10 %	-
Vapor permeability		

(\*) The conventional stress and strain limit values are also valid for an effective anchorage length of 200 mm and 250 mm.

The system is CE-marked and certified under Assessment and Verification of Constancy of Performance (AVCP) system 2+.

## APPLICATION OF THE SYSTEM

The application of the **C-MATRIX G320C40-H** system follows a process designed to ensure optimal performance in any context, whether historic (unrestricted) or modern, applied to masonry with an adequate quality index. Proper execution of all operational phases is essential to achieve effective and durable reinforcement.

## ENVIRONMENTAL CONDITIONS

**Application temperature:** The system must be applied under environmental conditions between +5°C and +35°C. Avoid exposure to direct sunlight or excessive humidity to ensure optimal mortar curing and proper adhesion of the mesh.

## SUBSTRATE PREPARATION

Substrate preparation is critical to ensure the full effectiveness of the C-MATRIX G320C40-H system. It is essential to work on a sound, compact, and mechanically resistant surface to ensure perfect adhesion of both the mortar and the reinforcement.

**Removal of surface layers and preparation of the substrate:** For interventions on load-bearing masonry, arches, or vaults, it is recommended to completely remove the existing plaster and/or surface coating layers, either manually or using mechanical tools. All inconsistent or delaminated parts must be eliminated, working until sound masonry is reached. Where possible, mortar joints should be scarified to a depth of at least 5 mm. If durable or strongly bonded surface coatings or plasters are present, and their removal could compromise the integrity of the substrate for reinforcement application, consulting Fibre Net's technical team for a specific evaluation is advised.

For vault interventions, the existing plaster should be mechanically removed to expose the underlying masonry. When reinforcing the extrados, the consistency of the backfill material must be verified before removal, and all project-specified phases must be adhered to.

In the presence of voids or large cracks, the substrate must be repaired using materials compatible with the original ones, such as stone, bricks, or tuff, to maintain structural coherence and compatibility with the existing materials. Edges where the system will be applied should be rounded to a curvature radius of at least 20 mm.

After removal and the above preparatory work, the surface must be thoroughly cleaned of dust, grease, efflorescence, and other contaminants using low-pressure water cleaning. Excess water should be allowed to evaporate, ensuring the substrate is saturated but the surface remains dry to the touch (SSD condition) before applying the mortar.

The prepared surface should be flat but rough, with a roughness index of at least 1 mm to ensure adequate adhesion for the subsequent mortar application. For highly absorbent or mechanically weak masonry, the application of a consolidating primer is recommended to enhance mortar adhesion. This step is particularly advisable for gypsum substrates or low-cohesion supports. For specific details on the most suitable consolidation materials, contact the company.

### **MORTAR PREPARATION**

The mortar **STRUTTURA RASO FINO - RF248** must be prepared by adding clean water in accordance with the specifications outlined in its technical datasheet. The mixing and preparation process should be carried out using appropriate tools and methods as specified in the same datasheet.

### **APPLICATION OF THE FIRST MORTAR LAYER**

On a properly roughened surface that has been thoroughly cleaned using low-pressure water washing and is in a saturated surface dry (SSD) condition, the following steps should be carried out.

Before applying the reinforcement system, irregular surfaces can be leveled by applying a layer of **STRUTTURA RASO FINO - RF248** mortar with a trowel, spatula, or spray. Allow this initial layer to harden for 18–24 hours, leaving a surface finish similar to roughcast.

Subsequently, apply a uniform first layer of **STRUTTURA RASO FINO - RF248** mortar with a thickness of 3–5 mm, ensuring the material is evenly distributed across the entire treatment area.

### **INSTALLATION OF THE REINFORCEMENT MESH**

While the mortar is still fresh, proceed with the installation of the bidirectional AR glass fiber impregnated mesh **FB-VAR320R16**. The mesh must be carefully placed and gently pressed with a flat spatula to ensure it is fully embedded in the mortar layer.

At the junctions between mesh sheets, both longitudinally and transversally, adequate overlap must be ensured in accordance with the **CNR-DT 215/2018** guidelines, thereby guaranteeing the continuity and effectiveness of the structural reinforcement. In the absence of laboratory tests, a minimum overlap of **300 mm** is required.

In this specific application, the system is qualified for overlap lengths of **150 mm** and **200 mm**, respectively.

### **APPLICATION OF THE SECOND MORTAR LAYER**

Once the mesh has been installed, apply a second layer of mortar while the first layer is still fresh, maintaining a uniform thickness of approximately 3–5 mm. The total thickness, including the first layer, should reach about 8 mm. This second layer must completely cover the mesh, ensuring adequate protection for the reinforcement system.

### **APPLICATION OF CONNECTORS (OPTIONAL)**

In specific cases requiring mechanical anchoring of the reinforcement system to the load-bearing structure, high-strength fiberglass connectors such as **FB-TUP10-VAR** or **FB-TUF\_VAR** can be utilized. These connectors are installed into pre-drilled holes within the masonry and embedded into the mortar layer, providing an effective bond between the reinforcement system and the existing structure.

The installation of connectors must comply with the project's technical specifications and the manufacturer's guidelines. For extrados reinforcement of arches or vaults, it is advisable to incorporate connections along the reinforcement system turned over at the springings, extending approximately **200 mm**.

### **CURING AND PROTECTION**

After the reinforcement system has been applied, the treated surfaces must be adequately protected during the curing phase for at least **24 hours**. In particularly dry, hot, or windy conditions, it is recommended to cover the surfaces with protective sheets or to use wet curing methods, such as misting the area with water, to prevent excessively rapid drying that could compromise the reinforcement's integrity.

In highly aggressive environments or areas exposed to moisture or water, it is advisable to apply an additional protective coating with a suitable product to enhance the system's durability. In such cases, consult the Technical Office to determine the most appropriate protective treatment for the specific conditions.

## HANDLING AND STORAGE CONDITIONS

The system is supplied in two separate components: the matrix (cementitious mortar) and the reinforcement (AR-impregnated bidirectional fiberglass mesh).

The **FB-VAR320R16S** meshes are available in rolls with the following dimensions:

- 100 – 150 – 200 cm (H) x 50 – 100 (L) m

The meshes must be stored in a dry, dust-free environment. Avoid direct exposure to light and heat sources.

The **STRUTTURA RASO FINO - RF248** mortar is supplied in:

- 25 kg bag

The mortar must be stored in its original, sealed packaging in a dry location. It must be protected from frost, high temperatures, excessive sunlight, and wind during the curing phase.

## SAFETY INSTRUCTIONS

During all preparation and application phases, operators must use Personal Protective Equipment (PPE) suitable for handling mesh and mortar. This includes work clothing, protective goggles, gloves, and dust masks. For specific recommendations, refer to the respective technical and safety data sheets. Avoid contact with skin and eyes. In case of skin contact, wash immediately with water and soap. If the product comes into contact with the eyes, rinse thoroughly with water and seek medical advice.

When working in enclosed spaces, ensure adequate ventilation to maintain proper air circulation.

## CERTIFICATIONS

The C-MATRIX G320C40-H system is CE-marked according to ETA No. 22/0865.

## SPECIFICATION VOICE

### **BRICK SUPPORT**

The structural reinforcement of existing brick masonry is carried out using the **C-MATRIX G320C40-H FRM** system by Fibre Net SpA, which complies with EAD 340275-00-0104, is CE-marked under AVCP system 2+, and meets the requirements of CAM (Minimum Environmental Criteria).

The intervention involves the application of an initial layer of **STRUTTURA RASO FINO – RF248** cementitious mortar by Fibre Net, which has a compressive strength of at least 40 MPa. Following this, a bidirectional AR-impregnated fiberglass mesh, **FB-VAR320R16S** by Fibre Net, is installed. This mesh has a 16x16 mm mesh size, a weight of 300 g/m<sup>2</sup>, an equivalent thickness of 0.057 mm, a characteristic composite tensile strength of 660 MPa, and an average elastic modulus of 83.50 GPa. The intervention is completed by applying a second layer of **STRUTTURA RASO FINO – RF248** mortar, ensuring a total intervention thickness of 8 mm.

Excluded from the scope are the removal of existing plaster, the remediation of deteriorated areas, the preparation of the substrate through washing and saturation with water, the installation of connectors (if required), finishing products, and the performance of material acceptance tests.

All materials used in the process must adhere to the relevant technical specifications and be certified in accordance with current regulations.

**STONE SUPPORT**

The structural reinforcement of existing stone masonry is carried out using the **C-MATRIX G320C40-H FRCM** system by Fibre Net SpA, which complies with **EAD 340275-00-0104**, is CE-marked under AVCP system 2+, and meets the requirements of CAM (Minimum Environmental Criteria).

The intervention involves the application of an initial layer of **STRUTTURA RASO FINO – RF248** cementitious mortar by Fibre Net, which has a compressive strength of at least 40 MPa. This is followed by the application of a bidirectional AR-impregnated fiberglass mesh, **FB-VAR320R16S** by Fibre Net, with a mesh size of 16x16 mm, a weight of 300 g/m<sup>2</sup>, an equivalent thickness of 0.057 mm, a characteristic composite tensile strength of 1104 MPa, and an average elastic modulus of 83.50 GPa. The process is completed with the application of a second layer of **STRUTTURA RASO FINO – RF248** mortar, ensuring a total intervention thickness of 8 mm.

Excluded from the scope are the removal of existing plaster, the remediation of deteriorated areas, the preparation of the substrate through washing and saturation with water, the installation of connectors (if required), finishing products, and the performance of material acceptance tests.

All materials used must conform to the relevant technical specifications and be certified in compliance with current regulations.

**TUFF SUPPORT**

The structural reinforcement of existing tuff masonry is carried out using the **C-MATRIX G320C40-H FRCM** system by Fibre Net SpA, which complies with **EAD 340275-00-0104**, is CE-marked under AVCP system 2+, and adheres to CAM (Minimum Environmental Criteria) requirements.

The intervention includes the application of an initial layer of **STRUTTURA RASO FINO – RF248** cementitious mortar by Fibre Net, featuring a compressive strength of at least 40 MPa. This is followed by the installation of a bidirectional AR-impregnated fiberglass mesh, **FB-VAR320R16S** by Fibre Net, with a mesh size of 16x16 mm, a weight of 300 g/m<sup>2</sup>, an equivalent thickness of 0.057 mm, a characteristic composite tensile strength of 747 MPa, and an average elastic modulus of 83.50 GPa. The process concludes with the application of a second layer of **STRUTTURA RASO FINO – RF248** mortar to achieve a total intervention thickness of 8 mm.

The scope excludes the removal of existing plaster, the remediation of deteriorated areas, the preparation of the substrate through washing and saturation with water, the installation of connectors (if required), finishing products, and the performance of material acceptance tests.

All materials must comply with the relevant technical specifications and be certified in accordance with applicable regulations.

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