



C-MATRIX SYSTEM C-MATRIX G320C15-M

FRCM (FIBER REINFORCED CEMENTITIOUS MATRIX) REINFORCEMENT SYSTEM FOR THE RESTORATION AND STRUCTURAL CONSOLIDATION OF HISTORIC AND MODERN MASONRY BUILDINGS

C-MATRIX G320C15-M is an FRCM reinforcement system that combines the effectiveness of a bidirectional dry AR fiberglass mesh and an inorganic matrix based on lime and hydraulic binders, bonded together with a water-based adhesion promoter. The system offers excellent chemical-physical and elastomechanical properties, ensuring optimal compatibility with support materials, even on architectural heritage items subject to constraints or protection.

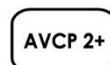
System components:

- **FB-VAR320R12:** Bidirectional dry AR fiberglass mesh (Alkali Resistant), with a dry weight of 300 g/m², providing high tensile strength for the entire system and ensuring proper distribution of static and seismic stresses.
- **MATERIA RINFORZA- RZ215:** Structural mortar based on lime and hydraulic binders, with a compressive strength ≥ 15 MPa, ensuring the correct transfer of stresses through good adhesion between the system and the substrate
- **FB-IPNO1:** Two-component water-based product consisting of resins supported by a microcrystalline inorganic matrix, used for impregnating fiberglass or carbon reinforcements as an adhesion promoter.

The bidirectional AR fiberglass mesh, characterized by flexibility and adaptability to irregular surfaces, as well as good mechanical strength, works synergistically with the inorganic matrix, aided by the presence of the adhesion promoter, to create a homogeneous, low-thickness reinforcement that does not alter the distribution of mass or structural stiffness. The system integrates seamlessly with the existing masonry, thereby enhancing the strength and ductility of the structure, even in potentially seismic environments.

C-MATRIX G320C15-M ensures excellent chemical and mechanical compatibility with traditional construction materials, making the system suitable for the consolidation of historically and artistically valuable buildings. Interventions using this reinforcement system are structurally effective while being minimally invasive, preserving the architectural value of existing structures.

Compliant with the provisions of **EAD 340275-00-0104** "Externally bonded Composite systems with inorganic matrix for strengthening of concrete and masonry structures," C-MATRIX G320C15-M is CE-marked for structural consolidation interventions. The system components are also certified with an EPD for CAM contribution.



APPLICATION FIELDS

- Structural reinforcement and seismic improvement of existing masonry with high masonry quality index
- Increase in 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
- Confinement and reinforcement of masonry columns • Anti-toppling protection and reinforcement of non structural elements (NSEs) (e.g., infill panels on framed structures)
- Reinforced masonry top courses

MAIN ADVANTAGES

1. **High performance:** the system enhances the tensile strength of masonry, ensuring structural safety even in seismic contexts and under high stress, without increasing the stiffness or mass of the structure.
2. **Durability and compatibility:** the matrix-reinforcement system ensures optimal chemical-physical compatibility with the materials in historic masonry, ensuring the durability of the intervention.
3. **Ease of application:** the AR fiberglass bidirectional dry mesh is lightweight, flexible, manageable, and easy to install. The "fresh on fresh" application technique, combined with the characteristics of the mesh, reduces the reinforcement installation time.
4. **Environmental sustainability and living comfort:** With a lime and hydraulic binder-based matrix, the system is breathable, eco-friendly, and has a low environmental impact (EPD certification available).
5. **Versatile solution:** Suitable for both historic buildings and modern masonry structures, C-MATRIX G320C15-M is a thin, non-invasive reinforcement solution ideal for applications on various substrates, including non-planar surfaces such as vaults, arches, columns, etc
6. **Reversibility of the intervention:** the **C-MATRIX G320C15-M** system meets the reversibility criteria required for protected architectural heritage, ensuring non-invasive interventions that are easily removable.

TECHNICAL DATA OF THE SYSTEM

	Description of the system
Commercial Name	C-MATRIX G320C15-M
Manufacturer	Fibre Net SpA
Type of reinforcement	FB-VAR320R12+IPN Bidirectional dry mesh made of AR glass fiber Water-based adhesion promoter
Type of matrix	MATERIA RINFORZA- RZ215 Lime-based mortar and hydraulic binders
Nominal thickness of the reinforcement system	8 mm

MECHANICAL CHARACTERISTICS OF THE SYSTEM

Pull out tests	Average value	Value characteristic	U.M.	Ref.
	Support: brick masonry			
Conventional limit tension $\sigma_{lim,conv}$	541	400	MPa	EAD 340275-00- 0104
Conventional limit strain $\epsilon_{lim,conv}$	0,87	-	%	
Tensile tests	Value average	Value characteristic	U.M.	
Ultimate tension σ_u of the composite	804	622	MPa	
Ultimate strain ϵ_u of the composite	1,35	-	%	
Stiffness module E_1 , in stage A	370,60	-	GPa	

GEOMETRIC, MECHANICAL AND PHYSICAL DATA OF THE REINFORCEMENT

Properties	Description	Ref.
Commercial name	FB-VAR320R12	
Weight of the mesh (dry) in warp	150 g/m ²	ISO 11667:1997
Weight of the mesh (dry) in weft	150 g/m ²	
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 ³	
Mesh size	12x12 mm	Internal method

Tensile tests	Value average	Value characteristic	U.M.	Ref.
Ultimate tensile strength σ_{uf} of the mesh	823	726	MPa	EAD 340275-00- 0104
Elastic modulus E_f of the mesh	62,02	55	GPa	
Ultimate tensile strain ϵ_{uf} of the mesh	1,33	-	%	

MECHANICAL CHARACTERISTICS OF THE ADHESION PROMOTER

Properties	Description	Ref.
Commercial name	FB-IPN01	
Catalysis ratio components A / B	0.5 : 1	-
Compressive strength at 28 days	> 15 MPa	EN 1542
Flexural strength at 28 days	> 5 MPa	EN 1015-11

MECHANICAL CHARACTERISTICS OF MORTAR

Properties	Description	Ref.
Commercial name	MATERIA RINFORZA- RZ215	
Class	M15	EN 998-2
Compressive strength at 28 days	≥ 15 MPa	EAD 340275-00-0104
Elastic modulus at 28 days	≥ 10 GPa	
Adhesion to the brick support	≥ 0.5 MPa (FP: A)	EN 1015-12
Percentage by weight of organic components	< 10 %	-
Vapor permeability	15 / 35	EN 998-2

Qualified system with **CE Marking** with assessment and verification of performance consistency **AVCP 2+**

SYSTEM APPLICATION GUIDELINES

The application of the **C-MATRIX G320C15-M** system follows a process designed to ensure optimal performance in every application context, whether historic or modern, on masonry with an appropriate quality index. Proper execution of all operational phases is essential to achieve effective and durable reinforcement.

ENVIRONMENTAL CONDITIONS

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

PREPARATION OF THE SUBSTRATE

The preparation of the substrate is crucial to ensure the full effectiveness of the **C-MATRIX G320C15-M** system. The surface must be healthy, compact, and mechanically resistant to guarantee proper adhesion of the mortar and reinforcement.

Removal of surface layers and preparation of the support: For interventions on load-bearing walls, arches, or vaults, it is recommended to completely remove the existing plaster and/or surface covering layers, either manually or using mechanical tools. All inconsistent or delaminating parts must be eliminated, proceeding until healthy masonry is reached.

Scarification, where possible, should also be performed on mortar joints to a depth of ≥ 5 mm. If the surface coatings or plasters are particularly tough and strongly bonded to the masonry, whose removal would compromise the integrity of the substrate for subsequent reinforcement application, it is advised to consult Fibre Net technicians for a specific evaluation.

For vault interventions, mechanically remove the existing plaster until reaching the masonry. In the case of reinforcement on the extrados, verify the consistency of the infill before removing it and follow the steps outlined in the project.

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

After removal and the above processes, thoroughly clean the surface of dust, grease, efflorescence, and other substances using low-pressure hydro-washing. Allow any excess water to evaporate, ensuring the substrate is saturated but the surface is dry (s.s.a.) before applying the mortar. The prepared surface should be planar, not smooth, but rough enough, with a roughness index ≥ 1 mm, sufficient to ensure the adhesion of the subsequent mortar.

For highly absorbent or mechanically weak masonry, it is recommended to apply a consolidating primer to improve mortar adhesion. This operation is especially recommended for substrates such as gypsum or weakly cohesive materials. For details on the most suitable consolidating materials, please contact the company.

MORTAR PREPARATION

The mortar **MATERIA RINFORZA - RZ 215** must be prepared by adding clean water according to the instructions provided in the relevant technical data sheet. Mixing and preparation of the paste should be carried out using appropriate tools and methods, as specified in the same technical data sheet.

APPLICATION OF THE FIRST LAYER OF MORTAR

On the properly roughened surface, thoroughly cleaned using low-pressure hydro-washing, and with the substrate saturated but the surface dry (s.s.a.), proceed with the following steps.

Before applying the reinforcement system, and in the presence of irregular surfaces, it is possible to level the masonry by applying a layer of **MATERIA RINFORZA - RZ215** mortar using a trowel, spatula, or spray application. Allow this first layer to harden for 18-24 hours.

Subsequently, apply a first uniform layer of **MATERIA RINFORZA - RZ215** mortar with a thickness of $3 \div 5$ mm, ensuring that the material is evenly distributed across the entire surface to be treated.

APPLICATION OF THE FIRST LAYER OF ADHESION PROMOTER

While the mortar is still damp, approximately 15–20 minutes after its application, proceed with the application of the first layer of adhesion promoter **FB-IPN01** using a brush or roller, at a coverage rate of approximately 600 g/m² of the surface to be treated.

It is important to apply the adhesion promoter on the still damp mortar surface, but outside the water film.

INSTALLATION OF THE REINFORCEMENT MESH

While the adhesion promoter is still fresh, proceed with the application of the bidirectional dry AR fiberglass mesh **FB-VAR320R12**. The mesh should be carefully placed and gently pressed with a flat trowel to ensure that it is completely embedded in the mortar and adhesion promoter layer. At the junctions between the mesh sheets, both longitudinally and transversely, adequate overlap must be ensured in accordance with **CNR-DT 215/2018**, thus ensuring continuity and effectiveness of the structural reinforcement. In the absence of laboratory tests, a minimum overlap of **300 mm** is required.

APPLICATION OF SECOND LAYER OF ADHESION PROMOTER

Once the mesh has been placed, apply the second layer of adhesion promoter **FB-IPN01** on the still damp reinforcement, using a brush or roller, at a coverage rate of 400 g/m² of the surface to be treated. Care should be taken to roll with a special ribbed steel roller to expel air from the fabric and ensure proper impregnation of the fibers.

APPLICATION OF THE SECOND LAYER OF MORTAR

Apply a second layer of mortar on top of the final layer of adhesion promoter, fresh on fresh, with a uniform thickness of approximately 3 ÷ 5 mm, ensuring the total thickness reaches 8 mm. This layer should completely cover the mesh and provide adequate protection for the reinforcement.

APPLICATION OF CONNECTIONS (OPTIONAL)

In specific cases where mechanical connection of the reinforcement to the supporting structure is required, high-strength fiberglass connectors such as **FB-TUP10-VAR** or **FB-TUF_VAR** can be used. These connectors are inserted into the thickness of the masonry through pre-drilled holes and embedded in the mortar, ensuring effective connection between the reinforcement system and the existing structure. The installation of connectors must follow the technical specifications of the project and the instructions provided by the company. Particularly, in the case of extrados reinforcement of arches or vaults, it is recommended to adopt connection systems on the reinforcement system turned at the springing for about 200 mm.

CURING AND PROTECTION

Once the reinforcement system has been applied, the surfaces should be properly protected during the curing phase for at least 24 hours. In particularly dry, hot, or windy climatic conditions, it is recommended to cover the surfaces with tarps or use wet curing techniques by misting water to prevent rapid drying, which could compromise the quality of the reinforcement. In particularly aggressive environments or areas exposed to moisture or water, it is advisable to apply an additional protective layer with a suitable product to ensure greater durability of the system. In these cases, it is recommended to consult the Technical Department to define the most appropriate protective treatment for the specific conditions.

HANDLING AND STORAGE CONDITIONS

The system is provided in two distinct phases: the matrix (monocomponent mortar based on lime and hydraulic binders) and the reinforcement (bidirectional dry AR fiberglass mesh).

The **FB-VAR320R12** mesh is available in rolls with the following dimensions:

- 100 cm (H) x 50 - 100 (L) m

The mesh should be stored in a dry, dust-free location. Direct exposure to light and heat sources should be avoided.

The mortar **MATERIA RINFORZA - RZ215** mortar is supplied in the following packaging:

- 25 kg bag

The mortar should be stored in its original, well-sealed packaging, in a dry location, and protected from frost, high temperatures, excessive sunlight, and wind during the curing period.

SAFETY INSTRUCTIONS

During all stages of preparation and application of the products, operators must use the appropriate Personal Protective Equipment (PPE) for the specific use of meshes and mortars (work clothing, protective goggles, gloves, and dust mask). For specific instructions, refer to the respective technical and safety data sheets. Avoid contact with skin and eyes; in case of skin contact, wash with water and soap; in case of eye contact, rinse with water and consult a doctor. When applying in enclosed spaces, ensure adequate ventilation to guarantee proper air circulation.

ENVIRONMENTAL STATEMENTS

The **FB-VAR320R12** mesh is provided with an Environmental Product Declaration (EPD) for compliance with CAM criteria.

Similarly, the **MATERIA RINFORZA - RZ215** mortar is certified for minimum recycled content, issued by ICMQ.

CERTIFICATIONS

The **C-MATRIX G320C15-M** system is CE marked according to ETA no. 22/0865.

SPECIFICATION VOICE

Structural reinforcement intervention on existing brick masonry using the FRCM system **C-MATRIX G320C15-M** by Fibre Net SpA, in compliance with **EAD 340275-00-0104**, CE marked with AVCP2+ control system, and in accordance with CAM criteria. The intervention involves the application of a first layer of **MATERIA RINFORZA - RZ215** mortar by Fibre Net, based on lime and hydraulic binders, with a compressive strength ≥ 15 MPa. While the mortar is still damp, the first layer of the water-based adhesion promoter **FB-IPN01**, made of interpenetrated resins, is applied. The installation of the bidirectional AR fiberglass mesh **FB-VAR320R12** by Fibre Net follows, with a mesh size of 12x12 mm, weight of 300 g/m², mesh thickness of 0.057 mm, conventional characteristic tensile strength of the composite of 400 MPa, and the average elastic modulus of the mesh being 62.02 GPa. A second layer of adhesion promoter **FB-IPN01** is then applied, followed by a second layer of **MATERIA RINFORZA - RZ215** mortar to achieve a total intervention thickness of 8 mm.

Excluded from this item: removal of existing plaster, remediation of degraded areas, preparation of the substrate through washing and saturation of the application surfaces with water, connectors (if specified), any finishing products, and material acceptance tests.

All materials must comply with the technical specifications and be certified according to current regulations.

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