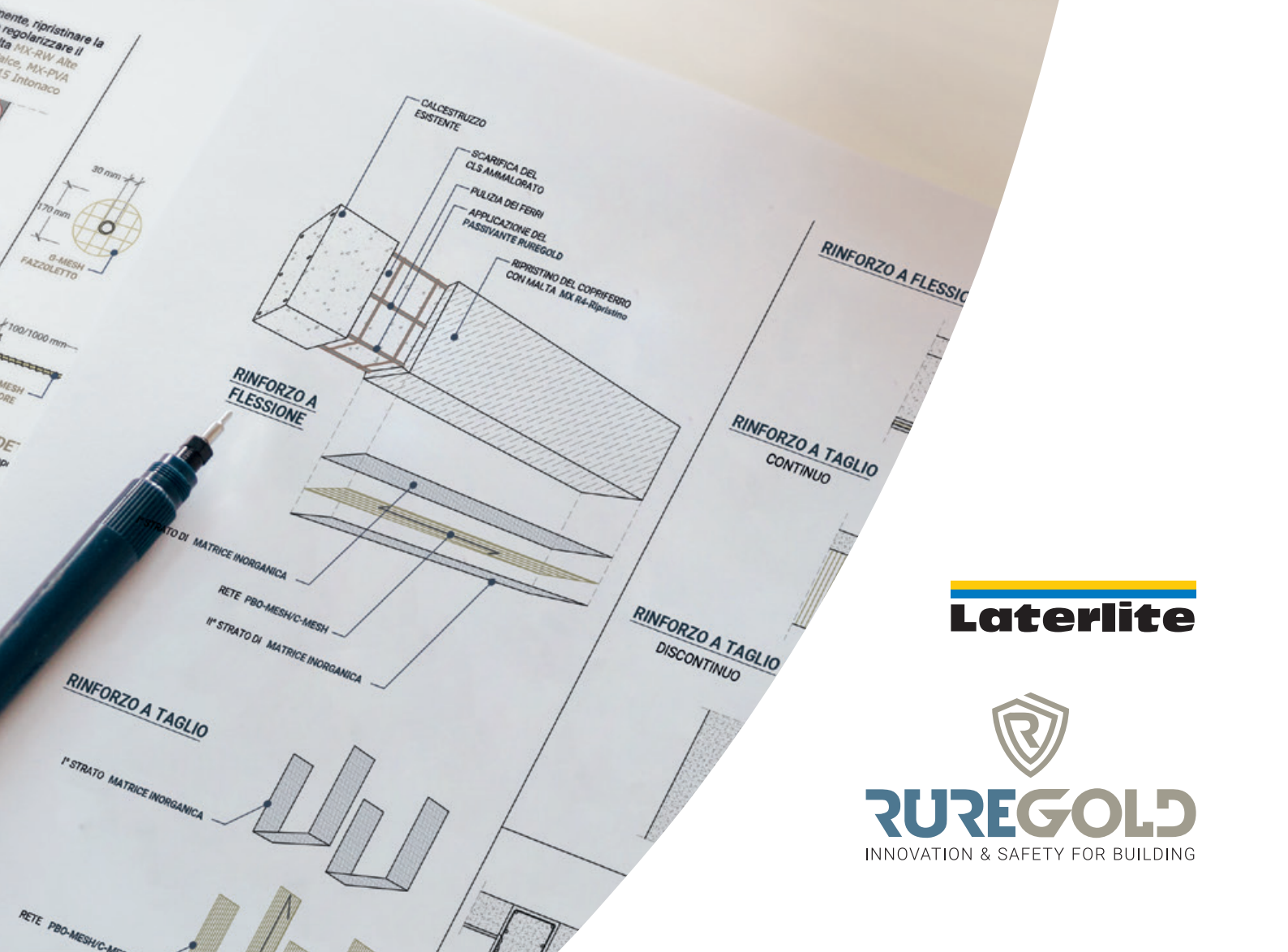


SOLUTION MANUAL

Structural retrofitting
and strengthening solutions for
concrete and masonry structures



Laterlite

RUREGOLD
INNOVATION & SAFETY FOR BUILDING

RUREGOLD

innovation and safety for construction and infrastructure.

Ruregold is a leading company in the **structural strengthening** sector, with deep knowledge of the market for building refurbishment and infrastructure maintenance based on know-how matured over nearly 20 years of experience.

Thanks to its recent acquisition by the **Laterlite Group**, **Ruregold** now stands alongside **LecaSistemi**, **Gras Calce**, and the parent company Laterlite as the fourth company of the Group.

The renewed Ruregold is focussing its energies on developing new strengthening systems for concrete and masonry structures, based on **composite materials of excellence**, in particular the **FRCM range**: the first in the world to win validation **certification at the international level**.

This means that Ruregold can now offer attentive support to designers who already know they can rely on Ruregold's innovative technologies, which have already demonstrated, with validated references, their validity for anti-seismic use and the **improved safety** they provide for structural strengthening.

This is evidence of the **Laterlite Group's** intention to expand and strengthen its range of technical solutions for the building industry, confirming **its vocation** as an **all-round partner in sustainable construction and refurbishment projects**.



Ruregold: know-how in structural strengthening

Ruregold, a specialised structural strengthening systems company with more than 20 years of experience, has now become part of the Laterlite Group.

Ruregold has always been at the forefront in developing new products, systems and technologies that maximise the safety of works to strengthen concrete and masonry structures based on the use of composite materials of excellence, in particular the FRCM range, the first in the world to win validation certification at the international level.

Thanks to Ruregold's development of structural strengthening systems based on long-fibre carbon composite materials, in the early 2000s it was the first to introduce a world innovation: the **C-MESH** range. In combination with inorganic matrix used as an adhesive (FRCM technology) these meshes have the ability to overcome the limitations of epoxy resins (FRP technology) in terms of their applicability and durability.

In 2011 Ruregold brought to the market an evolution of this carbon-FRCM system: the innovative **PBO-MESH** range, manufactured using new-generation PBO (polyparaphenylene benzo-bisoxazole) structural fibres that give better mechanical performance when applied to concrete and masonry structures. When they are combined with a range of patented inorganic matrices in the formulation of a strengthening system, these PBO meshes adhere to the element that is to be strengthened.

The different bidirectional and unidirectional weaves of the structural fibres in Ruregold **PBO-MESH** and **C-MESH** ensure maximum versatility for use in different load situations: **strengthening against combined axial and flexural forces in columns, shear in panels, bending in beams and floors, and directionally variable seismic actions.**



Ruregold's significant know-how, acquired working on highly engineered projects over many years of presence in the building reconstruction market, has also enabled it to offer an extended range of technologies: in particular the new **CRM reinforced plaster system** with **G-MESH 400** and **490** meshes; **MX-PVA Fibre Reinforced mortar** for strengthening masonry in the absence of diffused reinforcement; **X Plaster** solutions for securing and reinstating slabs; and HPFRC (high-performance fibre-reinforced) **microconcretes**.

This **Solution Manual** is a working tool for designers of structural strengthening systems.

It is divided into 5 sections:

- 1 • FRCM STRENGTHENINGS**
(Fibre Reinforced Cementitious Matrix)
 - reinforced concrete structures
 - masonry structures
 - arch and vault structures
- 2 • FRP STRENGTHENINGS** (Fibre Reinforced Polymer)
 - reinforced concrete structures
- 3 • CRM SYSTEM REINFORCED PLASTER**
(Composite Reinforced Mortar)
 - for reinstating and consolidating existing masonry
- 4 • HPFRC MICROCONCRETES**
(High Performance Fiber Reinforced Concrete)
 - for structural strengthening to reinforced concrete elements
- 5 • PROTECTION AND SAFETY SYSTEMS FOR NON-STRUCTURAL ELEMENTS.**

Each section includes comprehensive tables (downloadable free of charge, in .dwg format, from Ruregold.com) setting out the design, construction and application details of the strengthening solutions. Each system is accompanied by a brief presentation of the technical characteristics of the products used, and photographs of the solutions proposed.



Ruregold: know-how in structural strengthening

The **Laterlite Group** offers high-performance certified technical systems for structural and anti-seismic safety via the range of **Ruregold** solutions (technologies and composite materials of excellence) and **Laterlite** products (lightweight structural concretes and mechanical or chemical connection systems).

RUREGOLD exploits the performance of **composite materials applied to FRCM and FRP technologies**. These offer particularly high performance thanks to their **strength, lightness, and practicality of application**, and can be used in **selective strengthening** work to structurally critical areas.

The aim of any seismic retrofitting and upgrading strategy is to **eliminate local collapse mechanisms** and to **improve the strength and deformation capacity of structural elements**.

This is achieved by **increasing local ductility** in reinforced concrete structures: inducing box-like behaviour in loadbearing masonry buildings, eliminating unopposed thrusts, and inter-connecting loadbearing elements.

The **strength and deformation capacity** of each individually strengthened element, and the ability of the strengthening system to adhere to the structure, **are fundamentally important for its effectiveness and reliability**.

Adhesion capacity is a **certified and proven feature of Ruregold products and solutions**.

LATERLITE products offer **solutions for making buildings safe**, with a particular focus on horizontal structural elements, by means of strengthening works that induce **box-like behaviour in the existing building**.

Effective connection between floor slabs and walls is essential for ensuring the structural continuity of the load-bearing elements of a building, in which the task of the slab is to redistribute the horizontal forces to the walls as effectively as possible so as to form a rigid plane and prevent overturning.



The innovative **Laterlite Centrostorico Perimeter Connector** system for the **anti-seismic perimeter encirclement** of buildings consists of a **Perimeter Connector** and a **Chemical Anchor**.

Along with the range of **CentroStorico connectors, structural concretes, and Laterlite lightweight screeds**, this makes up the **Laterlite anti-seismic consolidation system**, which can **reduce the structural live load by up to 50%** (as compared to a traditional solution) ensuring positive effects both on the oscillating masses during a seismic event, and on the increased useful loadbearing capacity of the slab.

CERTIFICATIONS



ESR N° 3265: ICC-ES Evaluation Report.
Design Guideline: **ACI 549.4R-20:** Guide to Design and Construction of Externally Bonded Fabric-Reinforced Cementitious Matrix and Steel-Reinforced Grout Systems for Repair and Strengthening of Concrete Structures.
Qualification guideline: **AC 434/2019:** Acceptance Criteria for Concrete and Masonry Strengthening Using Fabric-Reinforced Cementitious Matrix (FRCM) and Steel Reinforced Grout (SRG) Composites.
PBO-Mesh 70/18 and C-MESH 84/84 system.



CVT Certificato di Valutazione Tecnica (Technical Evaluation Certificate): at approval stage.
Design guidelines: **CNR-DT 215/2018:** Guide for the design, construction, and control of structural strengthening works using fibre-reinforced inorganic matrix composites.
Qualification guidelines: **December 2018 GUIDELINES:** Guidelines for the identification, qualification, and acceptance control of inorganic matrix fibre-reinforced FRCM (Fibre Reinforced Cementitious Matrix) composites, used for structural strengthening of existing buildings. Implementing Decree published in January 2019.



CVT September 2019: Technical Evaluation Certificate pursuant to Chapter 11, point 11.1 letter c) of Ministerial Decree 17.1.2018. (Updated September 2019).
Design guidelines: **CNR-DT 200 R1/2013:** Instructions for the design, implementation, and checking of structural strengthening works using fibre-reinforced composites.
Qualification guidelines: **July 2015 GUIDELINES:** Guideline for the identification, qualification and acceptance checking of fibre-reinforced polymer matrix composites (FRP) used for the structural strengthening of existing buildings.



ETA: European Technical Assessment (at approval stage): EAD 340392-00-0104 "CRM (Composite Reinforced Mortar) systems for strengthening concrete and masonry structures".



ETA: European Technical Assessment (at approval stage): EAD 340275-00-0104 "Externally-bonded composite systems with inorganic matrix for strengthening concrete and masonry structures".



POLITECNICO DI MILANO Centrostorico Perimeter Connector has been certified by experimental testing at the Politecnico di Milano.



UNIVERSITÀ DEGLI STUDI DI BERGAMO Perimeter Connector has been certified by experimental testing at the Department of Civil and Environmental Engineering, University of Bergamo.



UNIVERSITÀ DEGLI STUDI DI PERUGIA Study for the use of MX-PVA Fibre-reinforced mortar to strengthen and improve the mechanical properties of wall panels subjected to seismic action.



UNIVERSITÀ DEGLI STUDI DI TRIESTE The Centrostorico Perimeter Connector system for the structural strengthening of slabs has been certified by the University of Trieste.

Scan the QR code for further information



ruregold.com



laterlite.com

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FRCM STRENGTHENINGS

■ Reinforced concrete structures

- 1.A Strengthening to **columns**
- 1.B Strengthening to **beams**
- 1.C Strengthening to **beam-column nodes**
- 1.D Strengthening to **joists in composite slabs**

1.A

STRENGTHENING TO COLUMNS

1.A

INSTALLATION PHASES

STRENGTHENING TO COLUMNS



SUBSTRATE PREPARATION

Remove deteriorated concrete, clean the rebars, and apply **PASSIVATOR**. Reinstall the reinforcement cover using **MX-R4 Repair mortar**.



INSTALLATION OF THE FRCM CONNECTOR

Install the **PBO-JOINT/C-JOINT** connector using the specific **MX-JOINT**.



APPLICATION OF STRENGTHENING AGAINST COMBINED AXIAL AND BENDING FORCES, SHEAR, AND CONFINEMENT

Apply **INORGANIC MATRIX** and **PBO-MESH/C-MESH** aligned with the longitudinal rebars (for **strengthening against combined axial and bending forces**) or the stirrups (for **shear and confinement strengthening**) ensuring, in the latter case, to create an overlap of 30 cm in the central area of the column face.

FRCM systems for CONCRETE

PBO MESH
PBO-MESH 105,
PBO-MESH 88,
PBO-MESH 70/18



+ INORGANIC MATRIX
MX-PBO Concrete

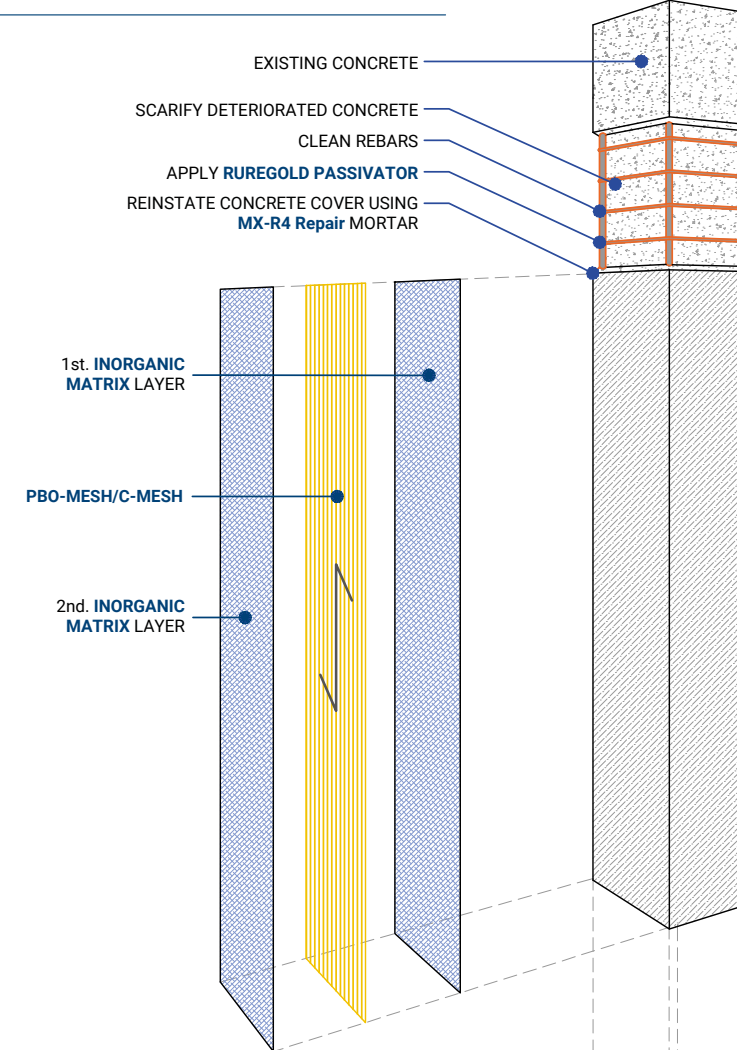
CARBON MESH
C-MESH 182



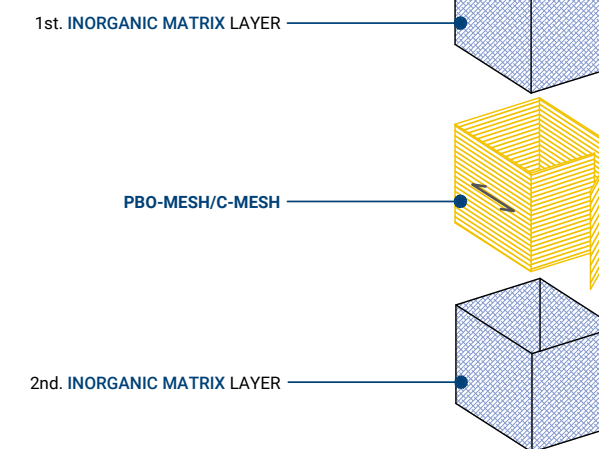
+ INORGANIC MATRIX
MX-C 50 Concrete.

For further information on all the products in the table, see chapter 6 (pages 142, 143, 146, 147 and 152).

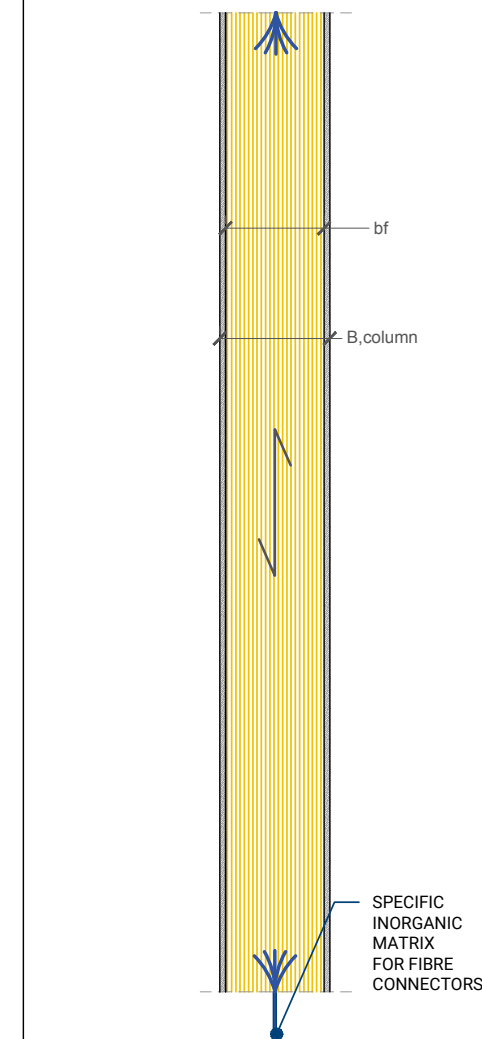
COMBINED AXIAL AND FLEXURAL FORCES STRENGTHENING



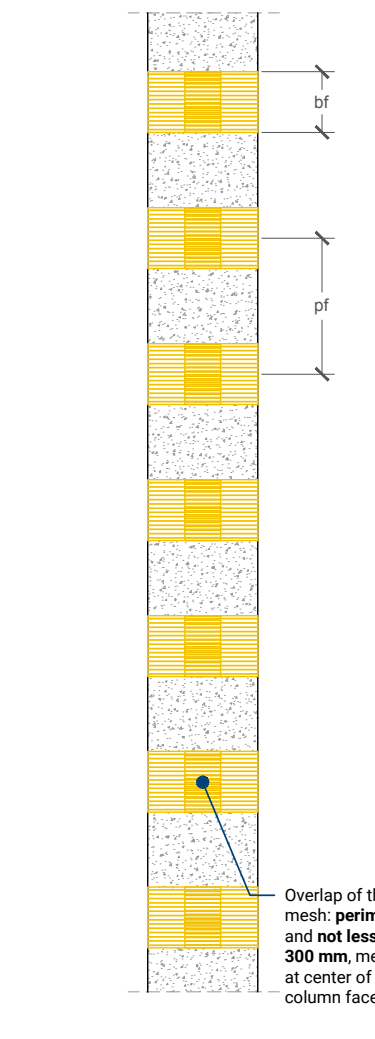
SHEAR STRENGTHENING AND CONFINEMENT



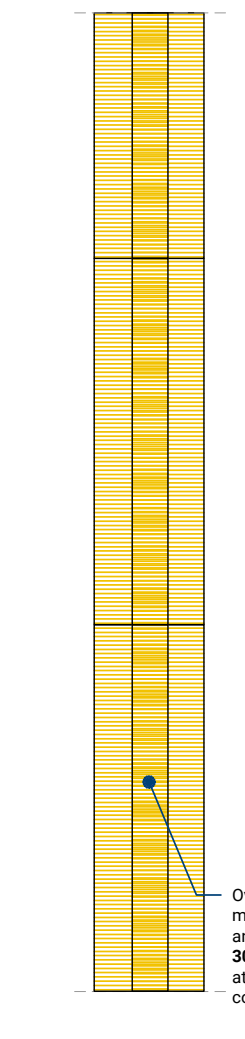
COMBINED AXIAL AND FLEXURAL FORCES STRENGTHENING



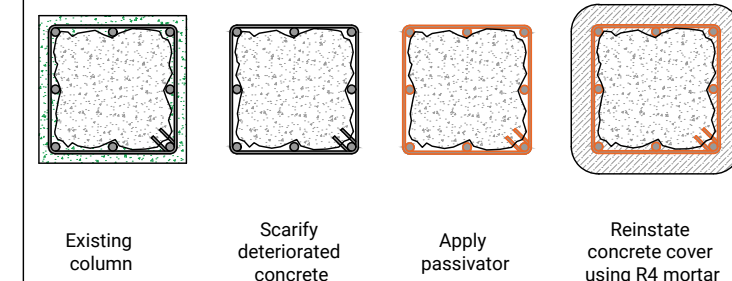
SHEAR STRENGTHENING



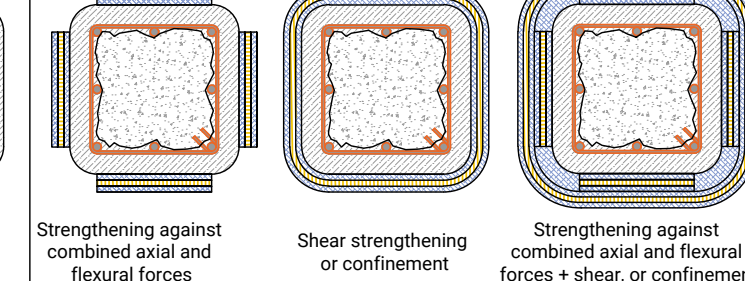
CONFINEMENT



CONCRETE REPAIR SEQUENCE



APPLICATION OF STRENGTHENING SYSTEM



INSTALLATION PHASES

1 SUBSTRATE PREPARATION

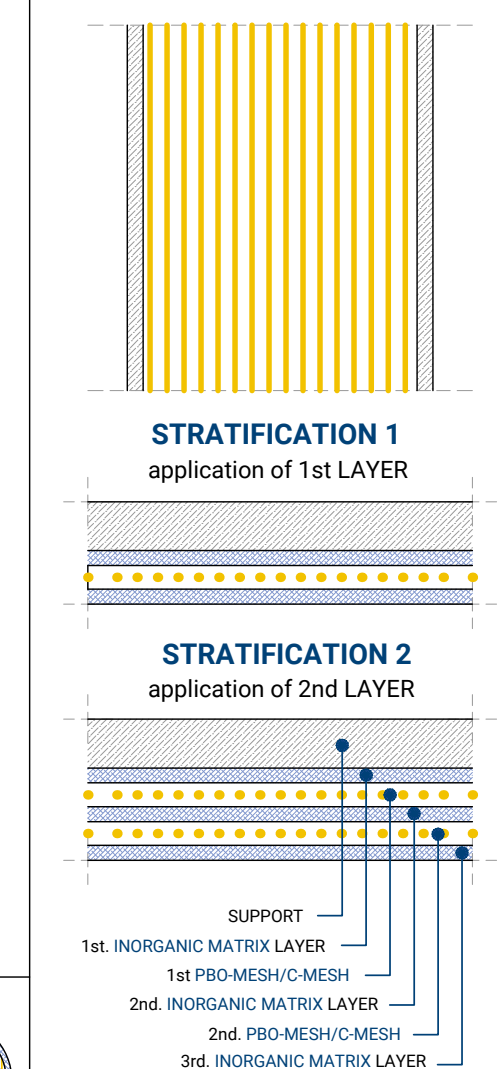
Remove any damaged substrate by hydro demolition or sandblasting until a concrete layer is reached that has not been carbonated and is well compacted. Remove rust from reinforcement bars by manual or mechanical brushing. Apply **RUREGOLD PASSIVATOR** to the existing reinforcement and restore the concrete cover using **MX-R4 Repair mortar**.

2 APPLICATION OF FRCM STRENGTHENING

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric, along the direction of the longitudinal reinforcement (for strengthening against combined axial and bending forces/bending) and perpendicular to it (for shear strengthening). Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple layers of **FRCM strengthening** are to be applied, repeat the previous steps **wet on wet**.

FRCM strengthening system with inorganic matrix and long fibres

FRONT VIEW OF STRENGTHENING



KEY

- Existing concrete
- MX-R4 Repair concrete repair mortar
- INORGANIC MATRIX
- RUREGOLD PASSIVATOR
- PBO-JOINT/C-JOINT connector and MX-JOINT inorganic matrix
- PBO-MESH/C-MESH
- PBO-MESH/C-MESH section

1.B

STRENGTHENING TO BEAMS

1.B

INSTALLATION PHASES

STRENGTHENING TO BEAMS



SUBSTRATE PREPARATION

Remove deteriorated concrete, clean the rebars, and apply **PASSIVATOR**. Reinstall the reinforcement cover using **MX-R4 Repair mortar**.



INSTALLATION OF THE FRCM SYSTEM

Flexural strengthening: application of **INORGANIC MATRIX** and **PBO-MESH/C-MESH** aligned with the longitudinal rebars



SHEAR STRENGTHENING WITH STRIPS

Strengthening against shear: application of **INORGANIC MATRIX** and **PBO-MESH/C-MESH** aligned with the stirrups.



CONTINUOUS SHEAR STRENGTHENING

FRCM systems for CONCRETE

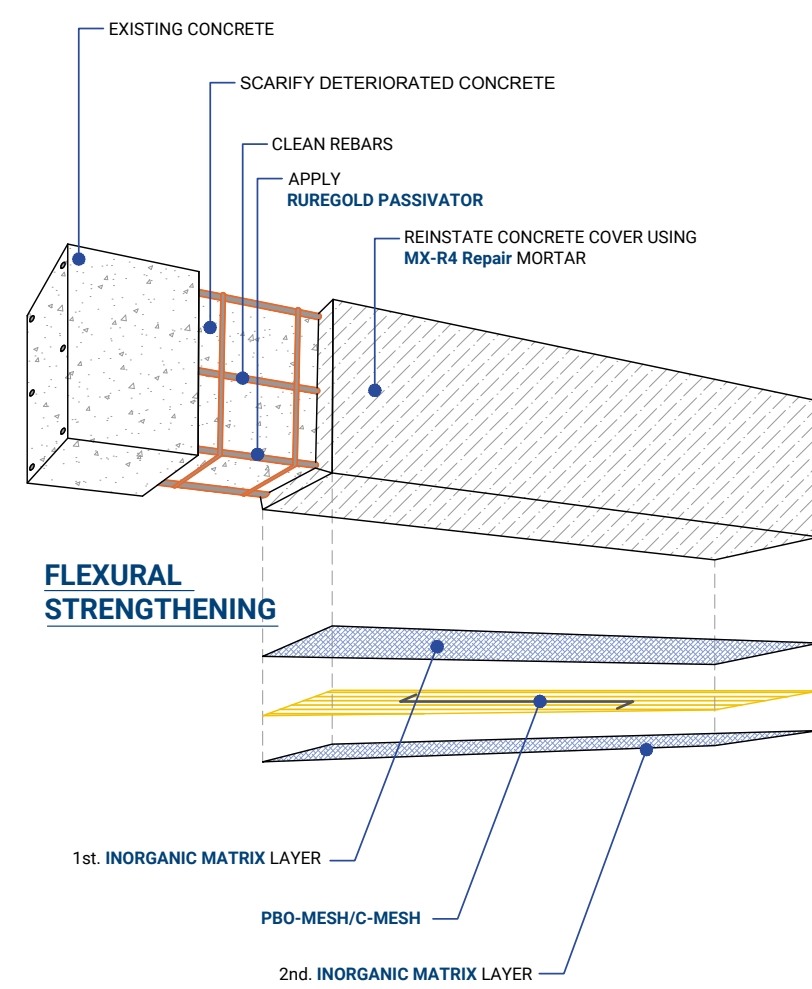
PBO MESH
PBO-MESH 105,
PBO-MESH 88,
PBO-MESH 70/18

+ INORGANIC MATRIX
MX-PBO Concrete

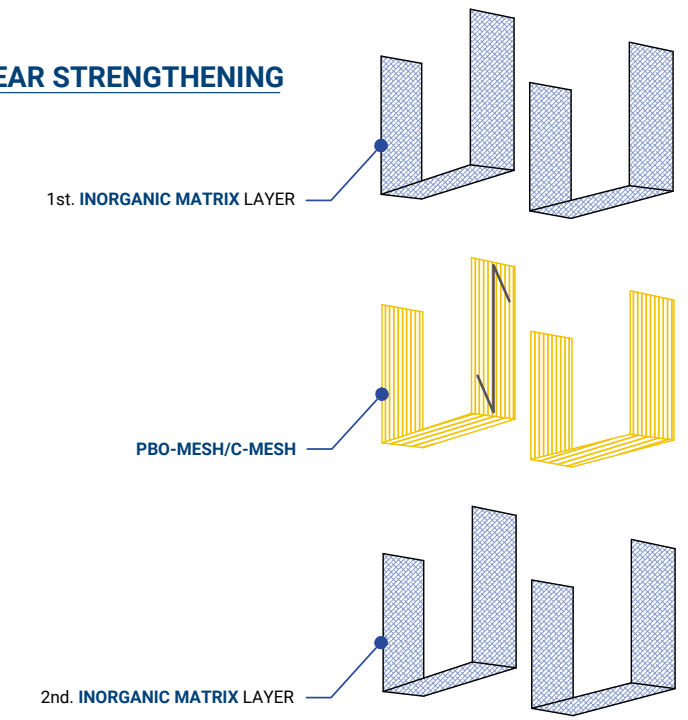
CARBON MESH
C-MESH 182 + INORGANIC MATRIX
MX-C 50 Concrete



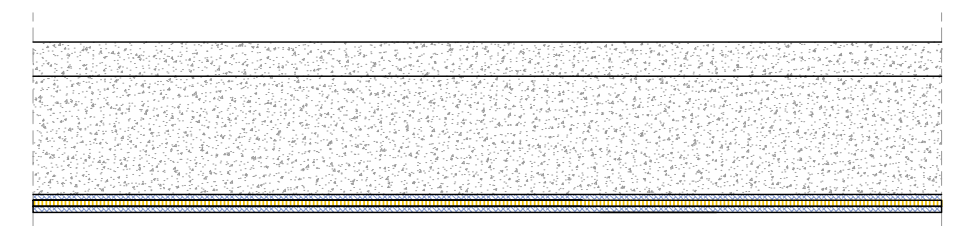
For further information on all the products in the table, see chapter 6 (pages 142, 143 and 152).



SHEAR STRENGTHENING

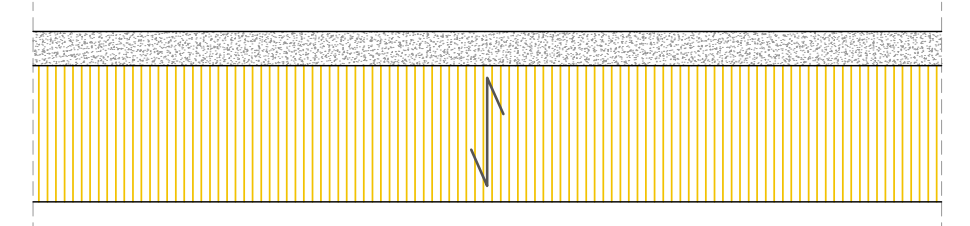


FLEXURAL STRENGTHENING



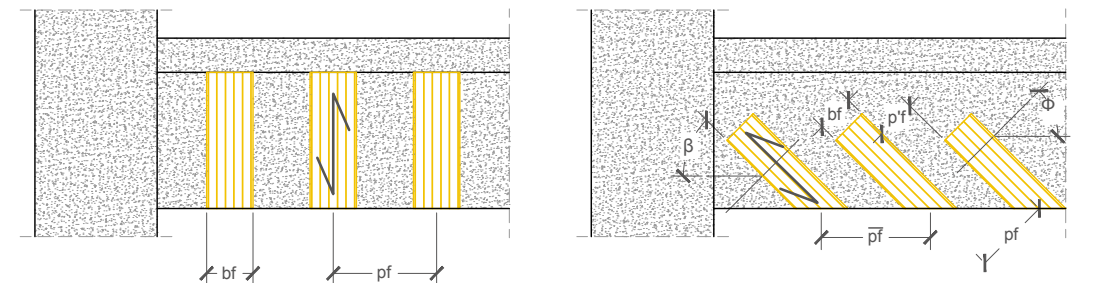
SHEAR STRENGTHENING

CONTINUOUS LAYOUT

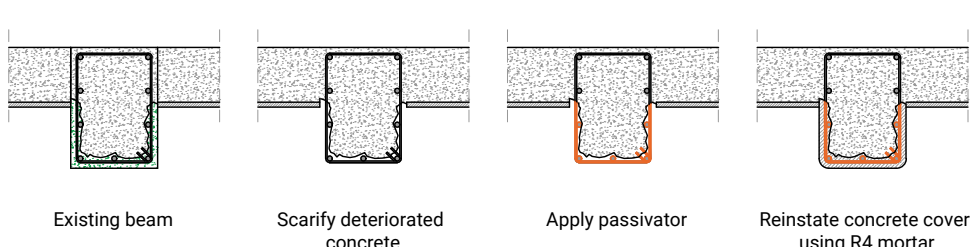


SHEAR STRENGTHENING

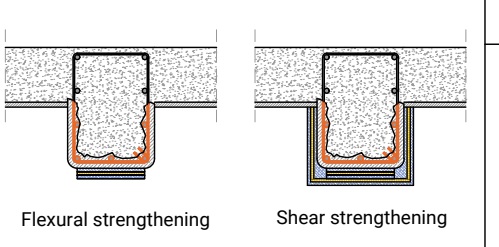
STRIPS LAYOUT



CONCRETE REPAIR SEQUENCE



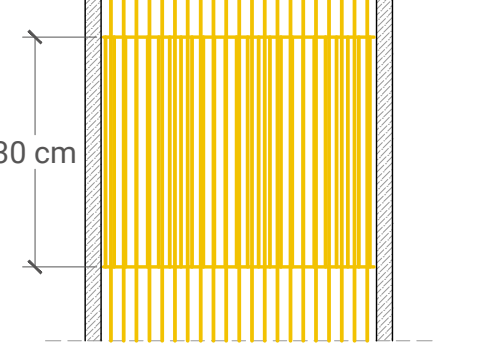
APPLICATION OF STRENGTHENING SYSTEM



FRCM strengthening system with inorganic matrix and long fibres

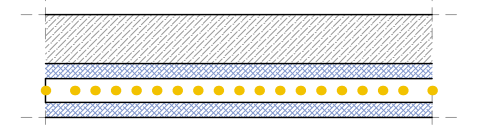
FRONT VIEW

mesh overlaps



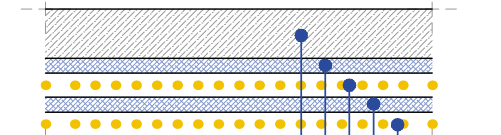
STRATIFICATION 1

application of 1st LAYER

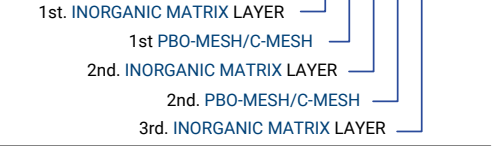


STRATIFICATION 2

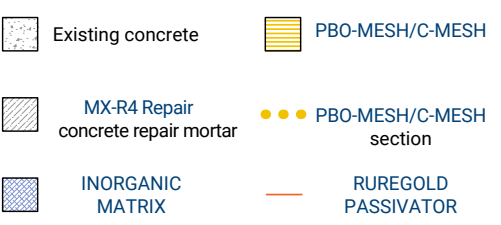
application of 2nd LAYER



SUPPORT



KEY



1 SUBSTRATE PREPARATION

Remove any damaged substrate by hydro demolition or sandblasting until a concrete layer is reached that has not been carbonated and is well compacted. Remove rust from reinforcement bars by manual or mechanical brushing. Apply **RUREGOLD PASSIVATOR** to the existing reinforcement and restore the concrete cover using **MX-R4 Repair mortar**.

2 APPLICATION OF FRCM STRENGTHENING

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric, along the direction of the longitudinal reinforcement (for strengthening against combined axial and bending forces/bending) and perpendicular to it (for shear strengthening). Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple layers of **FRCM strengthening** are to be applied, repeat the previous steps **wet on wet**.

INSTALLATION PHASES

1.C

STRENGTHENING TO BEAM-COLUMN NODES



SUBSTRATE PREPARATION

Remove deteriorated concrete, clean the rebars, and apply **PASSIVATOR**.



Reinstate the reinforcement cover using **MX-R4 Repair mortar**.



INSTALLATION OF THE FRCM SYSTEM

Apply **INORGANIC MATRIX** and **PBO-MESH/C-MESH** (to absorb the actions exerted by the external wall).



Apply **INORGANIC MATRIX** and **PBO-MESH/C-MESH** (to increase the shear strength of the node panel).

FRCM systems for CONCRETE

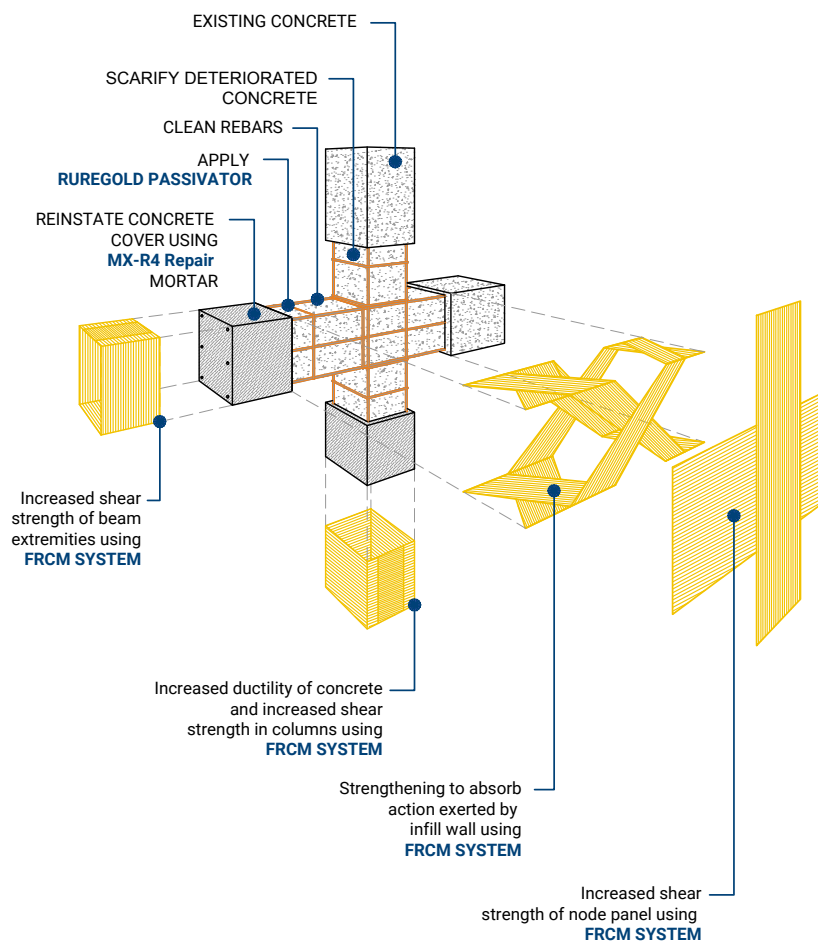
PBO MESH + INORGANIC MATRIX
PBO-MESH 105, PBO-MESH 88, PBO-MESH 70/18
MX-PBO Concrete



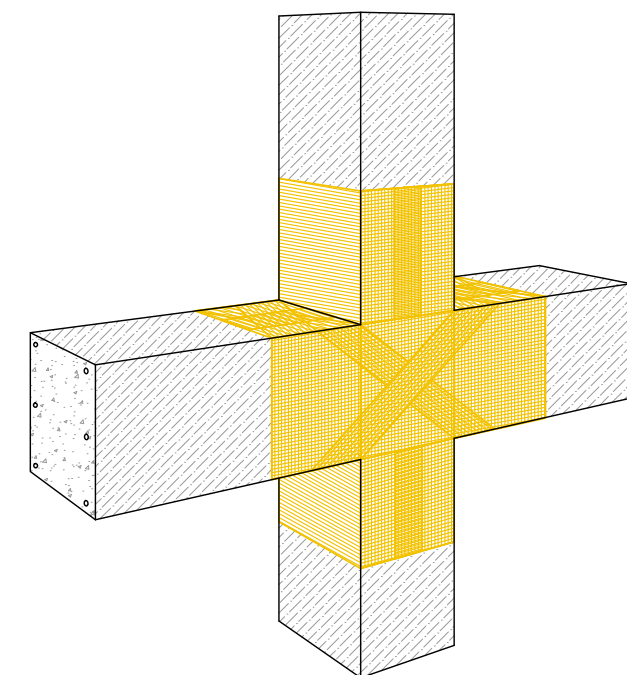
CARBON MESH + INORGANIC MATRIX
C-MESH 182
MX-C 50 Concrete



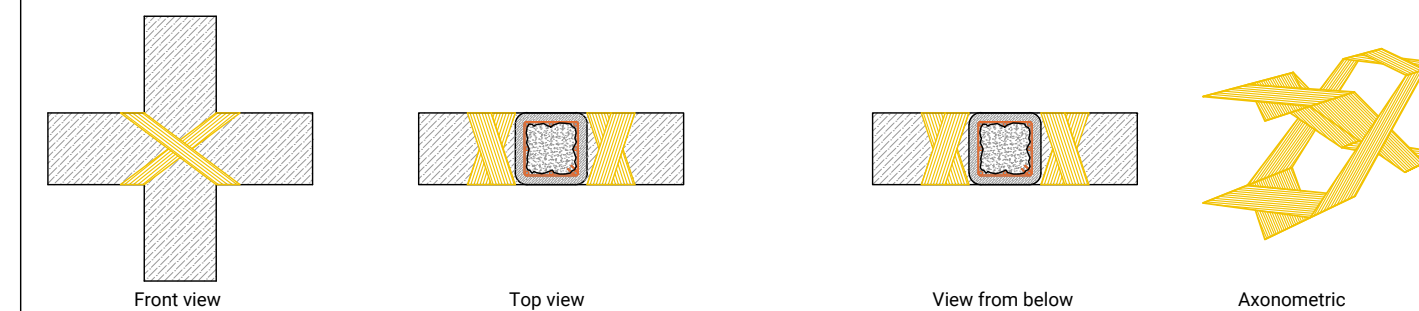
For further information on all the products in the table, see chapter 6 (pages 142, 143 and 152).



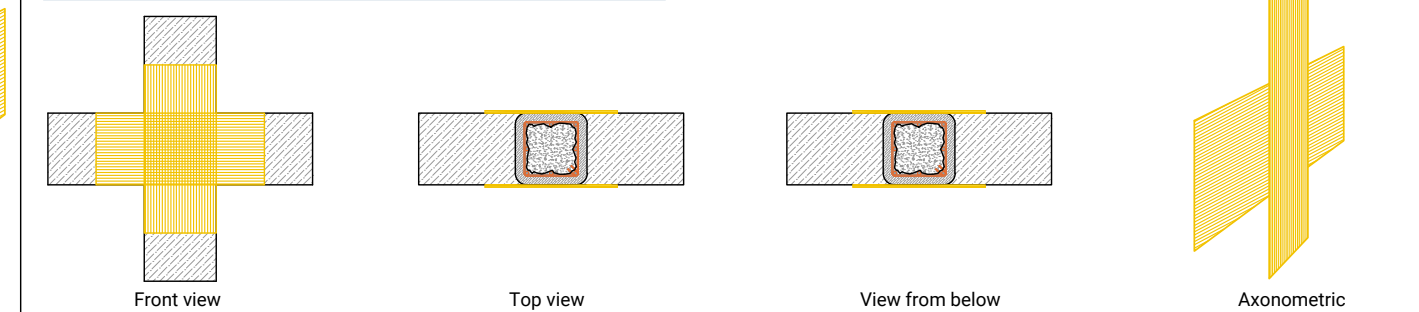
FULL BEAM-COLUMN JOINT STRENGTHENING AFTER COMPLETION



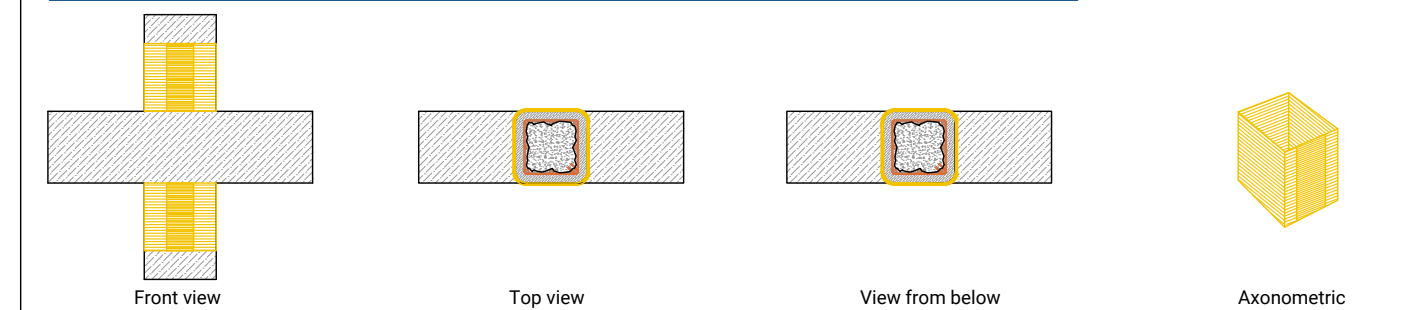
STRENGTHENING TO ABSORB ACTION EXERTED BY INFILL WALL



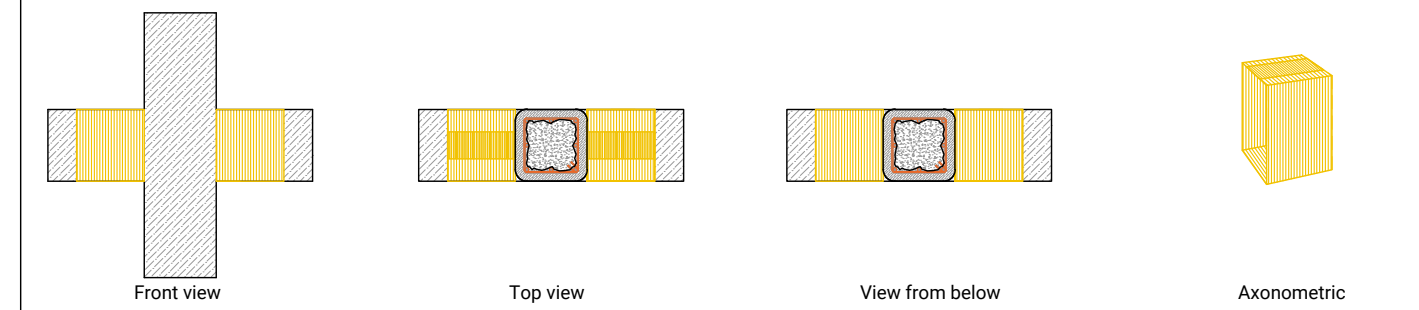
INCREASED SHEAR STRENGTH OF NODE PANEL



INCREASED DUCTILITY OF CONCRETE AND OF SHEAR STRENGTH IN COLUMNS



INCREASED SHEAR STRENGTH AT BEAM EXTREMITIES

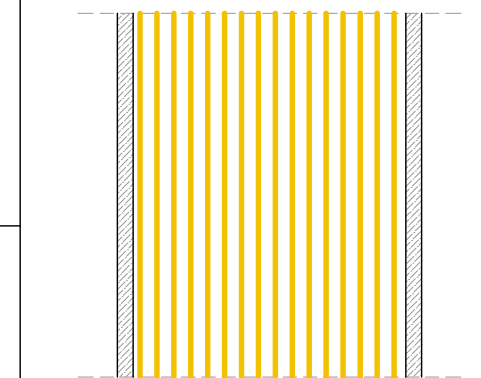


INSTALLATION PHASES

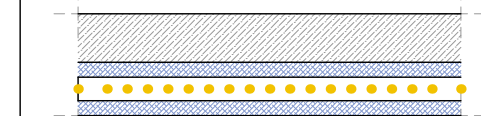
1 SUBSTRATE PREPARATION
 Remove any damaged substrate by hydro demolition or sandblasting until a concrete layer is reached that has not been carbonated and is well compacted. Remove rust from reinforcement bars by manual or mechanical brushing. Apply **RUREGOLD PASSIVATOR** to the existing reinforcement and restore the concrete cover using **MX-R4 Repair mortar**.

2 APPLICATION OF FRCM STRENGTHENING
 Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric, along the direction of the longitudinal reinforcement (for strengthening against combined axial and bending forces/bending) and perpendicular to it (for shear strengthening). Re-cover the mesh with a second layer of **INORGANIC MATRIX** o a thickness of 3-5 mm. If multiple layers of **FRCM strengthening** are to be applied, repeat the previous steps **wet on wet**.

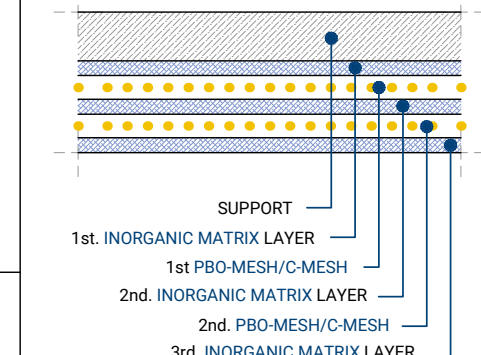
FRCM strengthening system with inorganic matrix and long fibres
FRONT VIEW



STRATIFICATION 1
 application of 1st LAYER



STRATIFICATION 2
 application of 2nd LAYER



KEY

- Existing concrete
- MX-R4 Repair concrete repair mortar
- INORGANIC MATRIX
- PBO-MESH/C-MESH
- PBO-MESH/C-MESH section
- RUREGOLD PASSIVATOR

1.D

STRENGTHENING TO JOISTS IN COMPOSITE SLABS

1.D

INSTALLATION PHASES

STRENGTHENING TO JOISTS IN COMPOSITE SLABS



INSTALLATION OF THE FRCM SYSTEM TO THE INTRADOS OF THE JOISTS

Remove deteriorated concrete, clean the rebars, and apply **PASSIVATOR**.
Reinstate the reinforcement cover using **MX-R4 Repair mortar**.
Apply **INORGANIC MATRIX** and **PBO-MESH/C-MESH**.



APPLICATION OF CENTROSTORICO CONNECTOR TO THE EXTRADOS OF THE SLAB

After the substrate has been cleaned, consolidate (if necessary) the existing concrete top slab with **CENTROSTORICO PRIMER** followed by application of **CENTROSTORICO CONCRETE CONNECTOR** or **CHEMICAL CONNECTOR** to the surface of the slab.

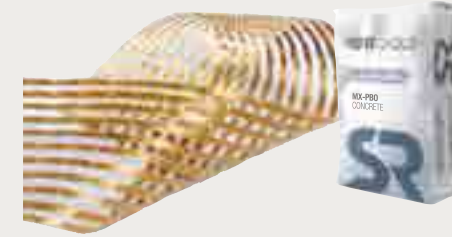


FORMATION OF A COLLABORATING CONCRETE TOP SLAB ON THE EXTRADOS OF THE EXISTING SLAB USING LATERMIX BETON

Cast the new **LATERMIX BETON 1400/1600/1800** lightweight structural concrete collaborating top slab, interconnected to the existing slab.

FRCM systems for CONCRETE

PBO MESH + INORGANIC MATRIX
PBO-MESH 105 + **MX-PBO Concrete**



CARBON MESH + INORGANIC MATRIX
C-MESH 182 + **MX-C 50 Concrete**

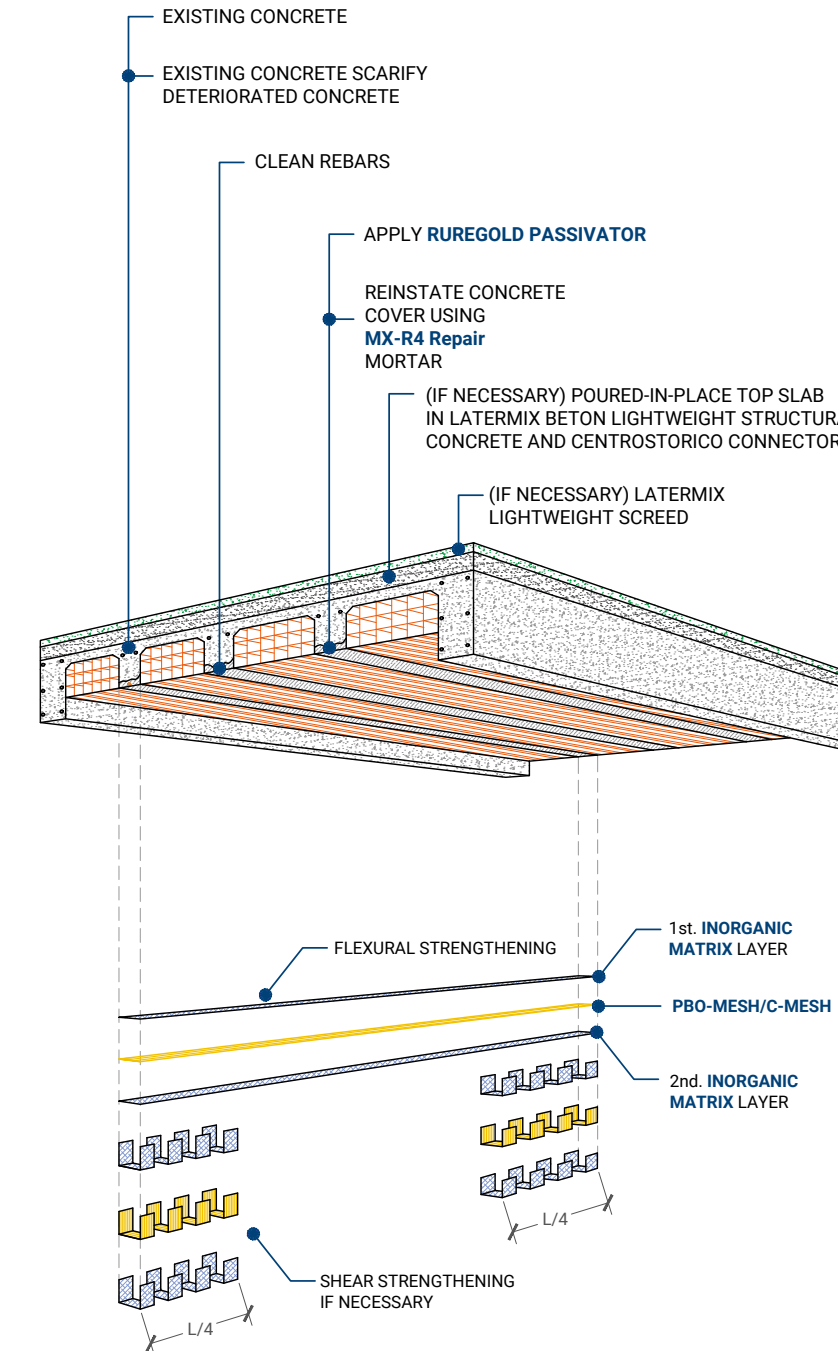


LATERLITE-CENTROSTORICO lightweight strengthening system for slabs

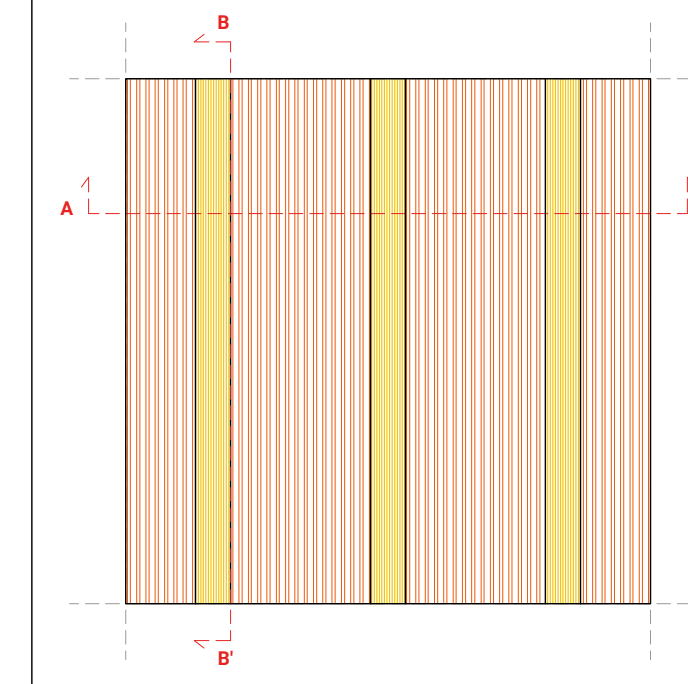


CONNECTOR + LIGHTWEIGHT STRUCTURAL CONCRETE
CentroStorico Concrete or **CentroStorico Chemical** + **Latermix Beton**

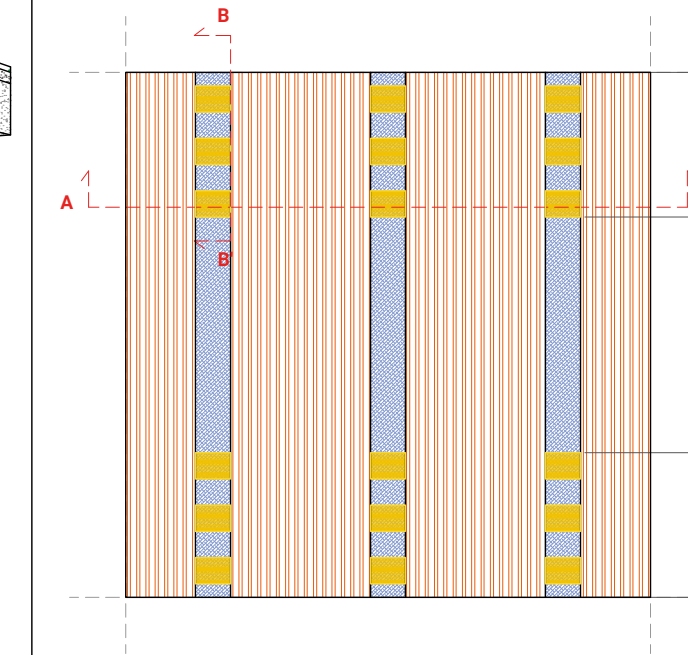
For further information on all the products in the table, see chapter 6 (pages 142, 143, 152, 158 and 159).



FLEXURAL STRENGTHENING



SHEAR STRENGTHENING IF NECESSARY

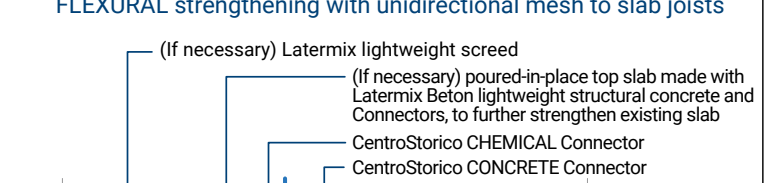


1 SUBSTRATE PREPARATION

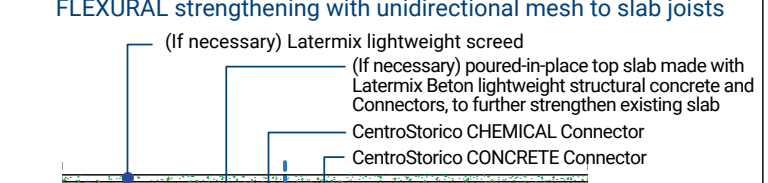
Remove any damaged substrate by hydro demolition or sandblasting until a concrete layer is reached that has not been carbonated and is well compacted. Remove rust from reinforcement bars by manual or mechanical brushing.
Apply **RUREGOLD PASSIVATOR** to the existing reinforcement and restore the concrete cover using **MX-R4 Repair mortar**.

INSTALLATION PHASES

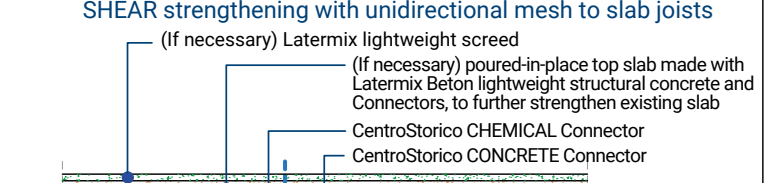
SECTION A-A'



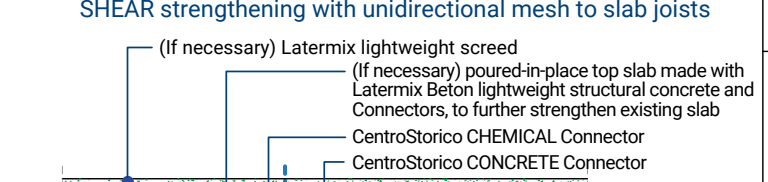
SECTION B-B'



SECTION A-A'

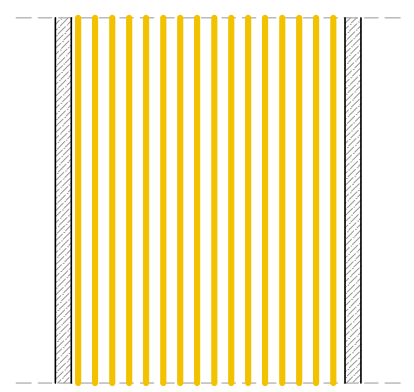


SECTION B-B'



FRCM strengthening system with inorganic matrix and long fibres

FRONT VIEW



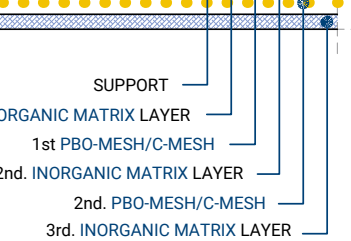
STRATIFICATION 1

application of 1st LAYER



STRATIFICATION 2

application of 2nd LAYER



KEY

- Existing concrete
- Latermix Beton lightweight concrete
- MX-R4 Repair concrete repair mortar
- Latermix lightweight screed
- PBO-MESH/C-MESH
- INORGANIC MATRIX
- Electrowelded mesh
- RUREGOLD PASSIVATOR

2 APPLICATION OF FRCM STRENGTHENING

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric, along the direction of the longitudinal reinforcement (for strengthening against combined axial and bending forces/bending) and perpendicular to it (for shear strengthening). Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple layers of **FRCM strengthening** are to be applied, repeat the previous steps **wet on wet**.



1

FRCM STRENGTHENINGS

■ Masonry structures

- 1.E Strengthening to **buildings** • **strips in grid** layout
- 1.F Strengthening to **buildings** • **continuous** layout
- 1.G Strengthening to **corners and floor edge beams**
- 1.Ha **Connection** systems
- 1.Hb Detail of **wall panel** • **face-to-face** connection
- 1.Hc Detail of **wall panel** • **one side only** connection

1.E

STRENGTHENING TO BUILDINGS • STRIPS IN GRID LAYOUT

1.E

INSTALLATION PHASES

STRENGTHENING TO BUILDINGS • STRIPS IN GRID LAYOUT



SUBSTRATE PREPARATION

Remove plaster and any incoherent parts. Scarify and repoint the mortar joints. Unstitch/restitch any lesions. Regularise the substrate (if required) with **MX-RW**, **MX-CP**, **MX-PVA**, or **MX-15** mortar.



APPLICATION OF FLEXURAL AND SHEAR STRENGTHENING TO THE WALL PANEL

Install the FRCM system, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH**, aligned with the direction of the stresses.



APPLICATION OF COMBINED AXIAL AND FLEXURAL FORCES AND SHEAR STRENGTHENING TO THE LOADBearing WALL

Apply **INORGANIC MATRIX** and **PBO-MESH/C-MESH**, aligned with the direction of the stresses.

FRCM systems for MASONRY

PBO MESH
PBO-MESH 22/22,
PBO-MESH 44

+ INORGANIC MATRIX
MX-PBO Masonry

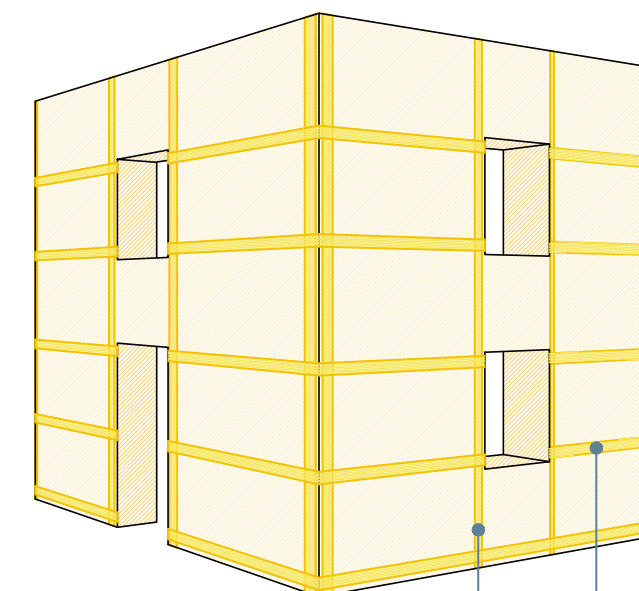
CARBON MESH
C-MESH 84/84

+ INORGANIC MATRIX
MX-C 25 Masonry



For further information on all the products in the table, see chapter 6 (pages 144, 145 and 155).

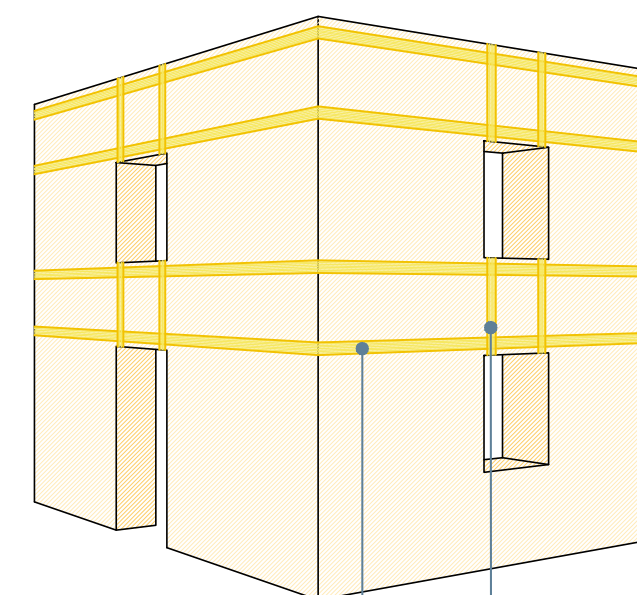
LOADBEARING WALL (PIERS)



Strengthening to loadbearing wall (piers) against COMBINED AXIAL AND FLEXURAL FORCES using PBO or CARBON FRCM SYSTEM

SHEAR strengthening of loadbearing wall (piers) using PBO or CARBON FRCM SYSTEM

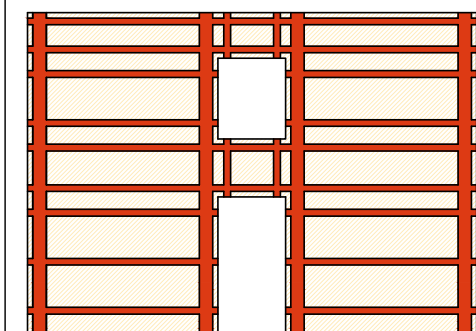
SPANDREL



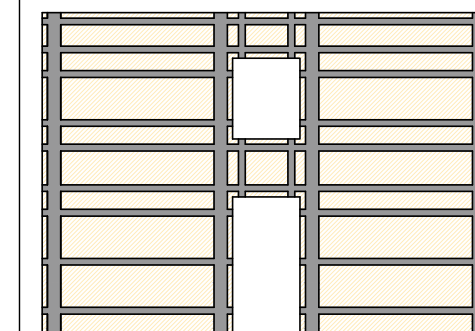
FLEXURAL strengthening of spandrel using PBO or CARBON FRCM SYSTEM

SHEAR strengthening of spandrel using PBO or CARBON FRCM SYSTEM

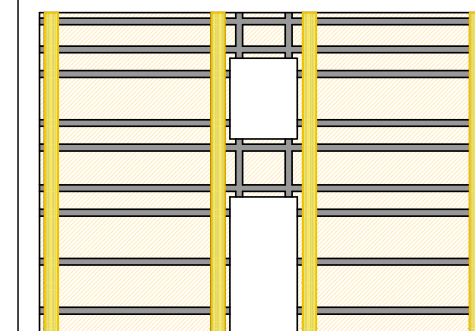
PHASE 1: remove plaster and incoherent parts in affected area. Scarify mortar joints if necessary



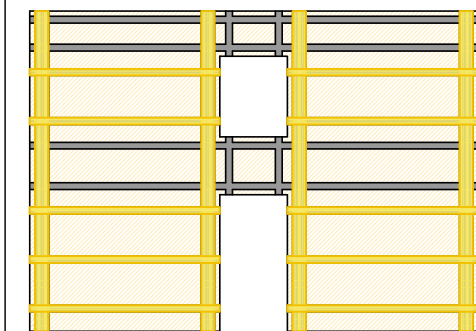
PHASE 2: Reinstale mortar joints (repointing) and regularise base layer using **MX-RW High Performance**, **MX-CP Lime**, **MX-PVA Fibre-reinforced**, or **MX-15 Plaster mortar**



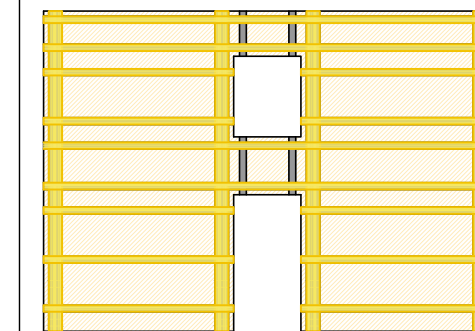
PHASE 3: Strengthening to loadbearing wall (piers) against COMBINED AXIAL AND FLEXURAL FORCES using PBO or CARBON FRCM SYSTEM



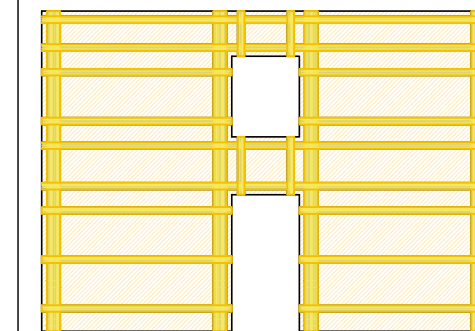
PHASE 4: SHEAR strengthening of loadbearing wall (piers) using PBO or CARBON FRCM SYSTEM



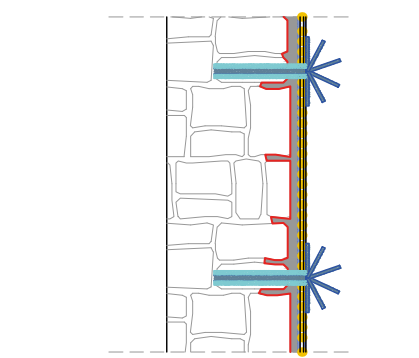
PHASE 5: FLEXURAL strengthening of spandrel using PBO or CARBON FRCM SYSTEM



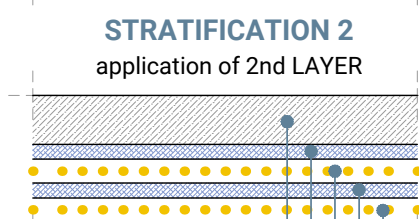
PHASE 6: SHEAR strengthening of spandrel using PBO or CARBON FRCM SYSTEM



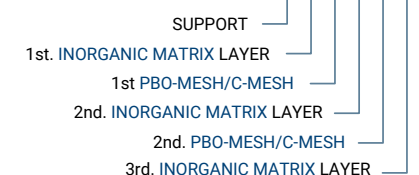
FRCM strengthening system with inorganic matrix and long fibres
APPLICATION FROM ONE SIDE ONLY (see Dwg. 1Hc)



STRATIFICATION 1
application of 1st LAYER



STRATIFICATION 2
application of 2nd LAYER



KEY

- Existing plaster
- Existing masonry
- INORGANIC MATRIX
- PBO-MESH/C-MESH
- MX-RW High Performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster

1 SUBSTRATE PREPARATION

Remove plaster and incoherent parts from the affected area by hydro demolition or sandblasting, ensuring that the joint mortar is not disintegrated.

If it is disintegrated, scarify and repoint the joints. If necessary, level the substrate with **MX-RW High performance**, **MX-CP Lime**, **MX-PVA Fibre-reinforced**, or **MX-15 Plaster mortar** (see DWG 3C). See DWG 1Ha and 1Hc for Connection System application information.

2 APPLICATION OF FRCM STRENGTHENING

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric.

Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple layers of **FRCM strengthening** are to be applied, repeat the previous steps **wet on wet**.

INSTALLATION PHASES

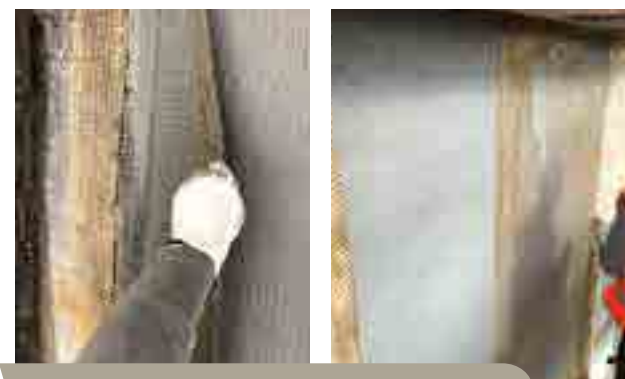
1.F

STRENGTHENING TO BUILDINGS • CONTINUOUS LAYOUT



SUBSTRATE PREPARATION

Remove the plaster and any incoherent parts. Scarify and repoint the mortar joints. Unstitch/restitch any lesions. Regularise the substrate (if required) with **MX-RW**, **MX-CP**, **MX-PVA**, or **MX-15** mortar.



MESH OVERLAPS

Install the FRCM system, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH**. The meshes should overlap by at least 30 cm so that the strengthening is continuous.



INSTALLATION OF THE FRCM CONTINUOUS LAYOUT STRENGTHENING SYSTEM

Install the FRCM system, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH**.



FRCM systems for MASONRY

PBO MESH
PBO-MESH 22/22,
PBO-MESH 44

+ INORGANIC MATRIX
MX-PBO Masonry

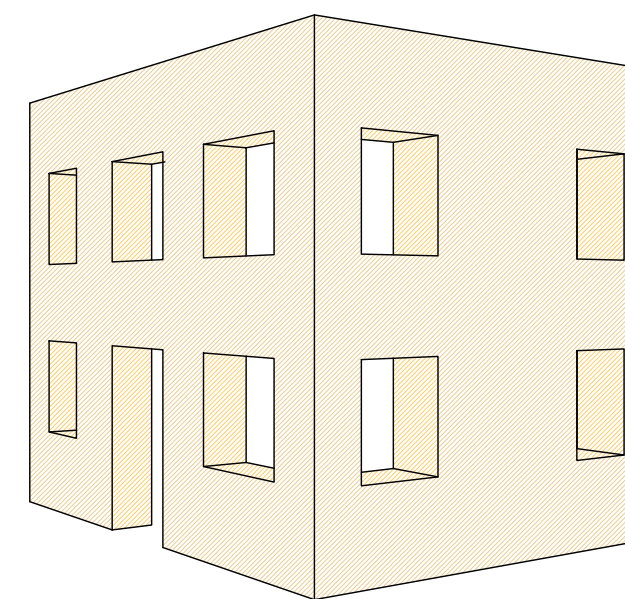
CARBON MESH
C-MESH 84/84

+ INORGANIC MATRIX
MX-C 25 Masonry

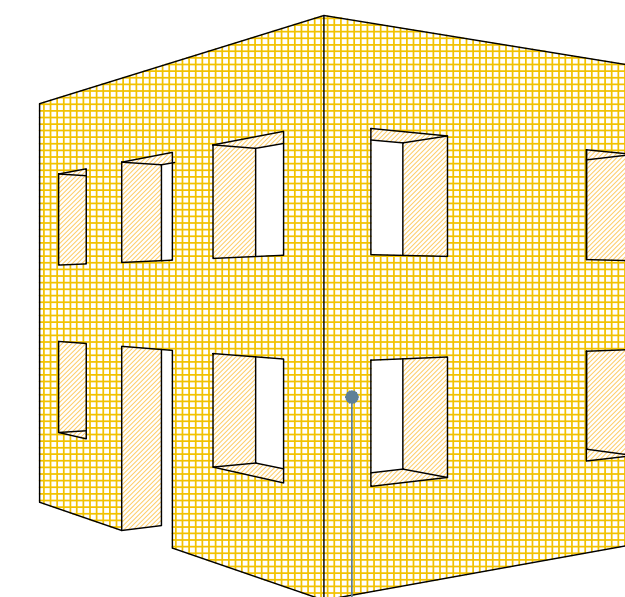


For further information on all the products in the table, see chapter 6 (pages 144, 145 and 155).

AS EXISTING

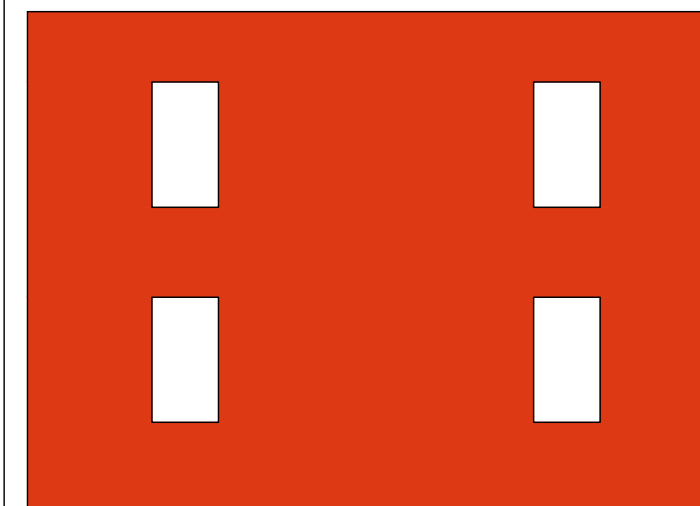


PROJECT

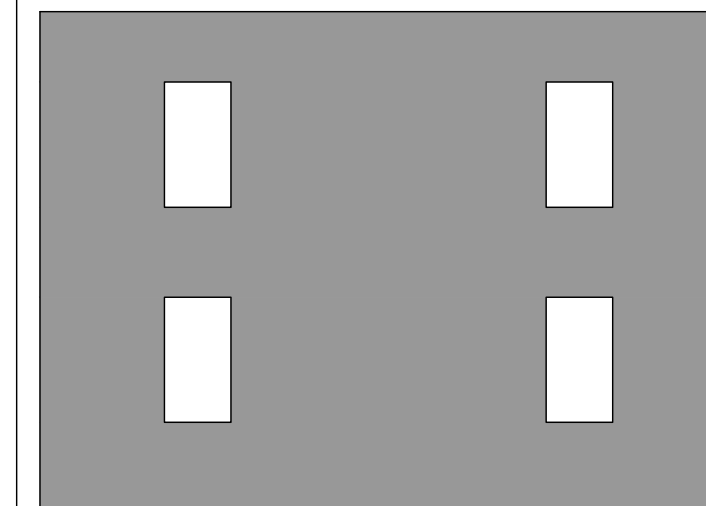


Continuous layout strengthening using bidirectional mesh and inorganic matrix, **PBO** or **CARBON FRCM SYSTEM**

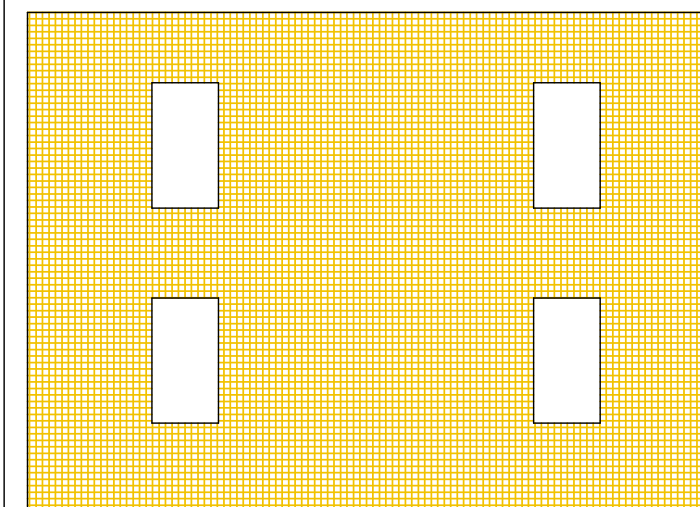
PHASE 1: Remove plaster and incoherent parts in affected area. Scarify mortar joints if necessary.



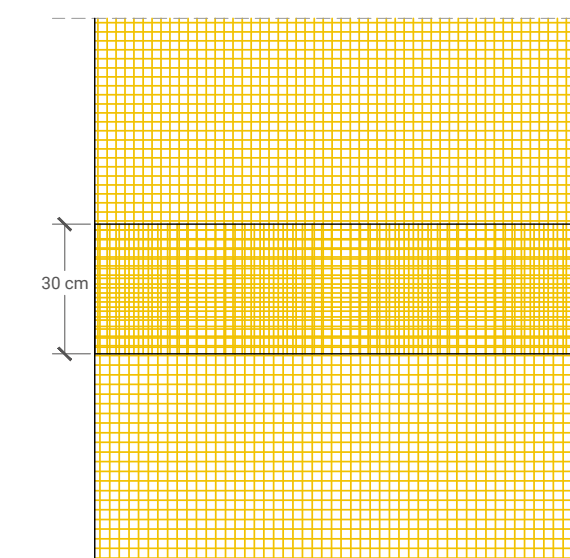
PHASE 2: Reinstatement mortar joints (repointing) and regularise base layer using **MX-RW High Performance**, **MX-CP Lime**, **MX-PVA Fibre-reinforced**, or **MX-15 Plaster mortar**.



PHASE 3: in-plane continuous layout strengthening of loadbearing wall (piers), using **PBO** or **CARBON FRCM SYSTEM**.

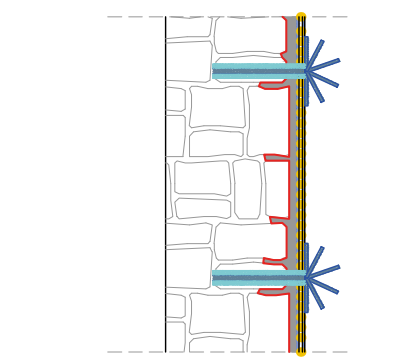


MESH OVERLAPS in the direction of stress.

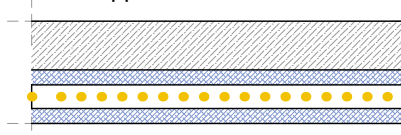


FRCM strengthening system with inorganic matrix and long fibres

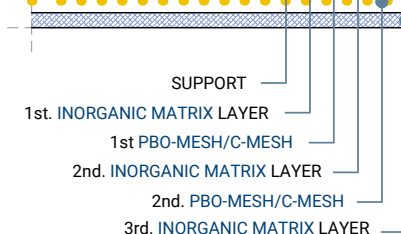
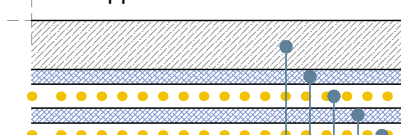
APPLICATION FROM ONE SIDE ONLY (see Dwg. 1.Hc)



STRATIFICATION 1
application of 1st LAYER



STRATIFICATION 2
application of 2nd LAYER



KEY

- Existing plaster
- Existing masonry
- MX-RW High Performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster
- INORGANIC MATRIX
- PBO-MESH/C-MESH
- 30 cm

INSTALLATION PHASES	1 SUBSTRATE PREPARATION	2 APPLICATION OF FRCM STRENGTHENING
		<p>Remove plaster and incoherent parts from the affected area by hydro demolition or sandblasting, ensuring that the joint mortar is not disintegrated. If it is disintegrated, scarify and repoint the joints. If necessary, level the substrate with MX-RW High Performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster mortar (see DWG 3C). See DWG 1Ha and 1Hc for Connection System application information.</p>

1.G

STRENGTHENING TO CORNERS AND FLOOR EDGE BEAMS

1.G

INSTALLATION PHASES

STRENGTHENING TO CORNERS AND FLOOR EDGE BEAMS



SUBSTRATE PREPARATION

Remove the plaster and any incoherent parts. Scarify and repoint the mortar joints. Unstitch/restitch any lesions. Regularise the substrate (if required) using **MX-RW**, **MX-CP**, **MX-PVA**, or **MX-15** mortar.



STRENGTHENING THE CORNERS AND FLOOR EDGE BEAMS

Install the FRCM system, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH**.



STRENGTHENING THE FLOOR EDGE BEAM

Install the FRCM system, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH**.



INSERTING THE CONNECTORS

Make the perforations, insert the **PBO-JOINT/C-JOINT** connectors, and grout with **MX-JOINT** inorganic matrix.

FRCM systems for MASONRY + CONNECTIONS

PBO MESH
PBO-MESH 22/22,
PBO-MESH 44
PBO CONNECTOR
PBO-JOINT

INORGANIC MATRIX
MX-PBO Masonry
MX-JOINT

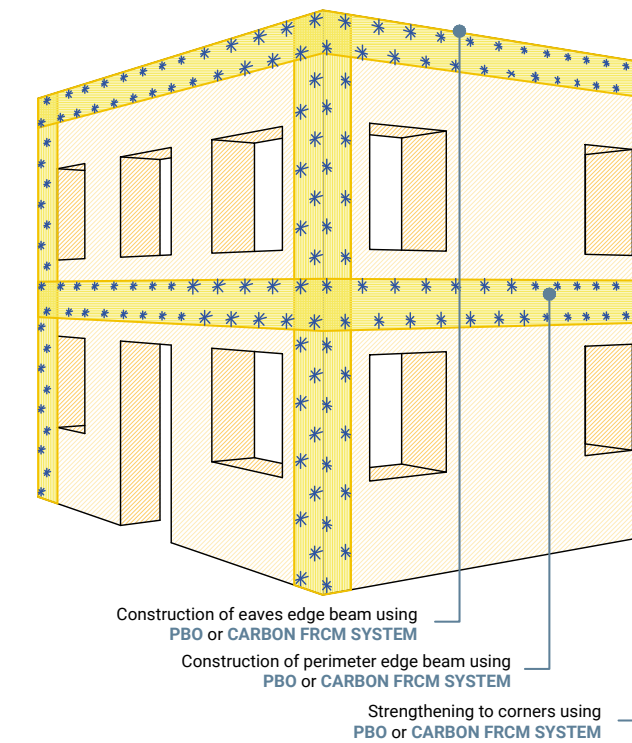
CARBON MESH
C-MESH 84/84
CARBON CONNECTOR
C-JOINT

INORGANIC MATRIX
MX-C 25 Masonry
MX-JOINT



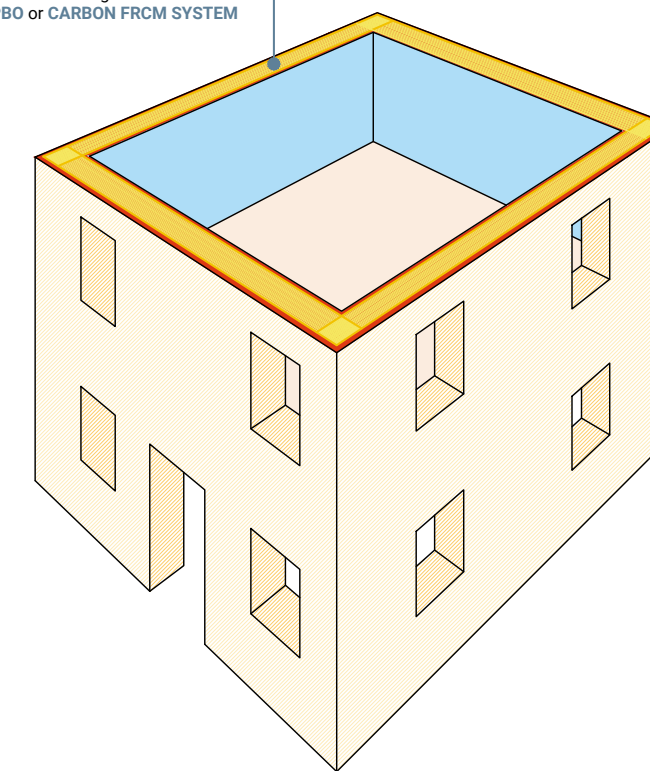
For further information on all the products in the table, see chapter 6 (from page 144 to 147 and page 155).

WORKS FOR STRENGTHENING AGAINST OUT-OF-PLANE ACTIONS

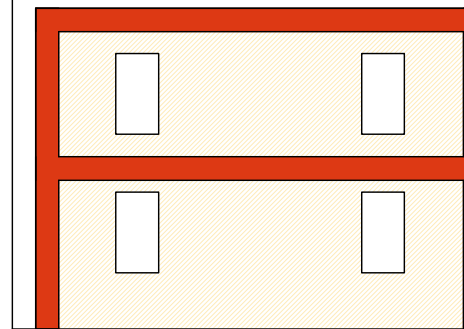


CONSTRUCTION OF EAVES EDGE BEAMS

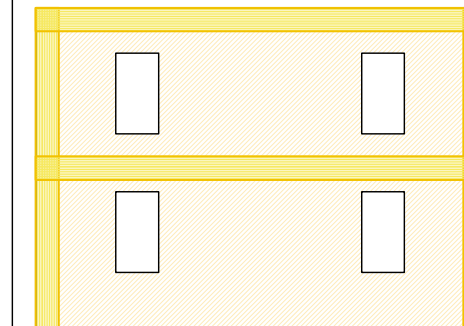
Construction of edge beam at eaves: PBO or CARBON FRCM SYSTEM



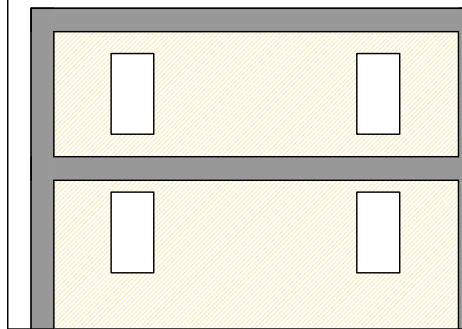
PHASE 1: Remove plaster and incoherent parts in affected area. Scarify mortar joints if necessary.



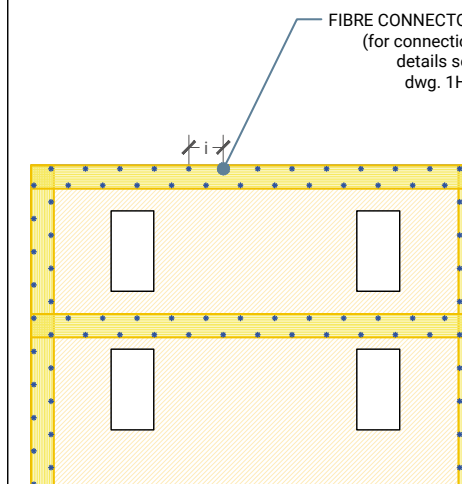
PHASE 4: Construct perimeter edge beams using PBO or CARBON FRCM SYSTEM.



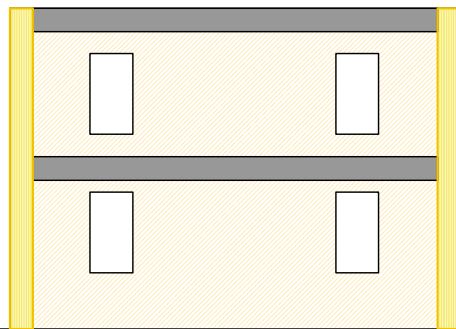
PHASE 2: Reinstall mortar joints (repointing) and regularise base layer using **MX-RW High Performance**, **MX-CP Lime**, **MX-PVA Fibre-reinforced**, or **MX-15 Plaster mortar**.



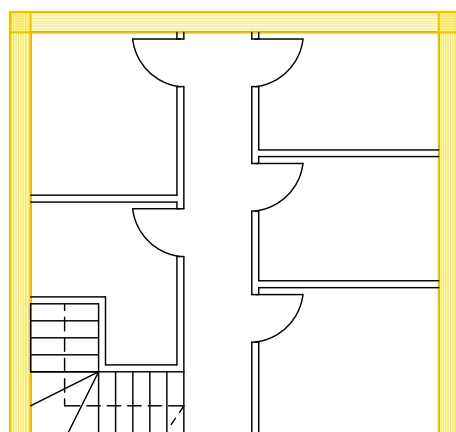
PHASE 5: Insert PBO or CARBON FRCM SYSTEM connectors.



PHASE 3: Strengthen corners using **PBO** or **CARBON FRCM SYSTEM**.

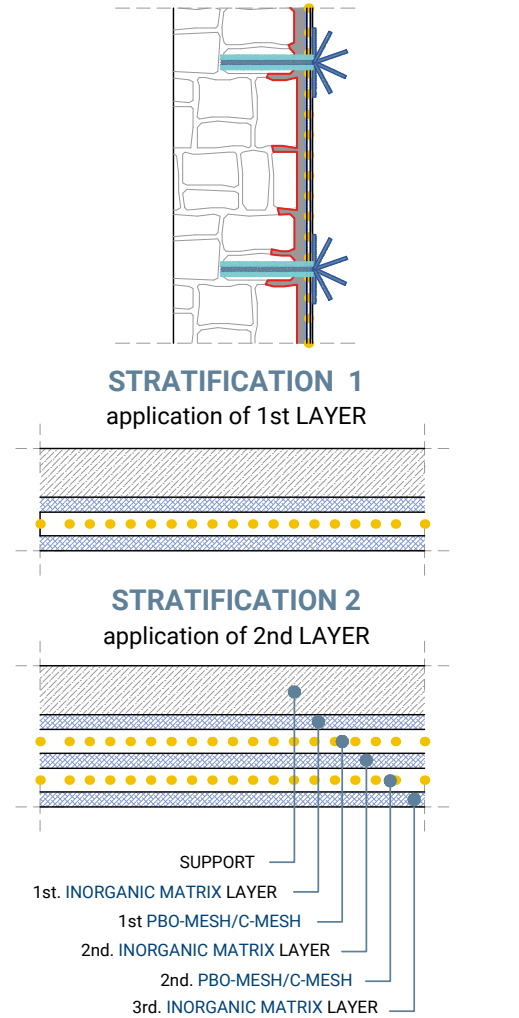


If necessary, construct eaves edge beams using PBO or CARBON FRCM SYSTEM.



FRCM strengthening system with inorganic matrix and long fibres

APPLICATION FROM ONE SIDE ONLY (see Dwg. 1.Hc)



KEY

- Existing plaster
- Existing masonry
- INORGANIC MATRIX
- PBO-MESH/C-MESH
- PBO-JOINT/C-JOINT Connector
- MX-RW High Performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster

1 SUBSTRATE PREPARATION

Remove plaster and incoherent parts from the affected area by hydro demolition or sandblasting, ensuring that the joint mortar is not disintegrated. If it is disintegrated, scarify and repoint the joints. If necessary, level the substrate with **MX-RW High Performance**, **MX-CP Lime**, **MX-PVA Fibre-reinforced**, or **MX-15 Plaster mortar** (see DWG 3C). Cut the **PBO-JOINT/C-JOINT** connectors to the length, considering the effective thickness of the masonry, and the extra length (at least 10 cm) needed to allow the connector end to be spread out on the wall surface. Perforate the masonry as the project requires. Clean the hole and moisten it without allowing water to accumulate. Wrap one end of the connector with masking tape for a length equal to the radius of the area on which it will be spread out. Impregnate the free part with the **MX-JOINT** matrix and wait for it to dry so that it then becomes easier to insert the connector into the hole (See DWG. 1Ha and 1Hc).

2 APPLICATION OF FRCM STRENGTHENING

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric. Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple layers of **FRCM strengthening** are to be applied, repeat the previous steps **wet on wet**. Inject part of the **MX-JOINT** inorganic matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres.

INSTALLATION PHASES

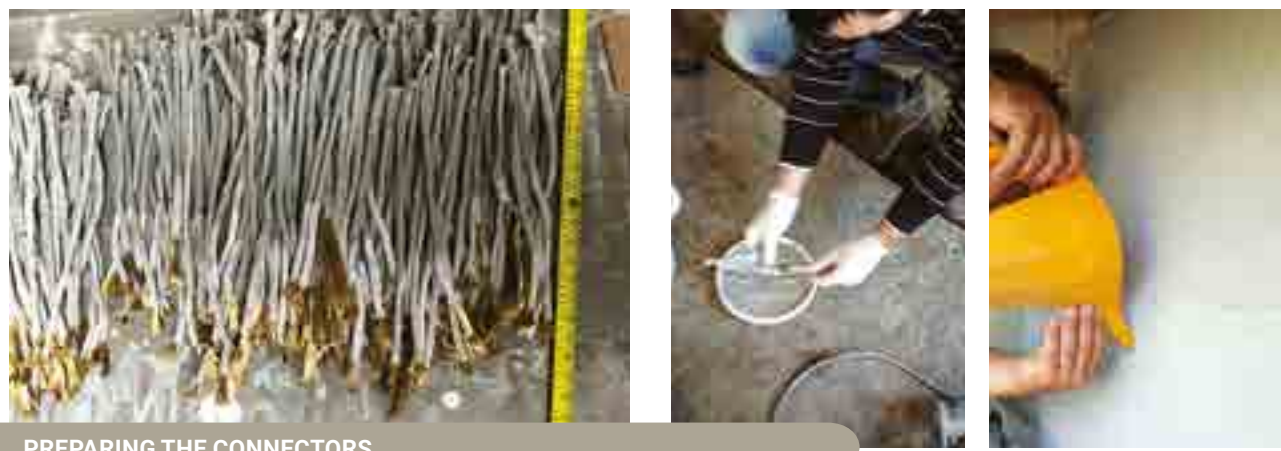
1.Ha

CONNECTION SYSTEMS

1.Ha

INSTALLATION PHASES

CONNECTION SYSTEMS



PREPARING THE CONNECTORS

Cut the **PBO-JOINT/C-JOINT** connectors, considering the masonry thickness and the radius of the spread-out fibres. The connector should be wrapped at one or both ends with masking tape, for a length equal to the radius of the spread-out fibres. The portion of the fibres to be inserted into the masonry is impregnated with **MX-PBO-JOINT/MX-C JOINT** matrix. The masonry should be perforated as the project specifies. The hole must be cleaned and moistened.



PLACING THE CONNECTORS AND INJECTING THE MATRIX

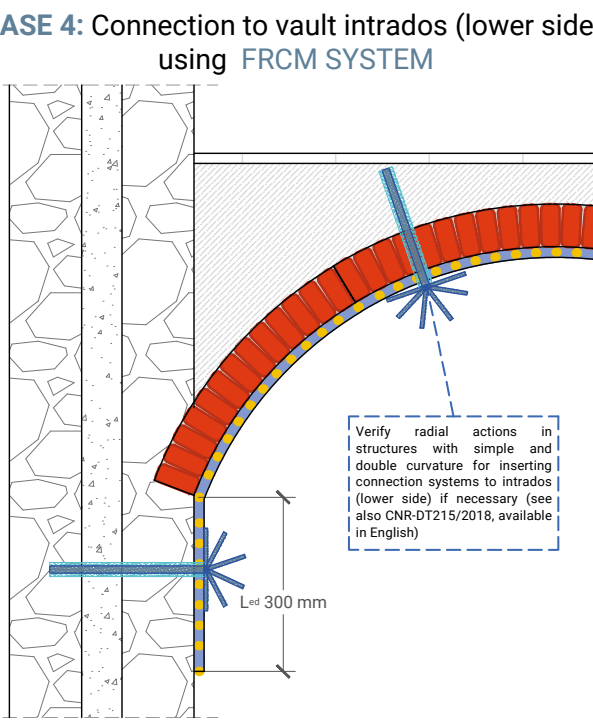
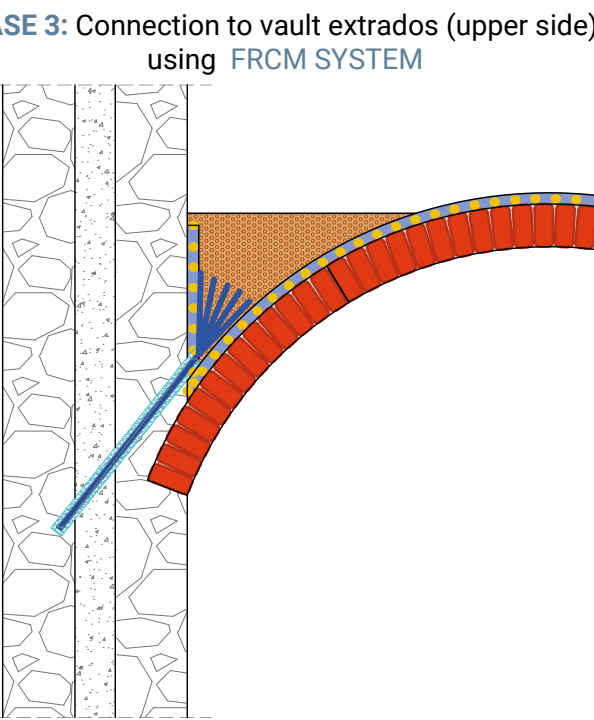
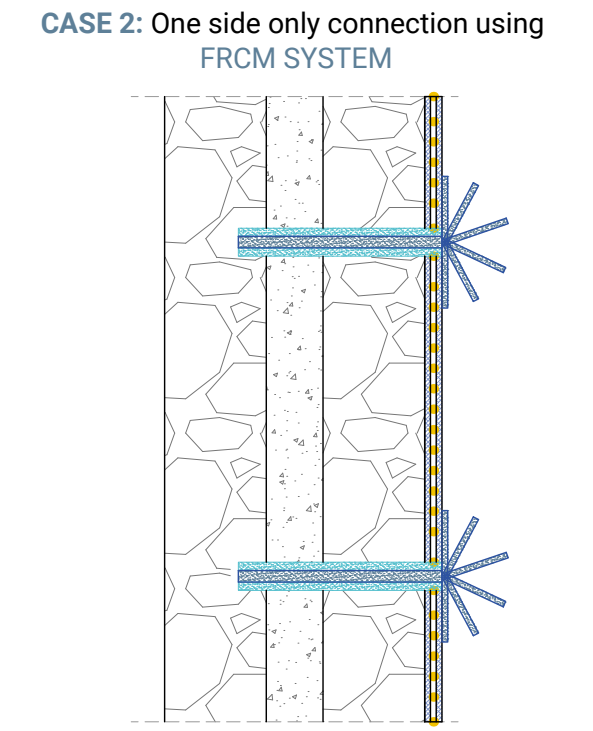
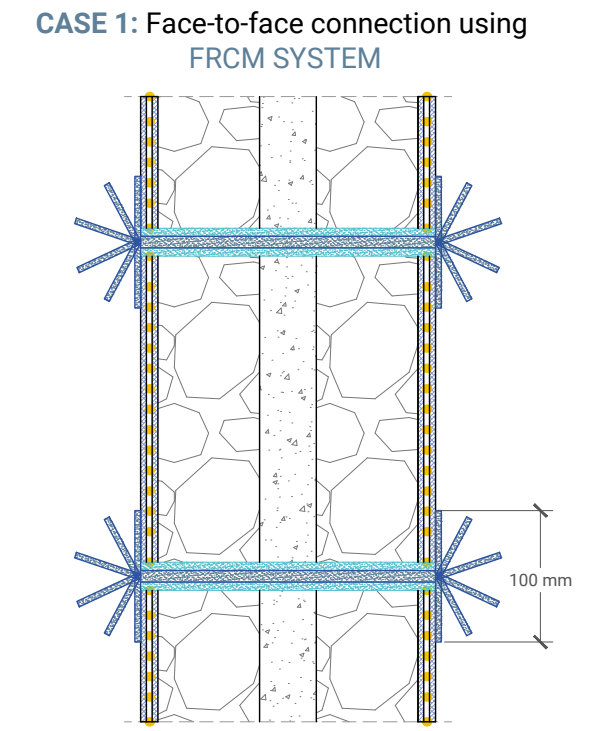
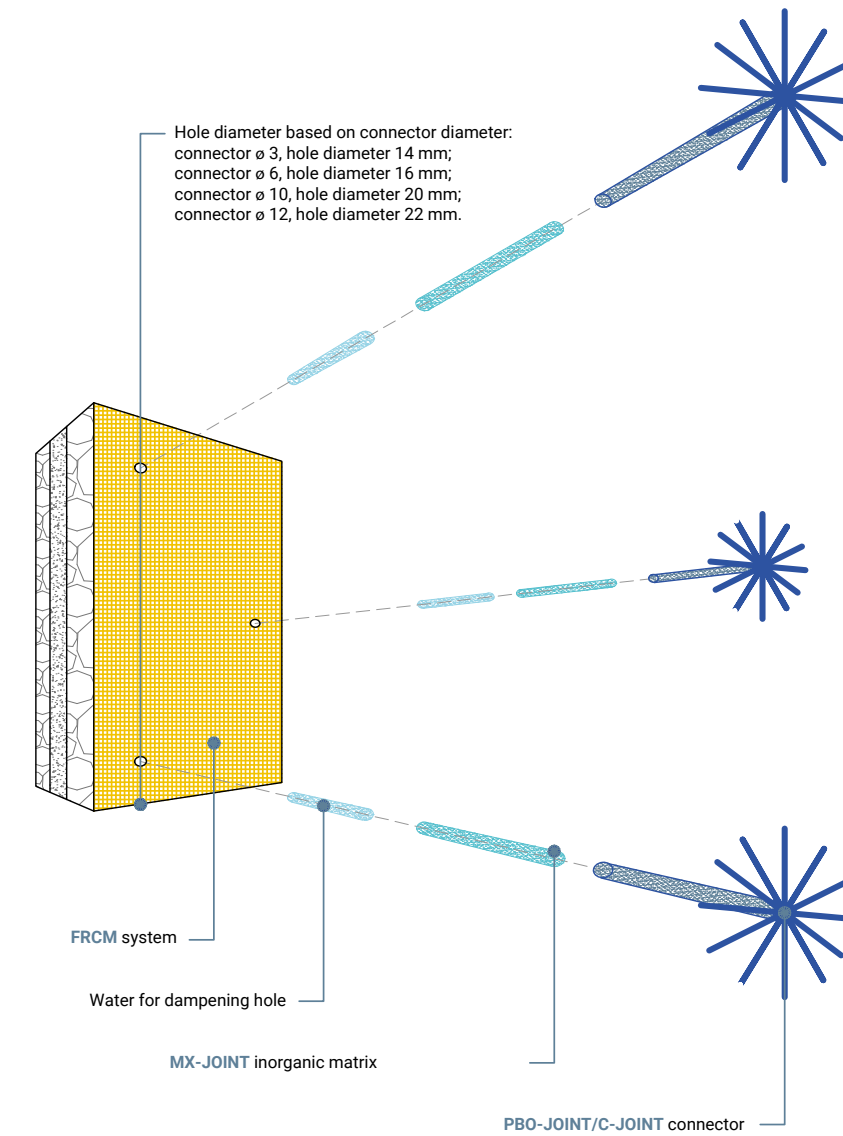
Inject part of the **MX-JOINT** matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors followed by injection of the rest of the matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape and spread out the connector, making the fibres adhere to the surface. Cover the fibers with **MX-JOINT** inorganic matrix.

FRCM systems for MASONRY + CONNECTIONS

PBO MESH PBO-MESH 22/22, PBO-MESH 44 PBO CONNECTOR PBO-JOINT	+	INORGANIC MATRIX MX-PBO Masonry	CARBON MESH C-MESH 84/84	+	INORGANIC MATRIX MX-C 25 Masonry
		MX-JOINT	CARBON CONNECTOR C-JOINT		MX-JOINT



For further information on all the products in the table, see chapter 6 (from page 144 to 147 and page 155).



When strengthening masonry from one side only, the connector must be long enough to intercept the opposite wall of the masonry. A length of 2/3-3/4 of the masonry thickness is therefore recommended.

CONSTRUCTION DETAILS*

- (...) An adequate anchorage length must be ensured, beyond the extreme section where FRCM reinforcement is required. If more accurate investigations are not possible, this must be at least 300 mm.
- (...) If the FRCM strengthening system is applied to one side only of the panel, the connectors must be long enough to penetrate into the unstrengthened outermost layer of the wall.
- If the strengthening is to be applied to both faces of rubblecore walls or walls with disconnected faces, the connectors must be of the face-to-face type.
- If panels of thickness $t \leq 400$ mm are to be strengthened with FRCM and using connectors, the suggested distance between the connectors should be $l \geq 3t$ and no more than 1600 mm; at corners and at disconnected intersecting walls, a length of the connectors $l = 3t$ is suggested.
- If the strengthening is applied to panels of thickness $t > 400$ mm, the suggested centre-to-centre distance is $i \geq 2t$ and no greater than 2000 mm; at corners and disconnected intersecting walls, connectors of length $l = 3t$ are suggested, set out in staggered parallel rows.

* Source: CNR-DT 215/2018 - Guide for the Design and Construction of Externally Bonded Fibre Reinforced Inorganic Matrix Systems for Strengthening Existing Structures, issued by Italian national research council CNR - Advisory committee on technical recommendations for construction.

KEY

Existing masonry	MX-JOINT inorganic matrix
PBO-MESH/C-MESH	PBO-MESH/C-MESH
INORGANIC MATRIX	PBO-JOINT/C-JOINT connector
Backfill with LATERLITE products	

INSTALLATION PHASES

1 SUBSTRATE PREPARATION

Remove plaster and incoherent parts from the affected area by hydro demolition or sandblasting, ensuring that the joint mortar is not disintegrated. If it is disintegrated, scarify and repoint the joints. If necessary, level the substrate with **MX-RW High Performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster mortar**. Cut the **PBO-JOINT/C-JOINT** connectors to the length, taking into careful account the effective thickness of the masonry and allowing a radius of at least 10 cm for the area on which the connector is to be spread out. Perforate the masonry as the project requires. The hole diameter must be:

- 14 mm for a ø 3 connector;
- 16 mm for a ø 6 connector;
- 20 mm for a ø 10 connector;
- 22 mm for a ø 12 connector.

Clean the hole with an air compressor or similar, and moisten it without allowing water to accumulate. Wrap one or both ends of the connector with masking tape for a length equal to the radius of the area on which it will be spread out. Impregnate the free part with the **MX-JOINT** matrix and wait for it to dry. This phase is necessary so that it then becomes easier to insert the connector into the hole.

2 APPLICATION OF FRCM STRENGTHENING

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric. Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple layers of FRCM strengthening are to be applied, repeat the previous steps **wet on wet**. Inject part of the **MX-JOINT** inorganic matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres.

1.Hb

DETAIL OF WALL PANEL • FACE-TO-FACE CONNECTION



PREPARING THE CONNECTORS



INSTALLATION OF THE FRCM SYSTEM

Cut the **PBO-JOINT/C-JOINT** connectors, considering the masonry thickness and the radius of the spread-out fibres. The connector should be wrapped at one or both ends with masking tape, for a length equal to the radius of the spread-out fibres. The portion of the fibres to be inserted into the masonry is impregnated with **MX-PBO-JOINT/MX-C JOINT** matrix. The hole must be cleaned and moistened.

Install the FRCM strips in grid layout, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH**, along the direction of the stresses.



PLACING THE CONNECTORS AND INJECTING THE MATRIX



Inject part of the **MX-JOINT** matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors followed by injection of the rest of the matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape and spread out the connector, making the fibres adhere to the surface. Cover the fibers with **MX-JOINT** inorganic matrix.

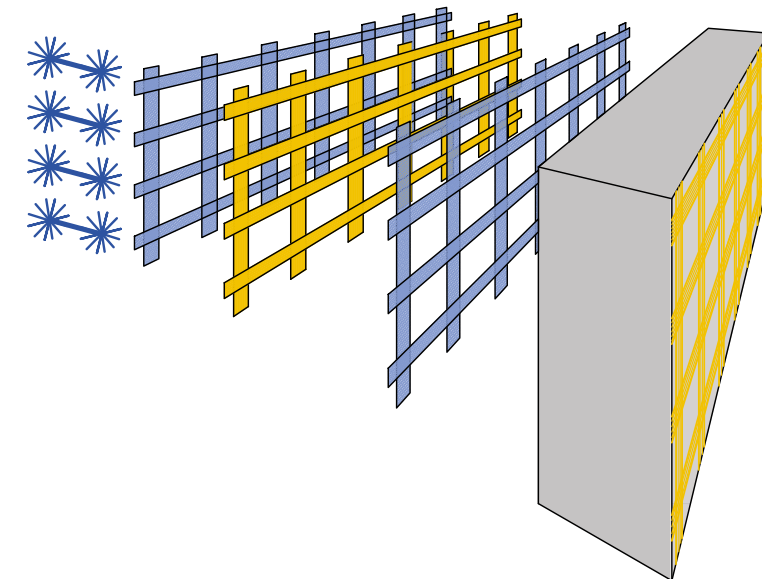
FRCM systems for MASONRY + CONNECTIONS

PBO MESH PBO-MESH 22/22, PBO-MESH 44 PBO CONNECTOR PBO-JOINT	+	INORGANIC MATRIX MX-PBO Masonry	CARBON MESH C-MESH 84/84	+	INORGANIC MATRIX MX-C 25 Masonry
		MX-JOINT	CARBON CONNECTOR C-JOINT		MX-JOINT

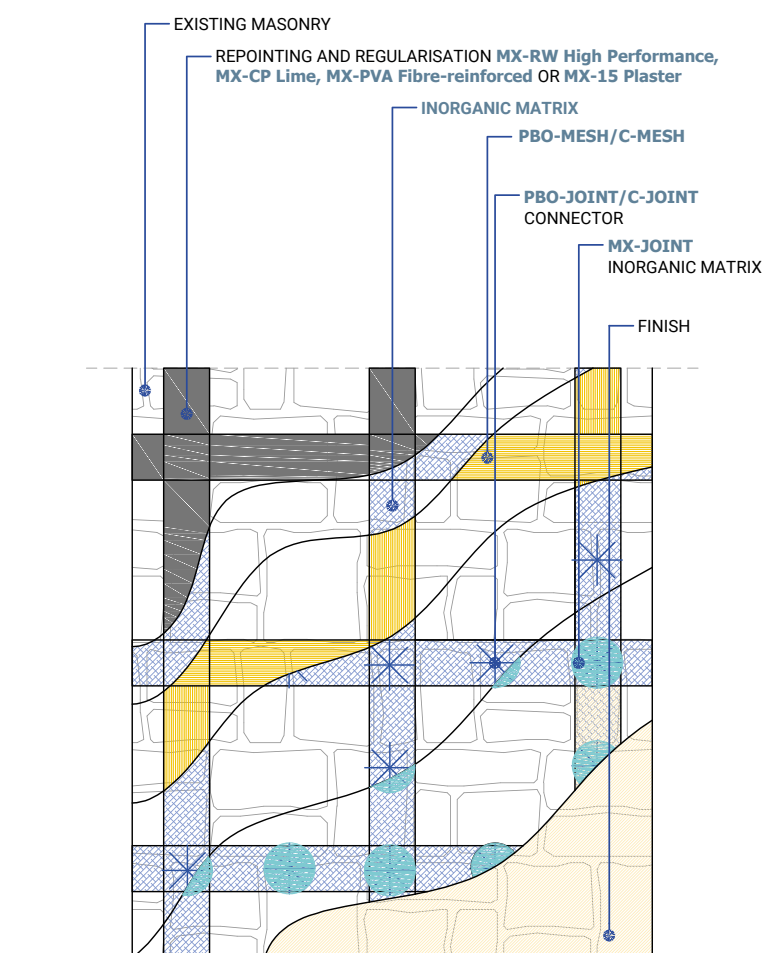


For further information on all the products in the table, see chapter 6 (from page 144 to 147 and page 155).

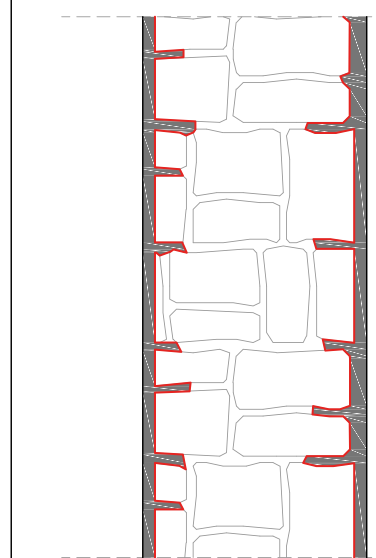
EXPLODED AXONOMETRIC



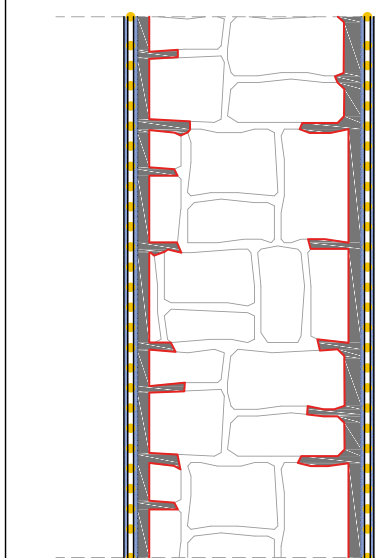
ELEVATION



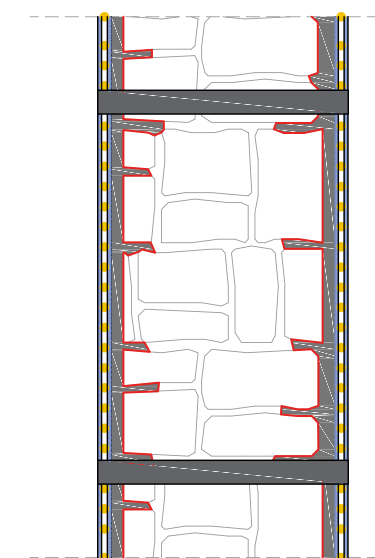
PHASE 1: Regularise support after scarifying and repointing mortar joints (see Drawing 3C).



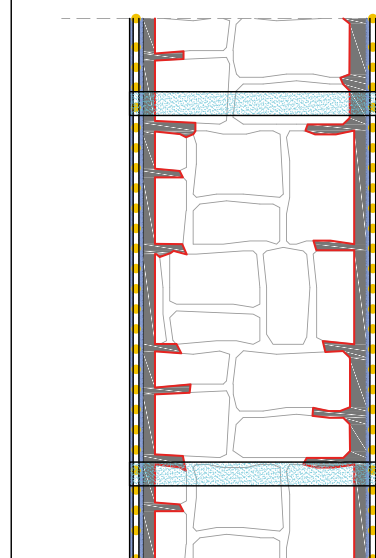
PHASE 2: Apply FRCM SYSTEM as per project (see Drawing 1E).



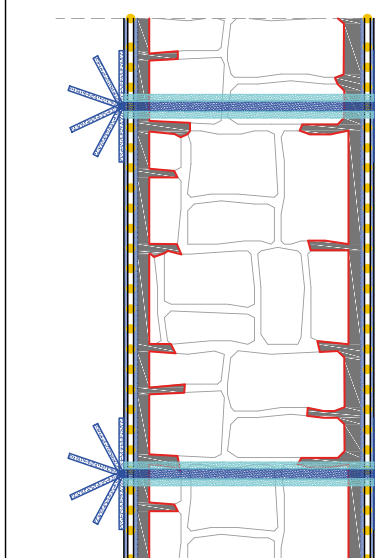
PHASE 3: Drill hole into wall (see Drawing 1Ha).



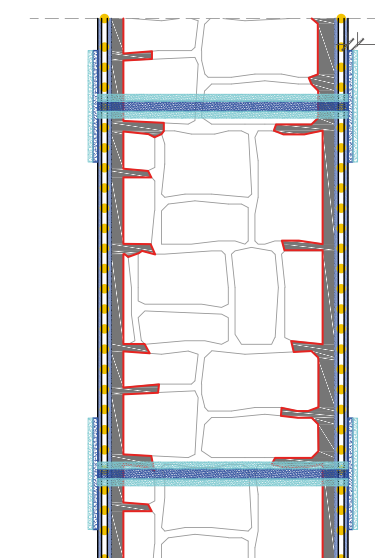
PHASE 4: After preparing connectors as necessary, moisten hole with water.



PHASE 5: Insert PBO-JOINT/C-JOINT connectors, impregnated with specific MX-JOINT mortar.



PHASE 6: Spread out PBO-JOINT/C-JOINT connectors whilst applying specific MX-JOINT mortar.



CONSTRUCTION DETAILS*

- (...) An adequate anchorage length must be ensured, beyond the extreme section where FRCM reinforcement is required. If more accurate investigations are not possible, this must be at least 300 mm.
- (...) If the FRCM strengthening system is applied to one side only of the panel, the connectors must be long enough to penetrate into the unstrengthened outermost layer of the wall.
- If the strengthening is to be applied to both faces of rubblecore walls or walls with disconnected faces, the connectors must be of the face-to-face type.
- If panels of thickness $t \leq 400$ mm are to be strengthened with FRCM and using connectors, the suggested distance between the connectors should be $l \geq 3t$ and no more than 1600 mm; at corners and at disconnected intersecting walls, a length of the connectors $l = 3t$ is suggested.
- If the strengthening is applied to panels of thickness $t > 400$ mm, the suggested centre-to-centre distance is $l \geq 2t$ and no greater than 2000 mm; at corners and disconnected intersecting walls, connectors of length $l = 3t$ are suggested, set out in staggered parallel rows.

* Source: CNR-DT 215/2018 - Guide for the Design and Construction of Externally Bonded Fibre Reinforced Inorganic Matrix Systems for Strengthening Existing Structures, issued by Italian national research council CNR - Advisory committee on technical recommendations for construction.

KEY	
	Existing masonry
	Scarification
	PBO-JOINT/C-JOINT Connector
	MX-RW High Performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster
	INORGANIC MATRIX
	PBO-MESH/C-MESH
	MX-JOINT inorganic matrix

1 SUBSTRATE PREPARATION

Remove plaster and incoherent parts from the affected area by hydro demolition or sandblasting, ensuring that the joint mortar is not disintegrated. If it is disintegrated, scarify and repoint the joints. If necessary, level the substrate with **MX-RW High performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster** mortar. Cut the **PBO-JOINT/C-JOINT** connectors to the length, taking into careful account the effective thickness of the masonry and allowing a radius of at least 10 cm for the area on which the connector is to be spread out. Perforate the masonry as the project requires. The hole diameter must be:

- 14 mm for a ϕ 3 connector;
- 16 mm for a ϕ 6 connector;
- 20 mm for a ϕ 10 connector;
- 22 mm for a ϕ 12 connector.

Clean the hole with an air compressor or similar, and moisten it without allowing water to accumulate. Wrap both ends of the connector with masking tape for a length equal to the radius of the area on which it will be spread out. Impregnate the free part with the **MX-JOINT** matrix and wait for it to dry. This phase is necessary so that it then becomes easier to insert the connector into the hole.

2 APPLICATION OF FRCM STRENGTHENING

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric. Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple layers of FRCM strengthening are to be applied, repeat the previous steps **wet on wet**. Inject part of the **MX-JOINT** inorganic matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres.

INSTALLATION PHASES

1.Hc

DETAIL OF WALL PANEL • ONE SIDE ONLY CONNECTION

1.Hc

INSTALLATION PHASES

DETAIL OF WALL PANEL • ONE SIDE ONLY CONNECTION



PREPARING THE CONNECTORS

Cut the **PBO-JOINT/C-JOINT** connectors, and wrap them at one end with masking tape, for a length equal to the radius of the spread-out fibres. The portion of the fibres to be inserted into the masonry is impregnated with **MX-PBO-JOINT/MX-C JOINT** matrix.



INSTALLATION OF THE FRCM SYSTEM

Install the FRCM strips in grid layout, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH**, along the direction of the stresses.



PLACING THE CONNECTORS AND INJECTING THE MATRIX

Inject part of the **MX-JOINT** matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors followed by injection of the rest of the matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape and spread out the connector, making the fibres adhere to the surface. Cover the fibers with **MX-JOINT** inorganic matrix.



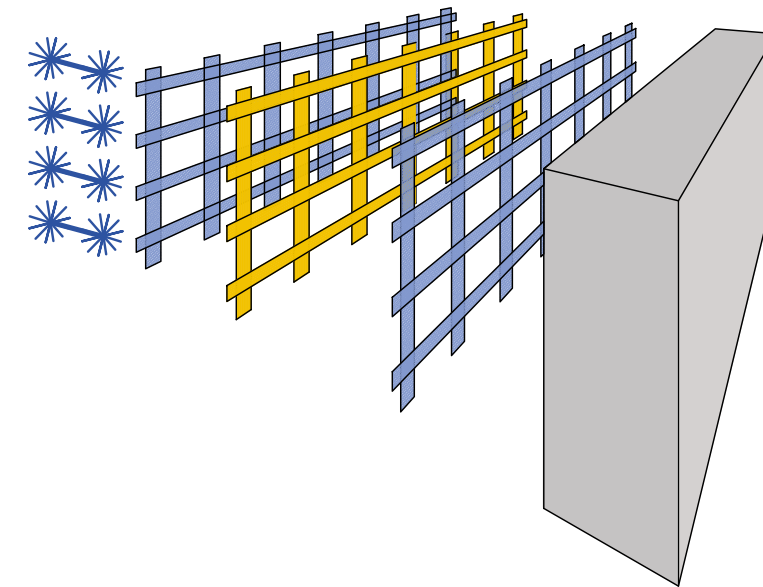
FRCM systems for MASONRY + CONNECTIONS

PBO MESH PBO-MESH 22/22, PBO-MESH 44 PBO CONNECTOR PBO-JOINT	+	INORGANIC MATRIX MX-PBO Masonry	CARBON MESH C-MESH 84/84	+	INORGANIC MATRIX MX-C 25 Masonry
		MX-JOINT	CARBON CONNECTOR C-JOINT		MX-JOINT

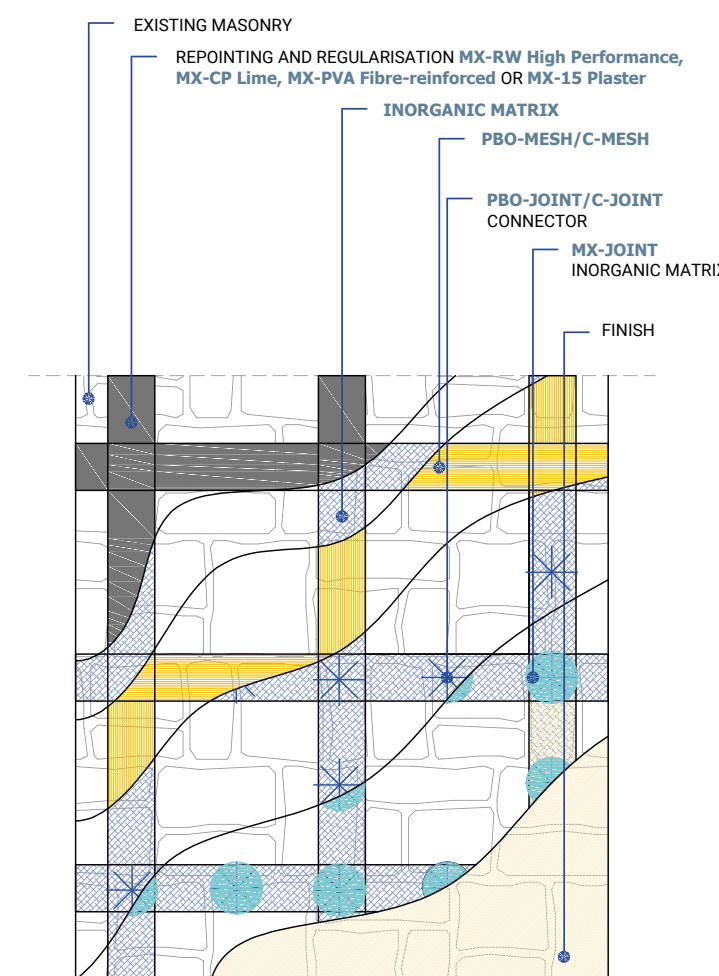


For further information on all the products in the table, see chapter 6 (from page 144 to 147 and page 155).

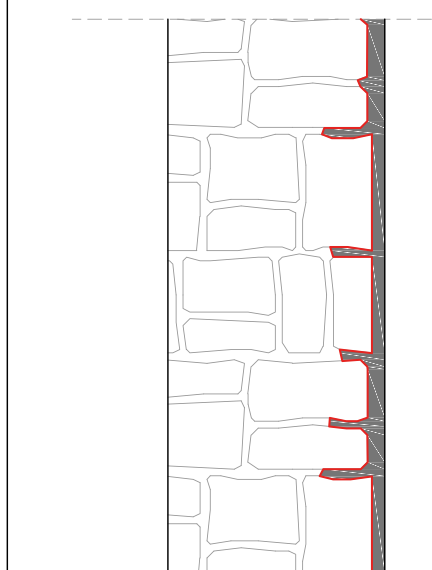
EXPLODED AXONOMETRIC



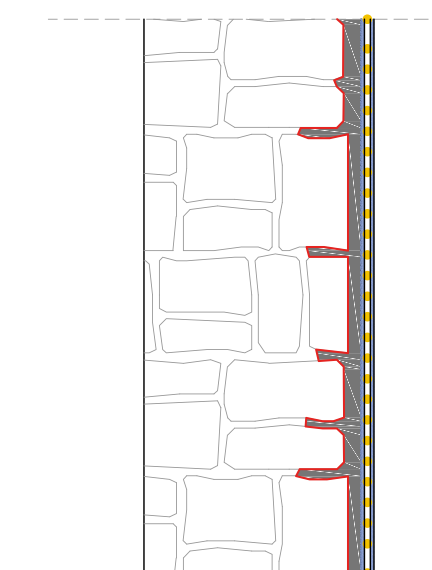
ELEVATION



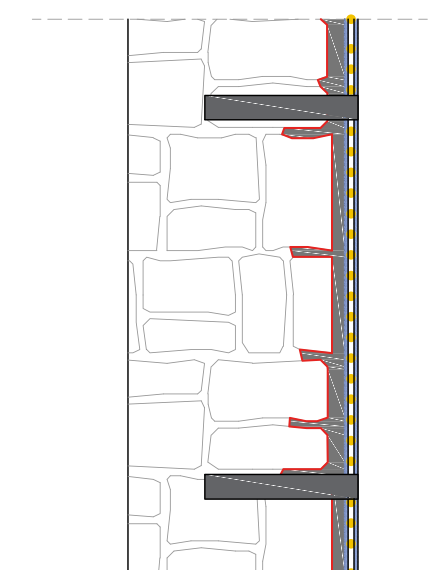
PHASE 1: Regularise support after scarifying and repointing mortar joints (see Drawing 3C).



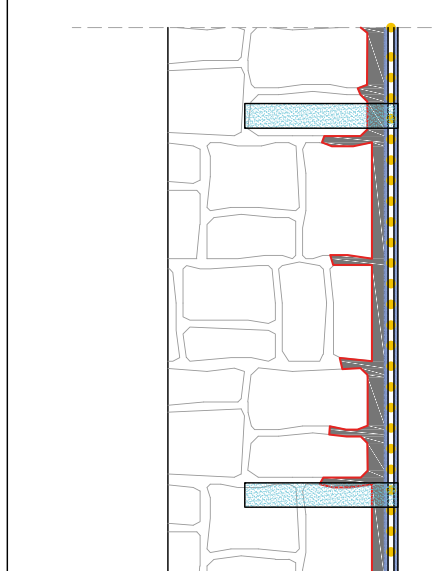
PHASE 2: Apply FRCM SYSTEM as per project (see Drawing 1E).



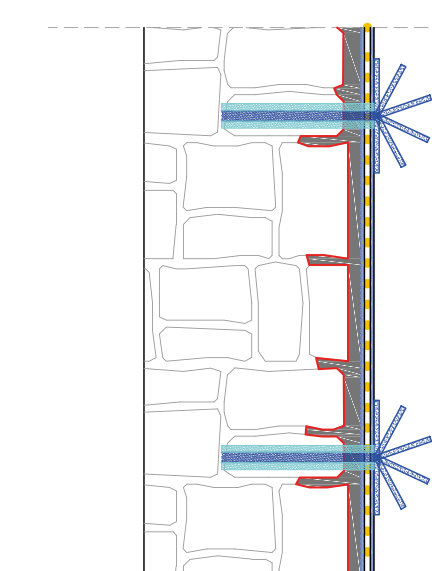
PHASE 3: Drill hole into wall (see Drawing 1Ha).



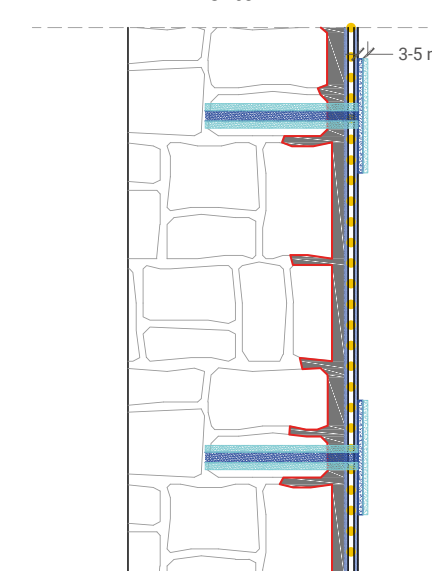
PHASE 4: After preparing connectors as necessary, moisten hole with water.



PHASE 5: Insert PBO-JOINT/C-JOINT connectors, impregnated with specific MX-JOINT mortar.



PHASE 6: Spread out PBO-JOINT/C-JOINT connectors whilst applying specific MX JOINT mortar.



CONSTRUCTION DETAILS*

- (...) An adequate anchorage length must be ensured, beyond the extreme section where FRCM reinforcement is required. If more accurate investigations are not possible, this must be at least 300 mm.
- (...) If the FRCM strengthening system is applied to one side only of the panel, the connectors must be long enough to penetrate into the unstrengthened outermost layer of the wall.
- If the strengthening is to be applied to both faces of rubblecore walls or walls with disconnected faces, the connectors must be of the face-to-face type.
- If panels of thickness $t \leq 400$ mm are to be strengthened with FRCM and using connectors, the suggested distance between the connectors should be $l \geq 3t$ and no more than 1600 mm; at corners and at disconnected intersecting walls, a length of the connectors $l = 3t$ is suggested.
- If the strengthening is applied to panels of thickness $t > 400$ mm, the suggested centre-to-centre distance is $i \geq 2t$ and no greater than 2000 mm; at corners and disconnected intersecting walls, connectors of length $l = 3t$ are suggested, set out in staggered parallel rows.

* Source: CNR-DT 215/2018 - Guide for the Design and Construction of Externally Bonded Fibre Reinforced Inorganic Matrix Systems for Strengthening Existing Structures, issued by Italian national research council CNR - Advisory committee on technical recommendations for construction.

KEY

- Existing masonry
- Scarification
- MX-RW High Performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster
- PBO-MESH/C-MESH
- PBO-JOINT/C-JOINT Connector
- INORGANIC MATRIX
- MX-JOINT inorganic matrix

1 SUBSTRATE PREPARATION

Remove plaster and incoherent parts from the affected area by hydro demolition or sandblasting, ensuring that the joint mortar is not disintegrated. If it is disintegrated, scarify and repoint the joints. If necessary, level the substrate with **MX-RW High Performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster mortar**. Cut the **PBO-JOINT/C-JOINT** connectors to the length, taking into careful account the effective thickness of the masonry and allowing a radius of at least 10 cm for the area on which the connector is to be spread out. Perforate the masonry as the project requires. The hole diameter must be:

- 14 mm for a ϕ 3 connector;
- 16 mm for a ϕ 6 connector;
- 20 mm for a ϕ 10 connector;
- 22 mm for a ϕ 12 connector.

Clean the hole with an air compressor or similar, and moisten it without allowing water to accumulate. Wrap one or both ends of the connector with masking tape for a length equal to the radius of the area on which it will be spread out. Impregnate the free part with the **MX-JOINT** matrix and wait for it to dry. This phase is necessary so that it then becomes easier to insert the connector into the hole.

2 APPLICATION OF FRCM STRENGTHENING

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric. Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple layers of FRCM strengthening are to be applied, repeat the previous steps **wet on wet**. Inject part of the **MX-JOINT** inorganic matrix into the hole. Insert the **PBO-JOINT C-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres.



1

FRCM STRENGTHENINGS

■ Arch and vault structures

- 1.Ia Strengthening to barrel vault • **extrados, continuous** layout
- 1.Ib Strengthening to barrel vault • **extrados, strips in grid** layout
- 1.Ic Strengthening to barrel vault • **intrados, continuous** layout
- 1.Id Strengthening to barrel vault • **intrados, strips in grid** layout
- 1.J Strengthening to a **cross vault**
- 1.K Strengthening to a **sail vault**
- 1.L Strengthening to a **pavilion vault**

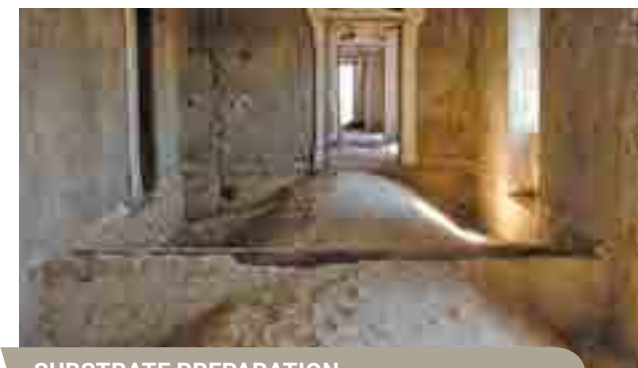
1.1a

STRENGTHENING TO BARREL VAULT • EXTRADOS, CONTINUOUS LAYOUT

1.1a

INSTALLATION PHASES

STRENGTHENING TO BARREL VAULT • EXTRADOS, CONTINUOUS LAYOUT



SUBSTRATE PREPARATION

Remove the plaster and any incoherent parts. Scarify and repoint the mortar joints. Unstitch/restitch any lesions. Regularise the substrate (if required) with **MX-RW**, **MX-CP**, **MX-PVA**, or **MX-15** mortar.



INSTALLATION OF THE FRCM SYSTEM

Install the FRCM system, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH**.
Install the connection system, using the specific **MX-JOINT** inorganic matrix with the **PBO-JOINT/C-JOINT** connector.



LIGHTWEIGHT FILL TO VAULTS AND PERIMETER CONSOLIDATION SYSTEM

Fill with **LATERMIX CEM** lightweight fill or **CENTROSTORICO LIME SUB-BASE**. Backfill (if necessary) with **LATERMIX BETON** lightweight structural concrete.
Install the **PERIMETER CONNECTOR** system for slab-to-wall connection and anti-seismic encirclement.

FRCM systems for MASONRY

PBO MESH + INORGANIC MATRIX
PBO-MESH 22/22, PBO-MESH 44 + MX-PBO Masonry



CARBON MESH + INORGANIC MATRIX
C-MESH 84/84 + MX-C 25 Masonry



Lightweight backfill and perimeter consolidation system



LIGHTWEIGHT BACKFILL
Latermix CEM
CentroStorico Lime
Sub-base

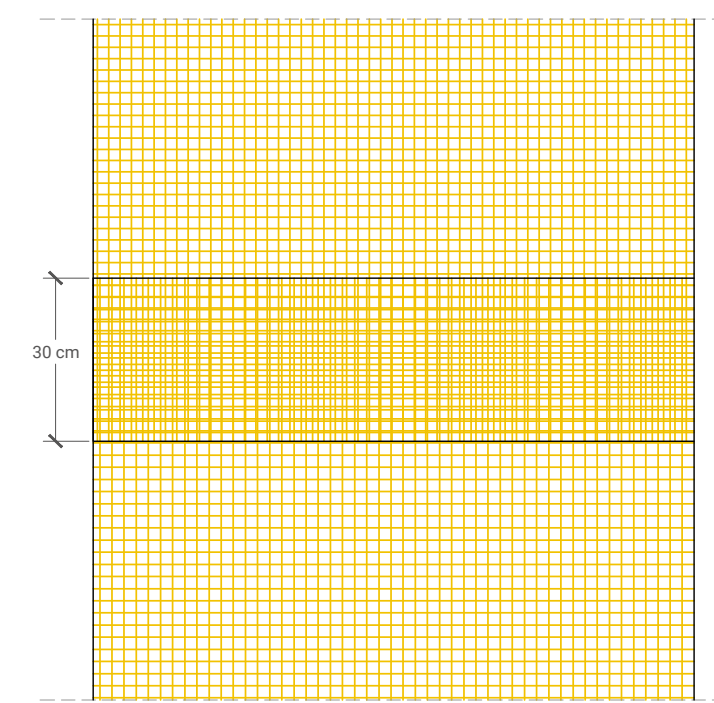


Perimeter Connector Chemical Anchor + LIGHTWEIGHT STRUCTURAL CONCRETE
CentroStorico + **Latermix Beton**

For further information on all the products in the table, see chapter 6 (from page 144 to 147, page 155 and from 159 to 161).

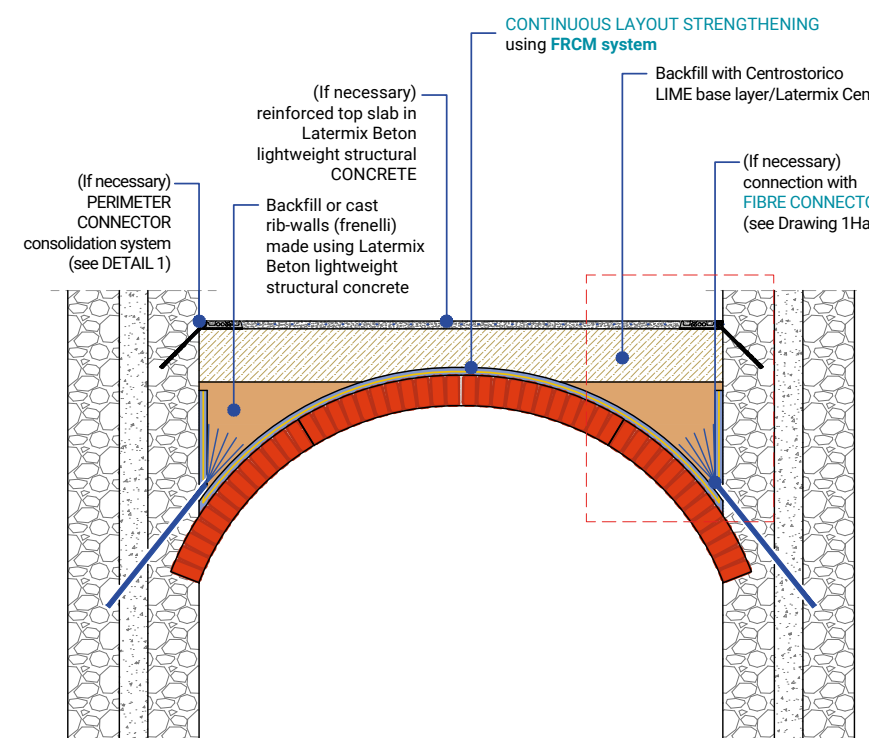
CONTINUOUS LAYOUT strengthening of a BARREL vault using FRCM SYSTEM

PLAN

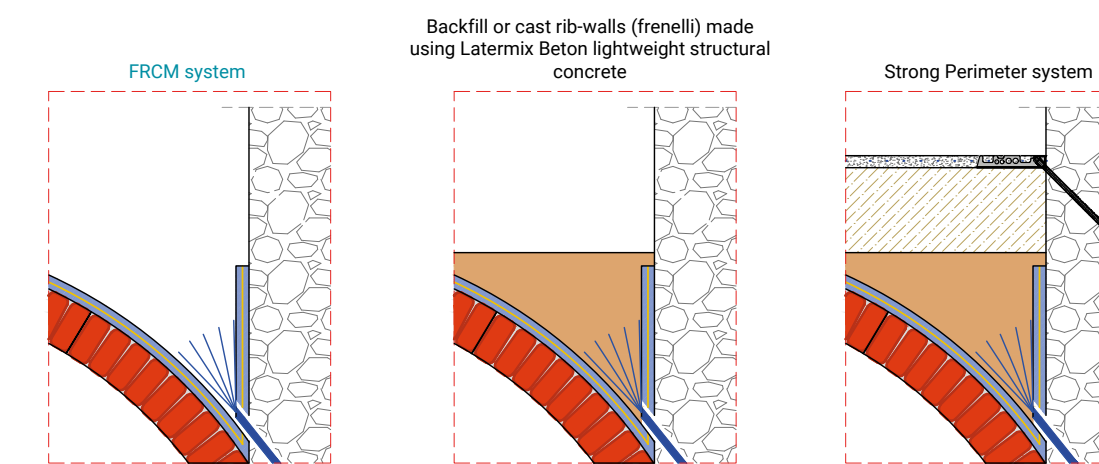


CONTINUOUS LAYOUT strengthening of a BARREL vault using FRCM SYSTEM

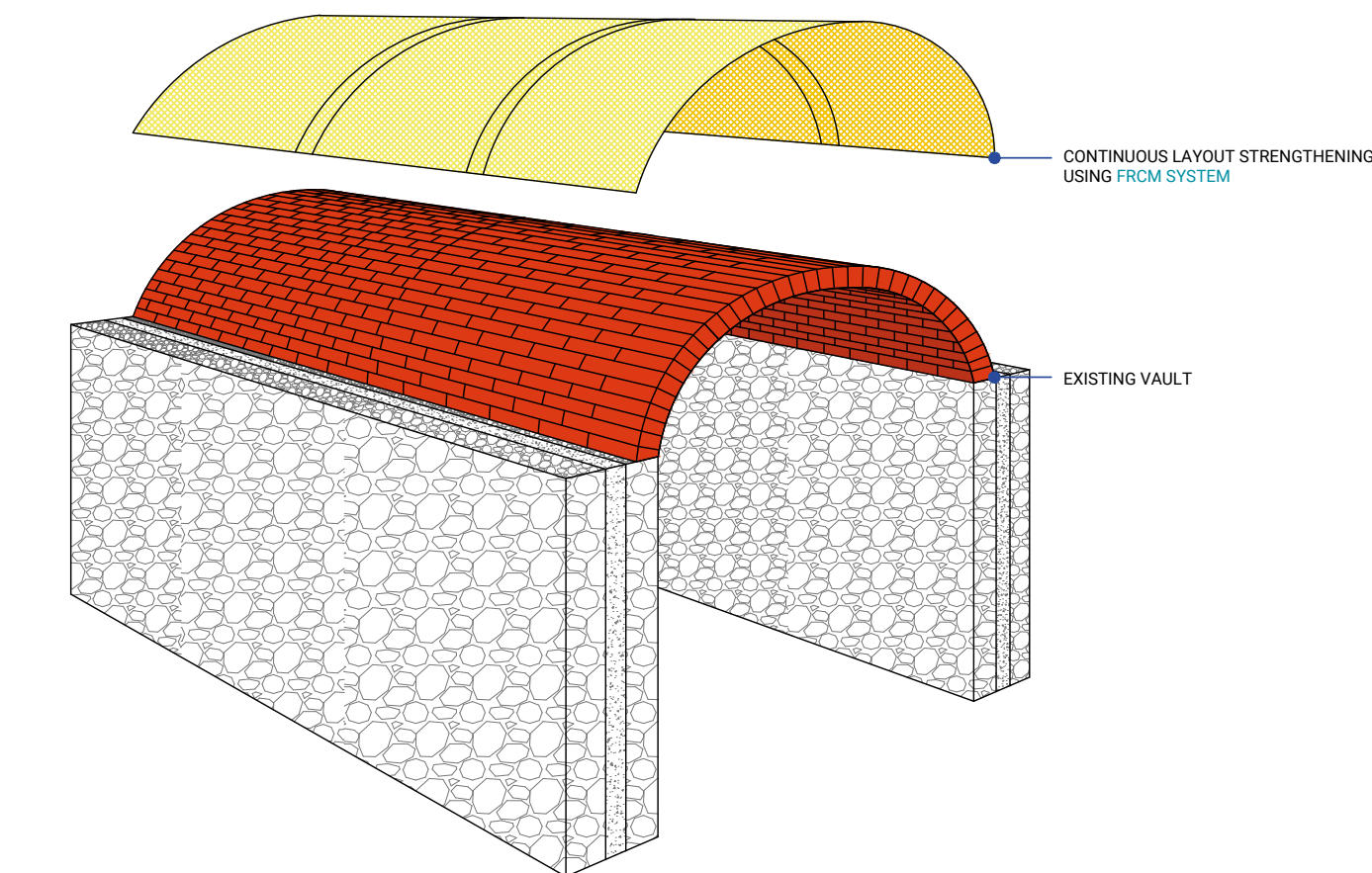
SECTION



SECTION

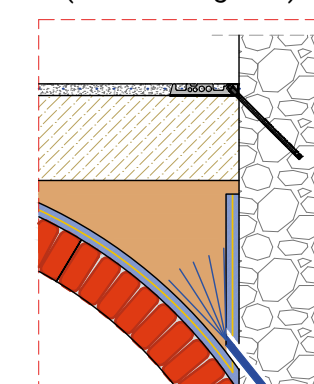


EXPLODED AXONOMETRIC



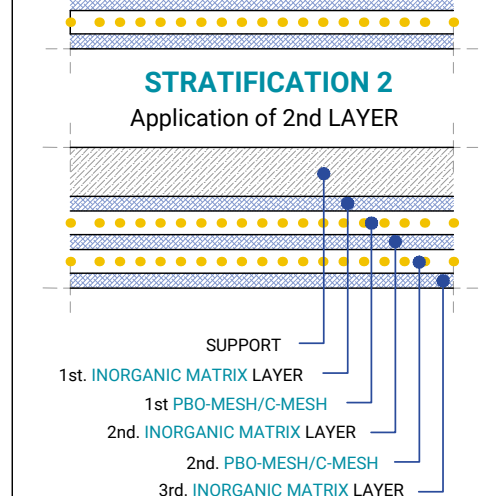
FRCM strengthening system with inorganic matrix and long fibres

DETAIL 1 (see Drawing 1Ha)



STRATIFICATION 1 Application of 1st LAYER

STRATIFICATION 2 Application of 2nd LAYER



KEY

- Existing vault
- Centrostorico LIME base layer/Latermix Cem
- Backfill with Latermix Beton lightweight structural concrete
- Perimeter Connector
- INORGANIC MATRIX
- PBO-MESH/C-MESH
- PBO-JOINT/C-JOINT connector
- MX-RW High Performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster

1 SUBSTRATE PREPARATION

Empty the hole and remove any incoherent parts. Ensure that the joint mortar is not disintegrated. If it is disintegrated, scarify the joints by hydro demolition or sandblasting and repoint them. In the presence of cracks, unstitching-restitching work must be realised.
This phase is necessary so that it then becomes easier to insert the connector into the hole. Inject part of the **MX-JOINT** inorganic matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres. (See DWG. 1Ha).

2 APPLICATION OF FRCM STRENGTHENING

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric. Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple layers of strengthening are to be applied, repeat the previous steps wet on wet. Wrap both ends of the connector with masking tape for a length equal to the radius of the area on which it will be spread out. Impregnate the free part with the **MX-JOINT** matrix and wait for it to dry.
This phase is necessary so that it then becomes easier to insert the connector into the hole. Inject part of the **MX-JOINT** inorganic matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres. (See DWG. 1Ha).

INSTALLATION PHASES

1.1b

STRENGTHENING TO BARREL VAULT • EXTRADOS, STRIPS IN GRID LAYOUT

1.1b

INSTALLATION PHASES

STRENGTHENING TO BARREL VAULT • EXTRADOS, STRIPS IN GRID LAYOUT



SUBSTRATE PREPARATION

Remove the plaster and any incoherent parts. Scarify and repoint the mortar joints. Unstitch/restitch any lesions. Regularise the substrate (if required) with **MX-RW**, **MX-CP**, **MX-PVA**, or **MX-15** mortar.



INSTALLATION OF THE FRCM STRENGTHENING

Install the FRCM system, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH** along the direction of the stresses and of the connectors using the specific **MX-JOINT** inorganic matrix with the **PBO-JOINT/C-JOINT** connector.



LIGHTWEIGHT FILL TO VAULTS AND PERIMETER CONSOLIDATION SYSTEM

Fill with **LATERMIX CEM** lightweight fill or **CENTROSTORICO LIME SUB-BASE**. Backfill (if necessary) with **LATERMIX BETON** lightweight structural concrete. Install the **PERIMETER CONNECTOR** system for slab-to-wall connection and anti-seismic encirclement.

FRCM systems for MASONRY

PBO MESH + INORGANIC MATRIX
PBO-MESH 22/22,
PBO-MESH 44 + **MX-PBO Masonry**



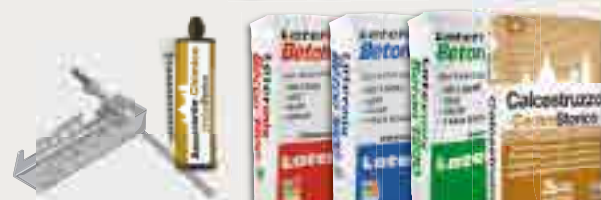
CARBON MESH + INORGANIC MATRIX
C-MESH 84/84 + **MX-C 25 Masonry**



Lightweight backfill and perimeter consolidation system



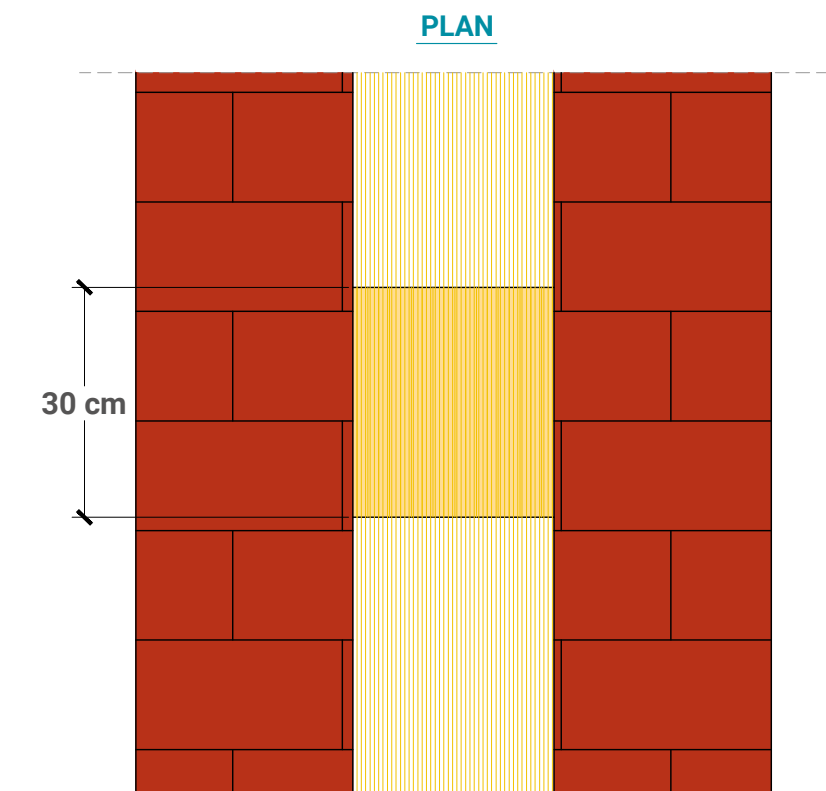
LIGHTWEIGHT BACKFILL
Latermix CEM
CentroStorico Lime Sub-base



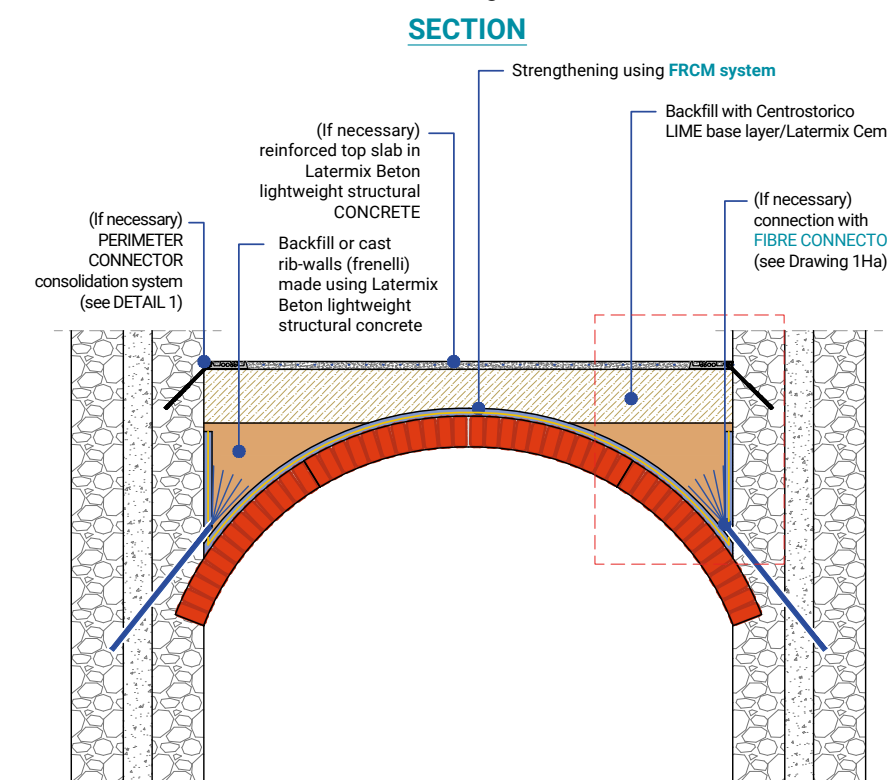
Perimeter Connector Chemical Anchor + **LIGHTWEIGHT STRUCTURAL CONCRETE**
CentroStorico + **Latermix Beton**

For further information on all the products in the table, see chapter 6 (from page 144 to 147, page 155 and from 159 to 161).

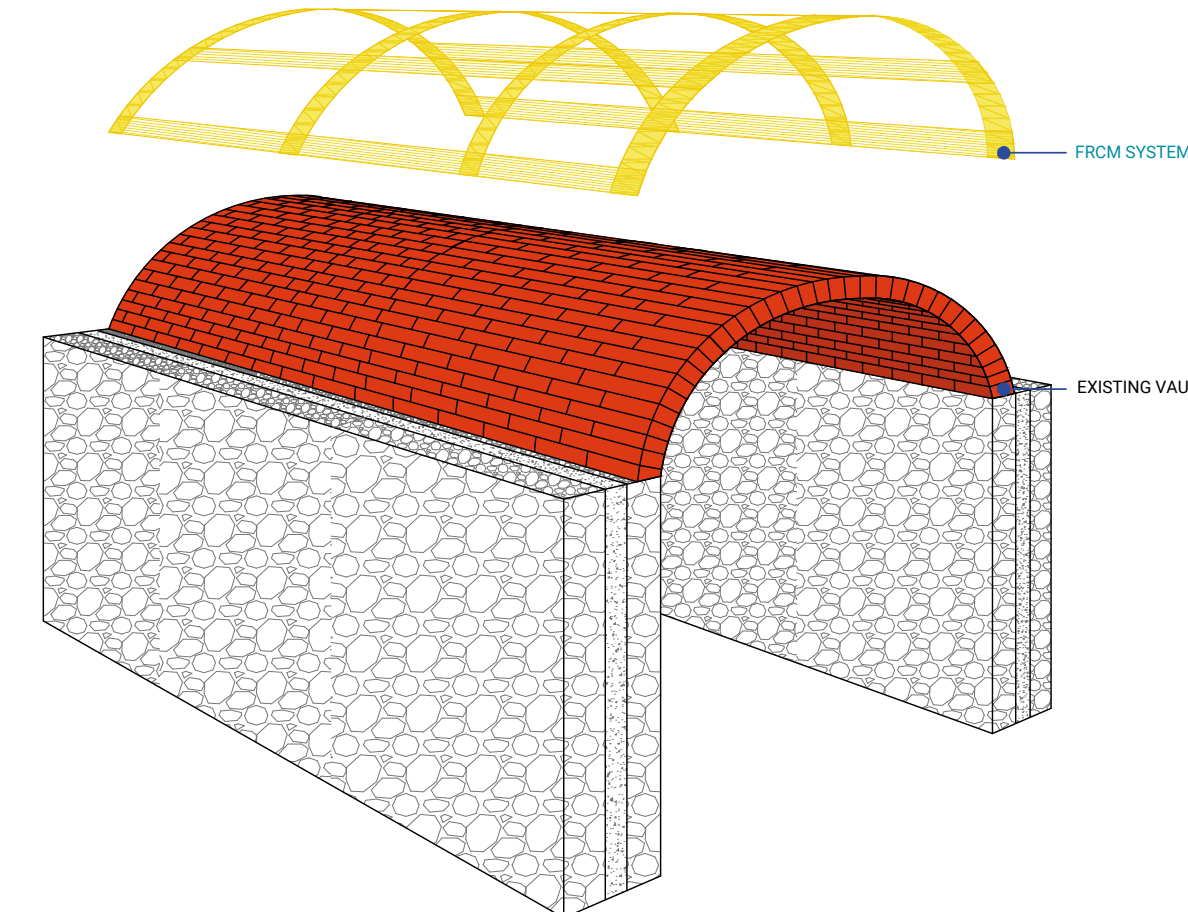
OVERLAP DETAIL FRCM SYSTEM



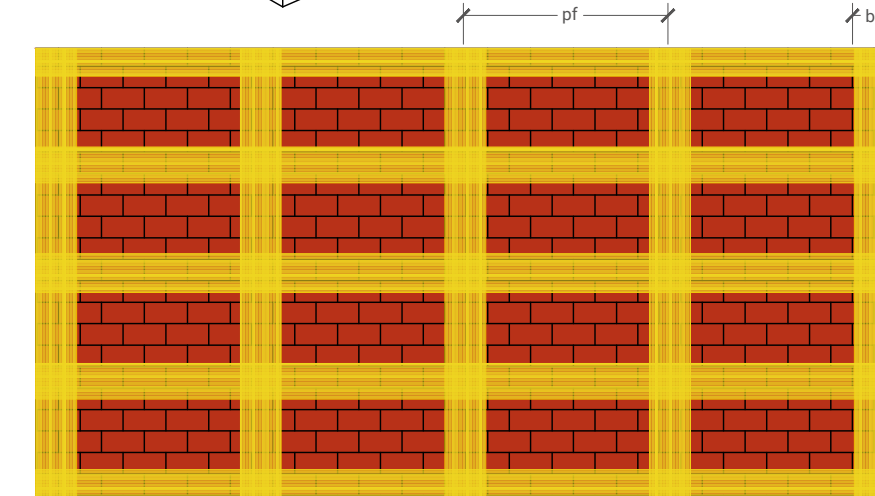
STRIPS IN GRID LAYOUT STRENGTHENING TO BARREL vault using FRCM SYSTEM



EXPLODED AXONOMETRIC



Detail of distribution of strengthening strips with FRCM SYSTEM



INSTALLATION PHASES

1 SUBSTRATE PREPARATION

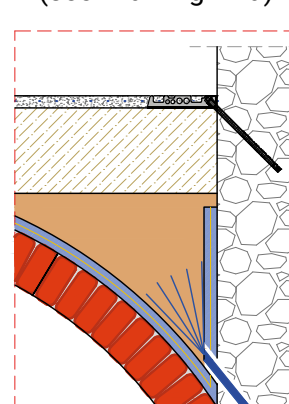
Empty the hole and remove any incoherent parts. Ensure that the joint mortar is not disintegrated. If it is disintegrated, scarify the joints by hydro demolition or sandblasting and repoint them. In the presence of cracks, unstitching-restitching work must be realised. If necessary, level the substrate with **MX-RW High Performance**, **MX-CP Lime**, **MX-PVA Fibre-reinforced**, or **MX-15 Plaster** mortar (see DWG. 3C).

2 APPLICATION OF FRCM STRENGTHENING

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric. Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple layers of strengthening are to be applied, repeat the previous steps wet on wet. Wrap both ends of the connector with masking tape for a length equal to the radius of the area on which it will be spread out. Impregnate the free part with the **MX-JOINT** matrix and wait for it to dry. This phase is necessary so that it then becomes easier to insert the connector into the hole. Inject part of the **MX-JOINT** inorganic matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres. (See DWG. 1Ha).

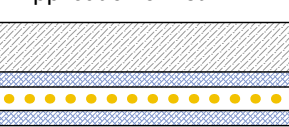
FRCM strengthening system with inorganic matrix and long fibres

DETAIL 1 (see Drawing 1Ha)



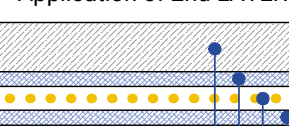
STRATIFICATION 1

Application of 1st LAYER



STRATIFICATION 2

Application of 2nd LAYER



KEY

- Existing vault
- Centrostorico LIME base layer/Latermix Cem
- Backfill with Latermix Beton lightweight structural concrete
- Perimeter Connector
- MX-RW High Performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster
- INORGANIC MATRIX
- PBO-MESH/C-MESH
- PBO-JOINT/C-JOINT connector

1.Ic

STRENGTHENING TO BARREL VAULT • INTRADOS, CONTINUOUS LAYOUT

1.Ic

INSTALLATION PHASES

STRENGTHENING TO BARREL VAULT • INTRADOS, CONTINUOUS LAYOUT



SUBSTRATE PREPARATION



Remove the plaster and any incoherent parts. Scarify and repoint the mortar joints. Unstitch/restitch any lesions. Regularise the substrate (if required) with **MX-RW**, **MX-CP**, **MX-PVA**, or **MX-15** mortar.



INSTALLATION OF THE FRCM STRENGTHENING



INSTALLATION OF THE CONNECTION SYSTEM

Install the FRCM system, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH**.

Install the connection system, using the specific **MX-JOINT** inorganic matrix with the **PBO-JOINT/C-JOINT** connector.

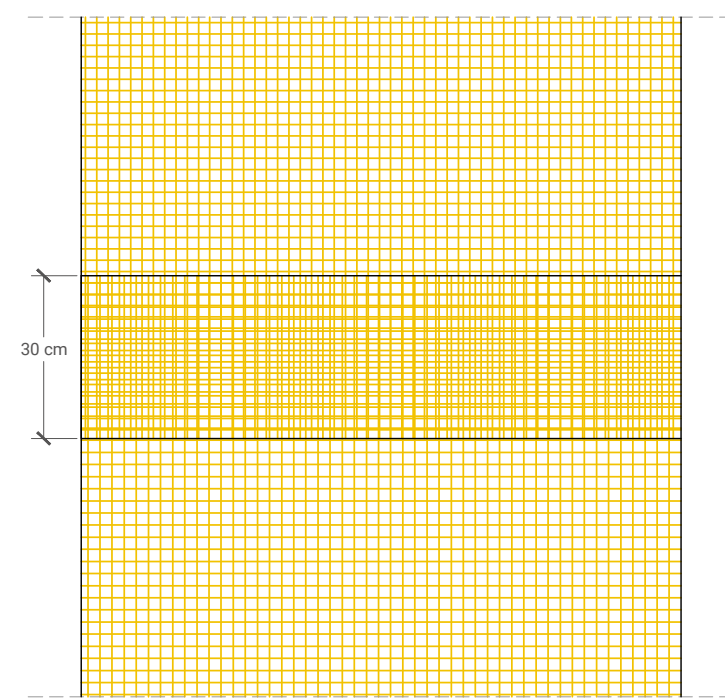
FRCM systems for MASONRY and CONNECTIONS

PBO MESH PBO-MESH 22/22, PBO-MESH 44 PBO CONNECTOR PBO-JOINT	+	INORGANIC MATRIX MX-PBO Masonry	CARBON MESH C-MESH 84/84	+	INORGANIC MATRIX MX-C 25 Masonry
		MX-JOINT	CARBON CONNECTOR C-JOINT		MX-JOINT

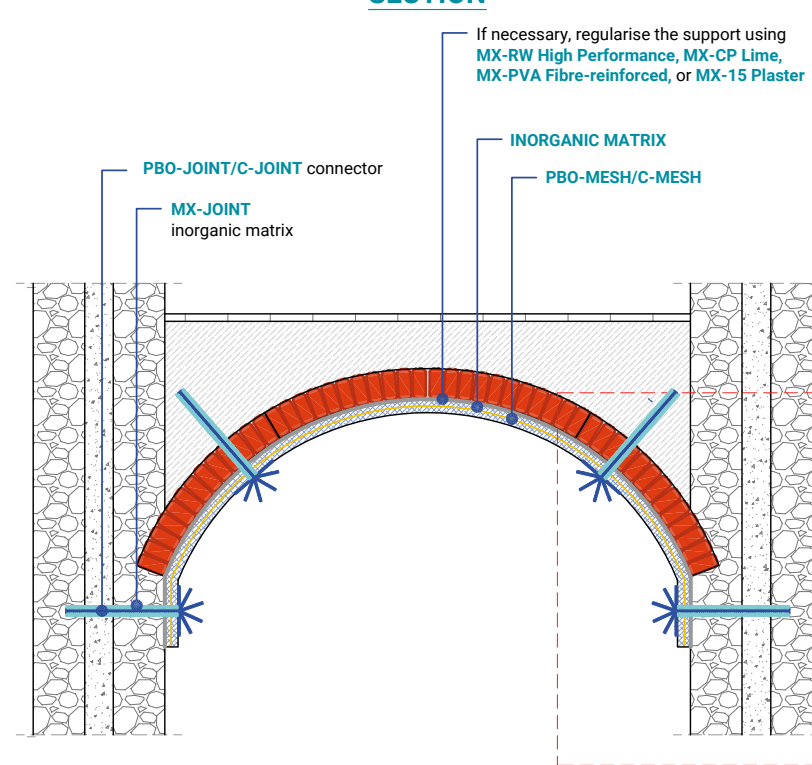


For further information on all the products in the table, see chapter 6 (from page 144 to 147 and page 155).

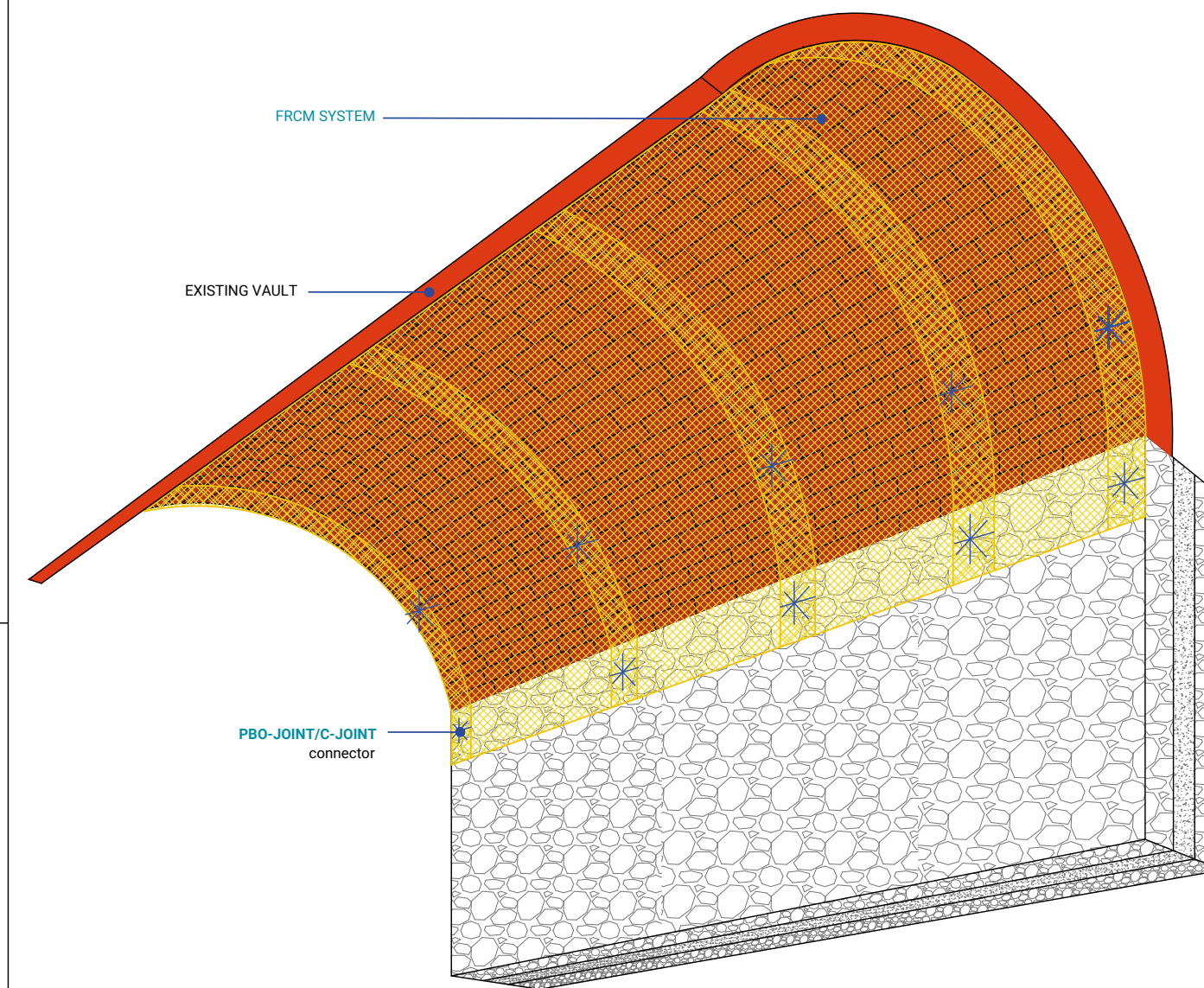
CONTINUOUS LAYOUT strengthening of a BARREL vault using FRCM SYSTEM PLAN



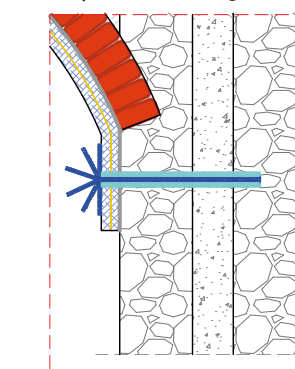
CONTINUOUS LAYOUT strengthening of a BARREL vault using FRCM SYSTEM SECTION



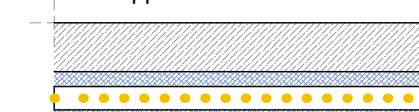
EXPLODED AXONOMETRIC



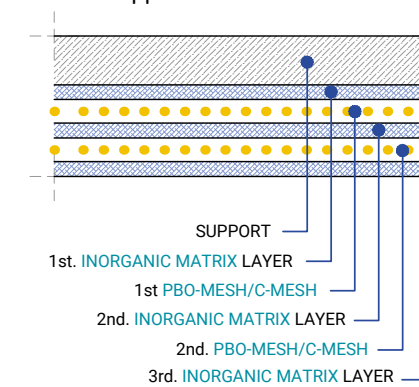
FRCM strengthening system with inorganic matrix and long fibres CONSTRAINT AT IMPOSTS IF NECESSARY (see Drawing 1Ha)



STRATIFICATION 1 Application of 1st LAYER



STRATIFICATION 2 Application of 2nd LAYER



KEY

Existing vault	INORGANIC MATRIX
PBO-JOINT/C-JOINT connector	PBO-MESH/C-MESH
MX-RW High Performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster	

1 SUBSTRATE PREPARATION

Empty the hole and remove any incoherent parts. Ensure that the joint mortar is not disintegrated. If it is disintegrated, scarify the joints by hydro demolition or sandblasting and repoint them. In the presence of cracks, unstitching-restitching work must be realised. If necessary, level the substrate with **MX-RW High Performance**, **MX-CP Lime**, **MX-PVA Fibre-reinforced**, or **MX-15 Plaster** mortar (see DWG 3C).

2 APPLICATION OF FRCM STRENGTHENING

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric. Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple layers of strengthening are to be applied, repeat the previous steps wet on wet. Wrap both ends of the connector with masking tape for a length equal to the radius of the area on which it will be spread out. Impregnate the free part with the **MX-JOINT** matrix and wait for it to dry. This phase is necessary so that it then becomes easier to insert the connector into the hole. Inject part of the **MX-JOINT** inorganic matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres. (See DWG. 1Ha).

INSTALLATION PHASES

1.Id

STRENGTHENING TO BARREL VAULT • INTRADOS, STRIPS IN GRID LAYOUT

1.Id

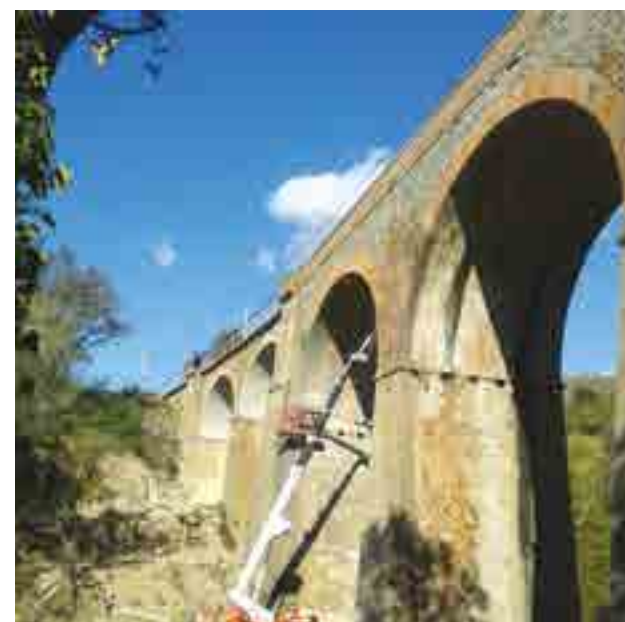
INSTALLATION PHASES

STRENGTHENING TO BARREL VAULT • INTRADOS, STRIPS IN GRID LAYOUT



SUBSTRATE PREPARATION

Remove the plaster and any incoherent parts. Scarify and repoint the mortar joints. Unstitch/restitch any lesions. Regularise the substrate (If required) with **MX-RW**, **MX-CP**, **MX-PVA**, or **MX-15** mortar.



INSTALLATION OF THE FRCM STRENGTHENING

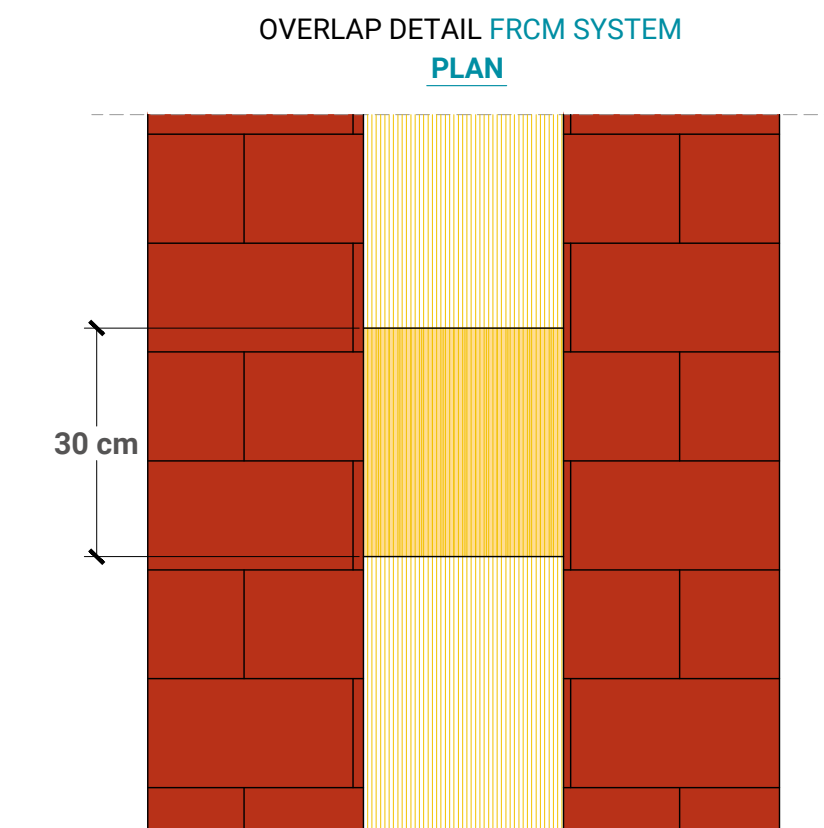
Install the FRCM system, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH** along the direction of the stresses. Install the connection system, using the specific **MX-JOINT** inorganic matrix with the **PBO-JOINT/C-JOINT** connector.

FRCM systems for MASONRY and CONNECTIONS

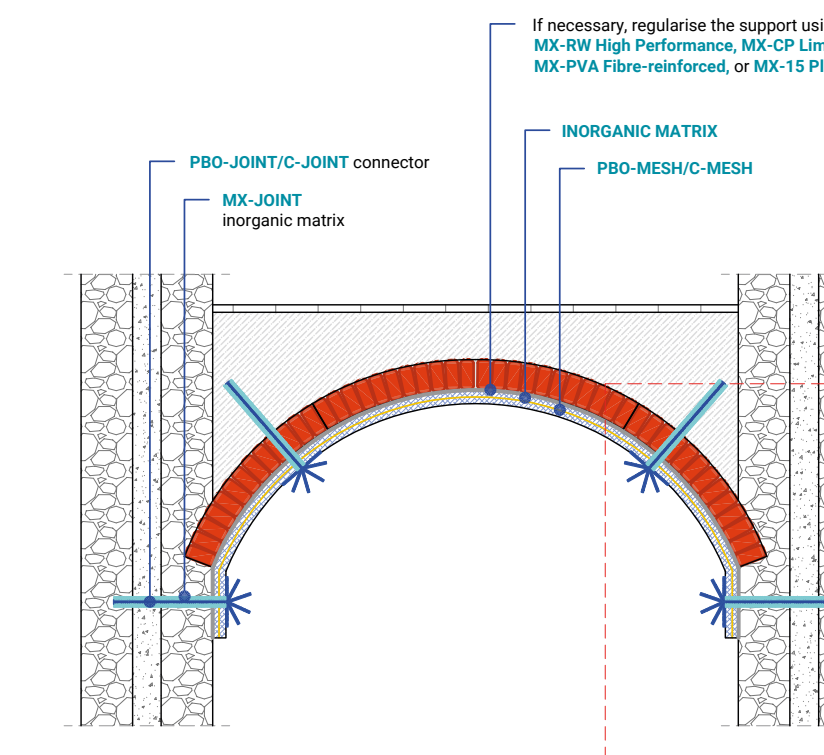
PBO MESH PBO-MESH 22/22, PBO-MESH 44 PBO CONNECTOR PBO-JOINT	+	INORGANIC MATRIX MX-PBO Masonry	CARBON MESH C-MESH 84/84	+	INORGANIC MATRIX MX-C 25 Masonry
		MX-JOINT	CARBON CONNECTOR C-JOINT		MX-JOINT



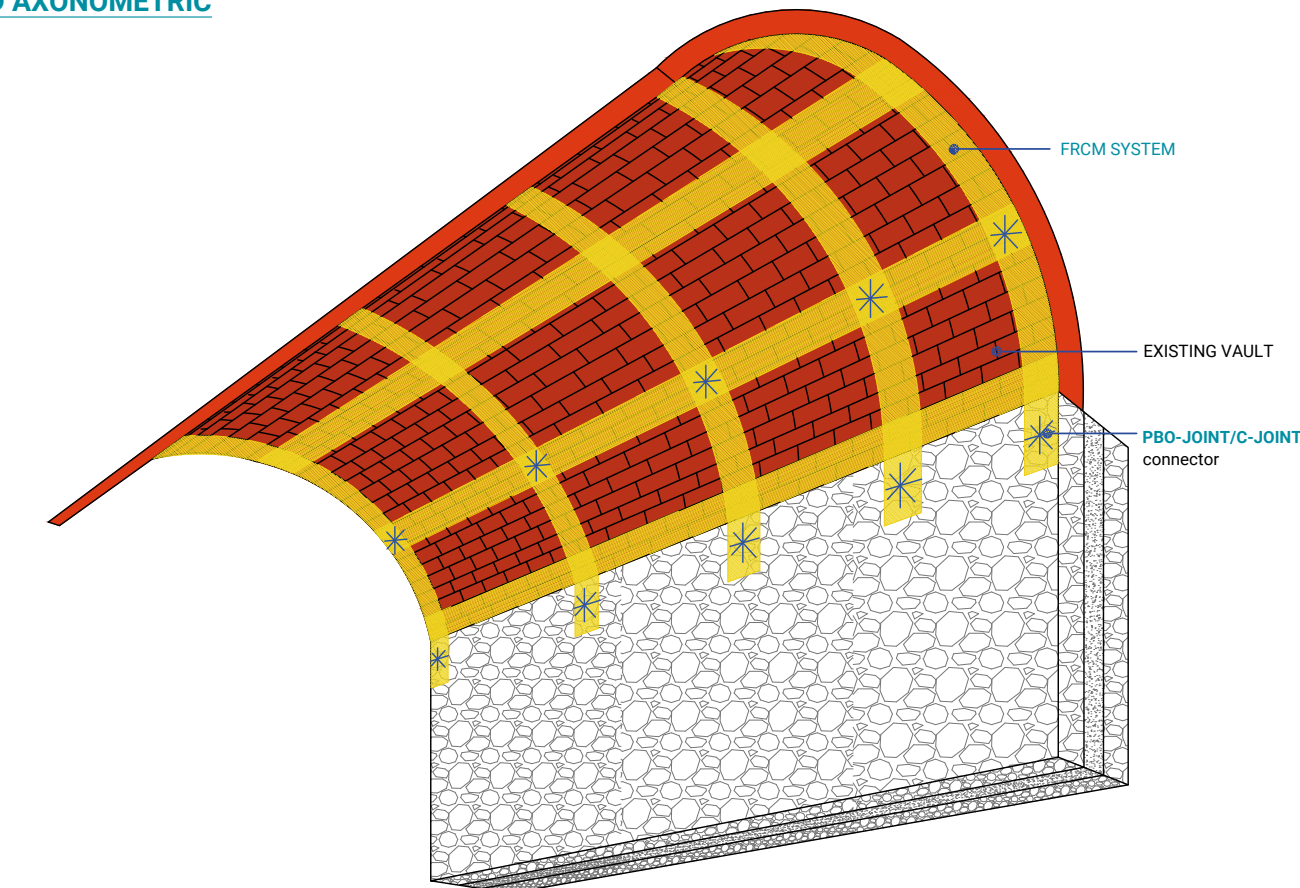
For further information on all the products in the table, see chapter 6 (from page 144 to 147 and page 155).



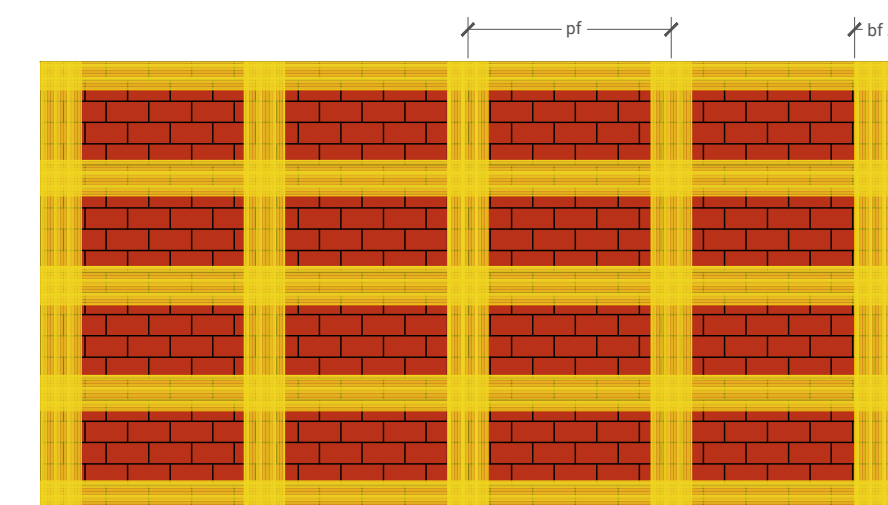
STRIPS IN GRID LAYOUT STRENGTHENING to BARREL vault using FRCM SYSTEM SECTION



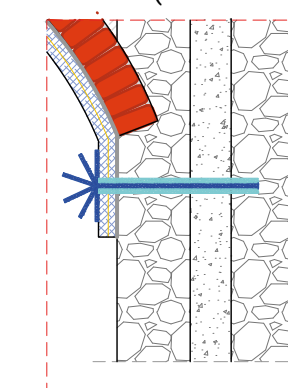
EXPLODED AXONOMETRIC



Detail of distribution of strengthening strips with FRCM SYSTEM PLAN

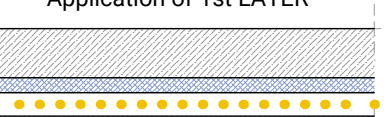


FRCM strengthening system with inorganic matrix and long fibres
CONSTRAINT AT IMPOSTS IF NECESSARY (see Drawing 1Ha)



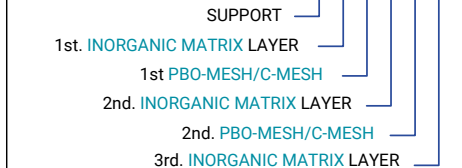
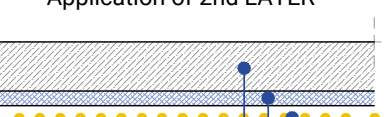
STRATIFICATION 1

Application of 1st LAYER



STRATIFICATION 2

Application of 2nd LAYER



KEY

Existing vault	INORGANIC MATRIX
PBO-JOINT/C-JOINT connector	PBO-MESH/C-MESH
MX-RW High Performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster	

INSTALLATION PHASES

1 SUBSTRATE PREPARATION

Empty the hole and remove any incoherent parts. Ensure that the joint mortar is not disintegrated. If it is disintegrated, scarify the joints by hand demolition or sandblasting and repoint them. In the presence of cracks, unstitching-restitching work must be realised. If necessary, level the substrate with **MX-RW High Performance**, **MX-CP Lime**, **MX-PVA Fibre-reinforced**, or **MX-15 Plaster** mortar (see DWG 3C).

2 APPLICATION OF FRCM STRENGTHENING

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric. Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple layers of strengthening are to be applied, repeat the previous steps wet on wet. Wrap both ends of the connector with masking tape for a length equal to the radius of the area on which it will be spread out. Impregnate the free part with the **MX-JOINT** matrix and wait for it to dry. This phase is necessary so that it then becomes easier to insert the connector into the hole. Inject part of the **MX-JOINT** inorganic matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres. (See DWG. 1Ha).

1.J

STRENGTHENING TO A CROSS VAULT

1.J

INSTALLATION PHASES

STRENGTHENING TO A CROSS VAULT



INSTALLATION OF THE FRCM STRENGTHENING

Remove the plaster and any incoherent parts. Scarify and repoint the mortar joints. Unstitch/restitch any lesions. Regularise the substrate (if required) with **MX-RW, MX-CP, MX-PVA, or MX-15** mortar. Install the FRCM system, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH**.



LIGHTWEIGHT FILL TO VAULTS

Fill with **LATERMIX CEM** lightweight fill or **CENTROSTORICO LIME SUB-BASE**. Backfill (if necessary) with **LATERMIX BETON** lightweight structural concrete.



PERIMETER CONSOLIDATION SYSTEM

Install the **PERIMETER CONNECTOR** system for slab-to-wall connection and anti-seismic encirclement.

FRCM systems for MASONRY

PBO MESH + INORGANIC MATRIX
PBO-MESH 22/22,
PBO-MESH 44



CARBON MESH + INORGANIC MATRIX
C-MESH 84/84



Lightweight backfill and perimeter consolidation system



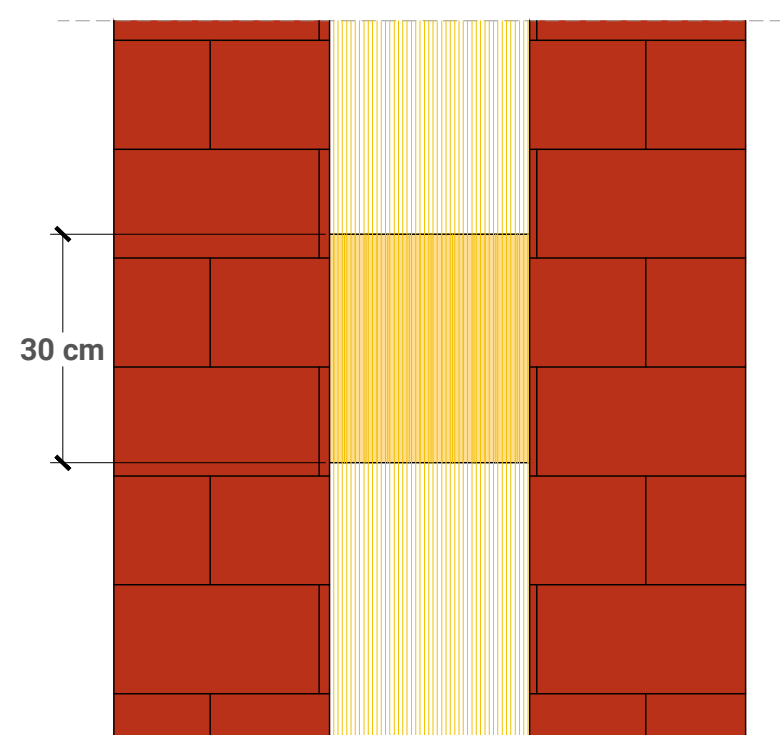
LIGHTWEIGHT BACKFILL
Latermix CEM
CentroStorico Lime Sub-base



Perimeter Connector Chemical Anchor + LIGHTWEIGHT STRUCTURAL CONCRETE
CentroStorico
Latermix Beton

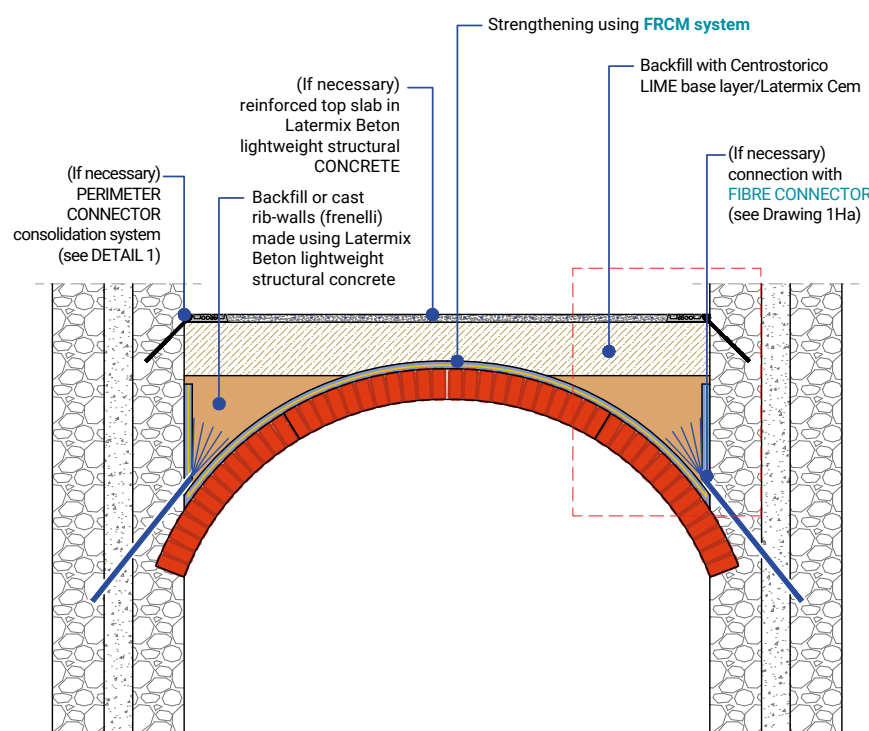
For further information on all the products in the table, see chapter 6 (from page 144 to 147, page 155 and from 159 to 161).

OVERLAP DETAIL FRCM SYSTEM PLAN

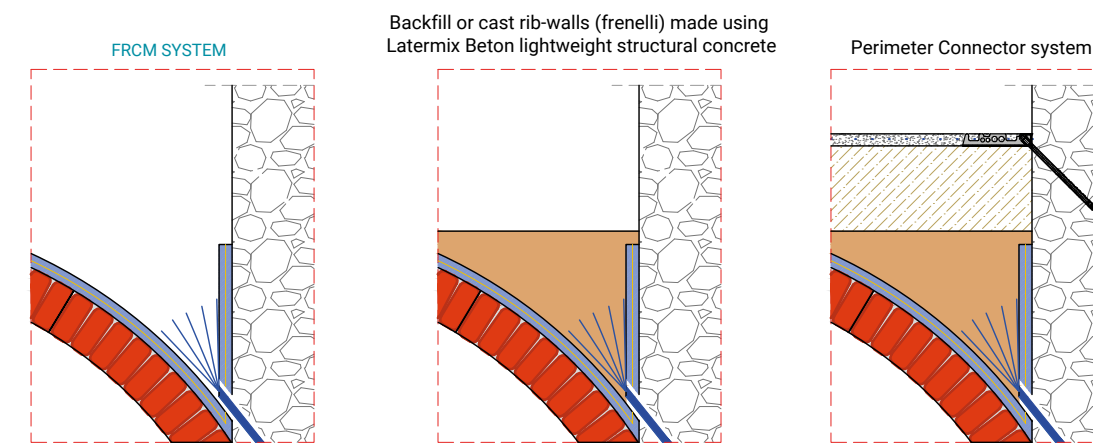


Strengthening to a CROSS vault using FRCM SYSTEM

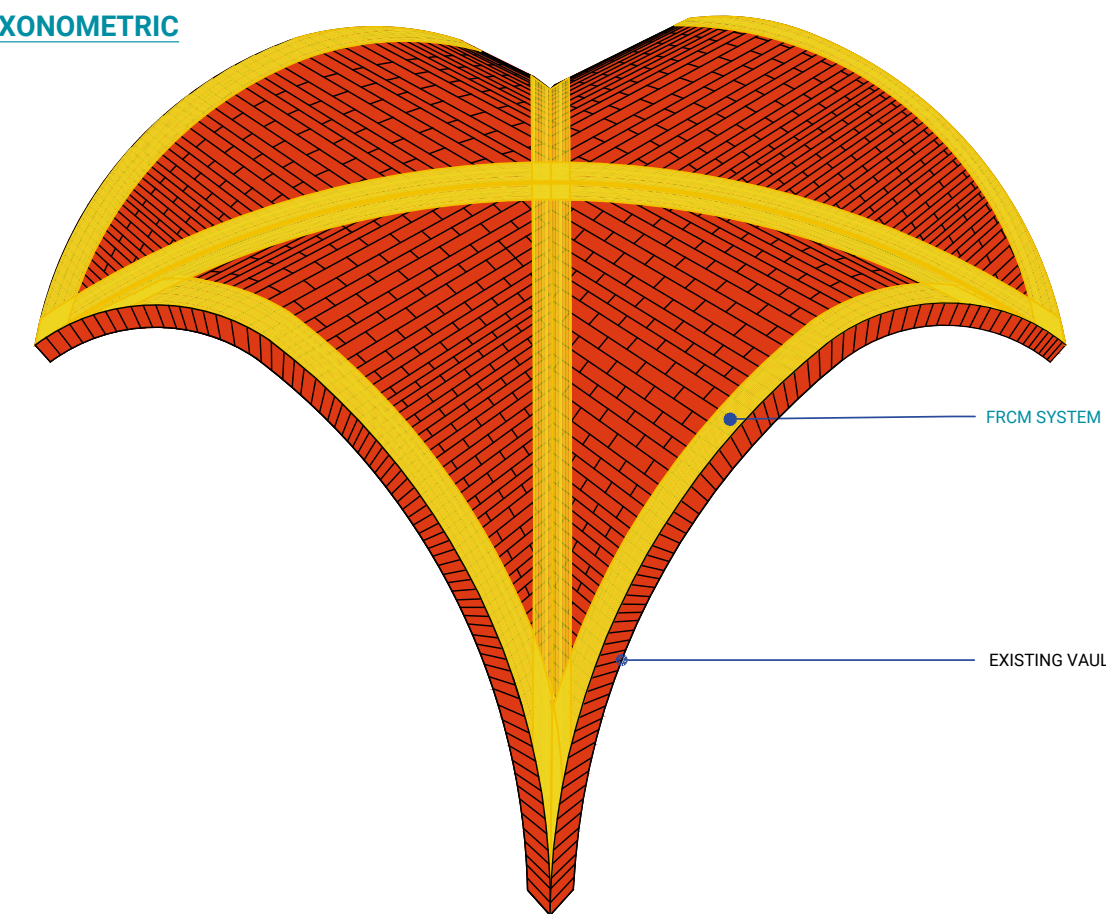
SECTION



SECTION



EXPLODED AXONOMETRIC



INSTALLATION PHASES

1 SUBSTRATE PREPARATION

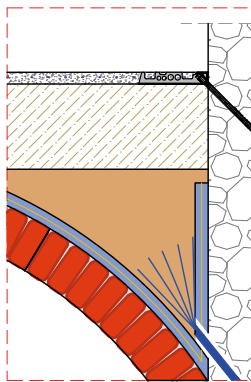
Empty the hole and remove any incoherent parts. Ensure that the joint mortar is not disintegrated. If it is disintegrated, scarify the joints by hydro demolition or sandblasting and repoint them. In the presence of cracks, unstitching-restitching work must be realised. This phase is necessary so that it then becomes easier to insert the connector into the hole. Inject part of the **MX-JOINT** inorganic matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres. (See DWG. 1Ha).

APPLICATION OF FRCM STRENGTHENING

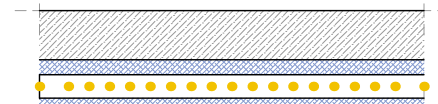
Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric. Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple layers of strengthening are to be applied, repeat the previous steps wet on wet. Wrap both ends of the connector with masking tape for a length equal to the radius of the area on which it will be spread out. Impregnate the free part with the **MX-JOINT** matrix and wait for it to dry. This phase is necessary so that it then becomes easier to insert the connector into the hole. Inject part of the **MX-JOINT** inorganic matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres. (See DWG. 1Ha).

FRCM strengthening system with inorganic matrix and long fibres

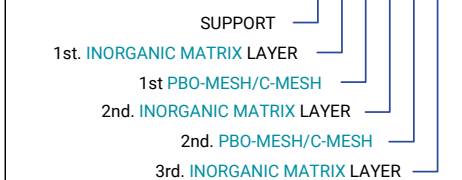
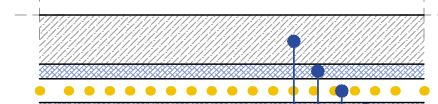
DETAIL 1 (see Drawing 1Ha)



STRATIFICATION 1 Application of 1st LAYER



STRATIFICATION 2 Application of 2nd LAYER



- KEY**
- Existing vault
 - Centrostorico LIME base layer/Latermix Cem
 - Latermix Beton
 - Perimeter Connector
 - INORGANIC MATRIX
 - PBO-MESH/C-MESH
 - PBO-JOINT/C-JOINT connector
 - MX-RW High Performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster

1.K

STRENGTHENING TO A SAIL VAULT

1.K

INSTALLATION PHASES

STRENGTHENING TO A SAIL VAULT



SUBSTRATE PREPARATION

Remove the plaster and any incoherent parts. Scarify and repaint the mortar joints. Unstitch/restitch any lesions. Regularise the substrate (if required) with **MX-RW**, **MX-CP**, **MX-PVA**, or **MX-15** mortar.



INSTALLATION OF THE FRCM SYSTEM

Install the FRCM system, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH** along the direction of the stresses. Install the connection system, using the specific **MX-JOINT** inorganic matrix with the **PBO-JOINT/C-JOINT** connector.



LIGHTWEIGHT FILL TO VAULTS AND PERIMETER CONSOLIDATION SYSTEM

Fill with **LATERMIX CEM** lightweight fill or **CENTROSTORICO LIME SUB-BASE**. Backfill (if necessary) with **LATERMIX BETON** lightweight structural concrete. Install the **PERIMETER CONNECTOR** system for slab-to-wall connection and anti-seismic encirclement.

FRCM systems for MASONRY

PBO MESH + INORGANIC MATRIX
PBO-MESH 22/22, PBO-MESH 44 + MX-PBO Masonry



CARBON MESH + INORGANIC MATRIX
C-MESH 84/84 + MX-C 25 Masonry



Lightweight backfill and perimeter consolidation system



LIGHTWEIGHT BACKFILL
Latermix CEM
CentroStorico Lime
Sub-base

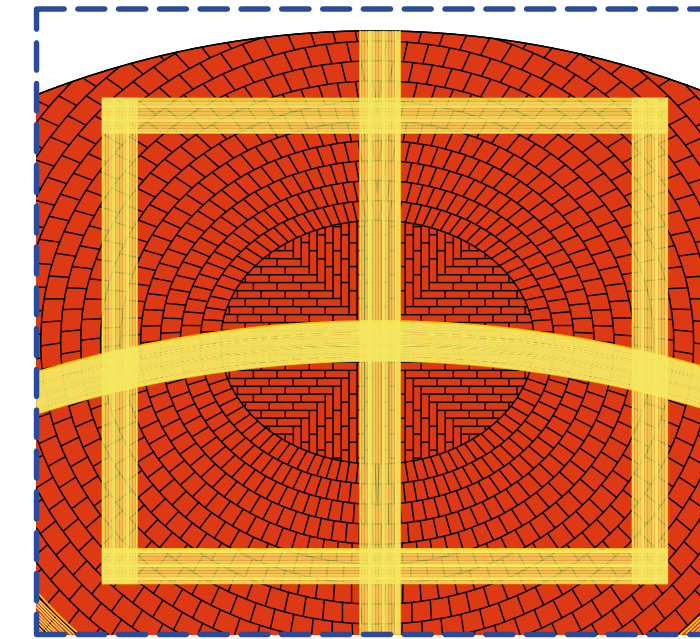


Perimeter Connector + LIGHTWEIGHT STRUCTURAL CONCRETE
Chemical Anchor + Latermix Beton
CentroStorico

For further information on all the products in the table, see chapter 6 (from page 144 to 147, page 155 and from 159 to 161).

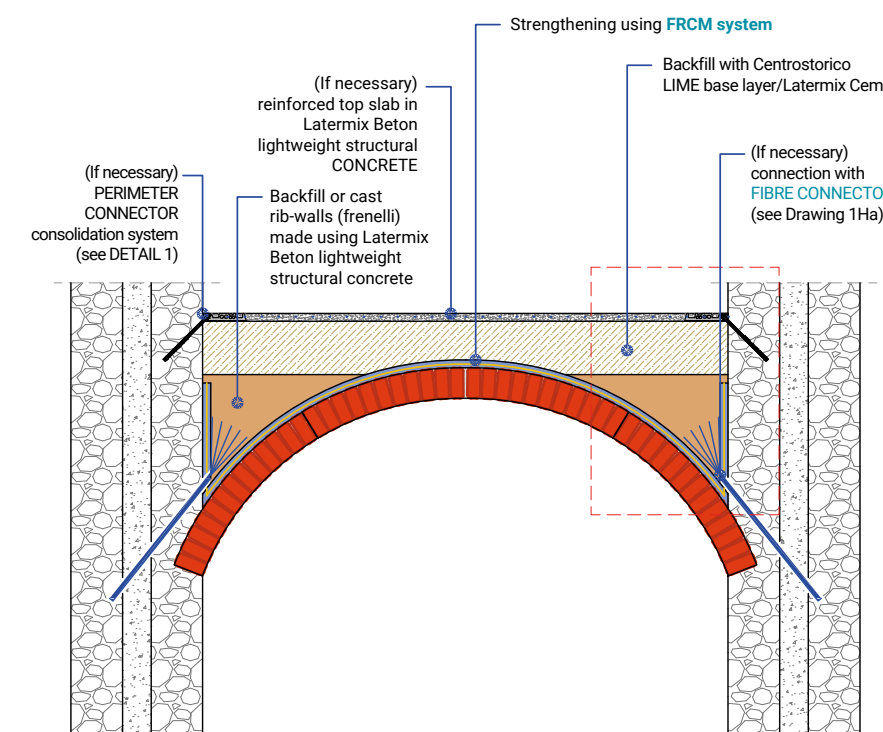
POLYGONAL CONNECTORS

In vaults of small diameter it is advisable to cut and arrange the meshes as shown in the illustration, with an overlap equal to their width. This arrangement makes it possible to avoid the formation of folds in the fabric if the curvature prevents correct installation.

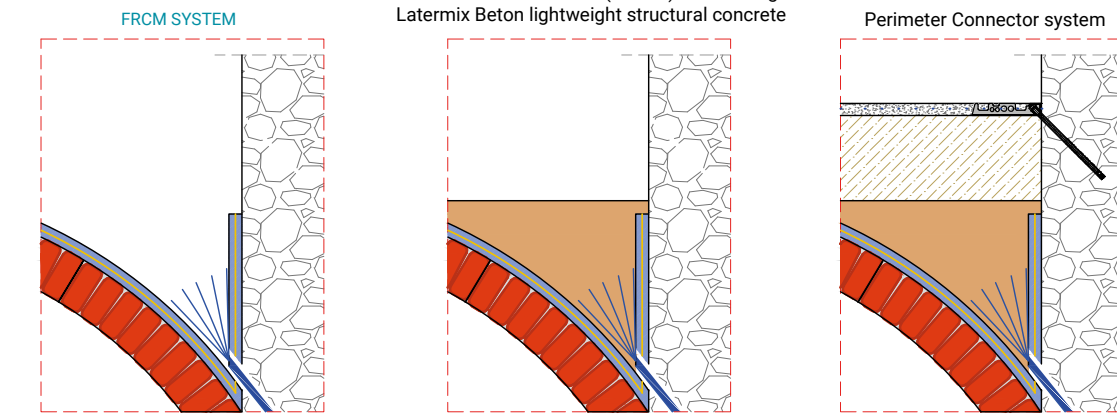


SAIL vault strengthening using FRCM SYSTEM

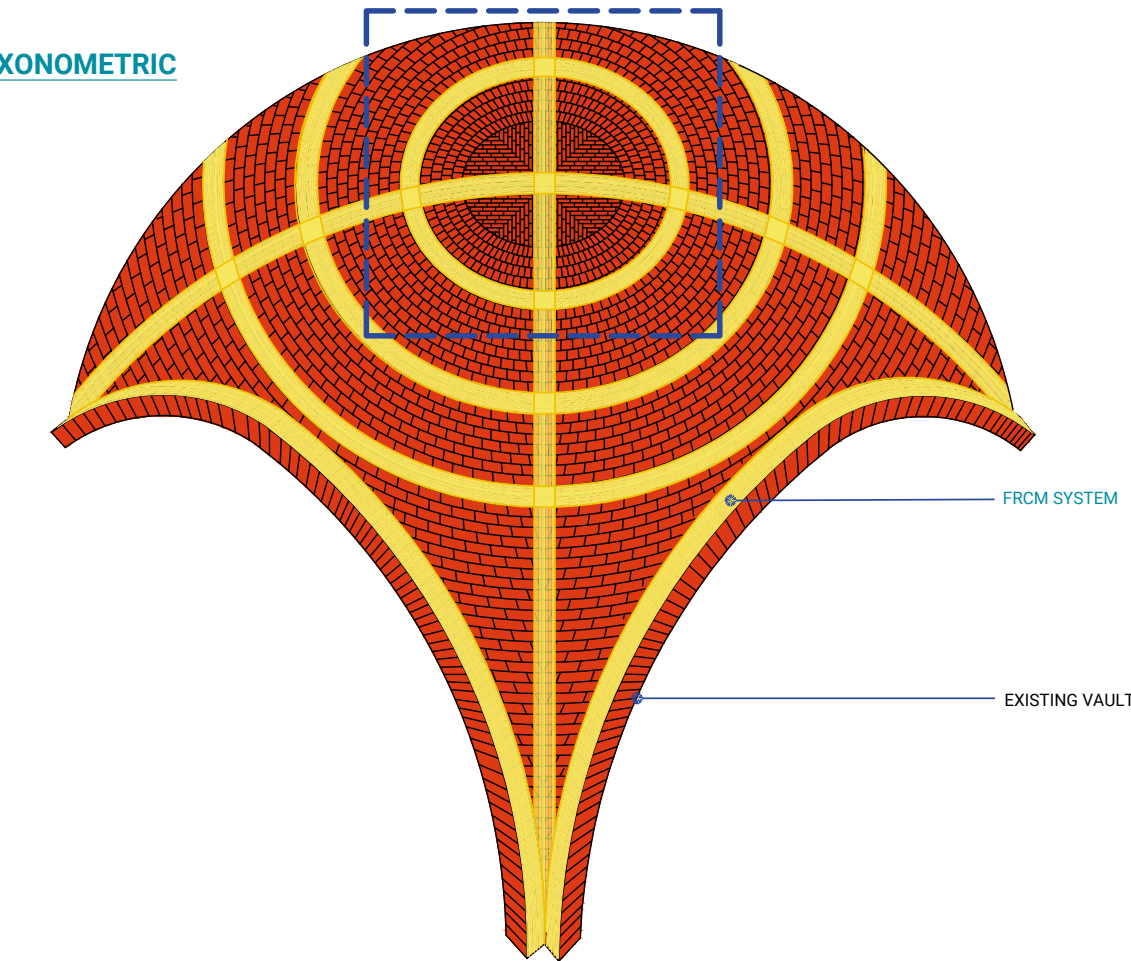
SECTION



SECTION

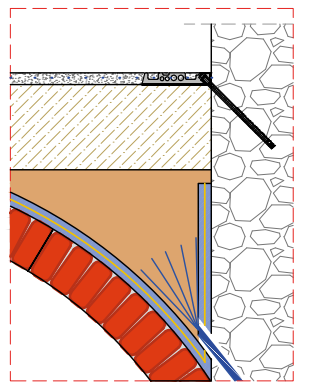


EXPLODED AXONOMETRIC

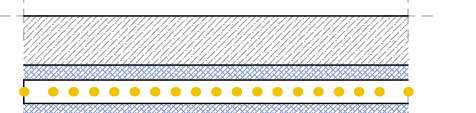


FRCM strengthening system with inorganic matrix and long fibres

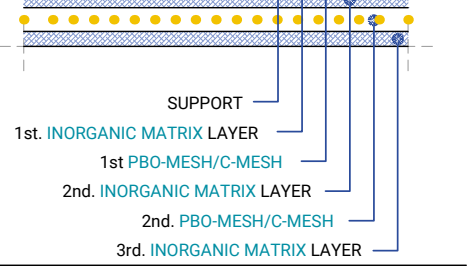
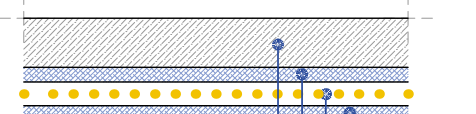
DETAIL 1 (see Drawing 1Ha)



STRATIFICATION 1 Application of 1st LAYER



STRATIFICATION 2 Application of 2nd LAYER



KEY	
	Existing vault
	Centrostorico LIME base layer/Latermix Cem
	Latermix Beton
	INORGANIC MATRIX
	PBO-MESH/C-MESH
	PBO-JOINT/C-JOINT connector
	Perimeter Connector
	MX-RW High Performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster

INSTALLATION PHASES

1 SUBSTRATE PREPARATION

Empty the hole and remove any incoherent parts. Ensure that the joint mortar is not disintegrated. If it is disintegrated, scarify the joints by hydro demolition or sandblasting and repaint them. In the presence of cracks, unstitching-restitching work must be realised. This phase is necessary so that it then becomes easier to insert the connector into the hole. Inject part of the **MX-JOINT** inorganic matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres. (See DWG. 1Ha).

APPLICATION OF FRCM STRENGTHENING

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric. Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple layers of strengthening are to be applied, repeat the previous steps wet on wet. Wrap both ends of the connector with masking tape for a length equal to the radius of the area on which it will be spread out. Impregnate the free part with the **MX-JOINT** matrix and wait for it to dry. This phase is necessary so that it then becomes easier to insert the connector into the hole. Inject part of the **MX-JOINT** inorganic matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres. (See DWG. 1Ha).

1.L

STRENGTHENING TO A PAVILION VAULT

1.L

INSTALLATION PHASES

STRENGTHENING TO A PAVILION VAULT



SUBSTRATE PREPARATION

Remove the plaster and any incoherent parts. Scarify and repoint the mortar joints. Unstitch/restitch any lesions. Regularise the substrate (if required) with **MX-RW**, **MX-CP**, **MX-PVA**, or **MX-15** mortar.



INSTALLATION OF THE FRCM SYSTEM

Install the FRCM system, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH** along the direction of the stresses. Install the connection system, using the specific **MX-JOINT** inorganic matrix with the **PBO-JOINT/C-JOINT** connector.



LIGHTWEIGHT FILL TO VAULTS AND PERIMETER CONSOLIDATION SYSTEM

Fill with **LATERMIX CEM** lightweight fill or **CENTROSTORICO LIME SUB-BASE**. Backfill (if necessary) with **LATERMIX BETON** lightweight structural concrete. Install the **PERIMETER CONNECTOR** system for slab-to-wall connection and anti-seismic encirclement.

FRCM systems for MASONRY

PBO MESH + INORGANIC MATRIX
PBO-MESH 22/22,
PBO-MESH 44 + **MX-PBO Masonry**



CARBON MESH + INORGANIC MATRIX
C-MESH 84/84 + **MX-C 25 Masonry**



Lightweight backfill and perimeter consolidation system



LIGHTWEIGHT BACKFILL
Latermix CEM
CentroStorico Lime
Sub-base



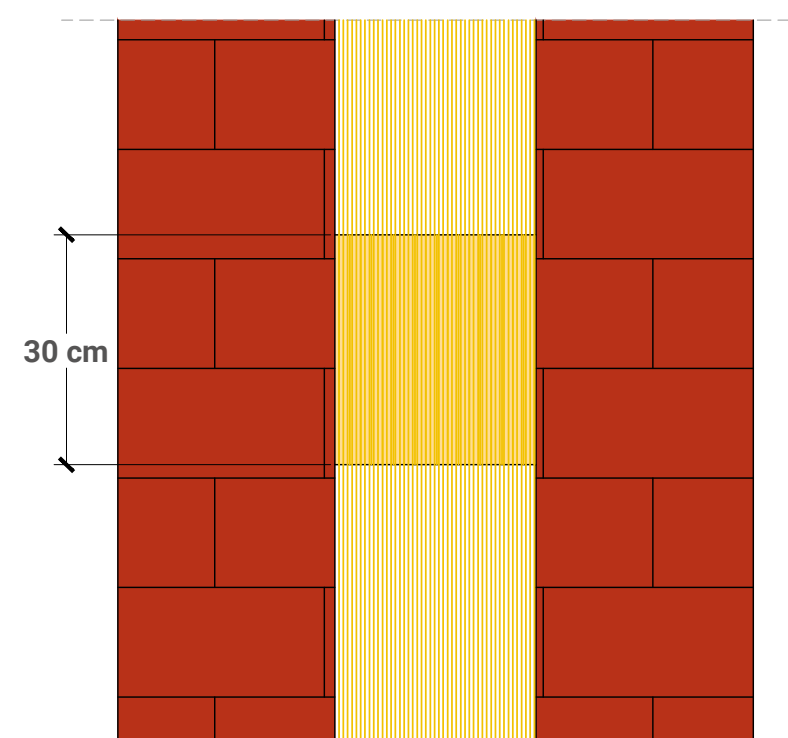
Perimeter Connector
Chemical Anchor
CentroStorico



LIGHTWEIGHT STRUCTURAL CONCRETE
Latermix Beton

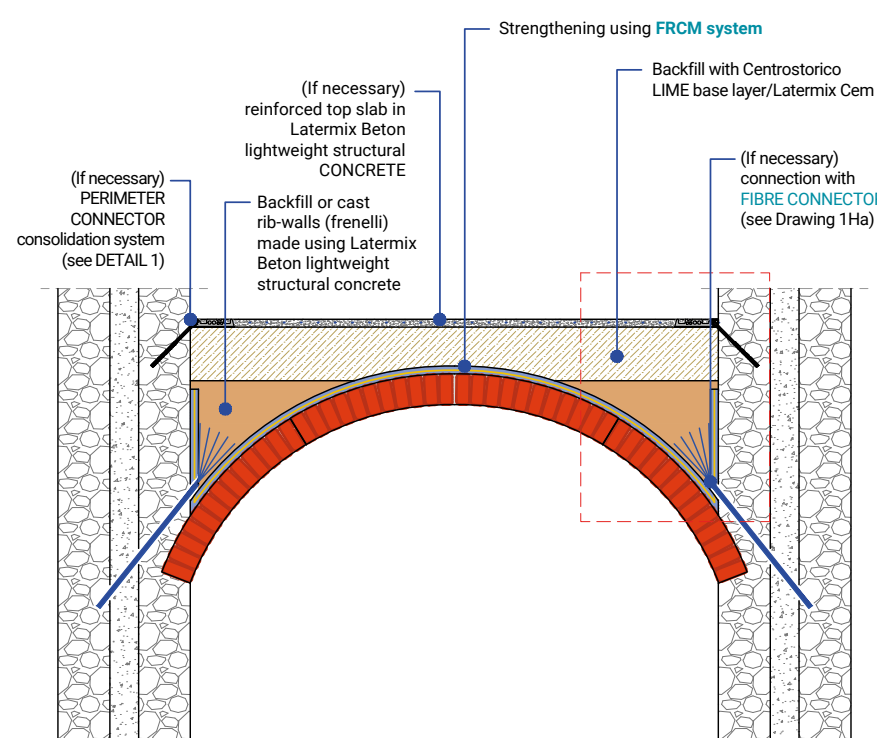
For further information on all the products in the table, see chapter 6 (from page 144 to 147, page 155 and from 159 to 161).

OVERLAP DETAIL FRCM SYSTEM PLAN

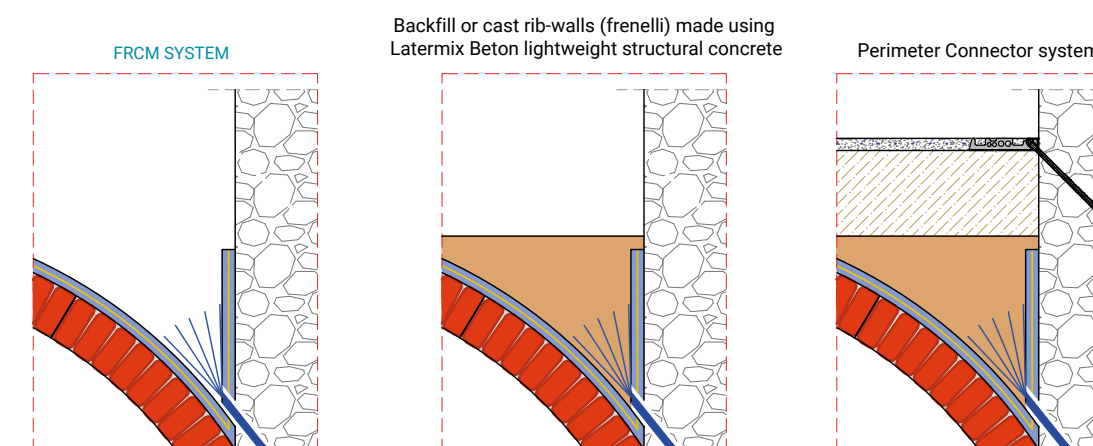


Strengthening to PAVILION vault using FRCM SYSTEM

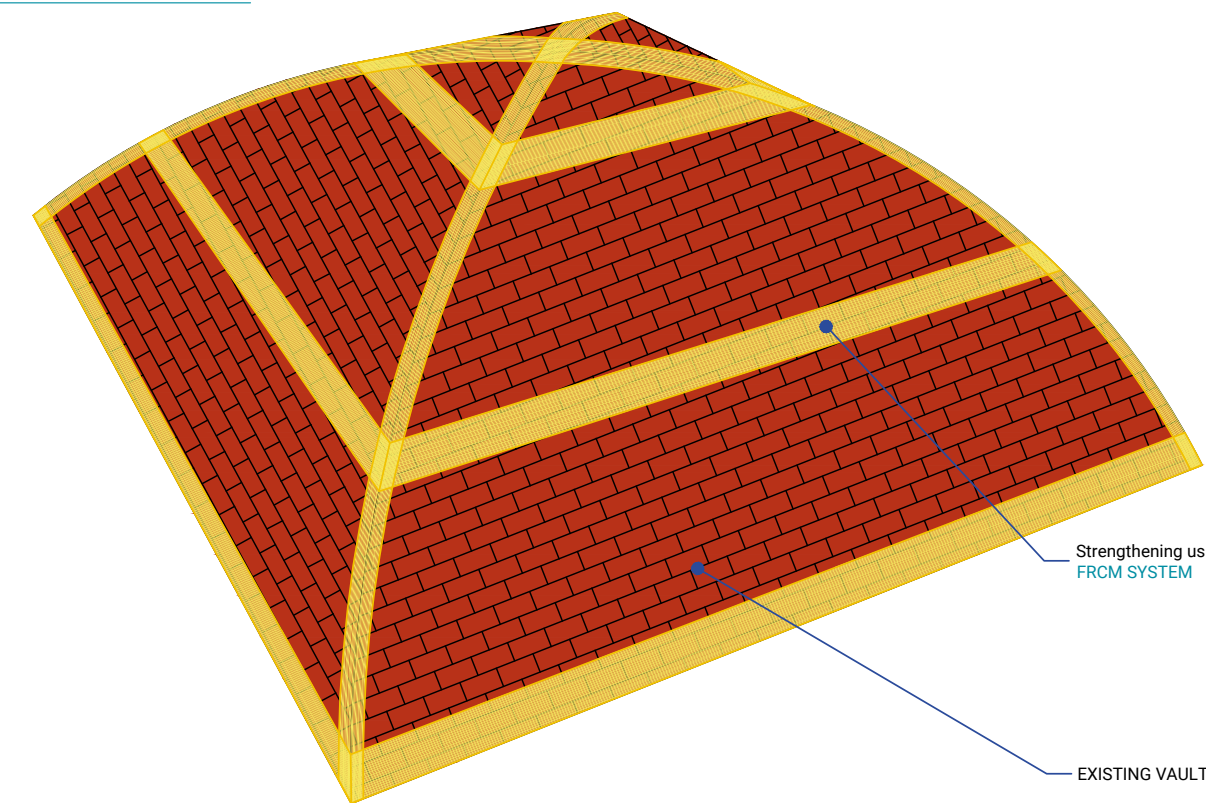
SECTION



SECTION

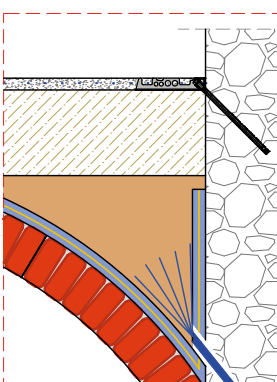


EXPLODED AXONOMETRIC

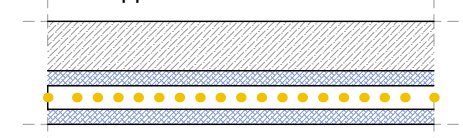


FRCM strengthening system with inorganic matrix and long fibres

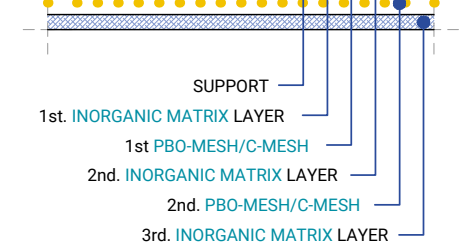
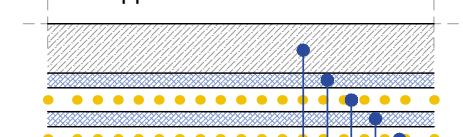
DETAIL 1 (see Drawing 1Ha)



STRATIFICATION 1 Application of 1st LAYER



STRATIFICATION 2 Application of 2nd LAYER



KEY

	Existing vault		INORGANIC MATRIX
	Centrostorico LIME base layer/Latermix Cem		PBO-MESH/C-MESH
	Latermix Beton		PBO-JOINT/C-JOINT connector
	Perimeter Connector		PBO-JOINT/C-JOINT connector
	MX-RW High Performance, MX-CP Lime, MX-PVA Fibre-reinforced, or MX-15 Plaster		

1 SUBSTRATE PREPARATION

Empty the hole and remove any incoherent parts. Ensure that the joint mortar is not disintegrated. If it is disintegrated, scarify the joints by hydro demolition or sandblasting and repoint them. In the presence of cracks, unstitching-restitching work must be realised. If necessary, level the substrate with **MX-RW High Performance**, **MX-CP Lime**, **MX-PVA Fibre-reinforced**, or **MX-15 Plaster** mortar (see DWG 3C).

2 APPLICATION OF FRCM STRENGTHENING

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric. Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple layers of strengthening are to be applied, repeat the previous steps wet on wet. Wrap both ends of the connector with masking tape for a length equal to the radius of the area on which it will be spread out. Impregnate the free part with the **MX-JOINT** matrix and wait for it to dry. This phase is necessary so that it then becomes easier to insert the connector into the hole. Inject part of the **MX-JOINT** inorganic matrix into the hole. Insert the **PBO-JOINT/C-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres. (See DWG. 1Ha).

INSTALLATION PHASES



2

FRP STRENGTHENINGS

■ Reinforced concrete structures

- 2.A Strengthening to **columns**
- 2.B Strengthening to **beams**
- 2.C Strengthening to **beam-column nodes**
- 2.D Strengthening to **joists in composite slabs**

2.A

STRENGTHENING TO COLUMNS



SUBSTRATE PREPARATION

Remove deteriorated concrete, clean the rebars, and apply **PASSIVATOR**. Reinstall the reinforcement cover using **MX-R4 Repair mortar**.



FRP SHEAR AND CONFINEMENT STRENGTHENING

The system is installed by spreading **C-PRIMER WRAP** on the support. When this has completely dried, apply the first layer of **C-RESIN WRAP** followed by **C-WRAP** or **C-QUADRIWRAP** tape, followed by the second layer of **C-RESIN WRAP**, being sure to cover the tape uniformly. Apply a final sand broadcasting layer on fresh resin.



INSTALLATION OF THE FRP CONNECTOR

Install the **C-JOINT** connector using **C-RESIN JOINT** grouting resin.

FRP systems for CONCRETE

CARBON FIBRE TAPE + EPOXY PRIMER AND RESIN
C-WRAP + **C-PRIMER WRAP**
C-QUADRIWRAP + **C-RESIN WRAP**



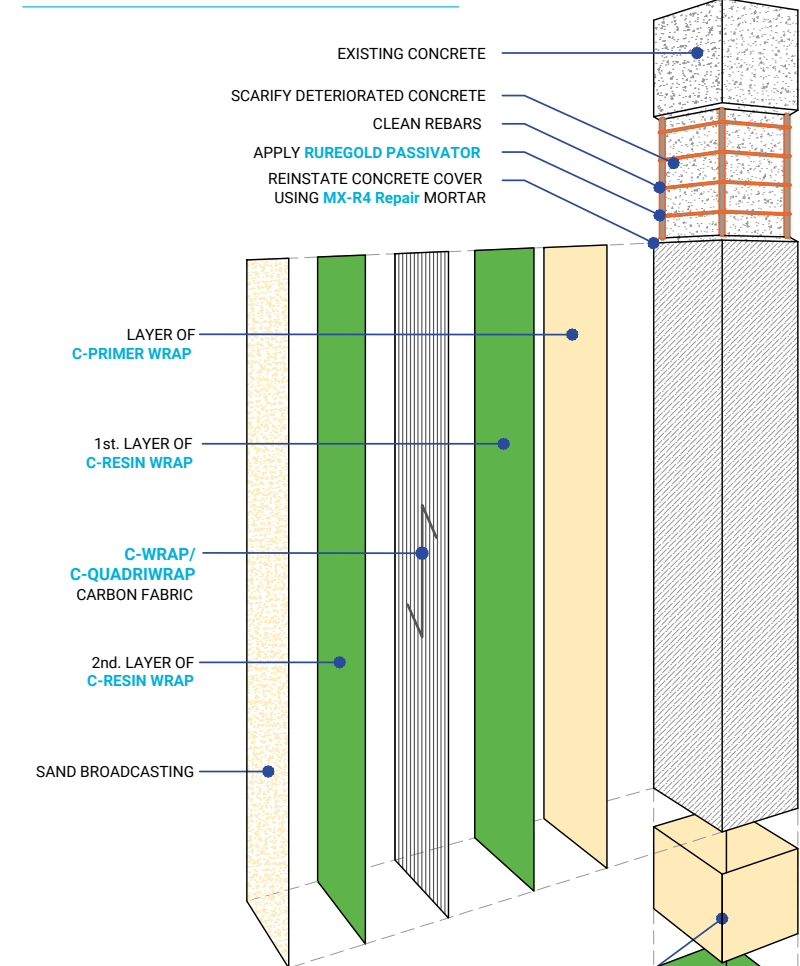
FRP CONNECTION systems

CARBON CONNECTOR + EPOXY RESIN
C-JOINT + **C-RESIN JOINT**

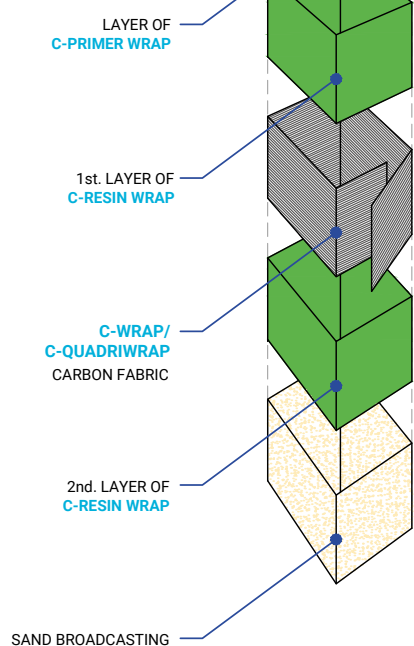


For further information on all the products in the table, see chapter 6 (from page 147 to page 149 and page 152).

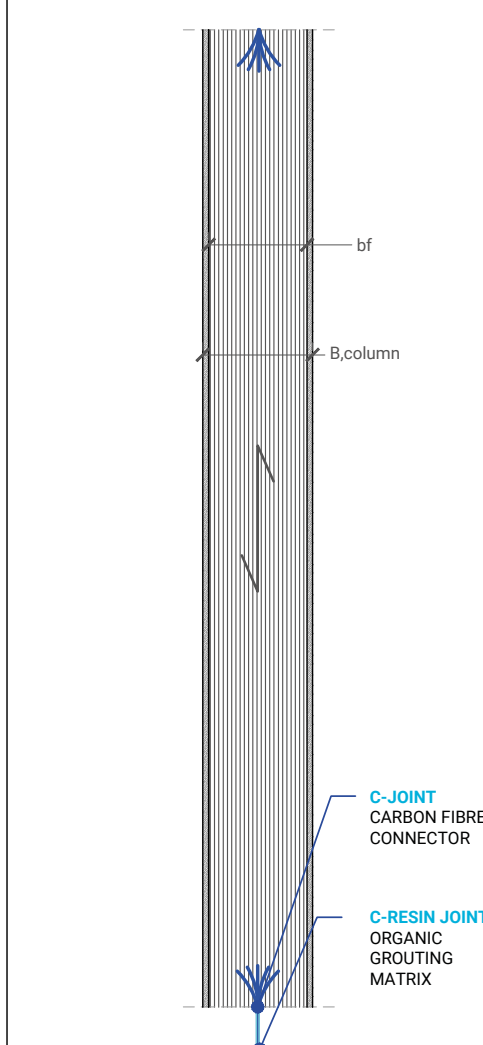
COMBINED AXIAL AND FLEXURAL FORCES STRENGTHENING



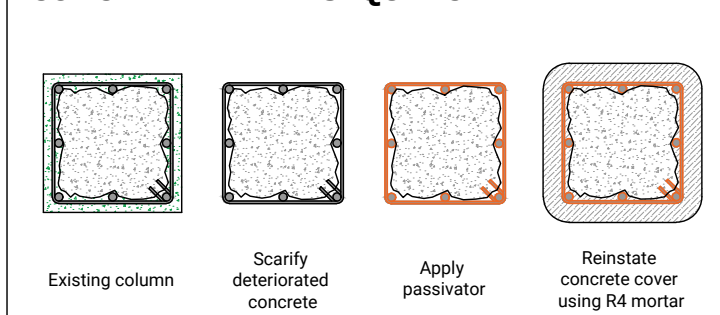
SHEAR STRENGTHENING AND CONFINEMENT



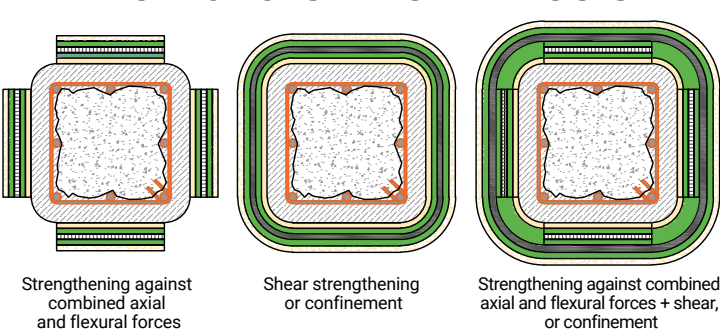
COMBINED AXIAL AND FLEXURAL FORCES STRENGTHENING



CONCRETE REPAIR SEQUENCE



APPLICATION OF STRENGTHENING SYSTEM



INSTALLATION PHASES

1 SUBSTRATE PREPARATION

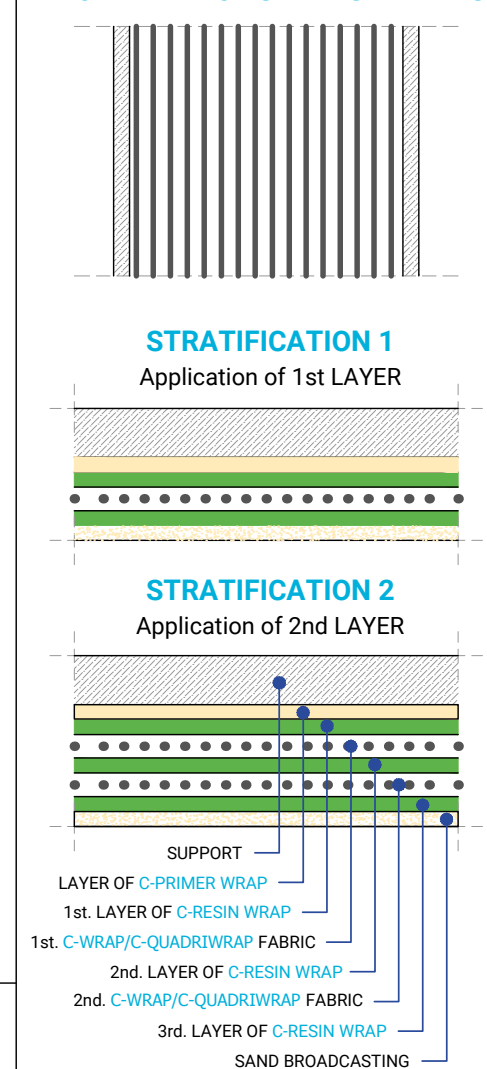
Eliminate any protective surface treatments or other substances that might affect good adhesion to the support. Remove any damaged substrate by hydro demolition or sandblasting until a concrete layer is reached that has not been carbonated and is well compacted. Remove rust from reinforcement by manual or mechanical brushing. Apply **RUREGOLD PASSIVATOR** to the existing reinforcement and restore the concrete cover using **MX-R4 Repair mortar**.

2 APPLICATION OF FRP STRENGTHENING

Round off the sharp edges and then, after ensuring that the support is perfectly clean and dry, apply **C-PRIMER WRAP** with a roller or a brush. Wait for the **C-PRIMER WRAP** to dry completely and then apply a first layer of **C-RESIN WRAP** with a brush or a roller. Wait for about 5 minutes and then apply the **C-WRAP/C-QUADRIWRAP** tape, pressing slightly to make it adhere to the structure. Impregnate the carbon fibres and use an air release roller to eliminate any air bubbles trapped between the fibres and the support, working longitudinally from the midpoint of the strip to the edges. Wait for about 5 minutes and then apply the second layer of **C-RESIN WRAP**, being sure to cover the tape evenly. If the project requires multiple layers of strengthening, the two previous operations just described must be repeated wet-on-wet until the required number of applications is attained. Apply a final sand broadcasting layer on fresh resin, to create a bonding layer for any protective plaster or finish.

FRP strengthening system with organic matrix and carbon fabric

FRONT VIEW OF STRENGTHENING



KEY



2.B

STRENGTHENING TO BEAMS

2.B

INSTALLATION PHASES

STRENGTHENING TO BEAMS



SUBSTRATE PREPARATION

Remove deteriorated concrete, clean the rebars, and apply **PASSIVATOR**. Reinstall the reinforcement cover using **MX-R4 Repair mortar**.



FLEXURAL STRENGTHENING



FLEXURAL STRENGTHENING AND SHEAR STRENGTHENING WITH STRIPS

The system is installed by spreading **C-PRIMER WRAP** on the support. When this has completely dried, apply the first layer of **C-RESIN WRAP** followed by **C-WRAP** or **C-QUADRIWRAP** tape. Then apply the second layer of **C-RESIN WRAP**, being sure to cover the tape uniformly. Apply a final sand broadcasting layer on fresh resin.

Support reinstatement

ANTI-CORROSION MORTAR FOR STEEL REINFORCEMENTS **PASSIVATOR**



REPAIR MORTAR **MX-R4 Repair**

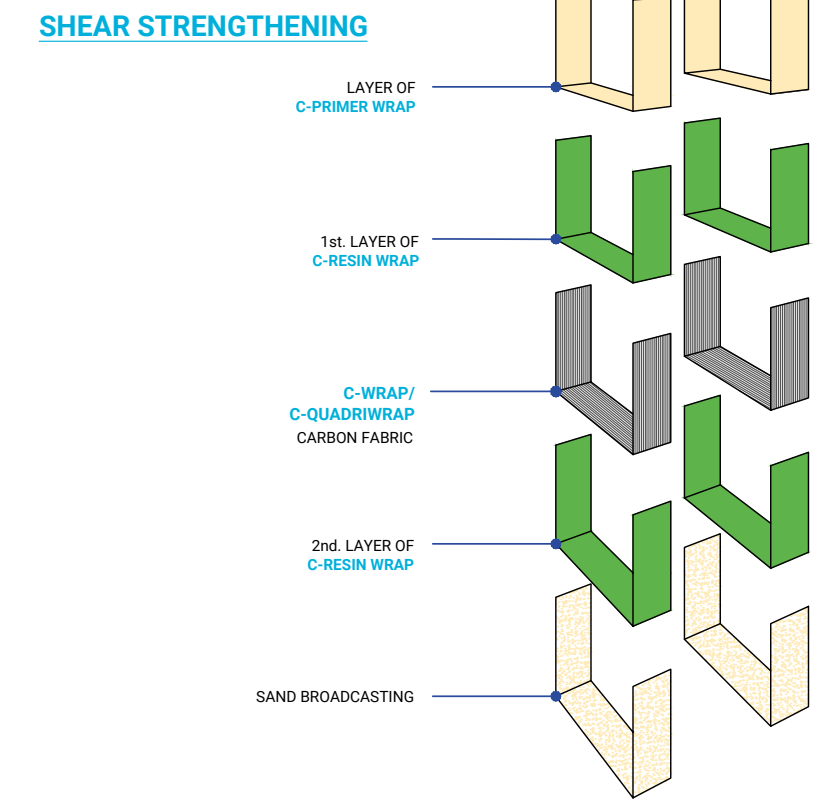
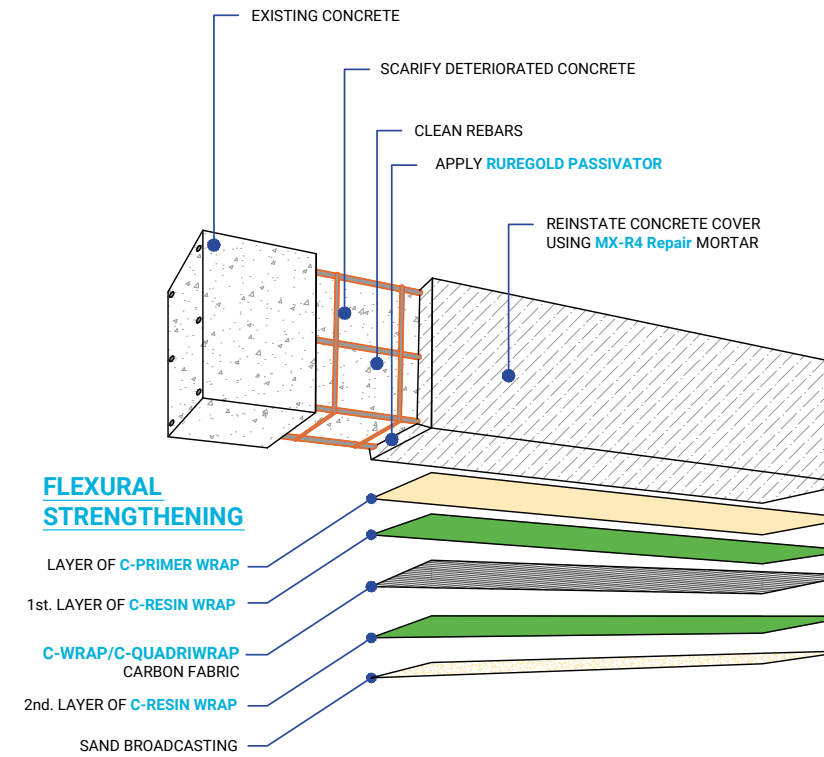


FRP systems for CONCRETE

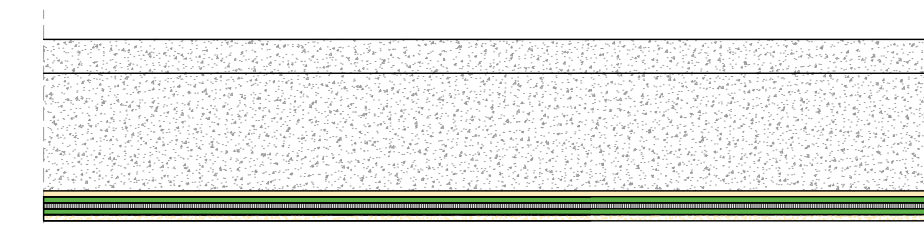
CARBON FIBRE TAPE + EPOXY PRIMER AND RESIN
C-WRAP + **C-PRIMER WRAP**
C-QUADRIWRAP + **C-RESIN WRAP**



For further information on all the products in the table, see chapter 6 (from page 147 to page 149 and page 152).

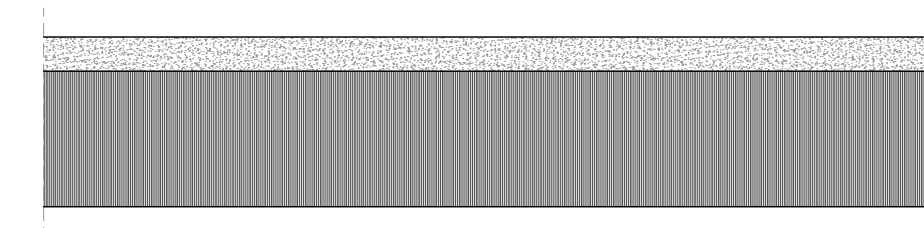


FLEXURAL STRENGTHENING



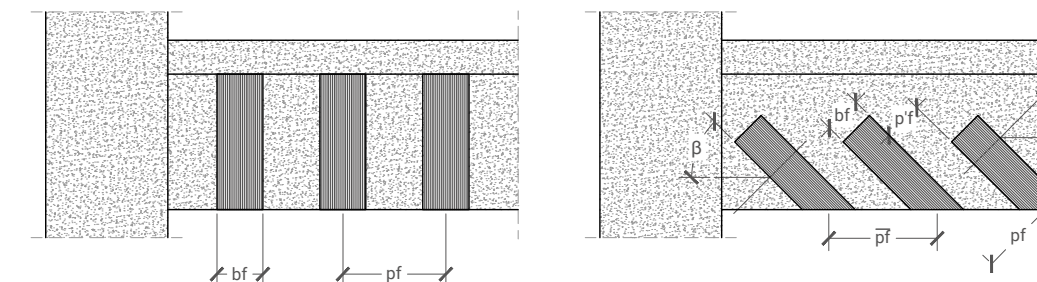
SHEAR STRENGTHENING

CONTINUOUS LAYOUT

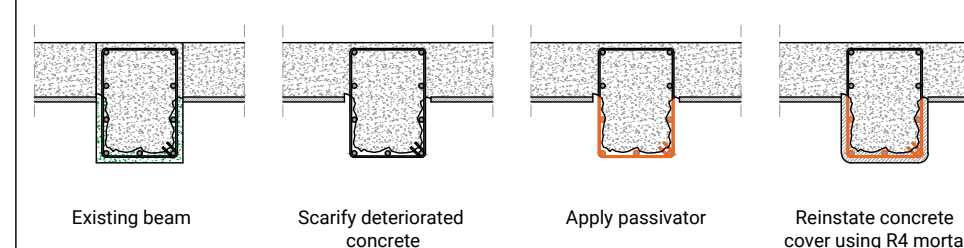


SHEAR STRENGTHENING

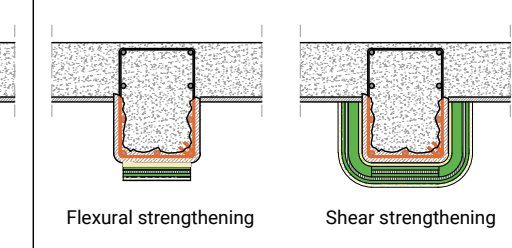
STRIPS LAYOUT



CONCRETE REPAIR SEQUENCE



APPLICATION OF STRENGTHENING SYSTEM



1 SUBSTRATE PREPARATION

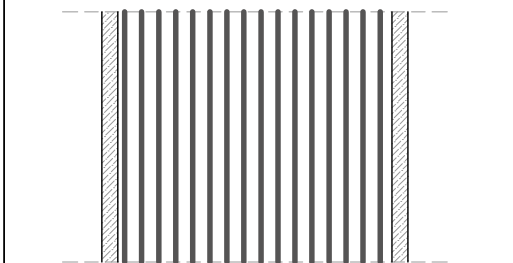
Eliminate any protective surface treatments or other substances that might affect good adhesion to the support. Remove any damaged substrate by hydro demolition or sandblasting until a concrete layer is reached that has not been carbonated and is well compacted. Remove rust from reinforcement by manual or mechanical brushing. Apply **RUREGOLD PASSIVATOR** to the existing reinforcement and restore the concrete cover using **MX-R4 Repair mortar**.

2 APPLICATION OF FRP STRENGTHENING

Round off the sharp edges and then, after ensuring that the support is perfectly clean and dry, apply **C-PRIMER WRAP** with a roller or a brush. Wait for the **C-PRIMER WRAP** to dry completely and then apply a first layer of **C-RESIN WRAP** with a brush or a roller. Wait for about 5 minutes and then apply the **C-WRAP/C-QUADRIWRAP** tape, pressing slightly to make it adhere to the structure. Impregnate the carbon fibres and use an air release roller to eliminate any air bubbles trapped between the fibres and the support, working longitudinally from the midpoint of the strip to the edges. Wait for about 5 minutes and then apply the second layer of **C-RESIN WRAP**, being sure to cover the tape evenly. If the project requires multiple layers of strengthening, the two previous operations just described must be repeated wet-on-wet until the required number of applications is attained. Apply a final sand broadcasting layer on fresh resin, to create a bonding layer for any protective plaster or finish.

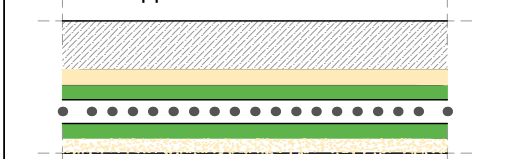
FRP strengthening system with organic matrix and carbon fabric

FRONT VIEW OF STRENGTHENING



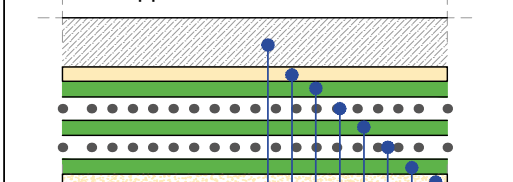
STRATIFICATION 1

Application of 1st LAYER



STRATIFICATION 2

Application of 2nd LAYER



KEY

- Existing concrete
- MX-R4 Repair concrete repair mortar
- RUREGOLD PASSIVATOR
- C-PRIMER WRAP
- C-RESIN WRAP
- C-WRAP/C-QUADRIWRAP carbon fabric
- Sand broadcasting

INSTALLATION PHASES

2.C

STRENGTHENING TO BEAM-COLUMN NODES

2.C

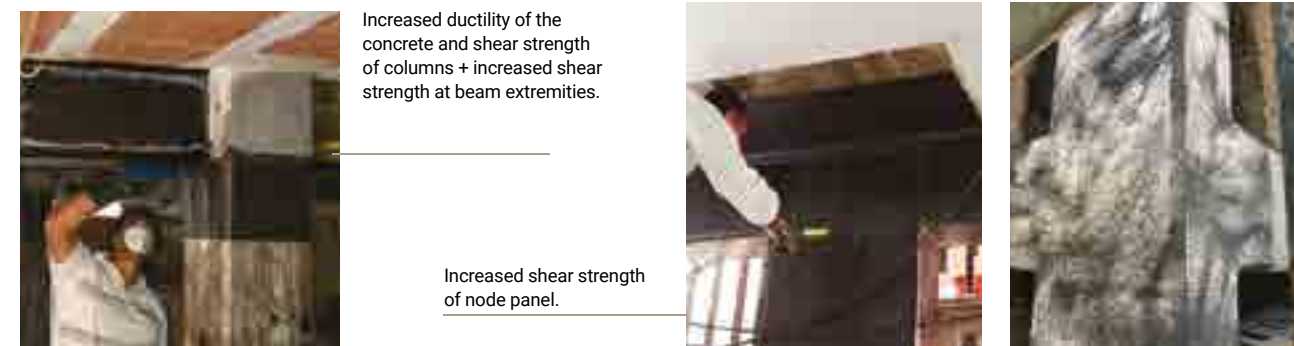
INSTALLATION PHASES

STRENGTHENING TO BEAM-COLUMN NODES



SUBSTRATE PREPARATION

Remove deteriorated concrete, clean the rebar, and apply **PASSIVATOR**. Reinstall the reinforcement cover using **MX-R4 Repair mortar**.



INSTALLATION OF THE FRP SYSTEM

The system is installed by spreading **C-PRIMER WRAP** on the support and allowing it to dry completely. Then apply **C-WRAP** or **C-QUADRIWRAP** tape, followed by the second layer of **C-RESIN WRAP**, being sure to cover the tape uniformly. Apply a final sand broadcasting layer on fresh resin.

FRP systems for CONCRETE

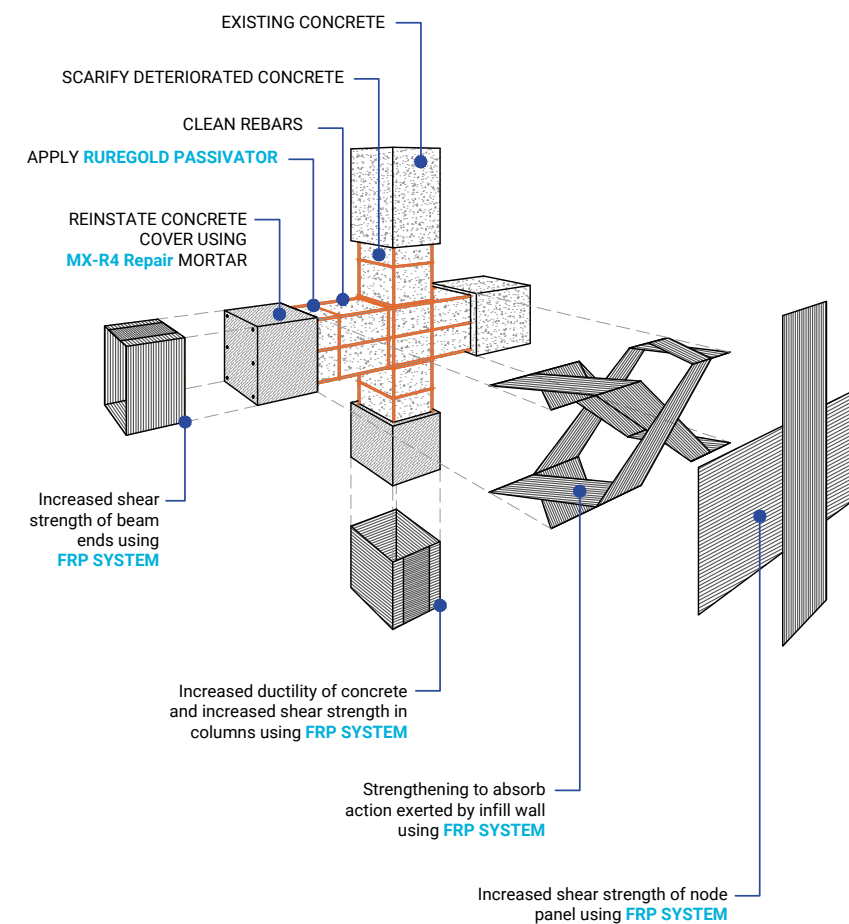
CARBON FIBRE TAPE
C-WRAP
C-QUADRIWRAP



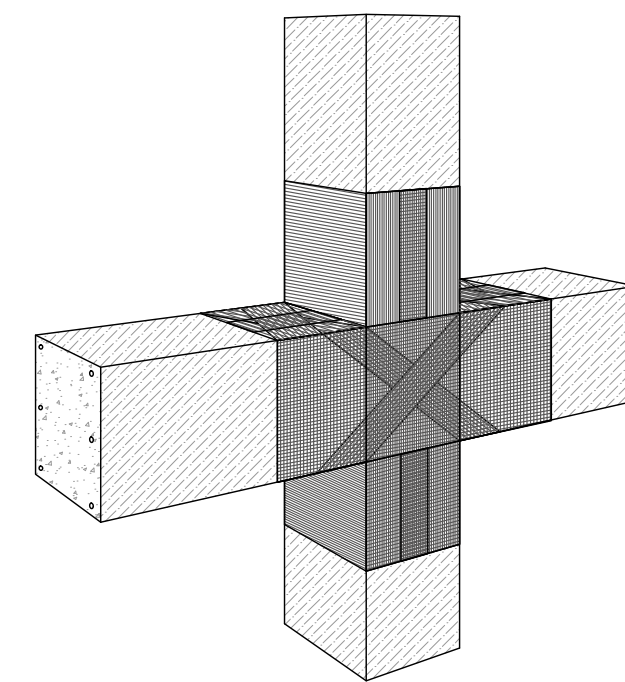
+ EPOXY PRIMER AND RESIN
C-PRIMER WRAP
C-RESIN WRAP



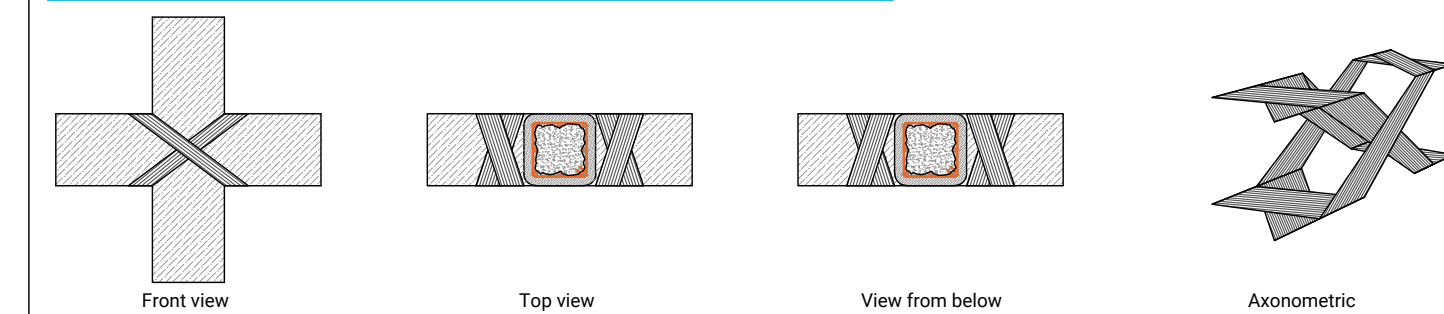
For further information on all the products in the table, see chapter 6 (pages 148, 149 and page 152).



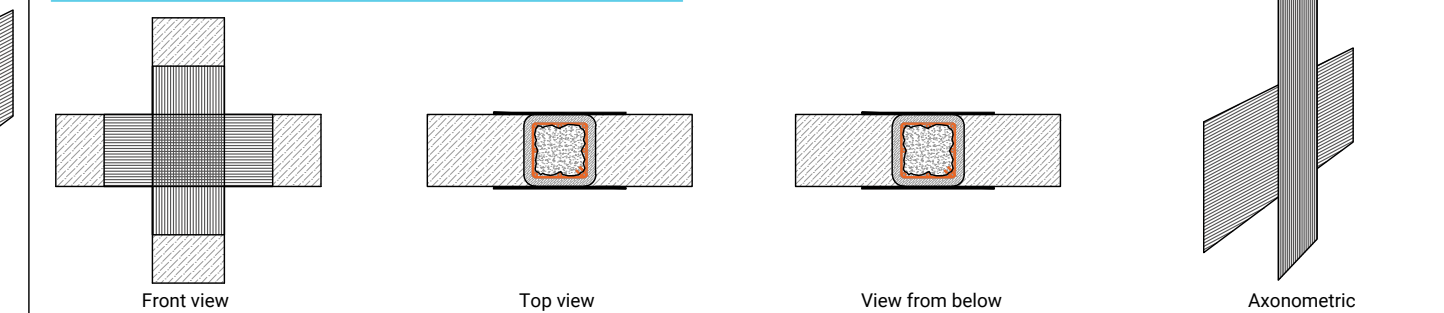
FULL BEAM-COLUMN JOINT STRENGTHENING AFTER COMPLETION



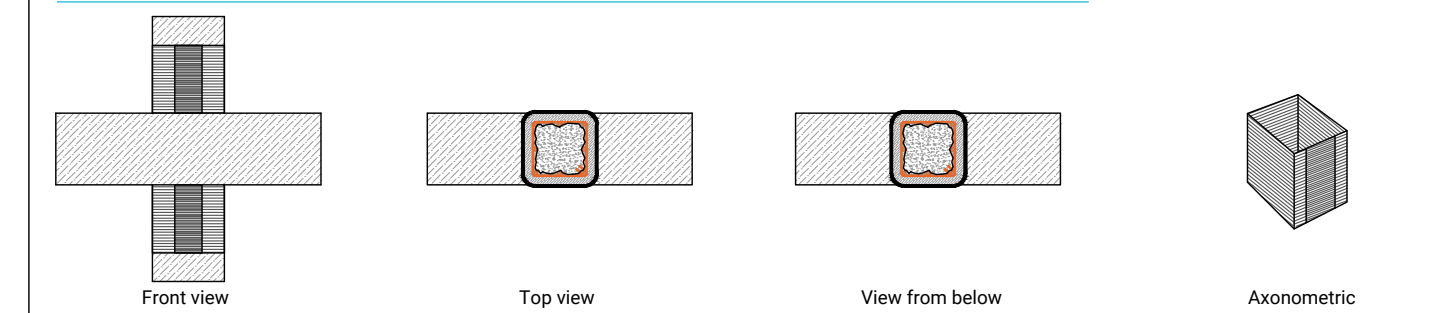
STRENGTHENING TO ABSORB ACTION EXERTED BY INFILL WALL



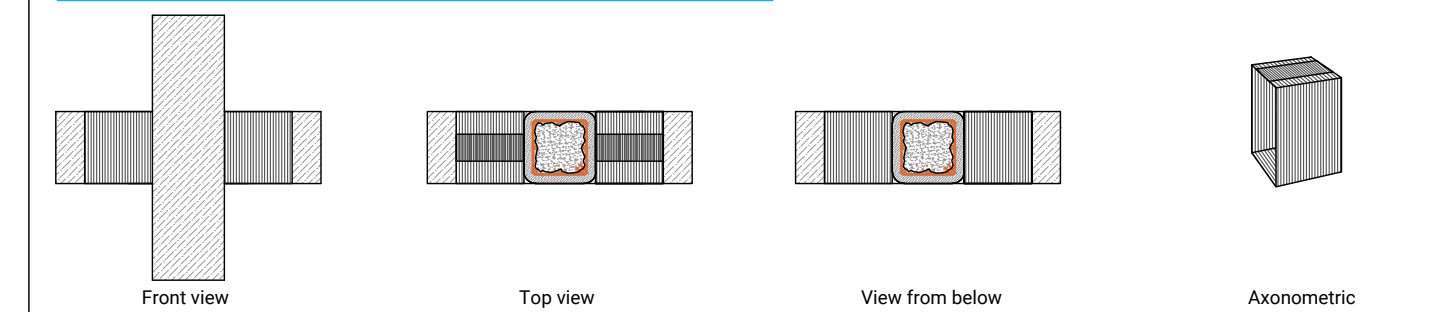
INCREASED SHEAR STRENGTH OF NODE PANEL



INCREASED DUCTILITY OF CONCRETE AND OF SHEAR STRENGTH IN COLUMNS



INCREASED SHEAR STRENGTH AT BEAM EXTREMITIES



INSTALLATION PHASES

1 SUBSTRATE PREPARATION

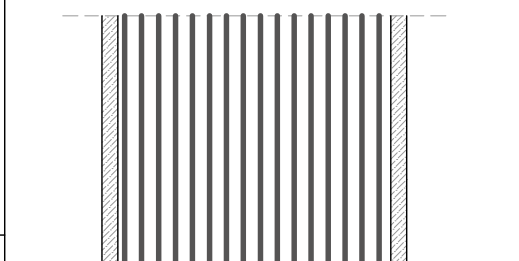
Eliminate any protective surface treatments or other substances that might affect good adhesion to the support. Remove any damaged substrate by hydro demolition or sandblasting until a concrete layer is reached that has not been carbonated and is well compacted. Remove rust from reinforcement by manual or mechanical brushing. Apply **RUREGOLD PASSIVATOR** to the existing reinforcement and restore the concrete cover using **MX-R4 Repair mortar**.

2 APPLICATION OF FRP STRENGTHENING

Round off the sharp edges and then, after ensuring that the support is perfectly clean and dry, apply **C-PRIMER WRAP** with a roller or a brush. Wait for the **C-PRIMER WRAP** to dry completely and then apply a first layer of **C-RESIN WRAP** with a brush or a roller. Wait for about 5 minutes and then apply the **C-WRAP/C-QUADRIWRAP** tape, pressing slightly to make it adhere to the structure. Impregnate the carbon fibres and use an air release roller to eliminate any air bubbles trapped between the fibres and the support, working longitudinally from the midpoint of the strip to the edges. Wait for about 5 minutes and then apply the second layer of **C-RESIN WRAP**, being sure to cover the tape evenly. If the project requires multiple layers of strengthening, the two previous operations just described must be repeated wet-on-wet until the required number of applications is attained. Apply a final sand broadcasting layer on fresh resin, to create a bonding layer for any protective plaster or finish.

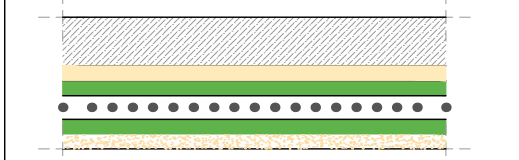
FRP strengthening system with organic matrix and carbon fabric

FRONT VIEW OF STRENGTHENING



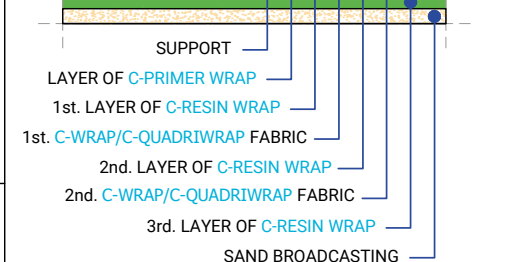
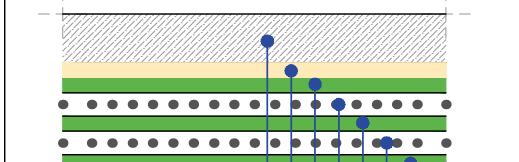
STRATIFICATION 1

Application of 1st LAYER

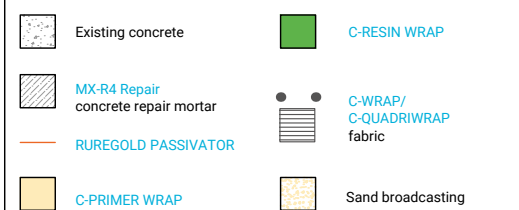


STRATIFICATION 2

Application of 2nd LAYER



KEY



2.D

STRENGTHENING TO JOISTS IN COMPOSITE SLABS



SUBSTRATE PREPARATION

Remove deteriorated concrete, clean the rebars, and apply **PASSIVATOR**. Reinstall the reinforcement cover using **MX-R4 Repair** mortar.



INSTALLATION OF THE FRP SYSTEM

The system is installed by applying **C-RESIN LAM** adhesive and **C-LAM** sheet to the surface, pressing continuously and uniformly.



APPLICATION OF CENTROSTORICO CONNECTOR TO THE EXTRADOS OF THE SLAB

Apply **CENTROSTORICO CONCRETE** or **CHEMICAL CONNECTOR** to the surface of the slab to be consolidated. If necessary consolidate the existing concrete top slab with **CENTROSTORICO PRIMER**, after cleaning the support.



FORMATION OF THE COLLABORATING TOP CONCRETE SLAB ON THE EXTRADOS OF THE EXISTING SLAB USING LATERMIX BETON

Cast the new collaborating top slab, interconnected to the existing slab, using **Latermix Beton 1400/1600/1800** lightweight structural concrete.

FRP systems for CONCRETE

PULTRUDED CARBON SHEET C-LAM + EPOXY RESIN C-RESIN LAM



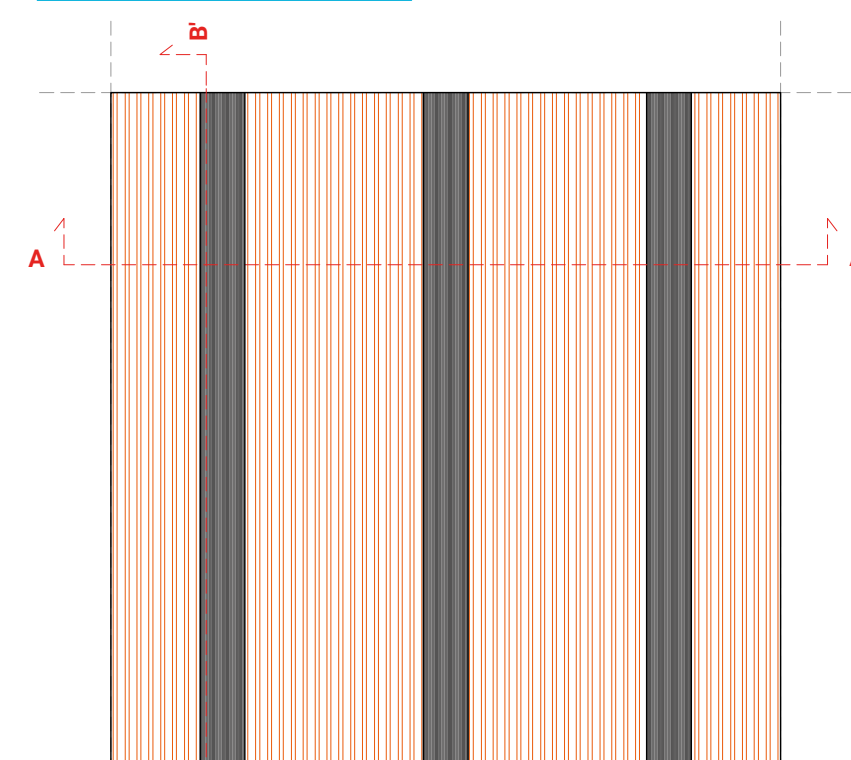
LATERLITE-CENTROSTORICO lightweight strengthening system for slabs

CONNECTOR CentroStorico Concrete or Chemical + LIGHTWEIGHT STRUCTURAL CONCRETE Latermix Beton

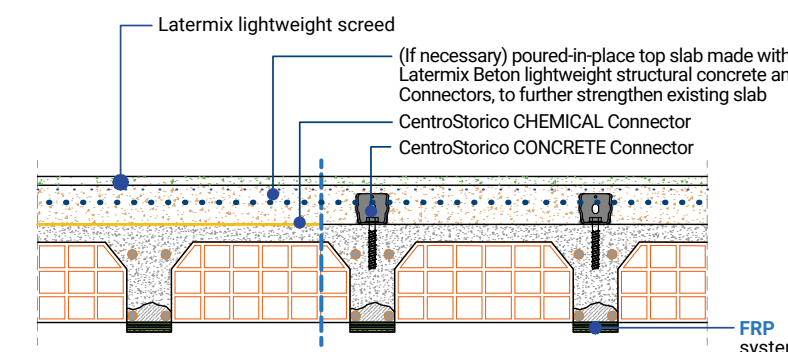


For further information on all the products in the table, see chapter 6 (pages 150, 152, 158 and 159).

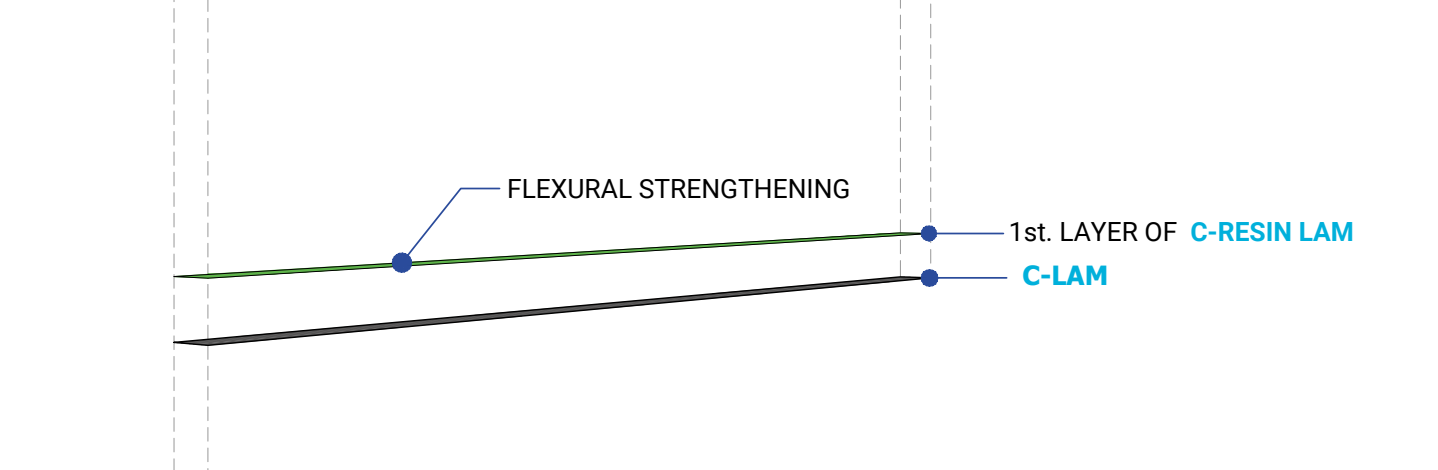
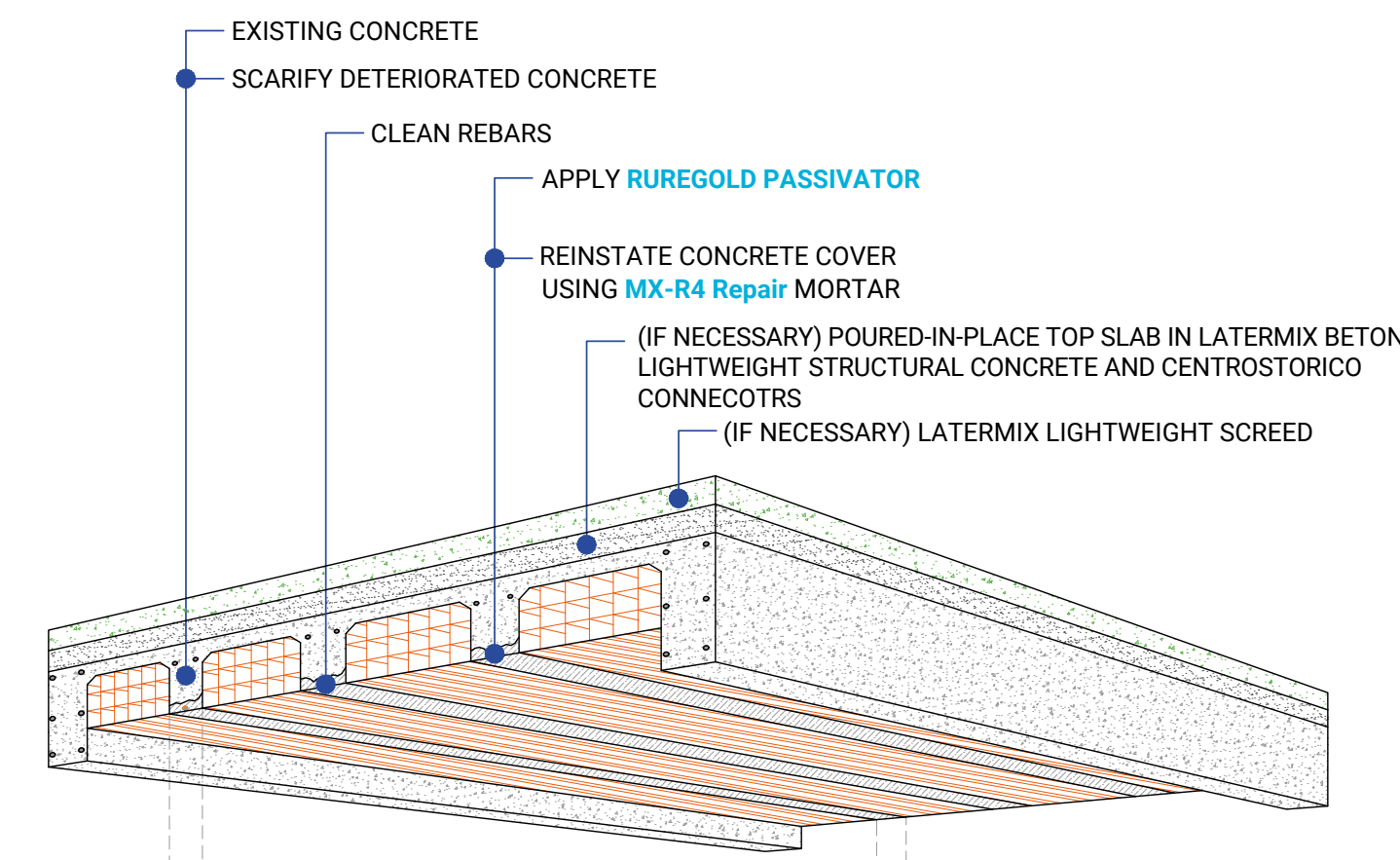
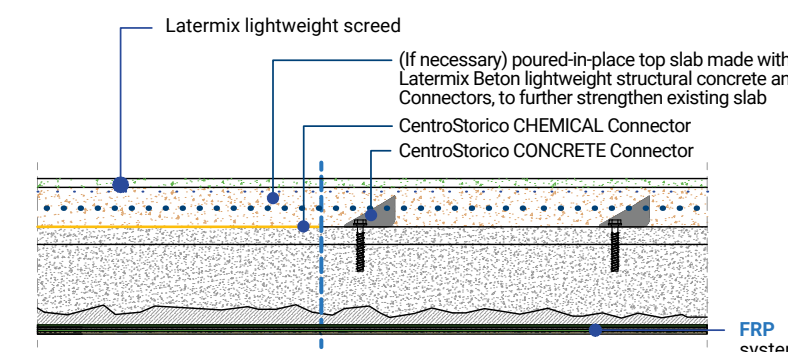
FLEXURAL STRENGTHENING



SECTION A-A' FLEXURAL strengthening to slab joists



SECTION B-B' FLEXURAL strengthening to slab joists

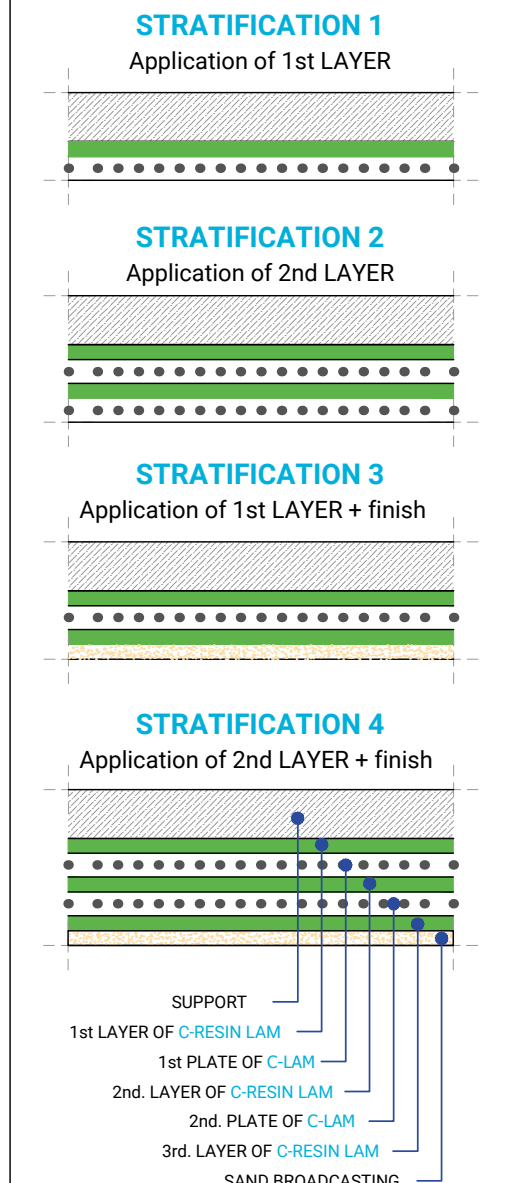


1 SUBSTRATE PREPARATION

Eliminate any protective surface treatments or other substances that might affect good adhesion to the support. Remove any damaged substrate by hydro demolition or sandblasting until a concrete layer is reached that has not been carbonated and is well compacted. Remove rust from reinforcement by manual or mechanical brushing. Apply **RUREGOLD PASSIVATOR** to the existing reinforcement and restore the concrete cover using **MX-R4 Repair** mortar.

2 APPLICATION OF FRP STRENGTHENING

Remove the protective (peel ply) film from the face of the sheet that is to adhere to the support. Using a notched spatula, apply about 1 mm of **C-RESIN LAM** adhesive to the face of the sheet from which the peel ply has been removed, and to the support. Using a hard rubber roller and applying constant uniform pressure, make the **C-LAM** adhere to the surface. Eliminate the excess adhesive that is forced out at the sides. After bonding, make sure no air bubbles remain underneath the strengthening. If the length is significant we recommend that the strengthening should be shored up to ensure that the laminate adheres completely.



KEY

	Existing concrete		Latermix Beton lightweight concrete
	MX-R4 Repair concrete repair mortar		Latermix lightweight screed
	RUREGOLD PASSIVATOR		Electro-welded mesh
	C-LAM strip		Sand broadcasting
	C-RESIN LAM		



3

CRM REINFORCED PLASTER SYSTEM

■ For reinstating and consolidating existing masonry

- 3.A Reinforced plaster • CRM system
- 3.B MX-PVA Fibre-reinforced plaster system
- 3.C Unstitch/Restitch • joint repointing • binder mix Injections

3.A

REINFORCED PLASTER • CRM SYSTEM

3.A

INSTALLATION PHASES

REINFORCED PLASTER • CRM SYSTEM



SUBSTRATE PREPARATION

Remove the plaster and any incoherent parts. Scarify and repoint the mortar joints. Unstitch/repatch any lesions. Regularise the substrate (if required) with **MX-RW**, **MX-CP**, **MX-PVA**, or **MX-15** mortar.



APPLICATION OF STRUCTURAL MORTARS

Finish by applying **MX-RW High Performance**, **MX-CP Lime**, or **MX-15 Plaster** structural mortar manually or Mechanically, depending on site requirements.



APPLICATION OF G-MESH

Apply **G-MESH** to both faces of the masonry. Install the **HELICAL CONNECTOR** connection system (dry) or **G-MESH CONNECTOR** (using CentroStorico Chemical Anchor) As the project requires. Fit the appropriate **G-MESH GUSSET** at the connector. Install the **G-MESH ANGLE** corner element to the internal and external corners/edges of the masonry building.

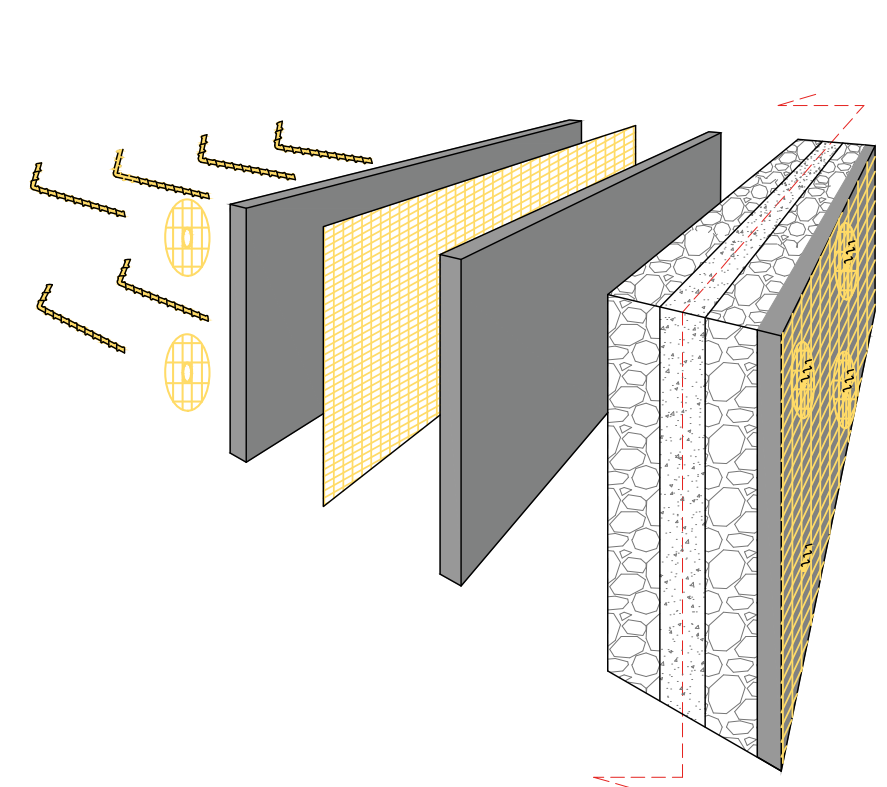
CRM system

A.R. GLASS FIBRE MESH G-MESH 400 G-MESH 490	+	INORGANIC MATRIX MX-RW High Performance MX-CP Lime MX-15 Plaster
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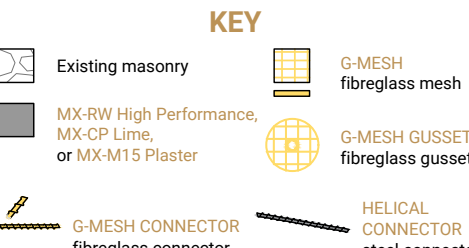
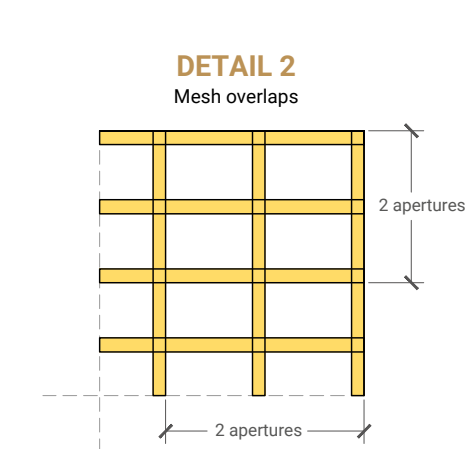
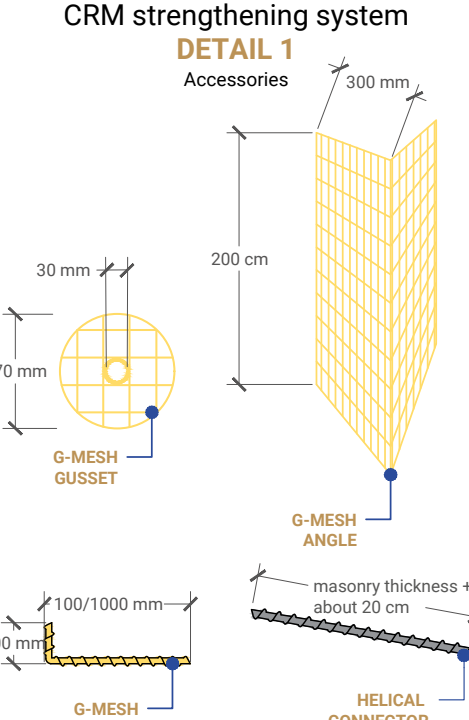
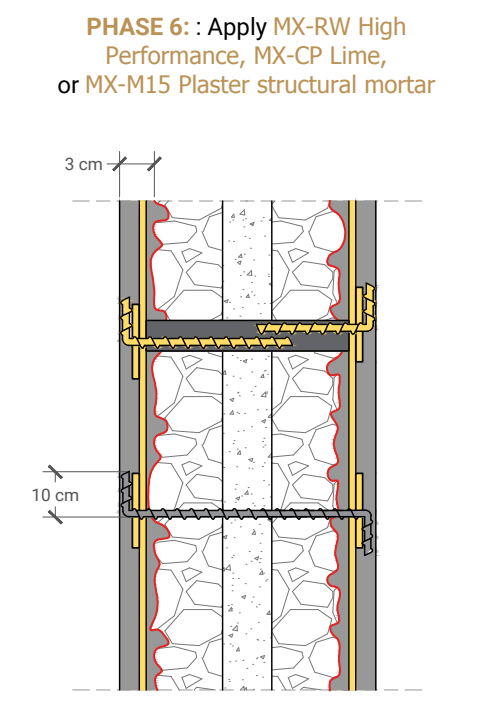
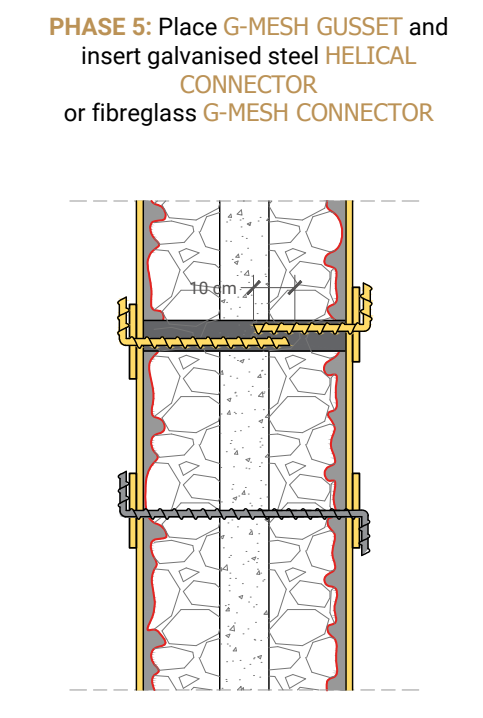
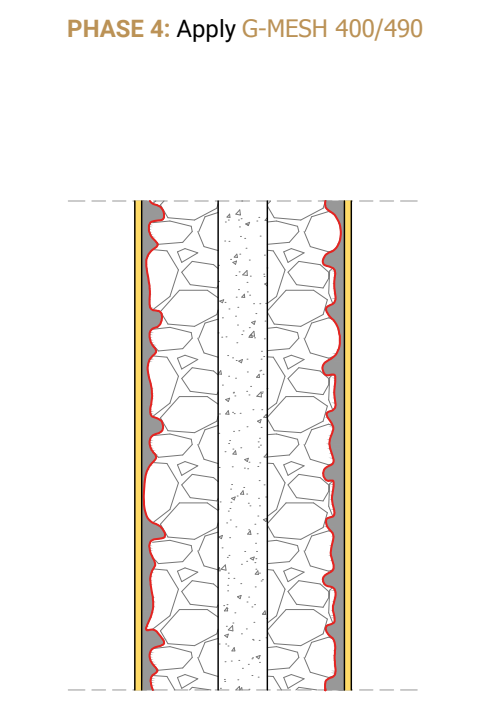
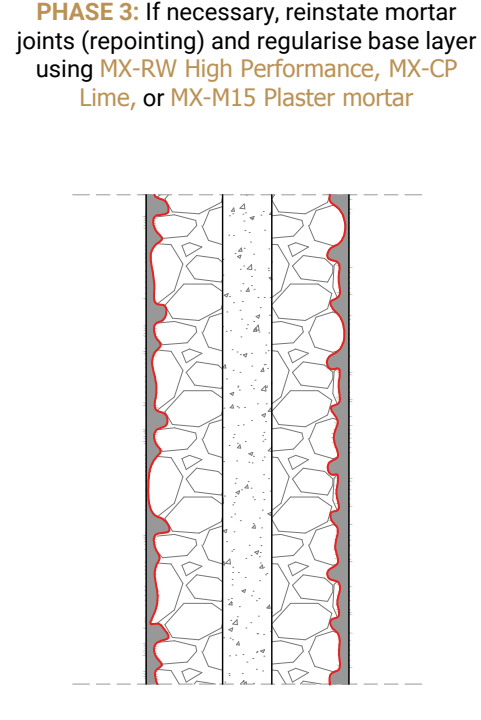
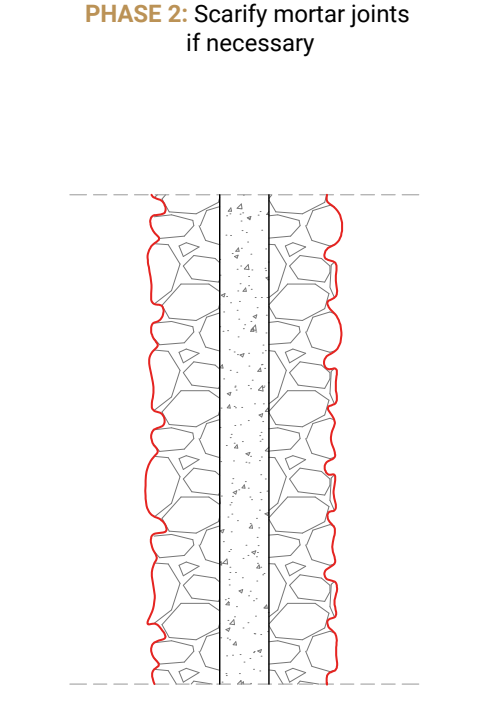
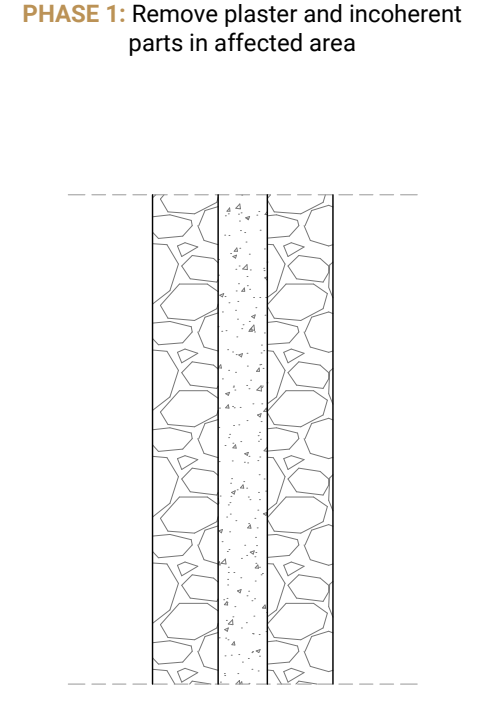
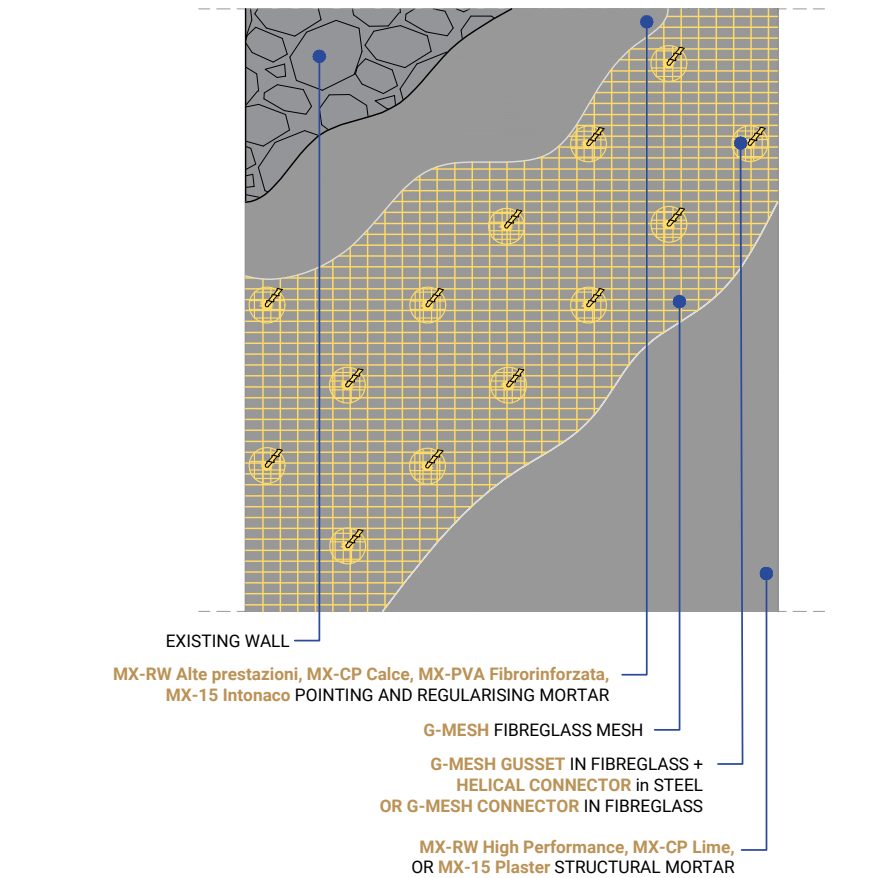
COMPLEMENTARY PRODUCTS

HELICAL CONNECTOR	G-MESH CONNECTOR	G-MESH GUSSET
G-MESH ANGLE	CentroStorico Chemical Anchor	

For further information on all the products in the table, see chapter 6 (pages 154, 155 and 160).



ELEVATION



1 SUBSTRATE PREPARATION

Remove plaster and incoherent parts from the affected area by hydro demolition or sandblasting, ensuring that the joint mortar is not disintegrated. If it is disintegrated, scarify and repoint the joints. If necessary, level the substrate with **MX-RW High Performance**, **MX-CP Lime**, **MX-PVA Fibre Reinforced**, or **MX-15 Plaster** mortar (see DWG 3C).

2 APPLICATION OF STRENGTHENING

Apply the **G-MESH** to the surface of the masonry, using spacers as appropriate so that the mesh remains separated from the support by about 1.5 cm depending on the planned and/or calculated final thickness of the strengthening layer. **The position of the mesh should always be about halfway through the expected final thickness of the layer.** After installing all the **HELICAL CONNECTOR** or **G-MESH CONNECTOR** connection systems as the project requires, unite the connector with the mesh to ensure that they collaborate more effectively. To ensure a better response to stress concentration, fit the appropriate **G-MESH GUSSET** to the connector. The connector is inserted by chemically anchoring it in the hole (use **CentroStorico Chemical Anchor**). Fit the appropriate **G-MESH ANGLE** mesh to the corners or edges of the masonry building (inner and outer wall faces - see CRM system construction details drawing). Allow for an overlap of approximately 2 apertures of the **G-MESH** and never less than 150 mm. Finish by applying **MX-RW High performance**, **MX-CP Lime**, **MX-PVA Fibre Reinforced**, or **MX-M15 Plaster** structural mortar.

3.B

MX-PVA FIBRE-REINFORCED PLASTER SYSTEM

3.B

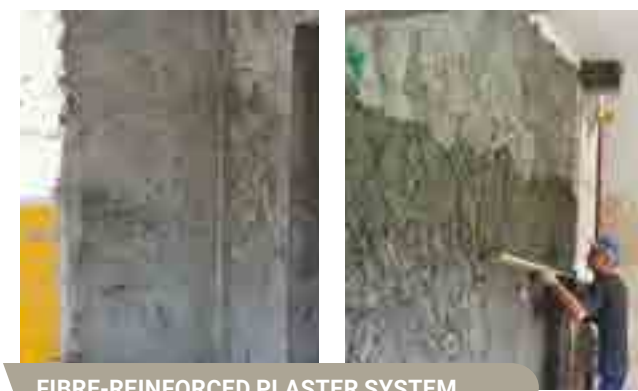
INSTALLATION PHASES

MX-PVA FIBRE-REINFORCED PLASTER SYSTEM



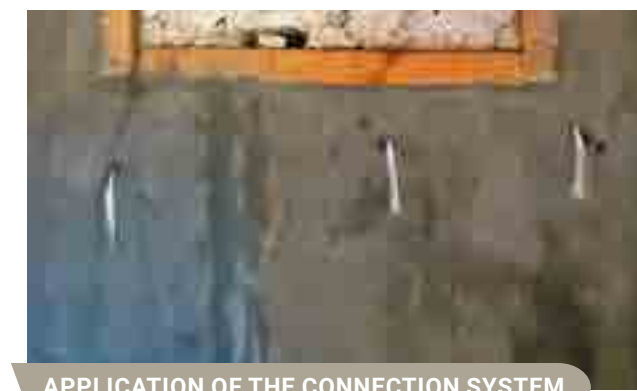
SUBSTRATE PREPARATION

Remove plaster and incoherent parts. Unstitch/restitch any lesions using **MX-PVA Fibre-reinforced** as a bedding mortar. Cut the **G-JOINT/B-JOINT** connectors.



FIBRE-REINFORCED PLASTER SYSTEM

Wrap both ends of the fibre connector with masking tape for a length that is the same as the radius of the opened fibres. Impregnate the free part of the fibre connector with the specific **MX-JOINT** matrix, and leave to dry.



APPLICATION OF THE CONNECTION SYSTEM

Using a trowel or a screw pump fitted with a mixer, apply **MX-PVA Fibre-reinforced** to a thickness of 30 mm.

Perforate the masonry as the project requires. Clean and moisten the hole. Insert the **G-JOINT/B-JOINT** connectors grouted with **MX-JOINT** inorganic matrix. Spread out the **G-JOINT/B-JOINT** connectors using **MX-JOINT** inorganic matrix.

Fibre Reinforced plaster system

FIBRE REINFORCED STRUCTURAL MORTAR
MX-PVA Fibre-reinforced



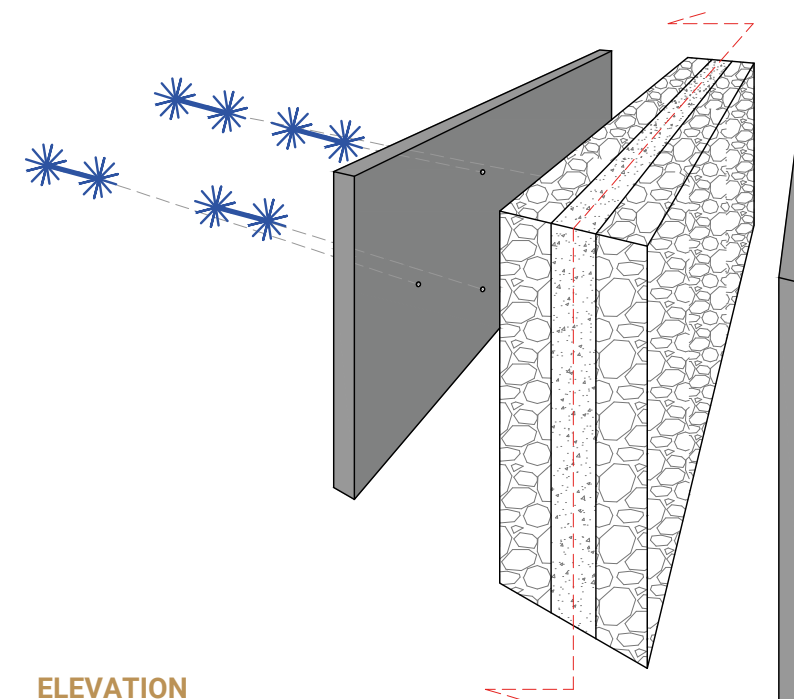
CONNECTION SYSTEMS
Glass fibre **G-JOINT**
Basalt fibre **B-JOINT**



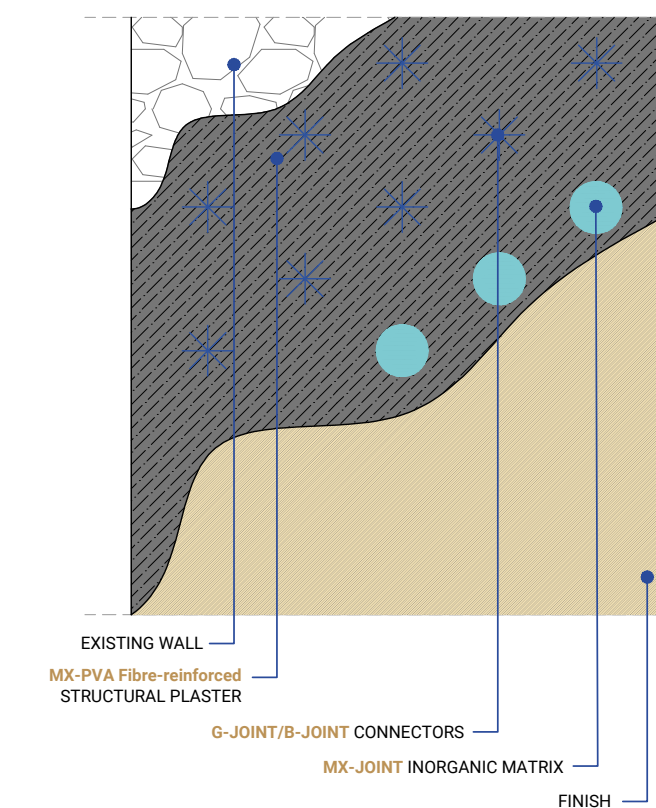
+ INORGANIC MATRIX
MX-JOINT



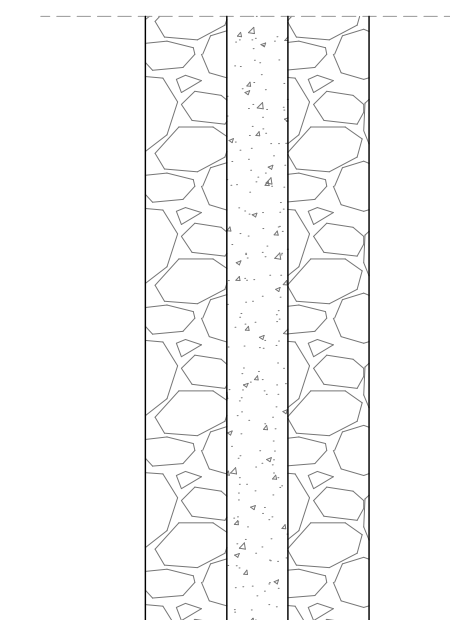
For further information on all the products in the table, see chapter 6 (pages 153 and 155).



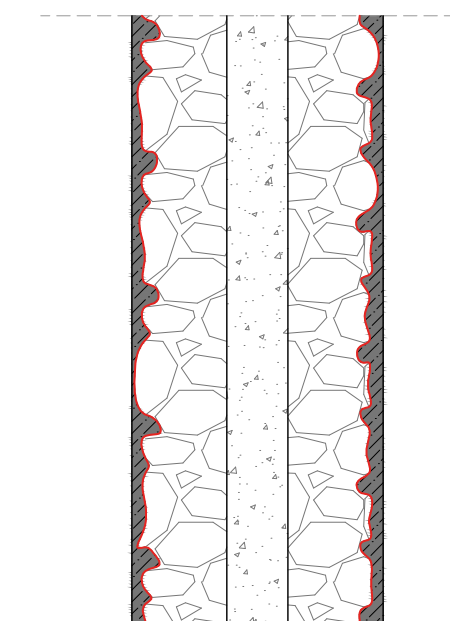
ELEVATION



PHASE 1: Remove plaster and incoherent parts in affected area



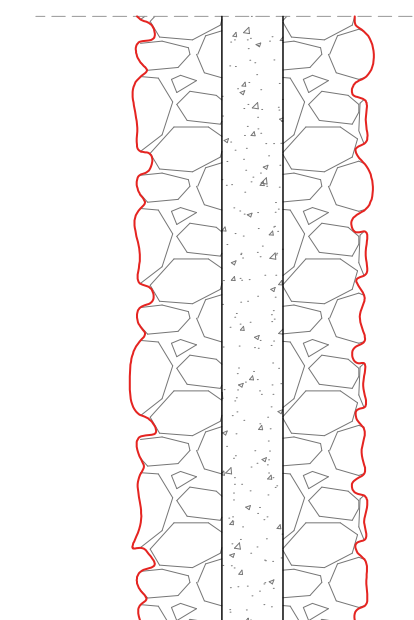
PHASE 3: If necessary, regularise surface using **MX-PVA Fibre-reinforced**



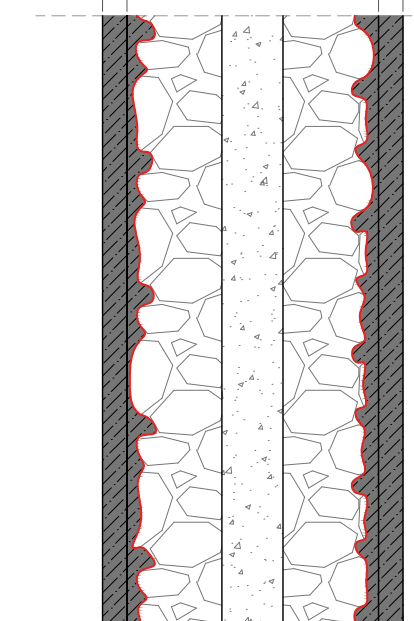
1 SUBSTRATE PREPARATION

Remove plaster and incoherent parts from the affected area by hydro demolition or sandblasting, ensuring that the joint mortar is not disintegrated. If it is disintegrated, scarify and repoint the joints. If necessary, level the substrate with **MX-PVA Fibre-reinforced**.
Cut the **G-JOINT/B-JOINT** connectors to the length as instructed by the Director of Works, taking into account the effective thickness of the masonry and allowing a radius of at least 10 cm.
Wrap both ends of the connector with masking tape for a length equal to the radius of the area on which it will be spread out. Impregnate the free part with the **MX-JOINT** matrix and wait for it to dry. This phase is necessary so that it then becomes easier to insert the connector into the hole.

PHASE 2: Scarify mortar joints



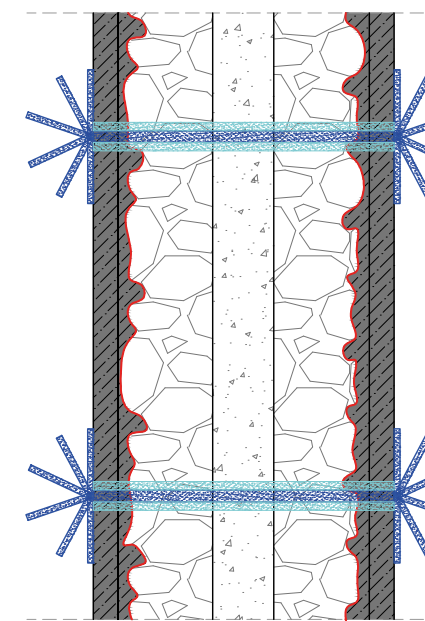
PHASE 4: Strengthen using **MX-PVA Fibre-reinforced structural plaster**



2 APPLICATION OF STRENGTHENING

Apply the **MX-PVA Fibre-reinforced** structural mortar using a trowel or a screw pump fitted with a mixer. The maximum applicable thickness for each single layer is 30 mm. Greater thicknesses are built up by applying successive layers, ensuring that each layer has dried before applying the next one. It is advisable to apply the product at temperatures between +5° C and +35° C; low temperatures (<5° C) will significantly retard the setting process.
Perforate the masonry as required by the project. The hole diameter must be:
• 12 mm for a ø 6 connector;
• 16 mm for a ø 10 connector;
• 18 mm for a ø 12 connector.
Clean the hole with an air compressor or similar, and moisten it without allowing water to accumulate. Inject part of the **MX-JOINT** inorganic matrix into the hole. Insert the **G-JOINT/B-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres.

PHASE 5: Insert connectors or further details see Drawing 1Ha) **G-JOINT/B-JOINT**



KEY

- Existing masonry
- MX-PVA Fibre-reinforced structural plaster
- MX-Joint inorganic matrix
- Finishing mortar
- Scarification
- G-JOINT/B-JOINT connector

INSTALLATION PHASES

3.C

- UNSTITCH/RESTITCH
- JOINT REPOINTING
- BINDER MIX INJECTIONS

3.C

INSTALLATION PHASES

UNSTITCH/RESTITCH • JOINT REPOINTING • BINDER MIX INJECTIONS



UNSTITCHING/RESTITCHING

Remove (unstitch) the locally damaged part of the masonry. Reinstatate (restitch) with elements that are in good condition, bedding them with **MX-RW**, **MX-CP**, **MX-PVA**, or **MX-15** mortar.



REPOINTING THE JOINTS

Scarify the mortar joints by hydro demolition/sandblasting until reaching mortar of good quality. Then repoint with **MX-RW**, **MX-CP**, **MX-PVA**, or **MX-15** mortar.



INJECTION OF BINDING MIXTURES

Perforate the masonry using a rotary drill. Insert the injection pipes (or nozzles) into the joints between the bricks and seal them with **MX-RW**, **MX-CP**, **MX-PVA**, or **MX-15** mortar. Wash the masonry from the inside by injecting pressurised water through the injection pipes (now in position) until saturation is reached. Working from bottom to top, inject the **MX INJECT** grout until saturation is reached.

Reinstatement of existing masonry



Fibre Reinforced structural mortar
MX-PVA Fibre-reinforced



High Performance structural mortar
MX-RW High Performance



Mortar based on pure natural NHL 3.5 hydraulic lime
MX-CP Lime



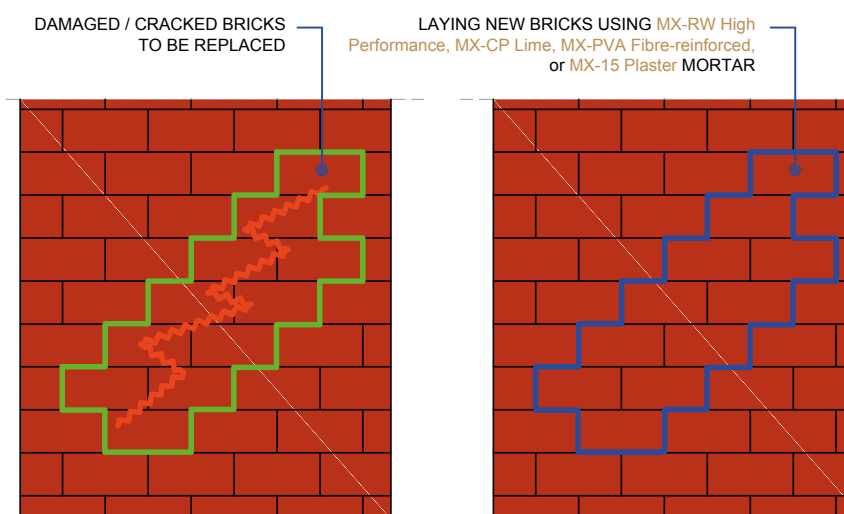
Pre-dosed structural fibre mortar
MX-15 Plaster



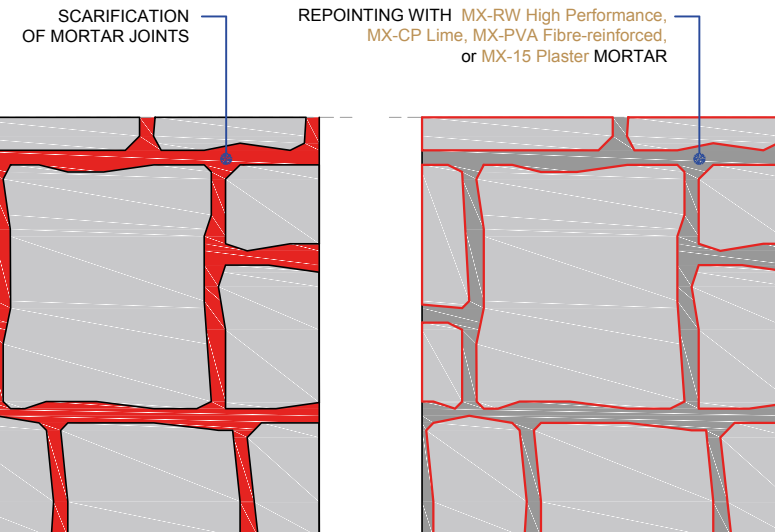
Special binder for injection slurries
MX-INJECT

For further information on all the products in the table, see chapter 6 (pages 152 and 155).

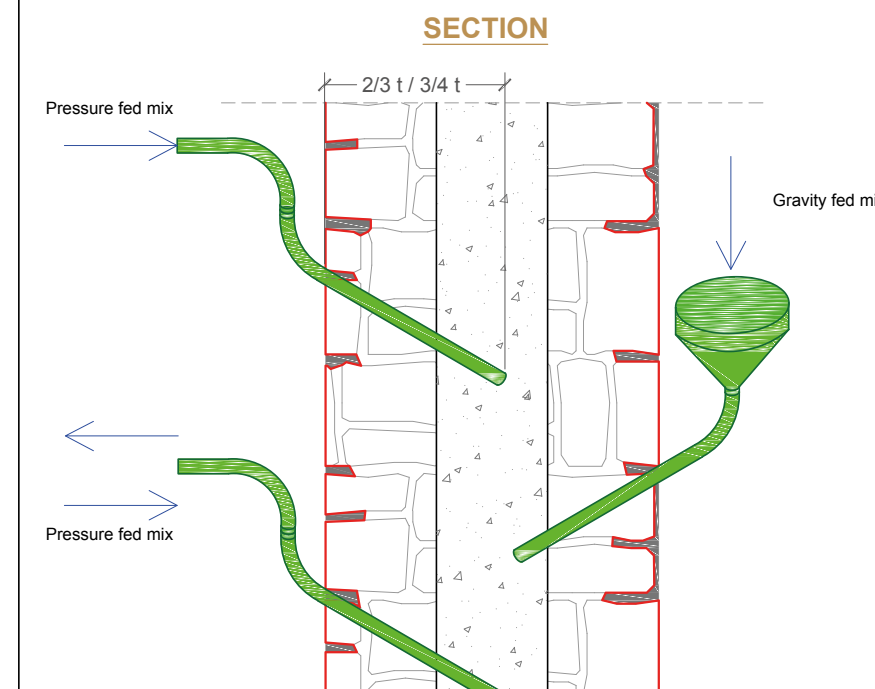
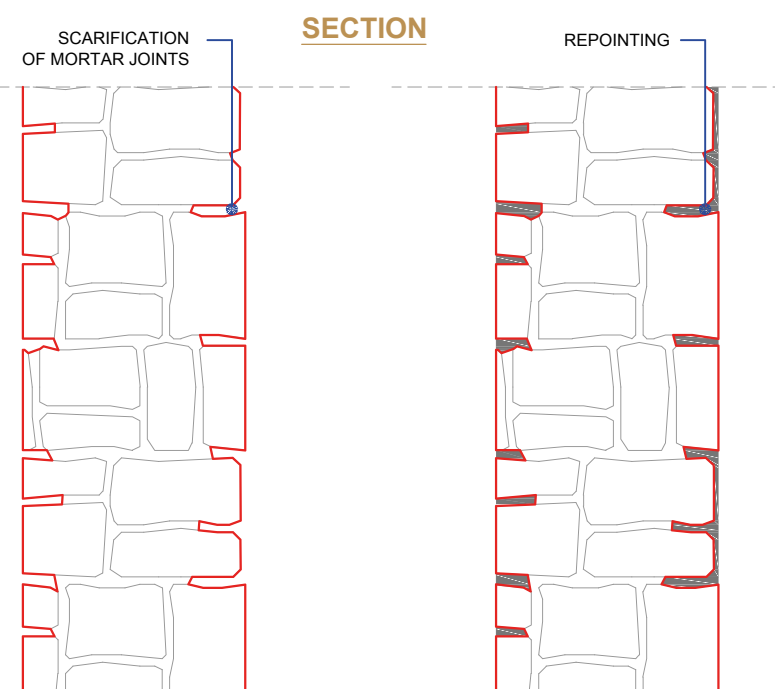
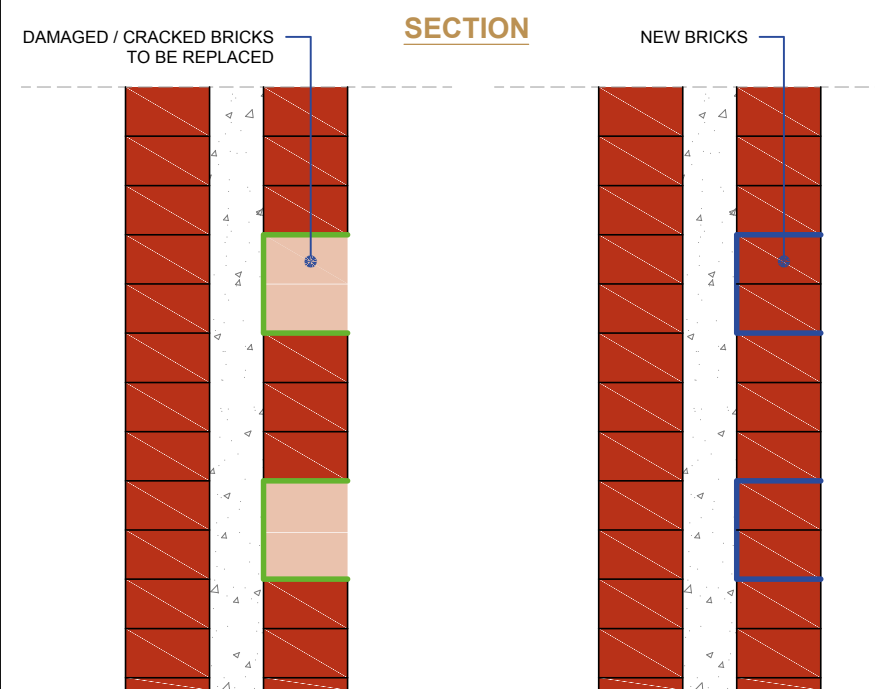
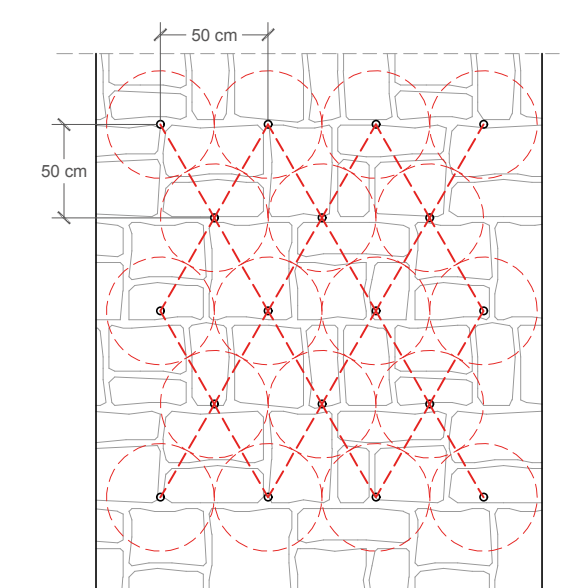
PHASE 1: Unstitching/restitching bricklaying repair work ELEVATION



PHASE 2: Mortar joint repointing ELEVATION



PHASE 2: Injection with MX INJECT mortar ELEVATION



INSTALLATION PHASES

1 SUBSTRATE PREPARATION

In the affected area, remove plaster and incoherent parts, ensuring that the joint mortar has not disintegrated. If it has disintegrated, scarify the joints. In accordance with the design requirements, drill the required perforations into the wall that is to be strengthened (preferably with a rotary drill; avoid using a percussion drill). Then insert the **injection tubes** (or nozzles) at the brickwork joints and seal them with **MX-RW High Performance**, **MX-CP Lime**, **MX-PVA Fibre-reinforced**, or **MX-15 Plaster** mortar. Repoint the joint mortar by hydro demolition or sandblasting. If necessary, regularise the substrate with **MX-RW High Performance**, **MX-CP Lime**, **MX-PVA Fibre-reinforced**, or **MX-15 Plaster** mortar. With the injection tubes now in position, wash the masonry from inside by feeding in **pressurised water until saturation** to eliminate dust, identify the lesioned areas, and to adequately wet the materials on to which the product is to be applied.

2 BINDER MIX INJECTION

Mix **MX INJECT** low salt pozzolanic hydraulic binder with water until a very fluid mixture is obtained. Working from bottom to top so as to saturate the wall correctly, inject the grout into the tubes at low pressure (<1-2 atm), which must be constant for the entire duration of this operation. Continue injecting into the same hole until saturation, i.e. until the mixture begins to come out from the adjacent pipes and those above. When this procedure is complete, it would be advisable for the site manager to request a check of the completed consolidation work. These checks are made on-site by a specialised laboratory by carrying out endoscopic investigations and/or taking masonry samples.

KEY

- Existing masonry
- Existing masonry
- MX-RW High Performance, MX-CP Lime, or MX-15 Plaster
- Injection holes
- Injection indication
- Crack
- Unstitch
- Stitch
- Scarification
- Injection pipes



4

HPFRC MICROCONCRETES

■ For structural strengthening to reinforced concrete elements

4.A Strengthening to **columns**

4.B Strengthening to **beams**

4.C Strengthening to **slabs**

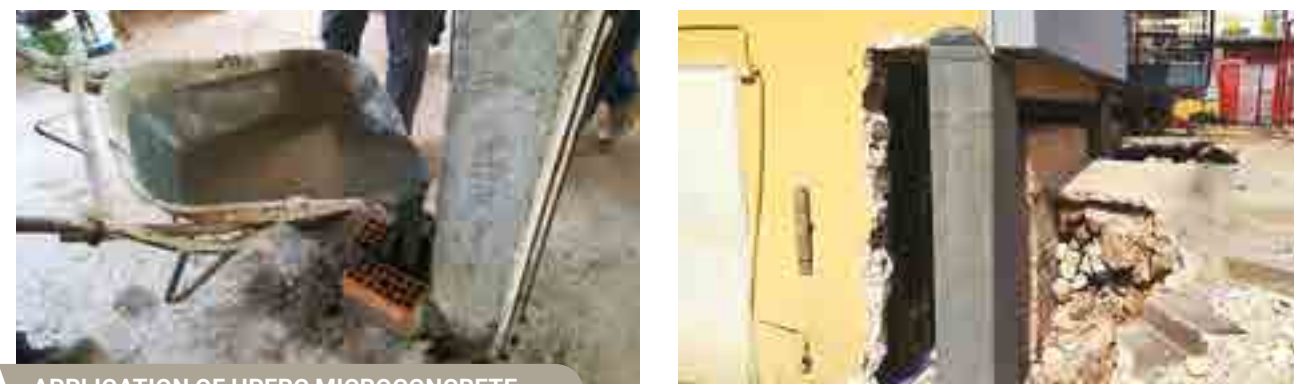
4.A

STRENGTHENING TO COLUMNS



SUBSTRATE PREPARATION

Use hydro demolition or sandblasting to remove any deteriorated substrate until reaching a concrete layer that shows no carbonation and is well compacted. Remove rust from the rebars by brushing (manually or mechanically). Apply **PASSIVATOR** to the existing reinforcement. The substrate must be solid and very rough (roughness 5 mm). Last illustration: the strengthened column.



APPLICATION OF HPFRC MICROCONCRETE

Insert any longitudinal rebars and/or inter-floor/foundation continuity bars. Form a pocket/hole on the beam, and holes for air venting. Mix **MICRO GOLD** and cast, beginning from one side, with a continuous flow.

Support reinstatement

ANTI-CORROSION MORTAR FOR STEEL REINFORCEMENTS
PASSIVATOR



HPFRC microconcretes

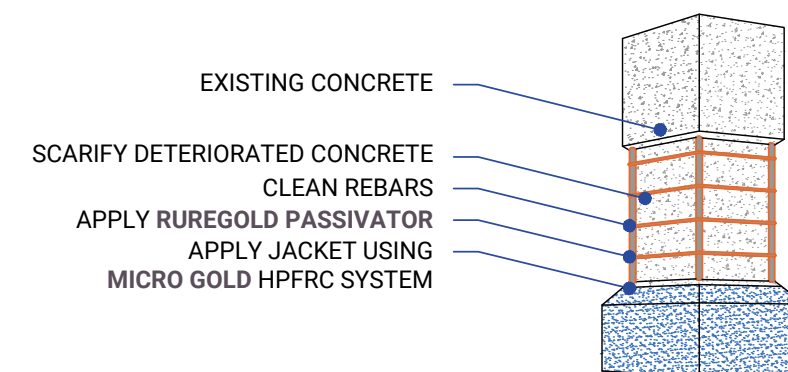
WITH METAL FIBRES
MICRO GOLD STEEL

WITH SYNTHETIC FIBRES
MICRO GOLD FCC

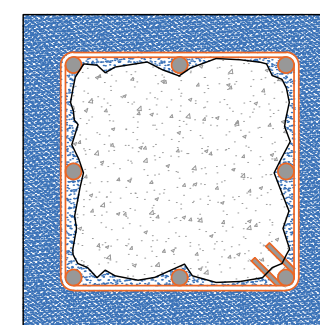


For further information on all the products in the table, see chapter 6 (pages 151 and 152).

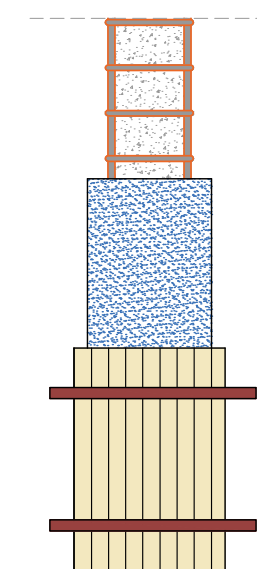
COLUMNS STRENGTHENING



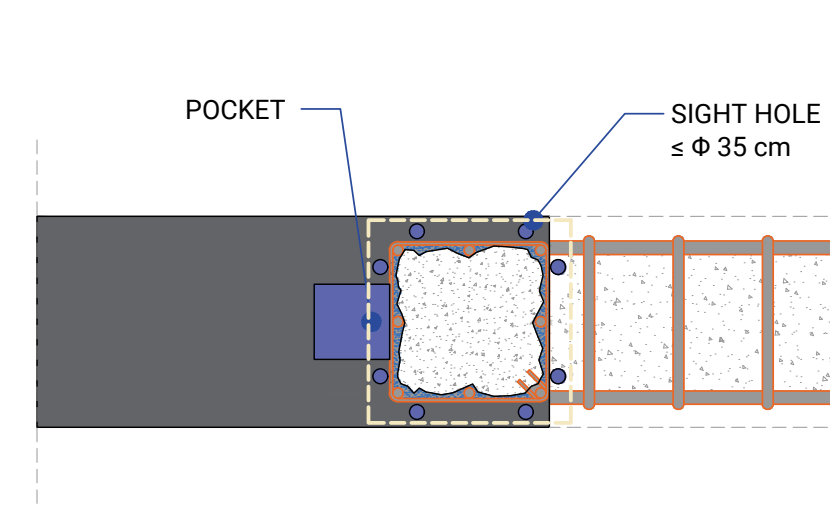
SECTION



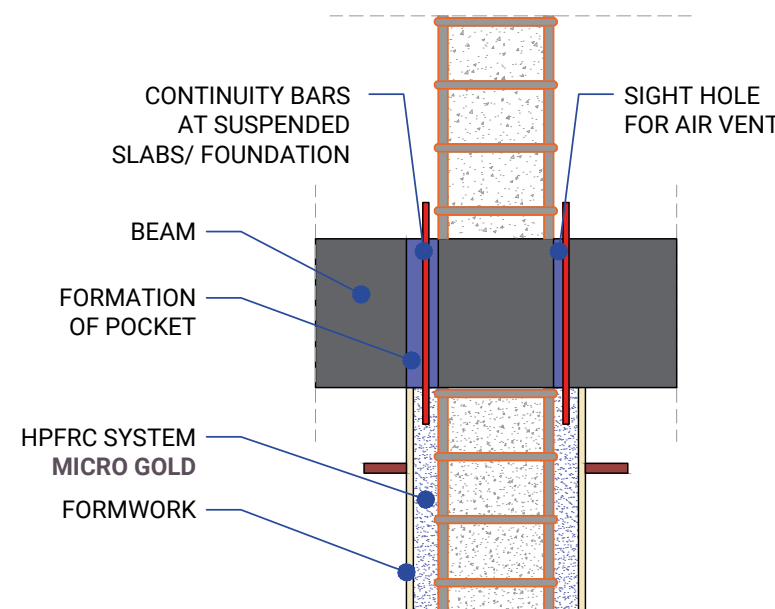
ELEVATION OF WORK PHASES



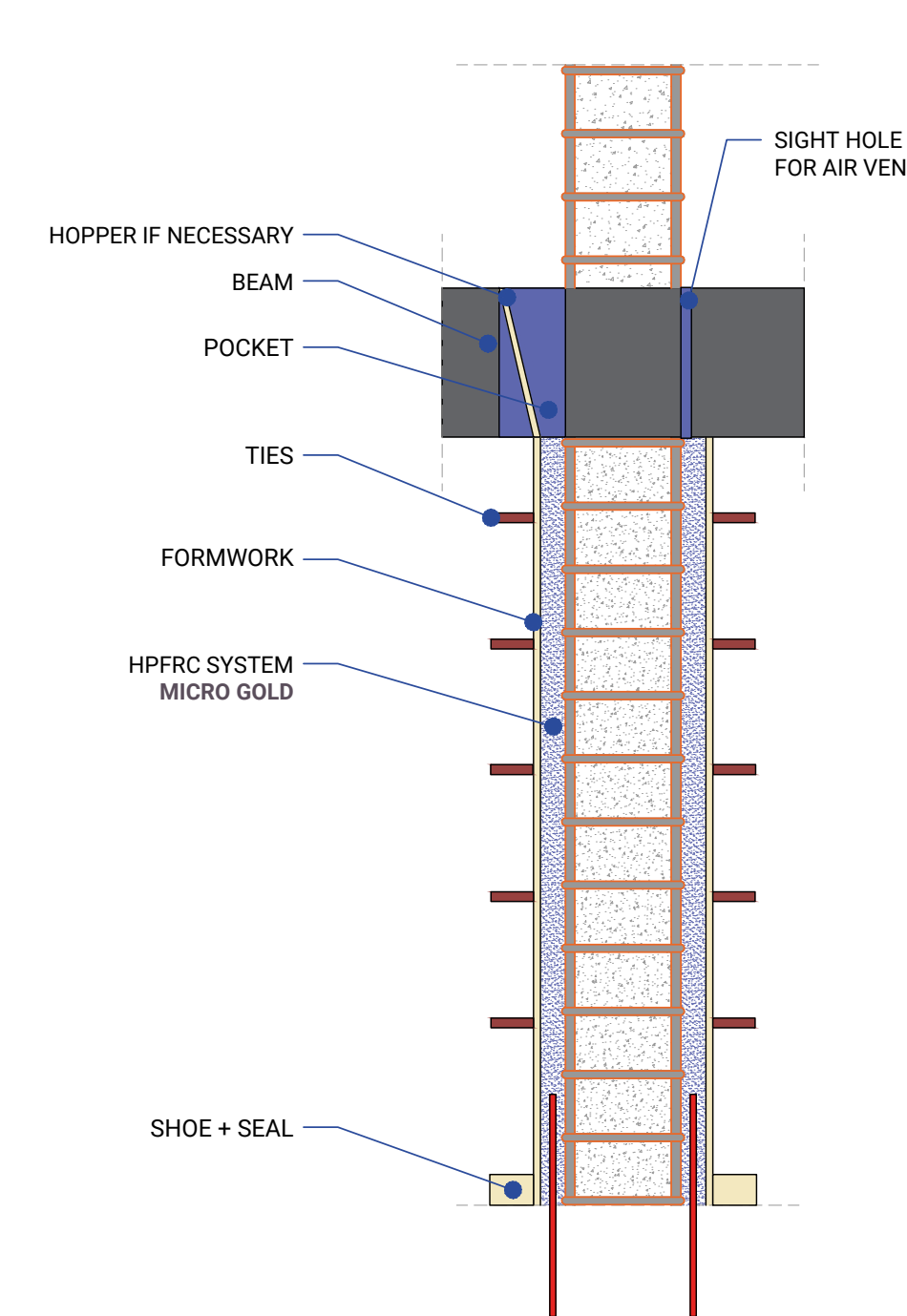
TOP VIEW



FRONT VIEW



LONGITUDINAL SECTION



INSTALLATION PHASES

Remove any damaged substrate by hydro demolition or sandblasting until a concrete layer is reached that has not been carbonated and is well compacted. Remove rust from reinforcement bars by manual or mechanical brushing. Apply **RUREGOLD PASSIVATOR** to the existing reinforcement. The substrate must be solid and very rough (5 mm roughness).
APPLICATION OF MICRO GOLD INTO WATERTIGHT FORMWORK:

- The formwork must be watertight with double ties and sealed at the bottom;
- Insert any longitudinal reinforcement and/or inter-floor or foundation continuity bars;
- Form a pocket/hole on the beam for gluing, **being particularly careful not to cut the existing beam reinforcement;**
- Form venting holes of diameter of at least 35 cm on the remaining three sides;
- After mixing, begin pouring microconcrete from one side, in a continuous flow to avoid entrapping air.
- In particularly strongly-reinforced areas or areas with complex geometry, gently vibrate to facilitate the flow of the concrete.

KEY

- Existing concrete
- MICRO GOLD HPFRC system
- Continuity bars
- RUREGOLD PASSIVATOR
- Formwork
- Ties

4.B

STRENGTHENING TO BEAMS



SUBSTRATE PREPARATION



Use hydro demolition or sandblasting to remove any deteriorated substrate until reaching a concrete layer that shows no carbonation and is well compacted. Remove rust from the rebars by brushing (manually or mechanically). Apply **PASSIVATOR** to the existing rebars. The substrate must be solid and very rough (roughness 5 mm).



APPLICATION OF HPFRC MICROCONCRETE



Insert longitudinal rebars if the dimensions require it. Form a pocket/hole on the beam. Mix **MICRO GOLD** and cast, beginning from one side, with a continuous flow.

Support reinstatement

ANTI-CORROSION MORTAR FOR STEEL REINFORCEMENTS
PASSIVATOR



HPFRC microconcretes

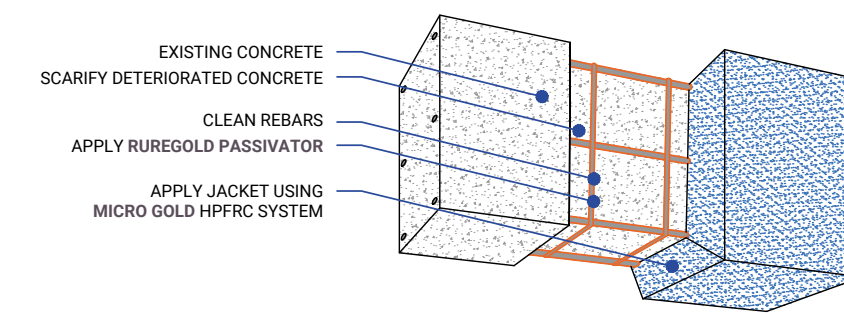
WITH METAL FIBRES
MICRO GOLD STEEL

WITH SYNTHETIC FIBRES
MICRO GOLD FCC

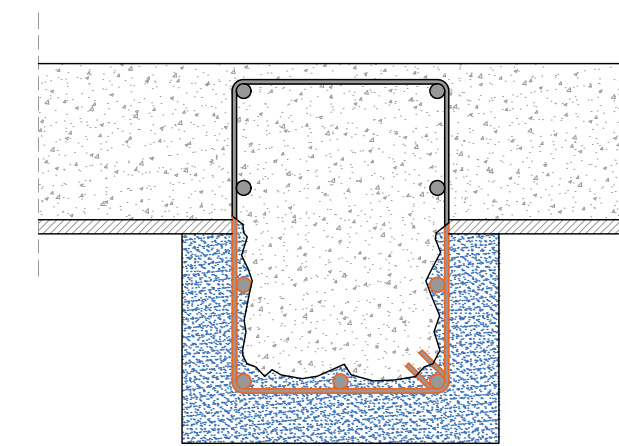


For further information on all the products in the table, see chapter 6 (pages 151 and 152).

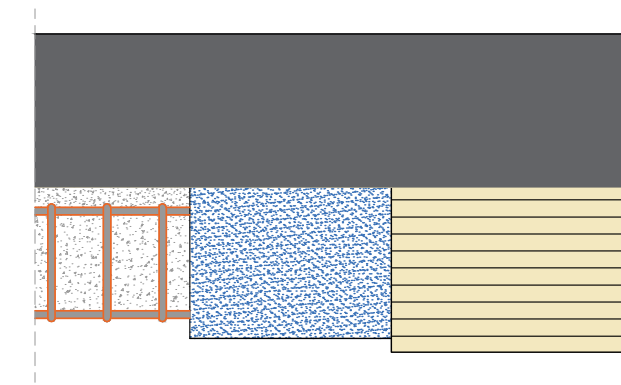
BEAMS STRENGTHENING



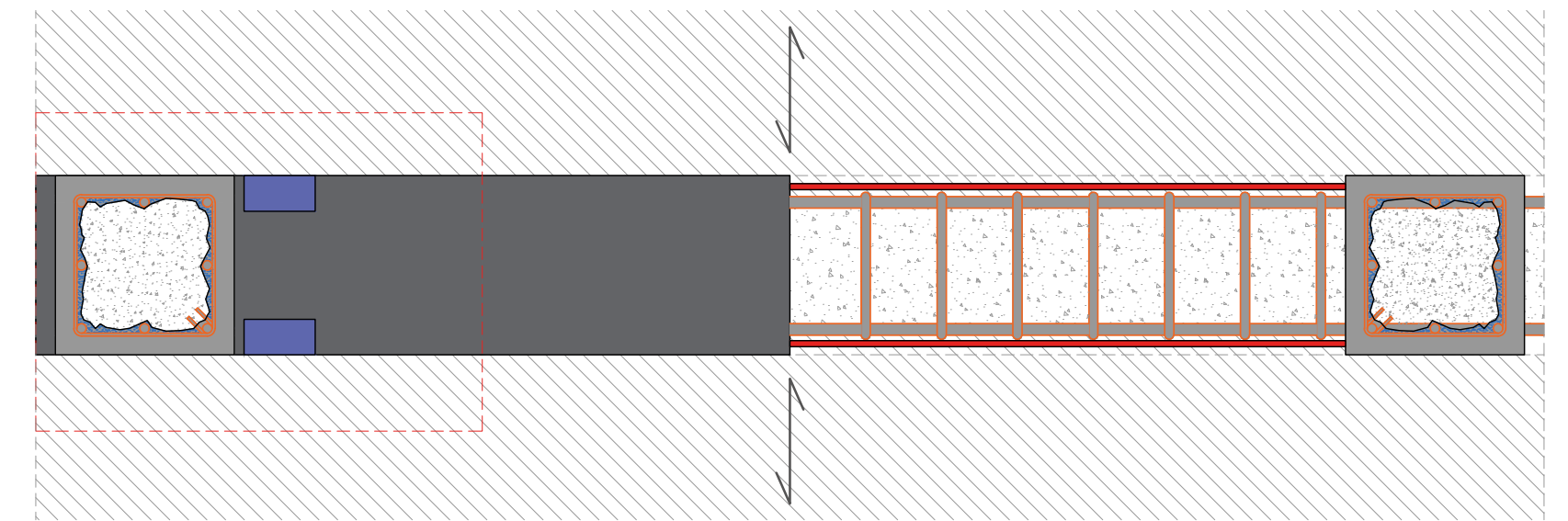
SECTION



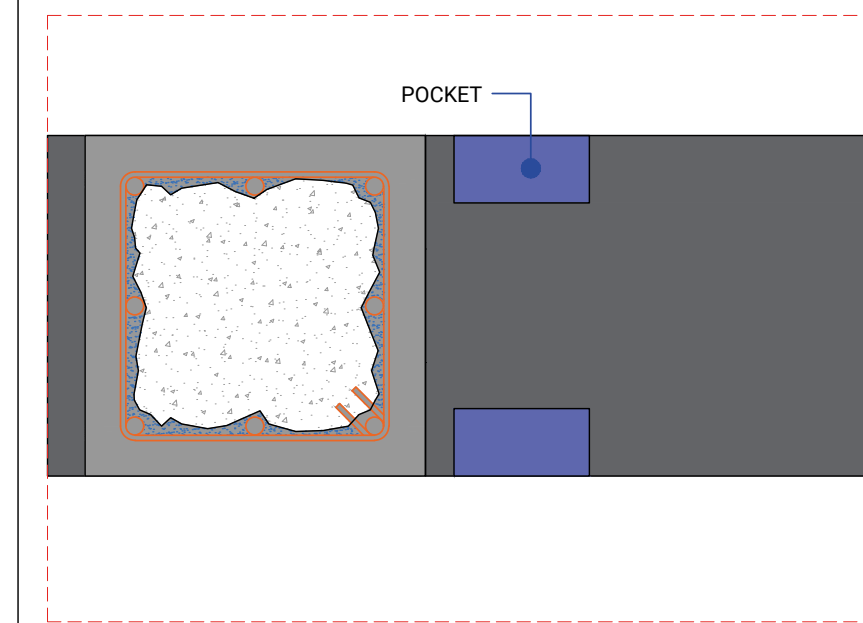
ELEVATION OF WORK PHASES



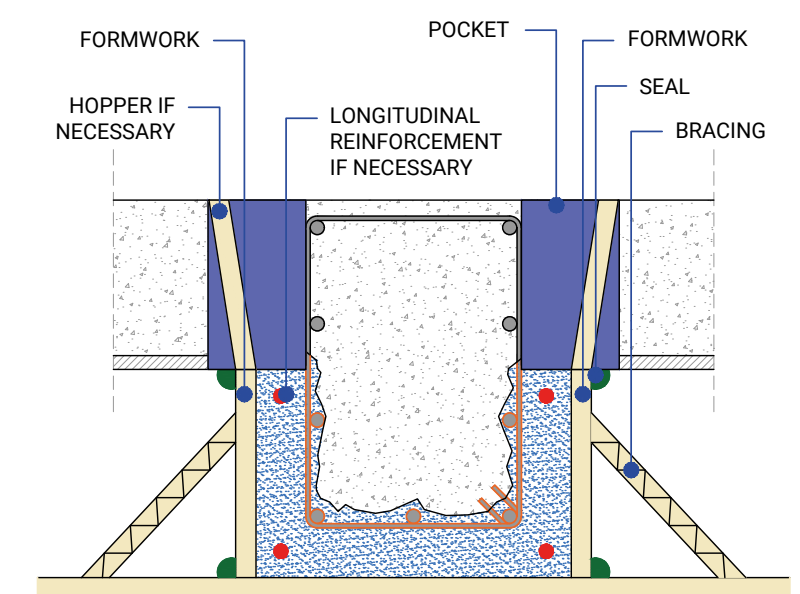
TOP VIEW



DETAIL



SECTION



INSTALLATION PHASES

- Remove any damaged substrate by hydro demolition or sandblasting until a concrete layer is reached that has not been carbonated and is well compacted. Remove rust from reinforcement bars by manual or mechanical brushing. Apply **RUREGOLD PASSIVATOR** to the existing reinforcement. The substrate must be solid and very rough (5 mm roughness).
- APPLICATION OF MICRO GOLD INTO WATERTIGHT FORMWORK:**
- The formwork must be watertight with double ties and sealed at the bottom;
 - Insert any longitudinal reinforcement and/or inter-floor or foundation continuity bars;
 - Form a pocket/hole on the beam for gluing, **being particularly careful not to cut the existing beam reinforcement;**
 - After mixing, begin pouring microconcrete from one side, in a continuous flow to avoid entrapping air.
 - In particularly strongly-reinforced areas or areas with complex geometry, gently vibrate to facilitate the flow of the concrete.

KEY

- Existing concrete
- MICRO GOLD HPFRC system
- Longitudinal reinforcement
- RUREGOLD PASSIVATOR
- Formwork
- Seal

4.C

STRENGTHENING TO SLABS



SUBSTRATE PREPARATION

Remove any deteriorated substrate until reaching a concrete layer that is well compacted. The substrate must be solid and very rough (roughness 5 mm). Alternatively, use **CENTROSTORICO CHEMICAL CONNECTOR** epoxy adhesive.



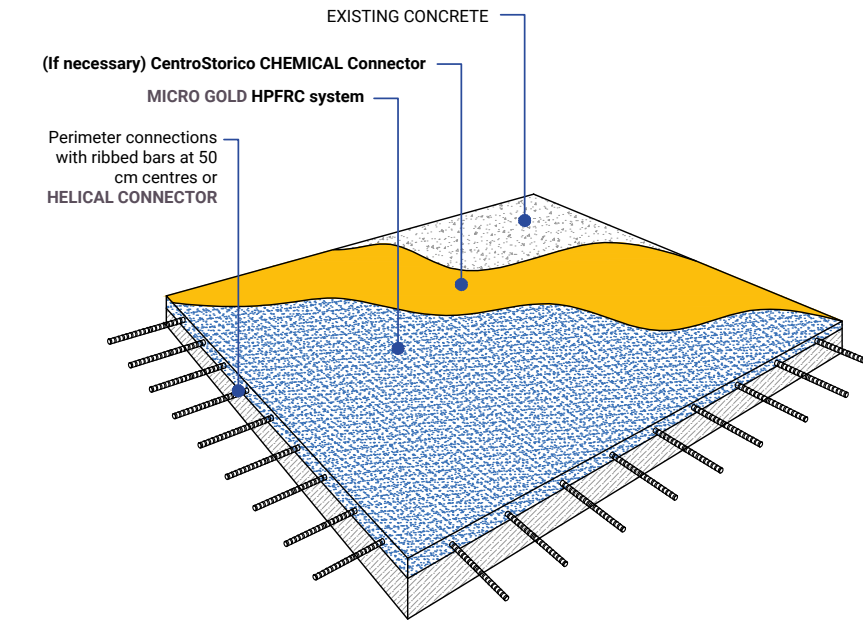
APPLICATION OF HPFRC MICROCONCRETE

Install perimeter connection system, using either ribbed steel rebars or **HELICAL CONNECTOR**.
Pour **MICRO GOLD** on to the surface from a wheelbarrow or through a channel, if necessary using a squeegee to spread it uniformly.

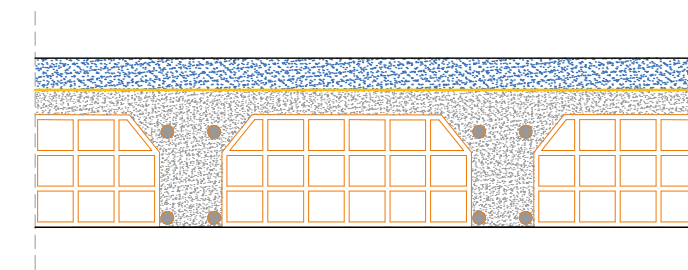
Support reinstatement	HPFRC microconcretes	Connections
LATERLITE-CENTROSTORICO ADHESIVE	WITH METAL FIBRES	STEEL BARS
CENTROSTORICO CHEMICAL CONNECTOR	MICRO GOLD STEEL	HELICAL CONNECTOR
	WITH SYNTHETIC FIBRES	
	MICRO GOLD FCC	

For further information on all the products in the table, see chapter 6 (pages 151, 154 and 158).

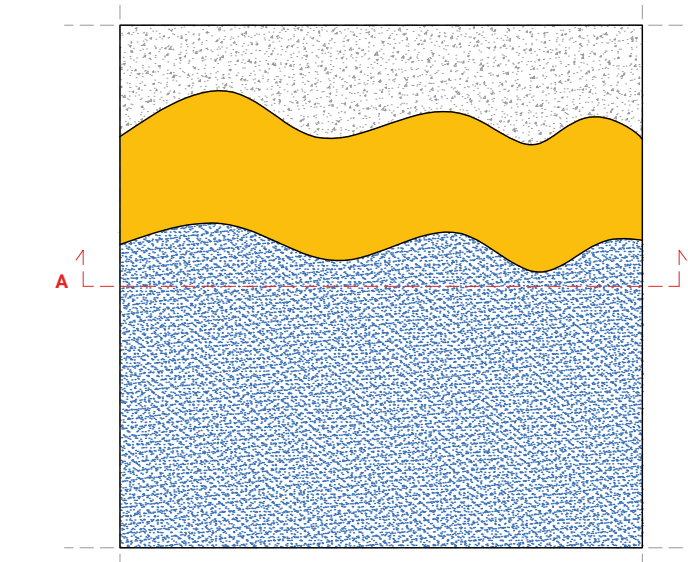
SLAB STRENGTHENING



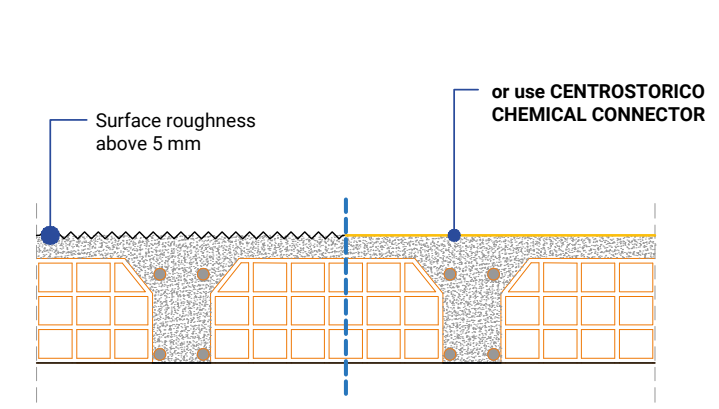
SECTION A-A'



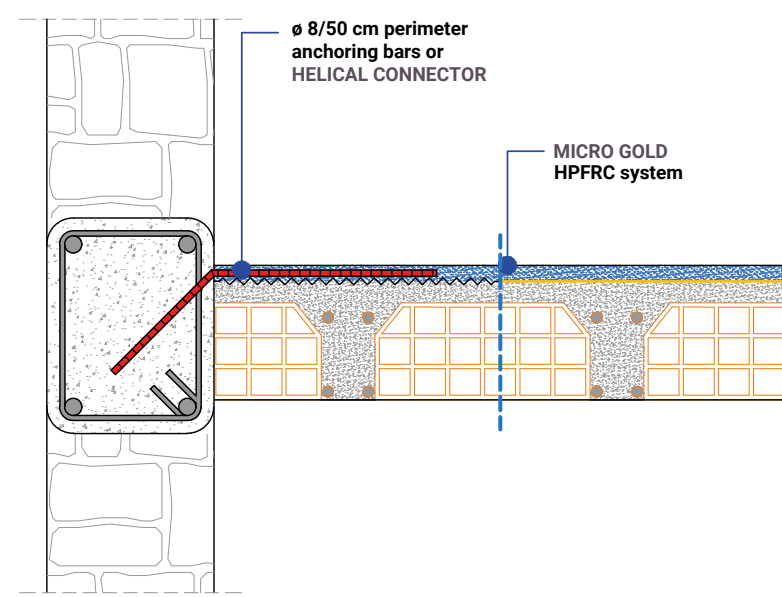
ELEVATION OF WORK PHASES



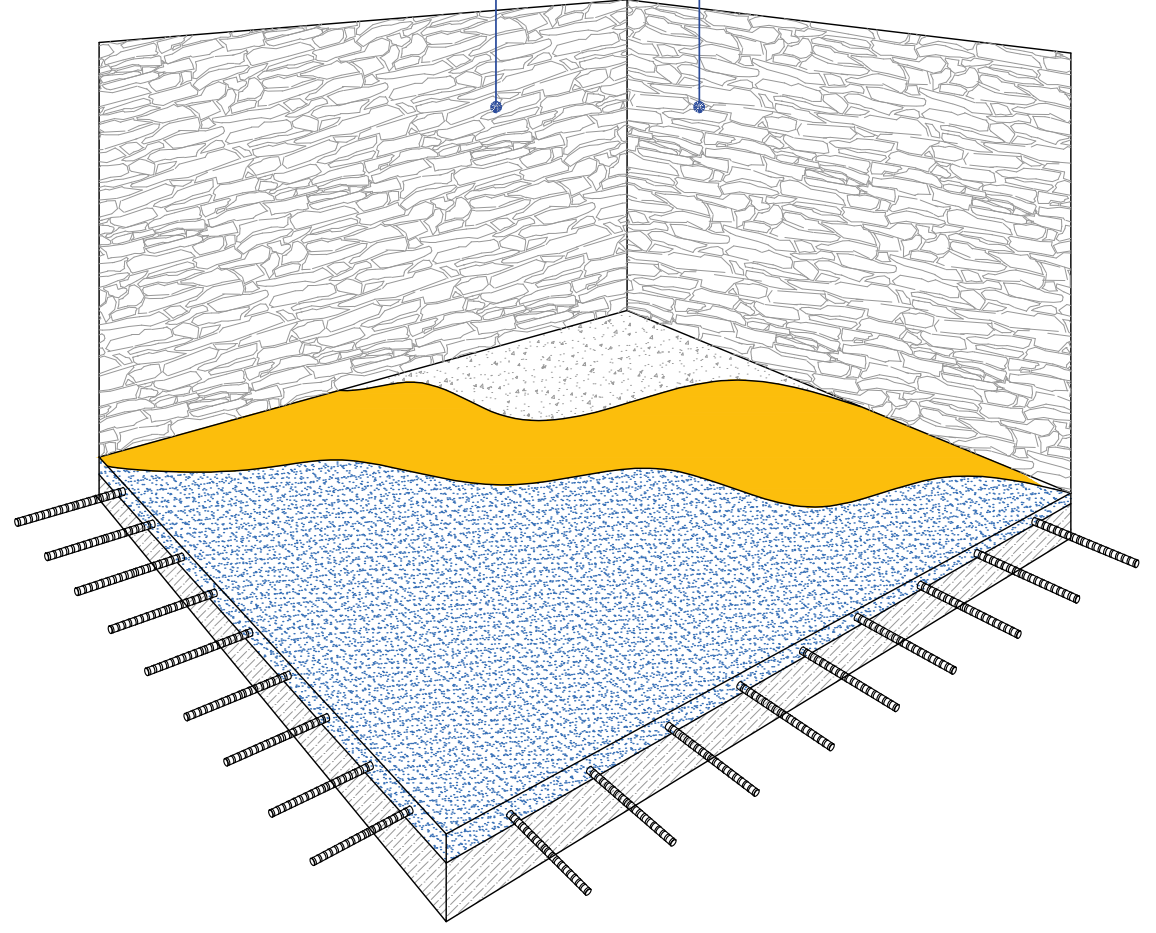
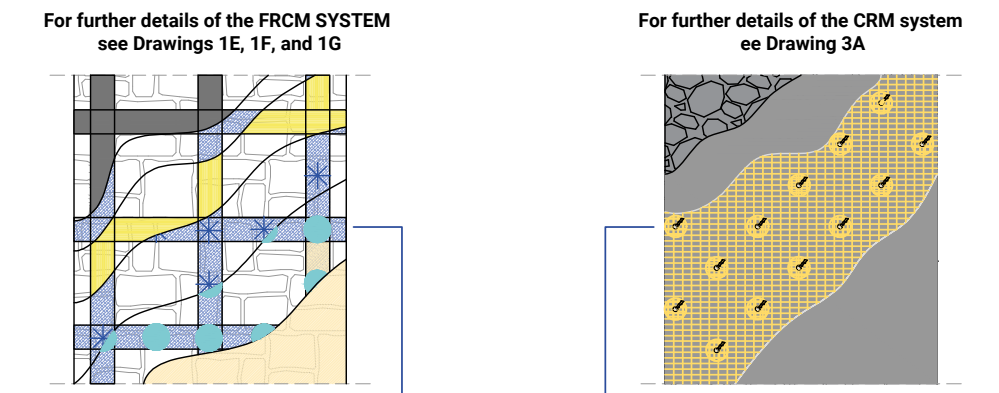
SURFACE PREPARATION



INSTALLATION OF ANCHORS (if necessary) and CAST FOR HPFRC SYSTEM



(IF NECESSARY) FRCM OR CRM STRENGTHENING SYSTEM



INSTALLATION PHASES

Remove any damaged substrate by hydro demolition or sandblasting until a concrete layer is reached that has not been carbonated and is well compacted. Remove rust from reinforcement bars by manual or mechanical brushing. The substrate must be solid and very rough (5 mm roughness).
If using CentroStorico Chemical Connector epoxy adhesive, apply it with a short-pile roller or a flat brush, thoroughly impregnating the support to ensure perfect adhesion to the entire surface that is to be glued. A gravity feed spray gun can also be used.
APPLICATION OF **MICRO GOLD** TO A HORIZONTAL SURFACE:
Pour **MICRO GOLD** on to the surface from a wheelbarrow or through a channel, if necessary using a squeegee to spread it uniformly.

KEY

- Existing concrete
- MICRO GOLD HPFRC system
- CentroStorico CHEMICAL Connector
- Perimeter anchoring ø 8/50 cm steel bars OR HELICAL CONNECTOR



5

PROTECTION AND SAFETY SYSTEMS for non-structural elements

- 5.A External walls
- 5.B Internal walls
- 5.C Anti-shatter protection to existing slabs

5.A

EXTERNAL WALLS

5.A

INSTALLATION PHASES

EXTERNAL WALLS



SUBSTRATE PREPARATION

Remove incoherent parts, clean as necessary, and wet the support.



INSTALLATION OF THE FRCM SYSTEM

Install the FRCM system, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH**.



INSTALLATION OF THE CONNECTOR

Drill face-to-face holes through the external walls and clean out the dust. Then moisten the holes and insert the connectors. Cut the **PBO-JOINT/C-JOINT** connectors taking into account the thickness of the external wall and the radius of the spread-out fibres. Wrap both ends of the fibre connector with masking tape for a length that is the same as the radius of the spread-out fibres. Insert the **PBO-JOINT/C-JOINT** connectors into the external wall with the specific **MX-JOINT** inorganic matrix.

FRCM SAFETY systems

PBO MESH + INORGANIC MATRIX
PBO-MESH 10/10 + MX-PBO Masonry



CARBON MESH + INORGANIC MATRIX
C-MESH 42/42 + MX-C 25 Masonry



FRCM CONNECTION systems

PBO CONNECTOR + INORGANIC MATRIX
PBO-JOINT + MX-JOINT

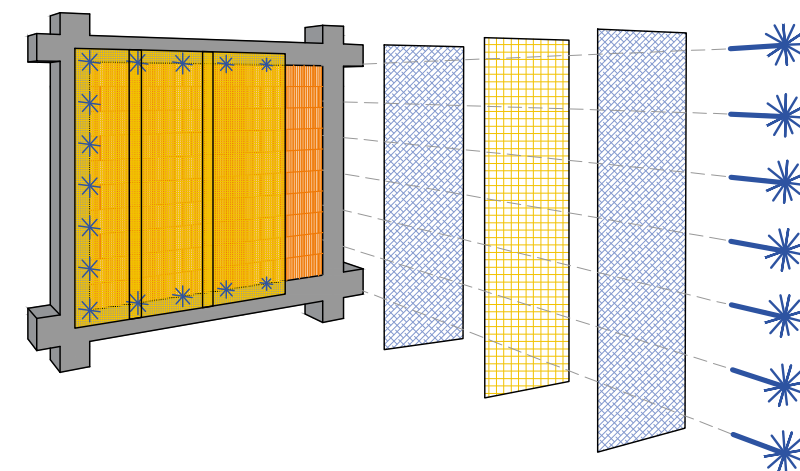


CARBONIO CONNECTOR + INORGANIC MATRIX
C-JOINT + MX-JOINT

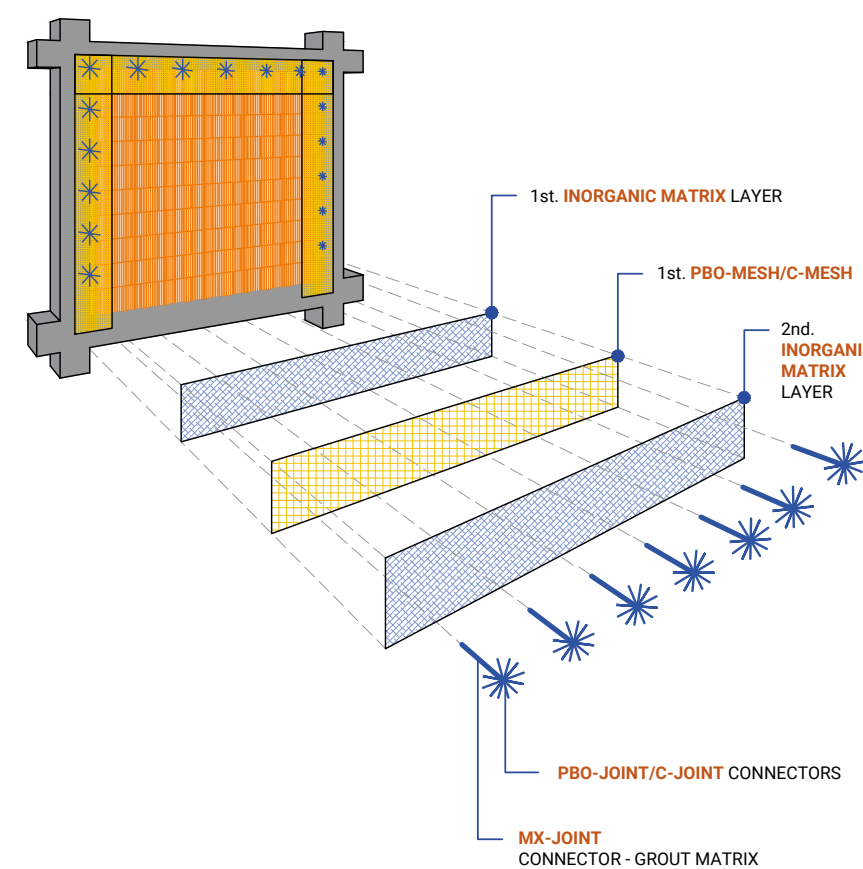


For further information on all the products in the table, see chapter 6 (pages 146, 147 and 156).

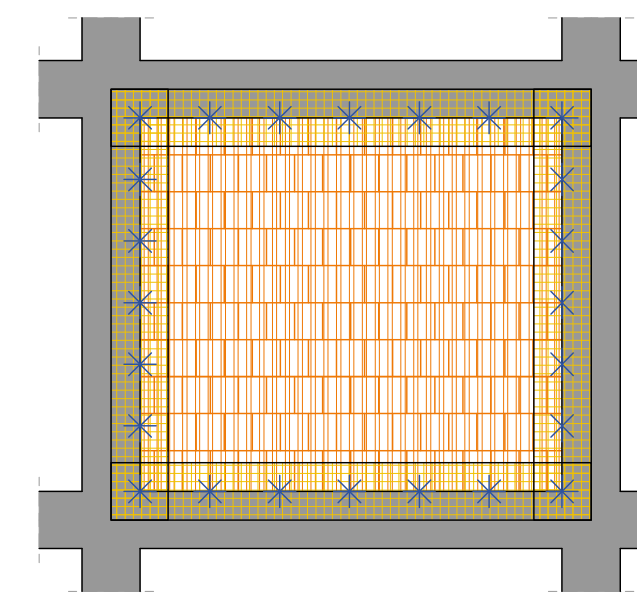
CONTINUOUS LAYOUT



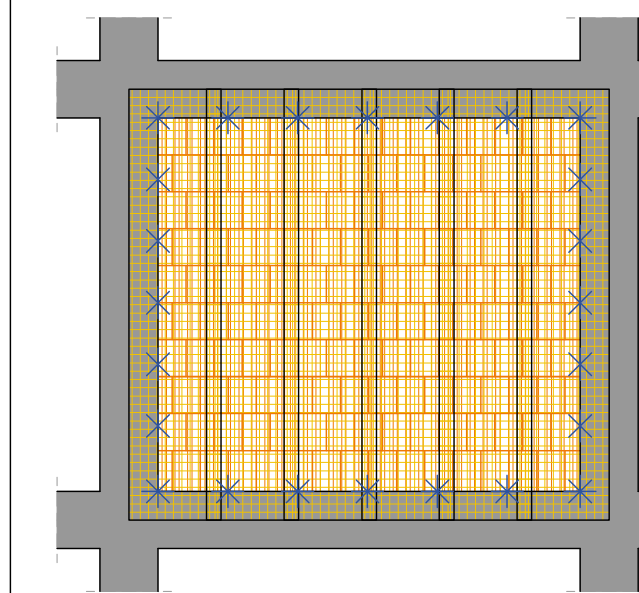
FRAME APPLICATION



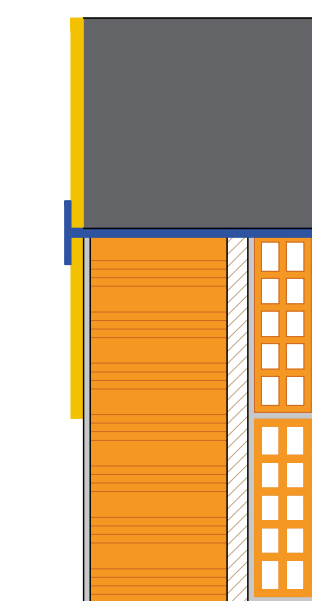
FRAME APPLICATION: Front view



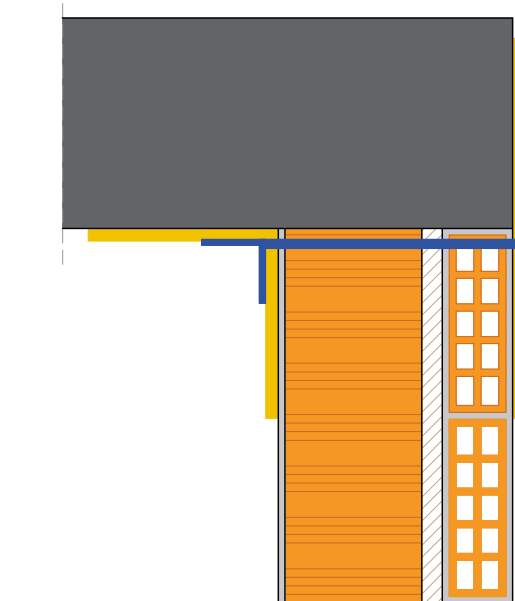
CONTINUOUS LAYOUT: Front view



CASE 1: SECTION of perimeter connection to columns, and to beams EMERGING from the concrete slab thickness, using FRCM system

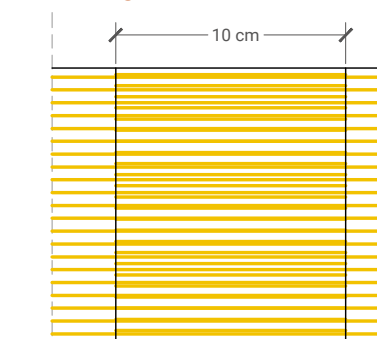


CASE 2: SECTION of perimeter connection to columns, and to beams NOT EMERGING from the concrete slab thickness, using FRCM system



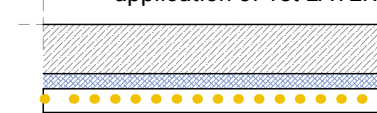
FRCM protection with inorganic matrix and long fibres

OVERLAP DETAIL



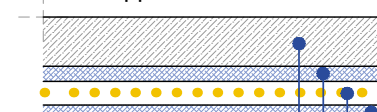
STRATIFICATION 1

application of 1st LAYER



STRATIFICATION 2

application of 2nd LAYER



SUPPORT
1st. INORGANIC MATRIX LAYER
1st. PBO-MESH/C-MESH
2nd. INORGANIC MATRIX LAYER
2nd. PBO-MESH/C-MESH
3rd. INORGANIC MATRIX LAYER

KEY

External infill wall INORGANIC MATRIX
PBO-JOINT/C-JOINT connector PBO-MESH/C-MESH
Section of PBO-MESH/C-MESH

1 SUBSTRATE PREPARATION

Remove the incoherent parts and eliminate any protective surface treatments or other substance that could compromise good adhesion to the support. To prepare the support before applying the **PBO-MESH/C-MESH** and make it ready to take the subsequent layers of **INORGANIC MATRIX**, ensure that the support is sufficiently moist, wetting it if necessary. As necessary, drill face-to-face holes through the external walls or internal partitions, drilling at a speed that is appropriate for the consistency of the material. Before inserting the connector, clean the dust out of the hole and moisten it.

2 APPLICATION OF FRCM PROTECTION

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric. Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple bands of strengthening are to be applied, repeat the previous steps wet on wet. Insert the **PBO-JOINT/C-JOINT** connectors into the masonry and inject the remaining matrix with the **RUREGOLD GUN** until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres.

INSTALLATION PHASES

5.B

INTERNAL WALLS

5.B

INSTALLATION PHASES

INTERNAL WALLS



SUBSTRATE PREPARATION

Remove incoherent parts, clean as necessary, and wet the support.



INSTALLATION OF THE FRCM SYSTEM

Install the FRCM system, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH**.

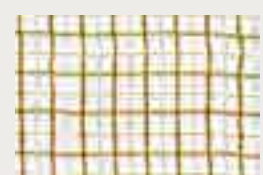


INSTALLATION OF THE CONNECTOR

Drill face-to-face holes through the external walls and clean out the dust. Then moisten the holes and insert the connectors. Cut the **PBO-JOINT/C-JOINT** connectors taking into account the thickness of the external wall and the radius of the spread-out fibres. Wrap both ends of the fibre connector with masking tape for a length that is the same as the radius of the spread-out fibres. Insert the **PBO-JOINT/C-JOINT** connectors into the external wall with the specific **MX-JOINT** inorganic matrix.

FRCM SAFETY systems

PBO MESH + INORGANIC MATRIX
PBO-MESH 10/10 + MX-PBO Masonry



CARBON MESH + INORGANIC MATRIX
C-MESH 42/42 + MX-C 25 Masonry



FRCM CONNECTION systems

PBO CONNECTOR + INORGANIC MATRIX
PBO-JOINT + MX-JOINT

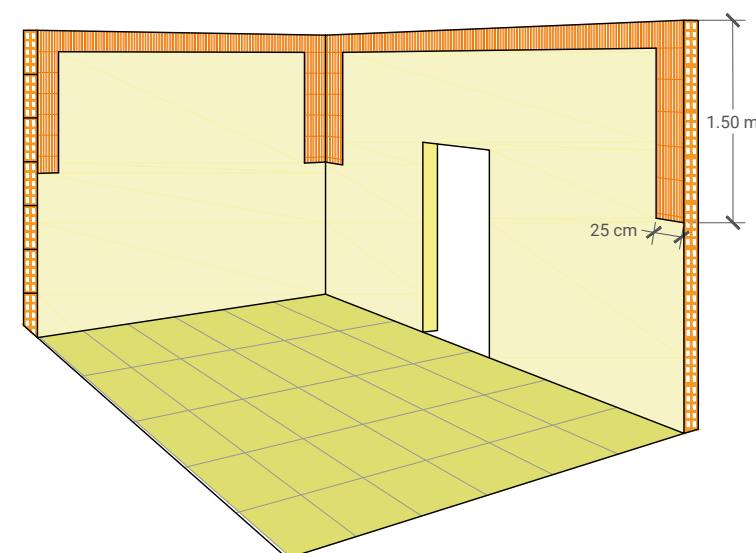


CARBON CONNECTOR + INORGANIC MATRIX
C-JOINT + MX-JOINT

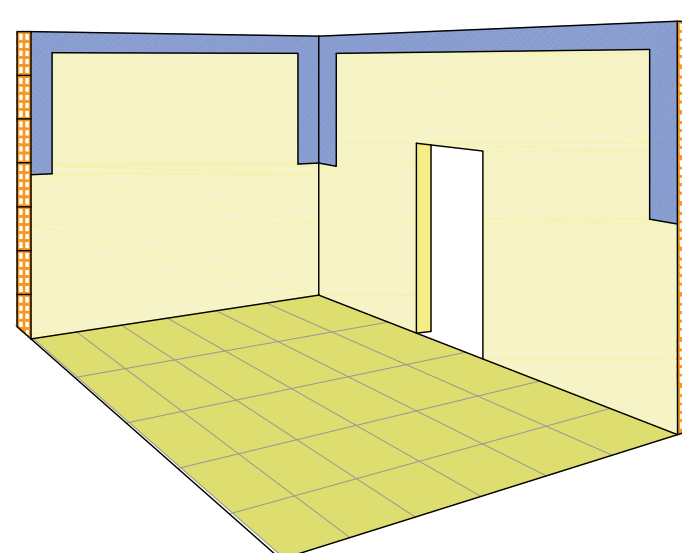


For further information on all the products in the table, see chapter 6 (pages 146, 147 and 156).

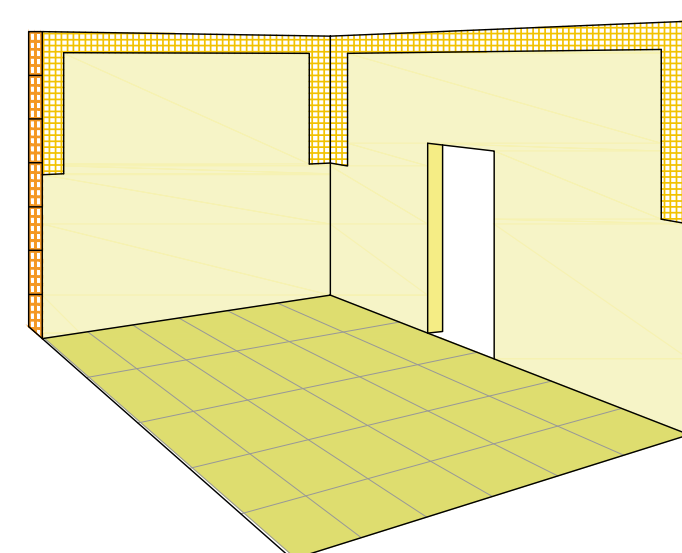
PHASE 1: Remove plaster to a width of 25 cm and a height of 1.50



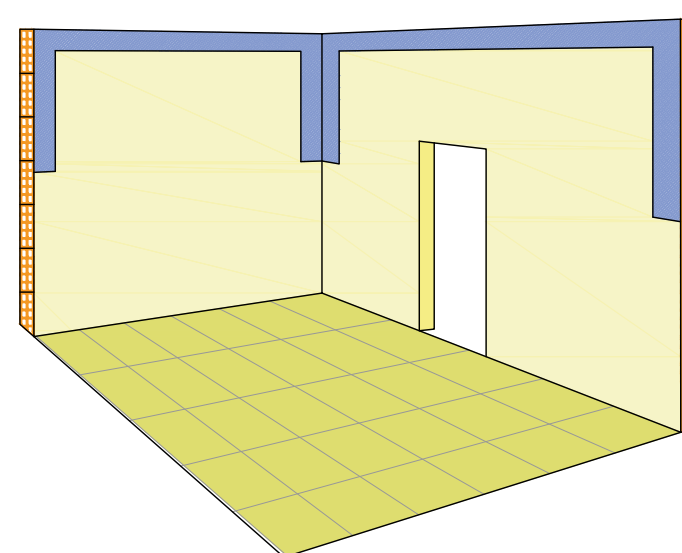
PHASE 2: Apply a 3-5 mm layer of INORGANIC MATRIX



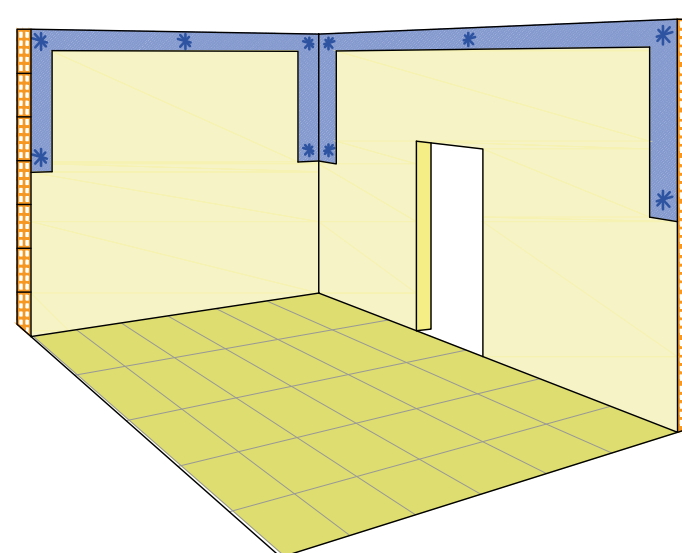
PHASE 3: Apply PBO MESH/C MESH



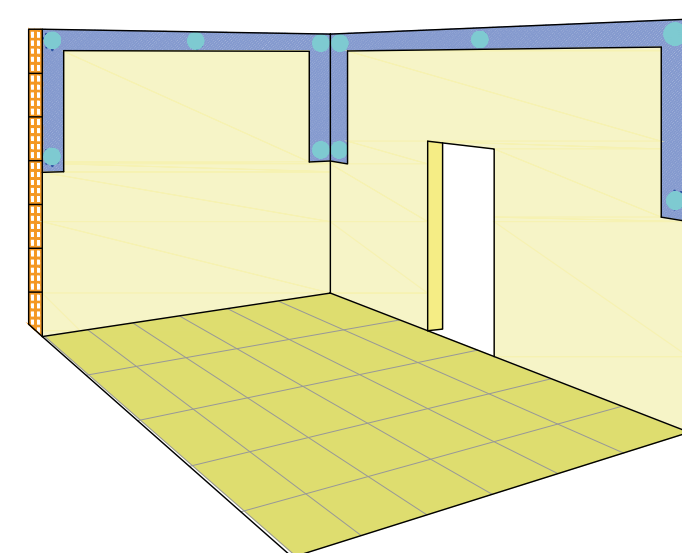
PHASE 4: Apply second layer of INORGANIC MATRIX



PHASE 5: Insert PBO-JOINT/C-JOINT CONNECTORS

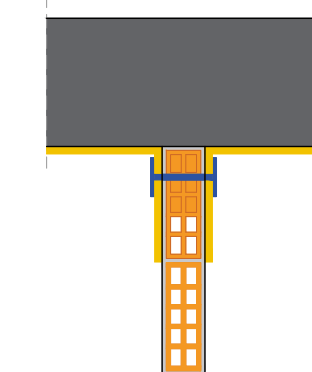


PHASE 6: Expand whilst applying MX-JOINT

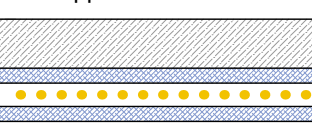


FRCM protection with inorganic matrix and long fibres

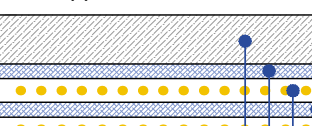
DETAIL



STRATIFICATION 1
application of 1st LAYER



STRATIFICATION 2
application of 2nd LAYER



SUPPORT
1st. INORGANIC MATRIX LAYER
1st PBO-MESH/C-MESH
2nd. INORGANIC MATRIX LAYER
2nd. PBO-MESH/C-MESH
3rd. INORGANIC MATRIX LAYER

KEY

- Partition wall
- INORGANIC MATRIX
- PBO-JOINT/C-JOINT connector
- PBO-MESH/C-MESH
- Section of PBO-MESH/C-MESH

INSTALLATION PHASES

1 SUBSTRATE PREPARATION

Remove the incoherent parts and eliminate any protective surface treatments or other substance that could compromise good adhesion to the support. To prepare the support before applying the **PBO-MESH/C-MESH** and make it ready to take the subsequent layers of **INORGANIC MATRIX**, ensure that the support is sufficiently moist, wetting it if necessary. As necessary, drill face-to-face holes through the external walls or internal partitions, drilling at a speed that is appropriate for the consistency of the material. Before inserting the connector, clean the dust out of the hole and moisten it.

2 APPLICATION OF FRCM PROTECTION

Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric. Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple bands of strengthening are to be applied, repeat the previous steps wet on wet. Insert the **PBO-JOINT/C-JOINT** connectors into the masonry and inject the remaining matrix with the RUREGOLD GUN until the hole is saturated. Remove the masking tape, spread out the connector so that the fibres adhere to the surface, and coat them with **MX-JOINT** inorganic matrix. To prevent the connector from coming out of the hole we recommend waiting until the day after inserting it, before spreading the fibres.

5.C

ANTI-SHATTER PROTECTION TO EXISTING SLABS

5.C

INSTALLATION PHASES

ANTI-SHATTER PROTECTION TO EXISTING SLABS



SUBSTRATE PREPARATION

If necessary, remove deteriorated concrete, clean the rebars, and apply **PASSIVATOR**. Reinstall the reinforcement cover using **MX-R4 Repair mortar**.



INSTALLATION OF THE FRCM SYSTEM

Install the FRCM system, using **INORGANIC MATRIX** and **PBO-MESH/C-MESH**.



APPLICATION OF ANTI-SHATTER PROTECTION

Install the **STUCANET** panel using the applicable method depending on the type of slab. Apply **PLASTERWALL** lightweight breathable mortar.



FORMATION OF A COLLABORATING CONCRETE TOP SLAB USING LATERMIX BETON

Apply **CENTROSTORICO CONCRETE** or **CHEMICAL CONNECTOR** to the surface of the slab to be consolidated. If necessary consolidate the existing concrete top slab with **CENTROSTORICO PRIMER**, after cleaning the support.

Cast the new collaborating top slab, interconnected to the existing slab, using **Latermix Beton 1400/1600/1800** lightweight structural concrete.

FRCM systems for CONCRETE

PBO MESH + INORGANIC MATRIX
PBO-MESH 105 + **MX-PBO Concrete**



CARBON MESH + INORGANIC MATRIX
C-MESH 182 + **MX-C 50 Concrete**



X PLASTER system

STEEL MESH PANEL WITH INTERWOVEN **STUCANET** CARDBOARD BACKING SHEET + BREATHABLE MORTAR **PLASTERWALL**

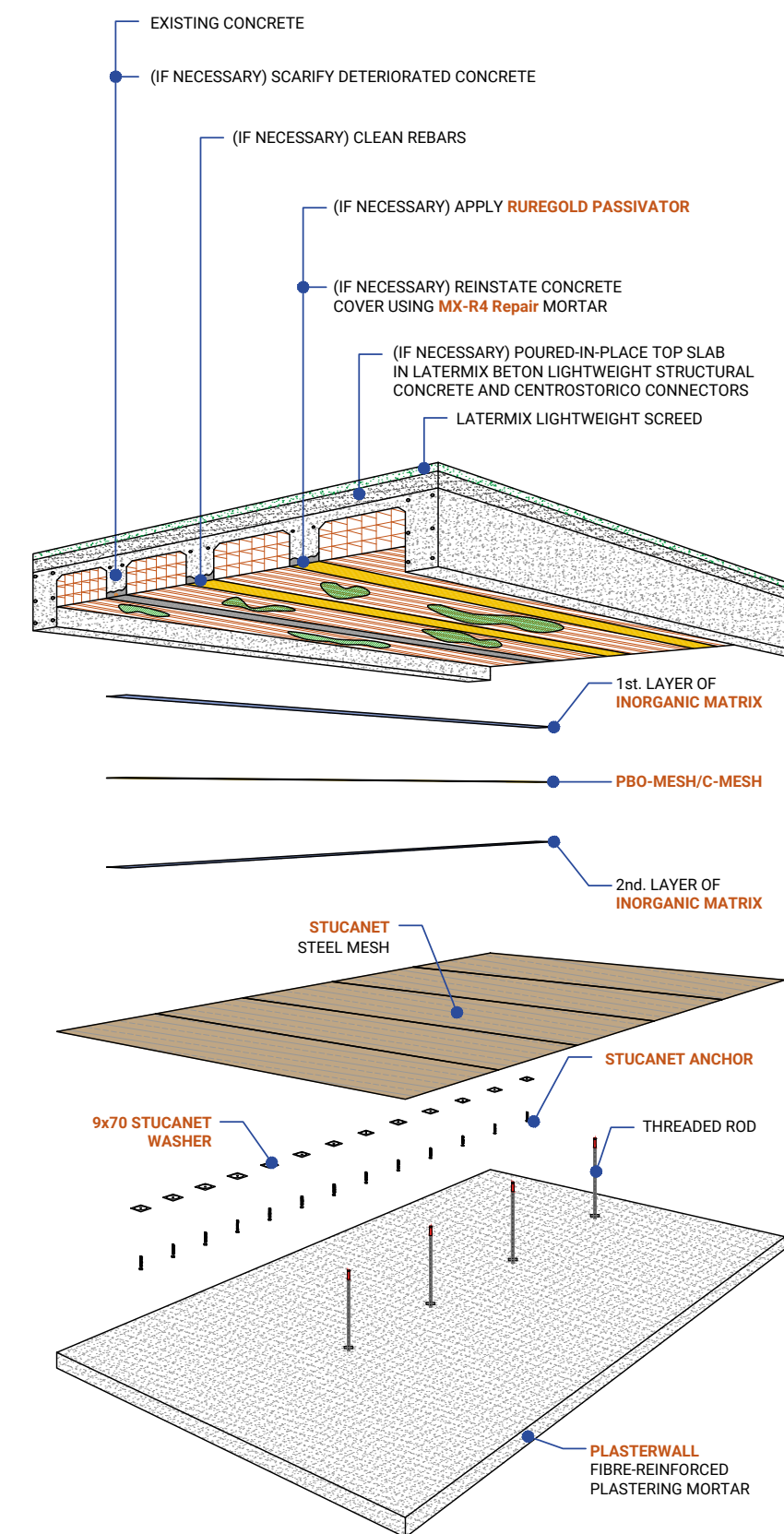


LATERLITE-CENTROSTORICO lightweight strengthening system for slabs

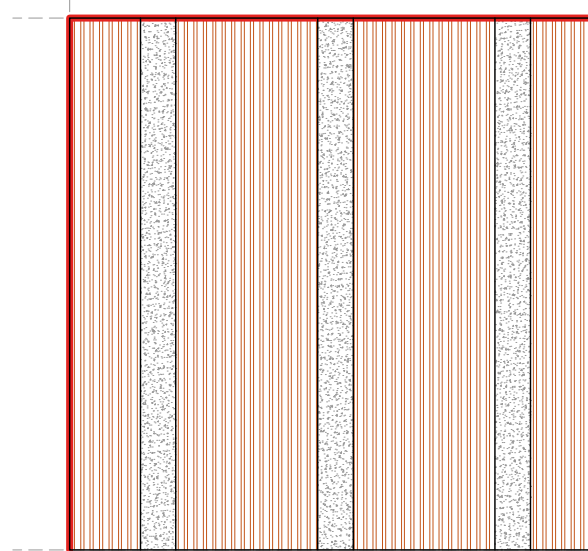


CONNECTOR **CENTROSTORICO CONCRETE** OR **CHEMICAL** + LIGHTWEIGHT STRUCTURAL CONCRETE **Latermix Beton**

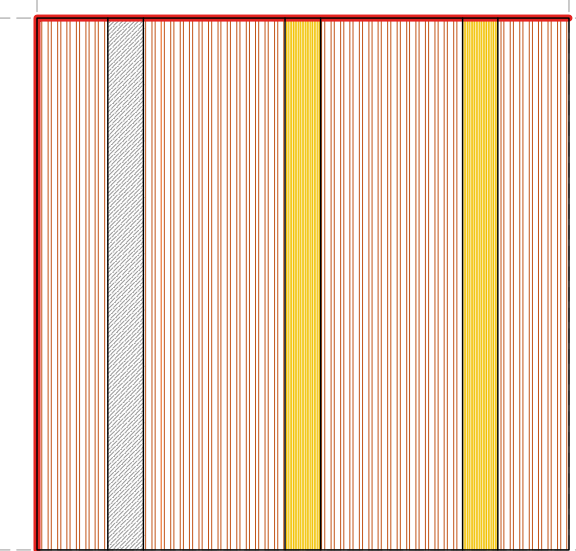
For further information on all the products in the table, see chapter 6 (pages 142, 143, 152 and from page 157 to 159).



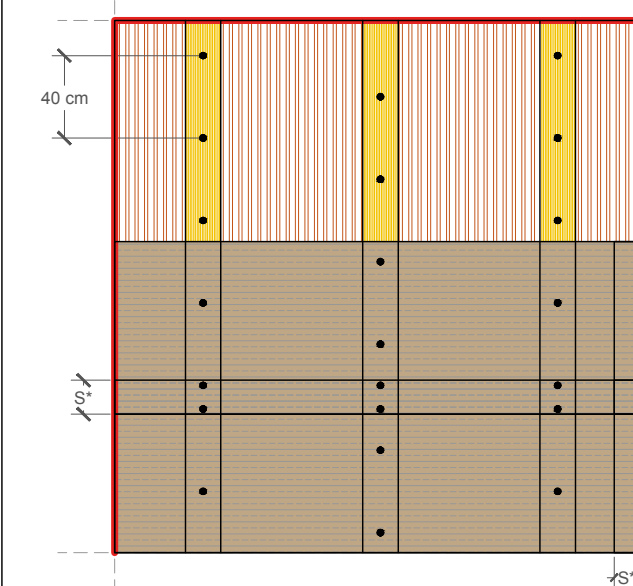
PHASE 1: Apply fireproof seal along slab perimeter at intersection with walls



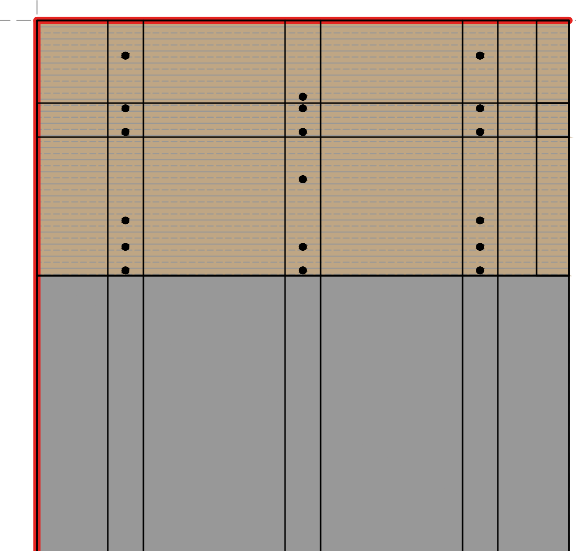
PHASE 2: If necessary, reinstate and strengthen joists using FRCM system (see Drawing 1D)



PHASE 3: Install **STUCANET** panels using fixing system



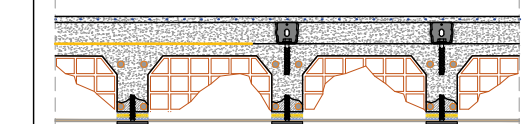
PHASE 4: Apply **PLASTERWALL** mortar



Fixing method for X Plaster system

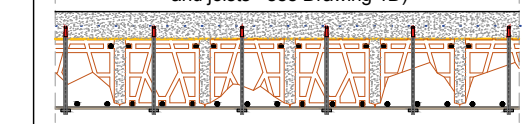
METHOD 1

With mechanical anchor in concrete joist (if necessary strengthening slab and joists - see Drawing 1D)



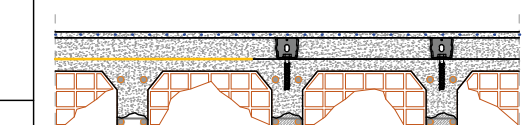
METHOD 2

With threaded rod anchored in EXISTING CONCRETE top slab (if necessary strengthening slab and joists - see Drawing 1D)

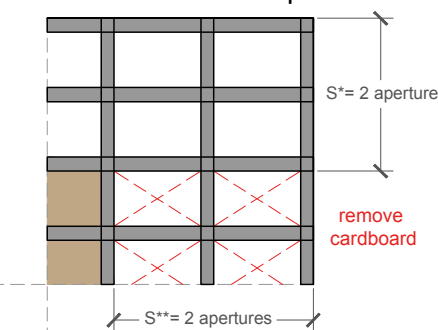


METHOD 3

With stainless steel wire passed round joist reinforcement (if necessary strengthening slab and joists - see Drawing 1D)



Detail of cardboard cut and mesh overlaps



KEY

- STUCANET
- PLASTERWALL
- MX-R4 Repair concrete repair mortar
- INORGANIC MATRIX
- PBO-MESH/C-MESH
- STUCANET ANCHOR
- Threaded rod
- 9x70 STUCANET WASHER

INSTALLATION PHASES

1 SUBSTRATE PREPARATION

Remove any damaged substrate by hydro demolition or sandblasting until a concrete layer is reached that has not been carbonated and is well compacted. Remove rust from reinforcement by manual or mechanical brushing. Apply **RUREGOLD PASSIVATOR** to the existing reinforcement and restore the concrete cover using **MX-R4 Repair mortar**. Smooth off the sharp edges, wet the support to excess, and apply the first layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. Place the **PBO-MESH/C-MESH**, taking care not to create folds in the fabric. Re-cover the mesh with a second layer of **INORGANIC MATRIX** to a thickness of 3-5 mm. If multiple bands of strengthening are to be applied, repeat the previous steps wet on wet.

2 APPLICATION OF ANTI-SHATTER PROTECTION

In accordance with the design requirements, form the holes as required into which the connectors are to be inserted. Then apply the **STUCANET** panels. The pre-perforated cardboard backing sheet must be cut and removed on the short side only (the vertical edge), for a length of approximately two meshes so that the overlap between panels is "steel on steel". The mesh overlaps should also always be "steel on steel" on the long side. The **STUCANET** panels must always be applied with the long side perpendicular to joists. The plaster is applied to the printed side. Assemble the mechanical connections by first inserting the **9x70 STUCANET WASHER** followed by the **STUCANET ANCHOR** or the **THREADED ROD**. Using a trowel or a plastering machine, apply **PLASTERWALL** fibre-reinforced, environmentally friendly, lightweight, breathable plaster mortar to a minimum thickness of 1 cm per coat in two successive coats for a total thickness of 2 cm. Conclude with a finishing mortar. Allow for a joint of at least 5 mm, which can be sealed as appropriate, between the panel and the wall at the perimeter.



6

PRODUCTS

■ 6.A RUREGOLD

FRCM STRUCTURAL STRENGTHENINGS

PBO-MESH CONCRETE SYSTEM	142
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PBO-MESH MASONRY SYSTEM	144
C-MESH MASONRY SYSTEM	145
PBO-JOINT CONNECTION SYSTEM - CONCRETE AND MASONRY	146
C-JOINT CONNECTION SYSTEM - CONCRETE AND MASONRY	147

FRP STRUCTURAL STRENGTHENINGS

C-WRAP CONCRETE SYSTEM	148
C-QUADRIWRAP CONCRETE SYSTEM	149
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FIBRE-REINFORCED STRUCTURAL STRENGTHENINGS

MICRO GOLD HPFRC MICROCONCRETES	151
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MORTARS FOR CONCRETE AND MASONRY	152
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CRM AND FIBRE-REINFORCED PLASTER SYSTEM

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ANTI-OVERTURN PROTECTION

PBO-MESH FRCM SYSTEM	156
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■ 6.B LATERLITE • CENTROSTORICO

STATIC CONSOLIDATION OF SLABS

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ANTI-SEISMIC CONSOLIDATION TO SLABS AND LIGHTWEIGHT BACKFILLS

PERIMETER CONNECTOR	160
LIGHTWEIGHT MORTARS AND CONCRETES IN EXPANDED CLAY	161

Scan the QR code for further information on ruregold.com



Scan the QR code for further information on laterlite.com



PBO-MESH SYSTEM FOR CONCRETE | PBO

▶ Reference drawings: from 1.A to 1.D = 5.C

PBO-MESH



INORGANIC MATRIX



PBO-MESH 105

Unidirectional mesh with **105 g/m²** PBO fibre. Thermoplastic glass fibres transversal to the direction of the PBO fibres. Available in H=10, 20*, 25, and 50* cm.

* Non-standard sizes. For availability of sizes contact Ruregold Sales Office.

- ▶ Young's modulus of elasticity **228 GPa**
- ▶ Equivalent thickness $t_f \approx 0.067$ mm

Suitable for: heavier applications to concrete structures and small cross-sectional elements such as composite slab joists.

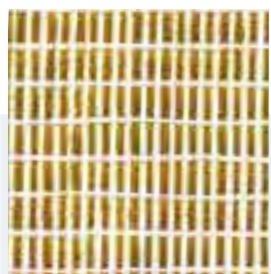


PBO-MESH 70/18

Unbalanced **bidirectional** mesh with **70 g/m²** in the warp direction and **18 g/m²** in the direction of the weft PBO fibres. Available in H=50 and 100 cm.

- ▶ Young's modulus of elasticity **241 GPa**
- ▶ Equivalent thickness $t_f \approx 0.057$ mm

Suitable for: applications such as confinement of concrete columns and strengthening beam-column nodes.



PBO-MESH 88

Unidirectional mesh with **88 g/m²** of PBO fibre, thermoplastic glass fibres transversal to the direction of the PBO fibres. Available in H=25 and 50* cm.

* Non-standard sizes. For availability of sizes contact Ruregold Sales Office.

- ▶ Young's modulus of elasticity **200 GPa**
- ▶ Equivalent thickness $t_f \approx 0.057$ mm

Suitable for: applications such as confinement of concrete columns and strengthening beam-column nodes.



MX-PBO Concrete

Optimises the transfer of stresses from the concrete structural element to the strengthening mesh.

- ▶ Density **approx. 1800 kg/m³**
- ▶ Compressive strength (28 days) **≥ 40 MPa**
- ▶ Flexural strength **≥ 4 MPa**
- ▶ Modulus of elasticity (28 days) **≥ 15 GPa**

■ PBO FIBRE

- ▶ Tenacity **5.8 GPa**
- ▶ Elongation at break **2.5%**
- ▶ Young's modulus of elasticity **270 GPa**



C-MESH CONCRETE SYSTEM | CARBON

▶ Reference drawings: from 1.A to 1.D = 5.C

CARBON MESH



INORGANIC MATRIX



C-MESH 182

Unidirectional mesh with **182 g/m²** of carbon fibre. Thermoplastic glass fibres transversal to the direction of the carbon fibres. Available in H=25 cm.

- ▶ Young's modulus of elasticity **82 GPa**
- ▶ Equivalent thickness $t_f \approx 0.100$ mm

Suitable for: applications to concrete structures such as confinement or shear and flexural strengthenings.

■ CARBON FIBRE

- ▶ Tenacity **4.9 GPa**
- ▶ Elongation at break **1.9%**
- ▶ Young's modulus of elasticity **250 GPa**



MX-C 50 Concrete

Optimises the transfer of stresses from the concrete structural element to the strengthening mesh.

- ▶ Density **approx. 1800 kg/m³**
- ▶ Compressive strength (28 days) **≥ 40 MPa**
- ▶ Flexural strength **≥ 4 MPa**
- ▶ Modulus of elasticity (28 days) **≥ 15 GPa**



PBO-MESH MASONRY SYSTEM

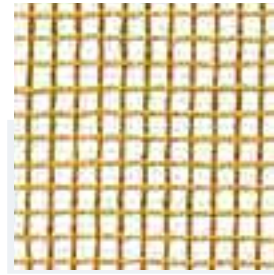
PBO

▶ Reference drawings: from 1.E to 1.L

PBO-MESH



INORGANIC MATRIX



PBO-MESH 22/22



MX-PBO Masonry

Bidirectional mesh with **44 g/m²** of PBO fibre, weft and warp uniformly distributed. Available in H=100 cm.

- ▶ Young's modulus of elasticity **282 GPa**
- ▶ Equivalent thickness $t_f \approx 0.022$ mm

Suitable for: strengthening to masonry elements such as vaults or loadbearing walls.

Optimises the transfer of stresses from the structural element to the strengthening mesh.

- ▶ Density **approx. 1650 kg/m³**
- ▶ Compressive strength (28 days) ≥ 20 MPa
- ▶ Flexural strength ≥ 3.5 MPa
- ▶ Modulus of elasticity (28 days) ≥ 7.5 GPa



PBO-MESH 44

Unidirectional mesh with **44 g/m²** in PBO fibre. Thermo-plastic glass fibre transversal to the direction of the PBO fibres. Available in H= 20* cm, 25 cm.

** Non-standard sizes. For availability of sizes contact Ruregold Sales Office.*

- ▶ Young's modulus of elasticity **302 GPa**
- ▶ Equivalent thickness $t_f \approx 0.028$ mm

Suitable for: major applications to masonry, particularly for shear and flexural strengthenings.

■ PBO FIBRE

- ▶ Tenacity **5.8 GPa**
- ▶ Elongation at break **2.5%**
- ▶ Young's modulus of elasticity **270 GPa**



C-MESH MASONRY SYSTEM

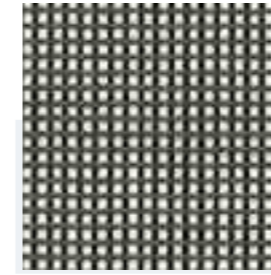
CARBON

▶ Reference drawings: from 1.E to 1.L

CARBON MESH



INORGANIC MATRIX



C-MESH 84/84



MX-C 25 Masonry

Bidirectional mesh with **168 g/m²** of carbon fibre, uniformly distributed in weft and warp. Available in H=100 cm.

- ▶ Young's modulus of elasticity **239 GPa**
- ▶ Equivalent thickness $t_f \approx 0.094$ mm

Suitable for: applications to masonry such as bandages or shear and flexural strengthenings

MX-C 25 Masonry inorganic matrix optimises the transfer of stresses from the structural element to the strengthening mesh.

- ▶ Density **approx. 1500 kg/m³**
- ▶ Compressive strength (28 days) ≥ 20 MPa
- ▶ Flexural strength ≥ 3.5 MPa
- ▶ Modulus of elasticity (28 days) ≥ 7 GPa



■ CARBON FIBRE

- ▶ Tenacity **4.9 GPa**
- ▶ Elongation at break **1.9%**
- ▶ Young's modulus of elasticity **250 GPa**



▶ Reference drawings: 1.A ■ 1.G ■ 1.Ha ■ 1.Hb ■ 1.Hc ■ 1.la ■ 1.lb ■ 1.lc ■ 1.ld ■ 1.J ■ 1.K ■ 1.L ■ 5.A ■ 5.B

PBO CONNECTOR



INORGANIC MATRIX

PBO-JOINT



PBO fibre connector for connecting existing reinforced structures with PBO FRCM structural strengthening systems. Available in Ø 3 mm, Ø 6 mm.

- ▶ Tensile strength
 - Ø 3 mm **2413 MPa**
 - Ø 6 mm **1860 MPa**
- ▶ Ultimate strain
 - Ø 3 mm **2.14%**
 - Ø 6 mm **1.95%**
- ▶ Young's modulus of elasticity
 - Ø 3 mm **198 GPa**
 - Ø 6 mm **238 GPa**

Suitable for: forming connections between existing structures and structural strengthening, to give the necessary continuity to the strengthening. Forming connections for anti-overturn protection works. Face-to-face connections at corners and at unbonded abutting walls.



MX-JOINT



Inorganic matrix for application of the PBO-JOINT fibre connector.

- ▶ Density **approx. 1800 kg/m³**
- ▶ Compressive strength (28 days) **≥ 40 MPa**
- ▶ Flexural strength **≥ 3 MPa**

■ PBO FIBRE

- ▶ Tenacity **5.8 GPa**
- ▶ Elongation at break **2.5%**
- ▶ Young's modulus of elasticity **270 GPa**



▶ Reference drawings: 1.A ■ 1.G ■ 1.Ha ■ 1.Hb ■ 1.Hc ■ 1.la ■ 1.lb ■ 1.lc ■ 1.ld ■ 1.J ■ 1.K ■ 1.L ■ 5.A ■ 5.B

CONNECTOR IN CARBON



INORGANIC MATRIX

C-JOINT



Carbon fibre connector for connecting existing reinforced structures using carbon-FRCM structural strengthening systems.

Available in Ø 6 mm, Ø 10 mm, Ø 12* mm.

* Non-standard size. For information on available diameters, contact Ruregold Sales Office.

- ▶ Tensile strength
 - Ø 6 mm **1225 MPa**
 - Ø 10 mm **1221 MPa**
 - Ø 12 mm **1263 MPa**
- ▶ Ultimate strain
 - Ø 6 mm **0.68%**
 - Ø 10 mm **0.49%**
 - Ø 12 mm **0.83%**
- ▶ Young's modulus of elasticity
 - Ø 6 mm **234 GPa**
 - Ø 10 mm **232 GPa**
 - Ø 12 mm **198 GPa**

Suitable for: forming connections between existing structures and structural strengthening, to give the necessary continuity to the strengthening. Forming connections for anti-overturn protection works. Face-to-face connections at corners and at unbonded abutting walls.



MX-JOINT



Inorganic matrix for applying C-JOINT fibre connector.

- ▶ Density **approx. 1800 kg/m³**
- ▶ Compressive strength (28 days) **≥ 40 MPa**
- ▶ Flexural strength **≥ 3 MPa**

■ CARBON FIBRE

- ▶ Tenacity **4.9 GPa**
- ▶ Elongation at break **1.9%**
- ▶ Young's modulus of elasticity **250 GPa**



C-WRAP CONCRETE SYSTEM

▶ Reference drawings: from 2.A to 2.C

CARBON FIBRE TAPE



PRIMER AND RESIN



C-WRAP

Unidirectional carbon fibre tape available in:
 200 g/m² H 25 – 50 cm, reel 50 m*
 310 g/m² H 20* – 25 – 30* - 50* cm, reel 50 m
 310 HM g/m² H 25 cm, reel 50 m
 400 g/m² H 25 cm, reel 50 m
 600 g/m² H 20* - 25 – 50* cm, reel 50 m.
 *Non-standard sizes. For availability of sizes contact Ruregold Sales Office.

▶ Average Young's modulus of elasticity

C-WRAP 200 Mono: 232 GPa Triple: 233 GPa**C-WRAP 310 Mono: 246 GPa Triple: 245 GPa****C-WRAP 310 HM Triple: 365 GPa****C-WRAP 400 Mono: 247 GPa Triple: 252 GPa****C-WRAP 600 Mono: 221 GPa Triple: 227 GPa**

▶ Grammage

C-WRAP 200 200 g/m²**C-WRAP 310 310 g/m²****C-WRAP 310 HM 310 g/m²****C-WRAP 400 400 g/m²****C-WRAP 600 600 g/m²**

▶ Equivalent thickness

C-WRAP 200 $t_f \approx 0.112$ mm**C-WRAP 310 $t_f \approx 0.167$ mm****C-WRAP 310 HM $t_f \approx 0.172$ mm****C-WRAP 400 $t_f \approx 0.223$ mm****C-WRAP 600 $t_f \approx 0.339$ mm**

C-PRIMER WRAP

Special epoxy primer with high impregnating power.
 Available in summer and winter versions.



C-RESIN WRAP

Special epoxy resin with high adhesive power.
 Available in summer and winter versions.

■ CARBON FIBRE

▶ Tenacity $\geq 4900 - 5100$ MPa▶ Fibre density 1.8 g/cm³▶ Young's modulus of elasticity $245-255$ GPa

Suitable for: increasing resistance to combined axial and bending forces, shear, and confinement in columns; bending and shear in beams and composite slab joists; and local strengthening to beam-column nodes. Increasing the ductility of one-dimensional elements such as reinforced concrete beams and columns.

CARBON CONNECTOR



RESIN

C-JOINT



Carbon fibre connector for connecting existing reinforced structures using carbon FRP systems (for characteristics see p.147).



C-RESIN JOINT

Special epoxy resin with high adhesive power.
 Available in summer and winter versions.

C-QUADRIWRAP CONCRETE SYSTEM

▶ Reference drawings: from 2.A to 2.C

CARBON FIBRE TEXTILE



PRIMER AND RESIN



C-QUADRIWRAP

Quadriaxial carbon fibre textile.
 Available in H=31,75 cm, 50m reel*

* Non-standard sizes. For availability of sizes contact Ruregold Sales Office.

▶ Average Young's modulus of elasticity

Mono: 307 GPa Triple: 302 GPa▶ Grammage **373 g/m²**▶ Equivalent thickness $t_f \approx 0.203$ mm

Suitable for: increasing resistance to combined axial and bending forces, shear, and confinement in columns; bending and shear in beams and composite slab joists; and local strengthening to beam-column nodes. Increasing the ductility of one-dimensional elements such as reinforced concrete beams and columns.



CARBON CONNECTOR



RESIN

C-JOINT



Carbon fibre connector for connecting existing reinforced structures using carbon FRP systems (for characteristics see p.147).



C-RESIN JOINT

Special epoxy resin with high adhesive power.
 Available in summer and winter versions.

C-LAM CONCRETE SYSTEM

▶ Reference drawings: 2.D

PULTRUDED CARBON SHEET



C-LAM

Pultruded carbon blades.

Available in:

- **C-LAM S** | high strength
H 50 -100 - 120* mm, reel 25 m
- **C-LAM H** | high modulus
H 50 - 100 - 120 mm, reel 25 m *

* Non-standard sizes. For availability of sizes contact Ruregold Sales Office.

▶ Young's modulus of elasticity

C-LAM S 171 GPa**C-LAM H 206 GPa**

▶ Laminate thickness

C-LAM S 1.4 mm**C-LAM H 1.4 mm**

RESIN



C-RESIN LAM

Special epoxy resin with high adhesive power.

■ CARBON FIBRE

- ▶ Young's modulus of elasticity **250 GPa**
- ▶ Tensile strength **5300 MPa**

Suitable for: increasing resistance to bending in reinforced concrete beams and composite slab joists.
Flexural strengthening in timber and steel structures.



HPFRC MICROCONCRETES

▶ Reference drawings: from 4.A to 4.C

MICRO GOLD
STEEL

Fibre-reinforced microconcrete with metal fibres for structural strengthening and seismic retrofitting.

- ▶ Density **2300 kg/m³**
- ▶ Compressive strength (28 days) **≥ 110 MPa**
- ▶ Modulus of elasticity (28 days) **≥ 35 GPa**

Suitable for: applying thin jackets to structural elements such as beams and columns, thereby reducing or replacing the need for additional rebars; low-thickness strengthening to slabs or bridge deck slabs, eliminating the use of electro-welded mesh.

MICRO GOLD
FCC

Fibre-reinforced microconcrete with synthetic fibres for structural strengthening and seismic retrofitting.

- ▶ Density **2300 kg/m³**
- ▶ Compressive strength (28 days) **≥ 85 MPa**
- ▶ Modulus of elasticity (28 days) **≥ 30 GPa**

Suitable for: applying thin jackets to structural elements such as beams and columns, thereby reducing or replacing the need for additional rebars; low-thickness strengthening to slabs or bridge deck slabs, eliminating the use of electro-welded mesh. The use of synthetic fibres enhances the durability of the strengthening.



MORTARS FOR CONCRETE AND MASONRY

► Reference drawings: from 1A to 1.D ■ from 2.A to 2.D ■ 3.C ■ 4.A ■ 4.B ■ 5.C

PASSIVATOR



Anticorrosion mortar for concrete rebars.
Available in 5 kg bucket.

- Density **1200 kg/m³**
- Application thickness **1 mm per coat**

Suitable for: reinstating concrete to re-alkalise and passivate the rebars.

MX-INJECT



Special binder for injection slurries, for consolidating masonry.

- Density **approx. 1800 kg/m³**
- Compressive strength (28 days) **≥ 36 MPa**
- Modulus of elasticity (28 days) **15 GPa**
- Flexural strength **≥ 4 MPa**

Suitable for: filling cavities and lesions to restore the masonry to its initial monolithicity.

MX-R4
Repair

Fibre reinforced thixotropic mortar with compensated shrinkage for applications to concrete.

- Density **1700 kg/m³**
- Compressive strength (28 days) **≥ 54 MPa**
- Modulus of elasticity (28 days) **≥ 24 GPa**
- Adhesion to concrete **≥ 2 MPa**
(the support breaks)

Suitable for: appropriate and durable structural reconstruction of concrete structures and elements.



G-JOINT/B-JOINT MASONRY CONNECTION SYSTEM

► Reference drawings: 3.B

GLASS/BASALT CONNECTOR



INORGANIC MATRIX

G-JOINT



Unidirectional AR glass fibre connector.
Available in Ø 6* mm, Ø 10* mm.

** Non-standard sizes. For availability of sizes contact Ruregold Sales Office.*

- Tensile strength
Ø 6 mm **719 MPa**
Ø 10 mm **777 MPa**
- Ultimate strain
Ø 6 mm **0.63%**
Ø 10 mm **0.87%**
- Young's modulus of elasticity
Ø 6 mm **86 GPa**
Ø 10 mm **77 GPa**

B-JOINT



Unidirectional basalt fibre connector.
Available in Ø 6* mm, Ø 10* mm, Ø 12* mm.

** Non-standard sizes. For availability of sizes contact Ruregold Sales Office.*

- Tensile strength:
Ø 6 mm **595 MPa**
Ø 10 mm **700 MPa**
Ø 12 mm **589 MPa**
- Ultimate strain:
Ø 6 mm **0.81%**
Ø 10 mm **0.95%**
Ø 12 mm **0.90%**
- Young's modulus of elasticity:
Ø 6 mm **83 GPa**
Ø 10 mm **84 GPa**
Ø 12 mm **82 GPa**

MX-JOINT



Inorganic matrix for impregnating and anchoring the G-Joint/B-Joint connector.

- Density **approx. 1800 kg/m³**
- Compressive strength after 28 days **≥ 40 MPa**
- Flexural strength **≥ 3 MPa**

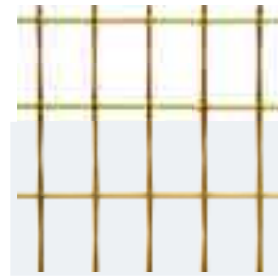
Suitable for: forming coupling connections between existing structures and the wall anti-overturn system.
Forming connections for anti-overturn protection works.



G-MESH 400/490 SYSTEM

▶ Reference drawings: **3.A**

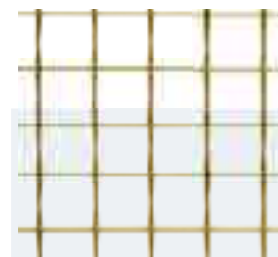
A.R. GLASS FIBRE MESH



G-MESH 400

Alkali-resistant mesh in GFRP (*Glass Fibre Reinforced Polymer*) composite material weighing 400 g/m², rectangular mesh 80x120 mm. Available in rolls H=2m, L=20m equivalent to 40 m².

▶ Weft mesh tensile strength: **42 kN/m**. Warp mesh tensile strength: **60 kN/m**.



G-MESH 490

Alkali-resistant mesh in GFRP (*Glass Fibre Reinforced Polymer*) composite material weighing 490 g/m², square mesh 80x80 mm. Available in rolls H=2m, L=20m equivalent to 40 m².

▶ Tensile strength of the warp and weft mesh **60 kN/m**

Suitable for: strengthening existing walls in solid brick, tufa, and irregular stones; the retrofitting and static and seismic retrofitting of existing loadbearing masonry buildings.



+ COMPLEMENTARY PRODUCTS



HELICAL CONNECTOR

Stainless steel bar for connection systems. Available in lengths: 200*, 400, 500, 600, 1000* mm.

For use with **HELICAL GUIDE**

Suitable for: consolidation and structural strengthening to existing brick, tufa, and irregular stone walls; creating dry restitching and anchors in masonry.



G-MESH CONNECTOR

Pre-formed connection element in A/R fibreglass. For use with a grouting anchor such as **C-RESIN JOINT** (page 148) or **CentroStorico Chemical Anchor** (page 160).

Available in: short end 100 mm, long end 100*, 200, 300*, 400, 500, 600*, 700*, 800*, 900*, 1000* mm.

Suitable for: consolidation and structural strengthening to existing brick, tufa, and irregular stone walls.



G-MESH ANGLE

L-shaped component in preformed composite GFRP mesh. Grammage 490 g/m², apertures 80x80 mm. Size H=2m, L 30 cm per side.

▶ Tensile strength of the mesh weft and warp **60 kN/m**

Suitable for: giving continuity to the CRM structural strengthening system at corners/edges of buildings.



G-MESH GUSSET

External diameter 170 mm, internal 30 mm. For application at the **connectors**.

Suitable for: transferring stress concentrations in connection systems.

STRUCTURAL MORTARS FOR MASONRY

▶ Reference drawings: from **1.E** to **1.L** ■ from **3.A** to **3.C**MX-PVA
Fibre-reinforced

High performance mortar with polyvinyl alcohol fibres for the structural reinstatement of masonry.

- ▶ Density **approx. 1850 kg/m³**
- ▶ Compressive strength (28 days) **≥ 45 MPa**
- ▶ Flexural strength **≥ 7 MPa**
- ▶ Modulus of elasticity (28 days) **≥ 15 GPa**

Suitable for: repairing lesioned masonry elements; consolidating masonry by applying fibre-reinforced repointing to the joints using the unstitch/restitch technique; regularising the support; applying fibre-reinforced structural mortar to contain plastic shrinkage; strengthening existing solid brick, tufa, or irregular stone walls; reinstating structures that are subject to shock loads and dynamic loads. Fibre-reinforced sheets and plasters (without mesh reinforcement). Constructing top slabs (without mesh reinforcement) as strengthening to consolidate vaults and vaulted floor slabs.

MX-CP
Lime

Mortar based on pure NHL 3.5 natural hydraulic lime for structural reinstatement of masonry.

- ▶ Density **approx. 1600 kg/m³**
- ▶ Compressive strength (28 days) **≥ 15 MPa**
- ▶ Flexural strength **≥ 3.5 MPa**
- ▶ Modulus of elasticity (28 days) **≥ 8.5 GPa**

Suitable for: repairing lesioned masonry elements; deep repointing to mortar joints using the unstitch/restitch technique; regularising the support; applying fibre-reinforced structural mortar to contain plastic shrinkage; strengthening existing solid brick, tufa, or irregular stone walls; applying reinforced plasters and/or CRM system; constructing top slabs as strengthening to consolidate vaults and vaulted floor slabs.

MX-RW
High Performance

High performance mortar for the structural reinstatement of masonry.

- ▶ Density **approx. 2100 kg/m³**
- ▶ Compressive strength (28 days) **≥ 49.5 MPa**
- ▶ Flexural strength **≥ 5.5 MPa**
- ▶ Modulus of elasticity (28 days) **≥ 15 GPa**

Suitable for: repairing lesioned masonry elements; deep repointing to mortar joints using the unstitch/restitch technique; regularising the support; applying fibre reinforced structural mortar to contain plastic shrinkage; strengthening existing solid brick, tufa, or irregular stone walls; applying reinforced plasters and/or CRM system; constructing top slabs to consolidate vaults and vaulted floor slabs.

MX-15
Plaster

Pre-dosed cement-based M15 structural fibre mortar, for strengthenings.

- ▶ Density **approx. 1800 kg/m³**
- ▶ Compressive strength (28 days) **≥ 15 MPa**
- ▶ Flexural strength **≥ 3.5 MPa**
- ▶ Modulus of elasticity (28 days) **≥ 15 GPa**

Suitable for: deep repointing to mortar joints using the unstitch/restitch technique; regularising the support; applying fibre reinforced structural mortar to contain plastic shrinkage; strengthening existing solid brick, tufa, or irregular stone walls; applying reinforced plasters and/or CRM system.

PBO-MESH AND C-MESH MASONRY SYSTEM

▶ Reference drawings: 5.A ■ 5.B

PBO MESH



PBO-MESH 10/10

Bidirectional mesh with 20 g/m² of PBO fibre, weft and warp uniformly distributed.

Available in H=50, 100 cm.

▶ Mesh weight **104 g/m²**

Suitable for: anti-overflow systems for internal partitions and external infill walls; anti-shatter protection.

INORGANIC MATRIX



MX-PBO Masonry

MX-PBO Masonry inorganic matrix optimises the transfer of stresses from the structural element to the strengthening mesh..

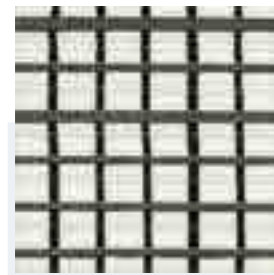
▶ Density **approx. 1650 kg/m³**

▶ Compressive strength after 28 days **≥ 20 MPa**

▶ Flexural strength **≥ 3.5 MPa**

▶ Modulus of elasticity (28 days) **≥ 7.5 GPa**

CARBON MESH



C-MESH 42/42

Bidirectional mesh with 84 g/m² of carbon fibre, weft and warp uniformly distributed.

Available in H=100 cm.

▶ Mesh weight **137 g/m²**

Suitable for: realizzare presidi antiribaltamento di tramezzature interne, tamponature esterne e antisfondellamento.

INORGANIC MATRIX



MX-C 25 Masonry

MX-C 25 Masonry inorganic matrix optimises the transfer of stresses from the structural element to the strengthening mesh.

▶ Density **approx. 1500 kg/m³**

▶ Compressive strength after 28 days **≥ 20 MPa**

▶ Flexural strength **≥ 3.5 MPa**

▶ Modulus of elasticity (28 days) **≥ 7 GPa**

■ PBO FIBRE

▶ Tenacity **5.8 GPa**

▶ Elongation at break **2.5%**

▶ Young's modulus of elasticity **270 GPa**

■ CARBON FIBRE

▶ Tenacity **4.9 GPa**

▶ Elongation at break **1.9%**

▶ Young's modulus of elasticity **250 GPa**

X PLASTER ANTI-OVERTURN SYSTEM

▶ Reference drawings: 5.C

STEEL MESH AND CARDBOARD



STUCANET

Electro-welded galvanised or stainless steel mesh interwoven with a cardboard backing sheet that ensures adhesion of the Plasterwall mortar in the plastic phase, whilst the holes ensure grip to the metal mesh in the hardened phase. 2.40 x 0.70 m (1.68 m²) panels, mesh size 38x50 mm. Available in versions: **S-Stucanet** double wire normal; **80-Stucanet** reinforced normal*; **SE - Stucanet** double wire stainless steel*; **BM - Stucanet** highly galvanised double wire*.

* Non-standard types: contact Ruregold Sales Office for information on the availability of this version.

▶ Tensile strength of steel **> 350 MPa**

▶ Galvanising **ø 1.5 e 2.0 mm - min 60 g/m²**

Flat 6 x 2 mm: min 50 g/m²

Suitable for: securing slabs by preventing shatter of composite slab hollow clay blocks.

The cardboard backing sheet enables an anti-shatter system to be created that requires no additional elements for filling voids.

MORTAR



PLASTERWALL

Fibre reinforced, anti-shrinkage, environmentally sustainable lightweight breathable plaster mortar for application to the Stucanet panel in two coats.

▶ Density **1250 kg/m³**

▶ Compressive strength (28 days) **≥ 5.0 MPa**

▶ Modulus of elasticity (28 days) **≥ 4.0 GPa**

Suitable for: application to the STUCANET panel. Its environmentally sustainable formulation enables normal thermo-hygrometric exchanges to continue. This ensures significant vapour permeability, thus not aggravating the deterioration of the concrete in the slabs (as normally occurs with non-breathable coatings)

■ ACCESSORIES

STUCANET ANCHOR



Anchor for fixing the mesh to the support

▶ Screw strength **Class 8.8**

▶ Thread diameter **6 mm (M6)**

▶ Anchor external diameter **hole 8 mm**

Suitable for: installing anti-shatter systems to existing clay-concrete composite slabs; plaster meshes.



STUCANET WASHER

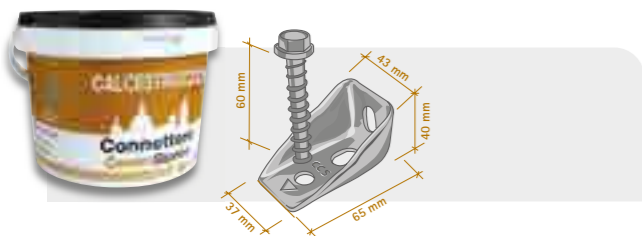
Washer for fixing the mesh to the support



CENTROSTORICO CONNECTORS

▶ Reference drawings: 1.D - 2.D - 4.C - 5.C

CONCRETE CONNECTOR



Connector for consolidating and strengthening concrete slabs..

- ▶ Characteristic strength P_{Rk} **12.6 kN**
- ▶ Design strength P_{Rd} **10.0 kN**
- ▶ Concrete of existing joist $R_{ck} \geq 20 \text{ MPa}$
- ▶ Minimum width of existing joist:
 - structural screed thickness $\geq 2 \text{ cm}$ 7 cm
 - if no structural screed: 8 cm
- ▶ Certification: University of Trieste

CHEMICAL CONNECTOR



Epoxy adhesive for consolidating and strengthening concrete slabs and reinforced joints.

- ▶ Adhesive strength (shear) $> 10 \text{ N/mm}^2$
- ▶ Tensile strength for flexure $> 40 \text{ N/mm}^2$
- ▶ Coverage: **1.0 - 1.2 kg/m² ca.** (hopper spray gun)
1.5 kg/m² approx. (roller or flat brush, depending on the unevenness of the support)
- ▶ CE marking: EN 1504-4
- ▶ Certification: Politecnico di Milano



LIGHTWEIGHT STRUCTURAL CONCRETES

▶ Reference drawings: 1.D - 1.Ha - 1.la - 1.lb - 1.J - 1.K - 1.L - 2.D - 5.C

LATERMIX BÉTON 1400



The lightest.

- ▶ Density **approx. 1400 kg/m³**
- ▶ Compressive strength **R_{ck} 25 N/mm²**

LATERMIX BÉTON 1600



Light and strong.

- ▶ Density **approx. 1600 kg/m³**
- ▶ Compressive strength **R_{ck} 35 N/mm²**

LATERMIX BÉTON 1800



The strongest, fibre reinforced.

- ▶ Density **approx. 1800 kg/m³**
- ▶ Compressive strength **R_{ck} 45 N/mm²**

LIGHTWEIGHT SCREEDS

▶ Reference drawings: 1.D - 2.D - 5.C

LATERMIX FAST



Quick drying.

- ▶ Density **approx. 1200 kg/m³**

LATERMIX FACILE



Multipurpose.

- ▶ Density **approx. 1000 kg/m³**

LATERMIX FORTE



Shrinkage compensated.

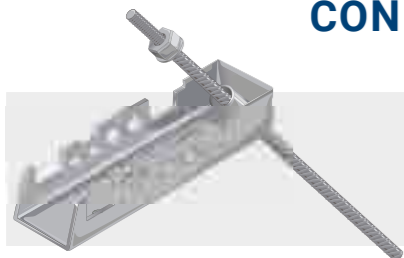
- ▶ Density **approx. 1050 kg/m³**

PERIMETRO FORTE

▶ Reference drawings: 1.Ia ■ 1.Ib ■ 1.J ■ 1.K ■ 1.L ■ 3.A

PERIMETER CONNECTOR

PERIMETER CONNECTOR



Connector for perimeter connection between floor and walls and anti-seismic encircling, available in lengths 315, 515, 715 mm.

- ▶ Ultimate tensile load **15 kN**
- ▶ Ultimate shear load **8,2 kN**
- ▶ Stiffness of the connection **7,5 kN/mm**
- ▶ Certification: University of Bergamo



CHEMICAL ANCHOR

CHEMICAL ANCHOR



Special high-performance two-component resin for fixing CentroStorico Perimeter Connector.

- ▶ Recommended tensile load (bar \varnothing 12):
2,8 kN (solid brick) | **13,5 kN** (concrete C20/25)
- ▶ Recommended shear load (bar \varnothing 12):
3,9 kN (solid brick) | **17,4 kN** (concrete C20/25)
- ▶ Excellent structural adhesion and high bonding capacity. Allows monolithicity to be obtained with the Perimeter Connector system.

METAL SLEEVE



In the case of rough, irregular and heterogeneous stone walls, it is recommended to use the special metal sleeve (available on demand) to avoid dispersing the Chemical Anchor.



ULTRA-LIGHTWEIGHT CONCRETES

▶ Reference drawings: 1.Ha ■ 1.Ia ■ 1.Ib ■ 1.J ■ 1.K ■ 1.L

CENTROSTORICO LIME BASE LAYER



NHL 3,5 based ultra-lightweight concrete - Fine size grade.

- ▶ Density **approx. 700 kg/m³**
- ▶ Compressive strength **R_{cm} 2 N/mm²**

LATERMIX COM MINI



Ultra-lightweight concrete - Fine aggregate size.

- ▶ Density **approx. 600 kg/m³**
- ▶ Compressive strength **R_{cm} 5 N/mm²**

LATERMIX CEM CLASSIC



Ultra-lightweight quick drying no fines porous concrete - Mid size grade.

- ▶ Density **approx. 600 kg/m³**
- ▶ Compressive strength **R_{cm} 2,5 N/mm²**

LATERMIX CEM MAXI



Ultra-lightweight quick drying no fines porous concrete - Coarse size grade.

- ▶ Density **approx. 450 kg/m³**
- ▶ Compressive strength **R_{cm} 1 N/mm²**



Sales information: info@ruregold.it

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Laterlite



Laterlite

Laterlite S.p.A.

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RUREGOLD

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