RENO MATTRESSES INSTALLATION MANUAL

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DESCRIPTION OF REVISIONS SINCE THE LAST VERSION
ETA Certification; Construction site management; Mattress closing on steep slope

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NOTICE AND ASSUMPTIONS

MACCAFERRI (also the “Company”) supplies all components and accessories which shall be used for construction of the Reno mattresses structures described in detail in the Construction Designs approved and accepted by the Contractor.

This manual (hereinafter also the “Manual”) represents a guide to the construction and gives practical guidance for the organization and control of the related operations. The Contractor’s personnel (site agent, foreman in charge of the works, etc..) and the Engineer’s staff shall be aware of the contents of the manual before the delivery of the materials to site.

The Manual is addressed to the Contractor only. The content is confidential and, save as provided below, is for discussion with, and use by, the Contractor (and no one else) and the latter shall not be entitled to assign, transfer or charge any information and/or interest it may have in the Manual. No other person/entity is entitled to rely on the Manual for any purpose whatsoever and MACCAFERRI accept no responsibility, duty or liability to any other person in respect of the contents of the Manual.

Neither this Manual nor the data contained herein shall be reproduced, used or disclosed to anyone without the written authorization of MACCAFERRI; in this regard the Manual should not be provided, without our prior written specific consent, to anyone other than the Contractor and only on the basis that it is strictly confidential; it being understood that MACCAFERRI accept no liability to them, they should not rely on it and they should not provide copies of it to any other person.

The instructions given in the Manual are of a general nature, and do not, therefore, exempt the Contractor from the obligations and responsibilities for the definition and correct execution of all the specific operations required for implementation of the project (construction sequence, loading and unloading procedures, safety plans, etc.). In such respect, MACCAFERRI will not be liable for any inaccuracies or omissions in the execution results and will not bear the consequences of any connected liability. The details given in this manual do not exempt the Contractor from compliance with the Construction Designs, Technical Specifications, Conditions of Contract provided by third parties and safety requirements related to the site. In any case, the Manual does not replace the Construction Designs realized by the appointed project designer.

At regards, when the structure to be installed has some special details, these will be defined in the Construction Design drawings. In the case of ambiguities or discrepancies between the Construction Design documents and this manual, the former documents will take priority.

If requested, MACCAFERRI, will send a technician to site at the start of construction to assist the Contractor in setting up the correct execution procedures, being understood that such activity shall not entail any obligation of result for MACCAFERRI

This installation Manual is not intended to provide to the Contractor an exhaustive summary of guidance for the organization and control of the related operations regarding Reno mattresses. All possible issues which may arise in connection with this Manual shall not be attributed to MACCAFERRI

Where the installation Manual reproduces or summarizes any information and/or description concerning the RENO MATTRESSES, MACCAFERRI does not accept any responsibility, duty or liability for the truth, accuracy or completeness of such information or opinion in any way whatsoever (including whether or not such information or opinion is misleading, by omission or otherwise).

1. INTRODUCTION

Reno mattresses are units manufactured from double twisted hexagonal woven steel wire mesh 6x8 type. They are produced in compliance with CPR - Construction Product Regulation 305/2011 and UNI EN 10223-3:2013, having EC marking in compliance with ETA-15/0219.
The management and production system is certified in compliance with standards ISO 9001 and ISO 14001.
Reno mattresses are divided into uniformly portioned cells by internal diaphragms positioned at 1 meter lateral centres; the diaphragms are created by inserting an upright double-mesh fold in the base panel, which improves diaphragm stability during filling operations.
Reno mattresses are filled with stones at the project site to form flexible, permeable, monolithic structures such as river bank protection and channel linings for erosion control projects. In order to reinforce the structure, all mesh panel edges are selvedged with a wire having a greater diameter.

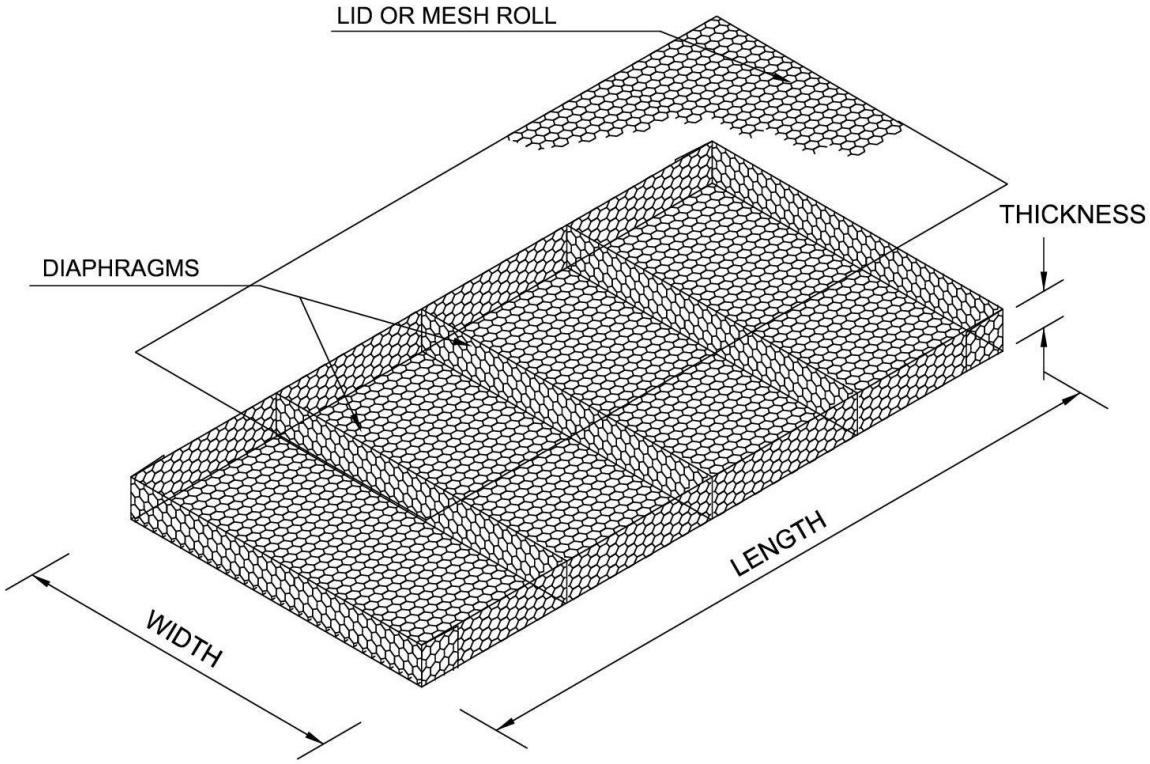

Fig. 1 - Reno mattress unit

2. IMPORTANT INFORMATION

2.1 RESPONSIBILITIES

The Contractor is responsible for a correct execution of the works in compliance with the Construction Design documents, the Technical Specifications and the Contract Documents (not provided by MACCAFERRI). In order to assist the Contractor, MACCAFERRI provides the recommendations contained in this manual, but they in no case relieve the Contractor of the responsibility to comply with all the current safety regulations and procedures. MACCAFERRI will not be liable for any inaccuracies or omissions in the execution results and will not bear the consequences of any connected liability.

The Contractor and the Client must check that the site personnel appointed for performance of the works are in possession of a copy of this Manual and are aware of its contents.

If previously agreed with the Contractor, the Technical Representative of MACCAFERRI will be present on site during the initial phases of the works. The Technical Representative will assist the Contractor in planning the deliveries and will provide advice on the installation procedures recommended for the Reno mattress as described in this Manual, being understood that the Technical Representative's assistance shall be considered as mere support to the Contractor and it shall not be binding for the latter, which shall assume all responsibility connected to installation and execution procedures.

This Technical Representative will not be present on site for the entire duration of the works, and shall not be considered as a substitute of the supervision and quality control staff appointed by the Contractor and the Client.

2.2 CONSTRUCTION DESIGN

Before starting any operations on site, the Contractor must ensure that the latest version of the related Construction Design, duly approved for Construction, is used for construction of the structure.

The Contractor must also carry out topographical survey checks to ensure that the structure is constructed in the required position.

2.3 MATERIALS AND REQUIREMENTS BEFORE STARTING

This work shall consist of furnishing, assembling and filling woven wire mesh Reno mattresses with rock as specified in the contract to the dimensions, lines and grades shown on the plans, or determined by the engineer.

Reno mattresses

Reno mattresses are manufactured with all components mechanically connected at the production facility with the exception of the lid, which is produced separately from the base.
All Reno mattresses are supplied in the collapsed form, folded and bundled for shipping. The bundles are compressed and strapped together at the factory for shipping and handling.
Reno mattress bases and lids may be packed in separate bundles.
Lacing wire is shipped in coils having a diameter approximately 0.60 m; fasteners are shipped in boxes.

Fig. 2 - Bundle of Reno mattress units

Ring fasteners, lacing wire and stiffeners for binding operations

To increase the installation productivity, steel ring fasteners are used to connect empty units and to close and secure filled gabions.

The rings are supplied in box (1600 rings/box) which must be stored in dry environments. These rings are available Galmac coated for the use with the corresponding type of material, or stainless steel for use with polymer coated mesh in highly corrosive environments.

The indicative amount of rings depends on the size of the mattress units.

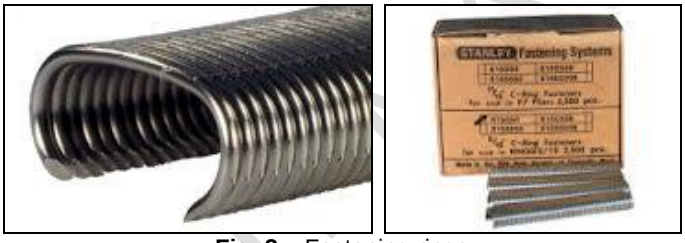

Fig. 3 – Fastening rings

MATTRESSES	RINGS
H = 0.17 - 0.23	15-18 /m^2
H = 0.30	18-20 /m^2

Tab. 1 - Suggested number of rings

Lacing wire is also used to assemble and interconnect the units; sufficient lacing wire is supplied in coils with each unit to enable assembly (Fig. 4). For Galmac and polymer coated gabions, Galmac and polymer coated lacing wire is used.

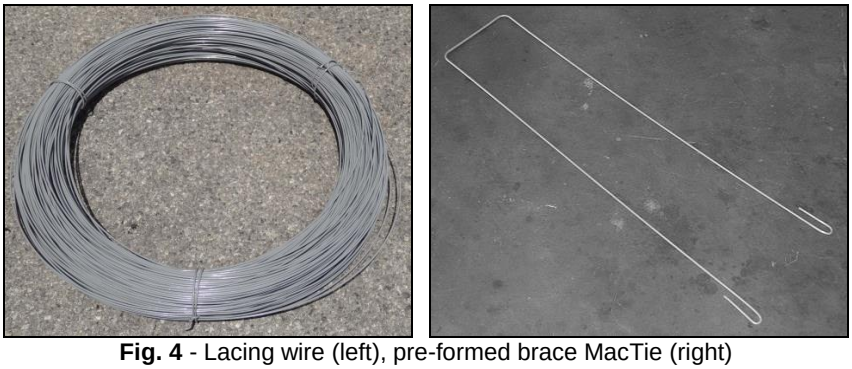

Fig. 4 - Lacing wire (left), pre-formed brace MacTie (right)

Ensure that the correct type of lacing wire is available for use with the required structure, see table 2:

PRODUCT	COATED	MESH TYPE	MESH WIRE DIAMETER (mm)	LACING WIRE DIAMETER (mm)
MATTRESSES	GALMAC	6x8	2.20	2.20
	GALMAC + POLYMER		2.20/3.20	2.20/3.20

Table 1 – Lacing wire diameters

Geotextile

A MacTex (nonwoven) geotextile must be placed at the soil-mattress interface for separation/filtration purposes. Ensure that the correct type, grade and quantity is delivered to the site. The MacTex range of geotextiles has been developed specifically for mattress related applications and is available in various grades for different applications.

Gabion stones

Ensure that the correct quality, grading and quality of rock is available for the completion of the works. Rock used should be clean, hard, angular to round, durable and of such quality that they shall not be damaged on exposure to water or weathering during the life of the structure.
The rocks should be also well graded between 75 mm and 150 mm.
The range in sizes may allow for a variation of 5% oversize and/or undersize rock, provided it is not placed on the mattress exposed surface.

Tools

To aid the lacing and bracing operations, the use of pliers tight joints is recommended.
Care shall be taken to avoid damaging to the wire coating. The teeth of the pliers should be ground to a smooth finish. Do not use fencing pliers as they damage the polymer coating. Care shall be taken when using crowbars for closing the lids as this also damages the coating.
Available tools suitable for fasteners rings are shown in Fig. 5 and Fig. 6: Pneumatic (to be connected to a 6-7 bar air compressor, air pipe Φ max 10 mm and max length 30 m) or manual lacing guns.

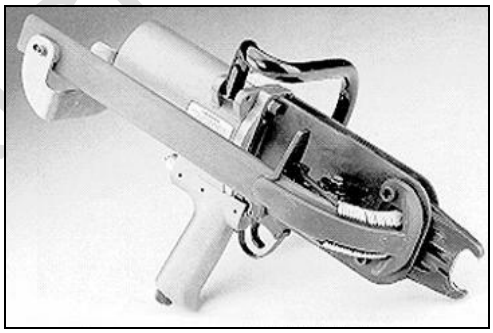

Fig. 5 – Pneumatic lacing tool

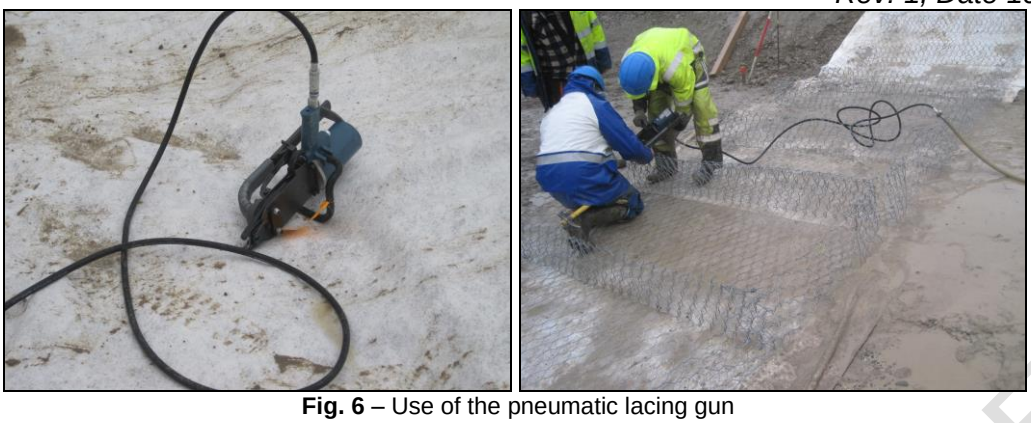

Fig. 6 – Use of the pneumatic lacing gun

Delivery and storage of materials on job site

Reno mattress units are delivered to the warehouse storage or construction site. The staff of the contractor is responsible for checking that the materials are supplied carefully in order to:

1. Ease loading and unloading
2. Avoid risk of damage during transportation
3. Keep the area accessible for any inspection controls
4. Promptly report any anomaly for the acceptance of the goods.

The delivered material is labelled so that the characteristics can be read and the products can be properly identified and used by the staff responsible for installation.

2.4 CONSTRUCTION SITE MANAGEMENT

Reno mattress installation shall be managed as earthworks. The installation productivity will depend directly on the optimal management of the construction site. Installation includes mattresses laying and earthworks.

Overview of the different installation phases
(1- Geotextile laying; 2- Reno mattresses laying; 3- Reno mattresses filling with stones)

2.5 REQUIRED MACHINERY FOR INSTALLATION

- **Reno mattresses unloading** – The units can be transported by a minimum of two workers. The unloading from trucks shall be carried out with the help of handling equipment (mechanical shovel, manuscopic…).

- **Stone filling** – The stone filling shall be transported by trucks and unloaded with the help of mechanical shovels. The filling of the units shall be carried out with the help of mechanical shovel whose weight and arm length shall be adapted to the construction site configuration. The choice of the machinery is left to the contractor as it depends on the condition of access to the site and the volume of soil fill.

2.6 REQUIRED EQUIPMENT FOR INSTALLATION

- Equipment for topographic location
- Pliers, pincers, scissors
- Ring fasteners and lacing guns

2.7 ESTIMATED WORKING TEAM

- 1 foreman (responsible for installation)
- 4 workers

2.8 WORK TO BE DONE BY THE CONTRACTOR

- Preparation of the construction site, including the foundation level, if necessary replacement of foundation soil and installation of drainage systems, impermeable membranes, geotextiles if they are included in the construction drawings.
- Preparation of the laying surface for reno mattresses
- Safety devices installation
- Unloading and stock of materials
- Installation of reno mattresses and stone filling
- Preparation of the systems required for the access and the maintenance of the construction site (access roads, banks, lateral draining channels, protections against bad weather)
- Soil covering of Reno mattresses (if present)

2.9 OPTIONAL SERVICES PROVIDED BY MACCAFERRI

If requested, MACCAFERRI can provide the following services:

- Drawings used to obtain the BOQ of the elements required to build Reno mattress structures
- Delivery to the site of the material provided (F.O.B.), considering an unloading time, from the arrival at site, of maximum two hours.

2.10 MATERIALS PROVIDED BY MACCAFERRI

MACCAFERRI will provide the following materials:

- Reno mattress units
- Ring fasteners and tools
- MacTex Geotextile

The Certificate of conformity for the above-mentioned materials are supplied by MACCAFERRI It is, however, the Contractor's responsibility to check that all the materials received comply with the Delivery Documentation and the Construction design requirements.

Any discrepancy must be recorded on the Delivery Documentation (or proof of delivery) at the time of unloading and immediately notified to MACCAFERRI

3. FOUNDATION

3.1 FOUNDATION PREPARATION

The foundation on which mattresses are to be placed shall be level and graded to the elevations as shown on the project construction drawings (Fig. 7).
The foundation shall be smooth and free from surface irregularities, loose material and vegetation, in accordance with the project specifications.
Appropriate measures shall be taken for filtering and drainage of the foundation, as per the project specifications (filter cloth, drain works, etc.).
A geotextile Mactex shall be installed first, behind or underneath Reno mattress structures, to comply with the requirements for subsurface drainage applications.

Fig. 7 – Mattresses foundation levelling

3.2 SETTING OUT

Points marked should be start of the wall, end of wall and any internal/external angle changes or steps. Points required to be marked out must be at the front of the toe wall i.e. front base of wall at top of foundation level.

4. GABION ASSEMBLY

4.1 FLATTENING THE UNITS

Workers shall ensure to have a safe open level area adequate for opening the units.
Each individual unit will be removed from the bundle; mattresses shall be opened, unfolded and pressed out to their original shape. If necessary use a board to form the folds at the ends and sides and then lift these into the vertical position.

4.2 ASSEMBLING AND LACING THE INDIVIDUAL UNITS

Front, back and end panels shall be lifted to a vertical position to form an open box shape (Fig. 7, 8, 9).
End flaps shall be folded and/or overlapped as appropriate; panels shall be fastened together with the projecting heavier wire by firmly wrapping the selvedge wire around the selvedge or edge of the intersecting panel, or back panel.

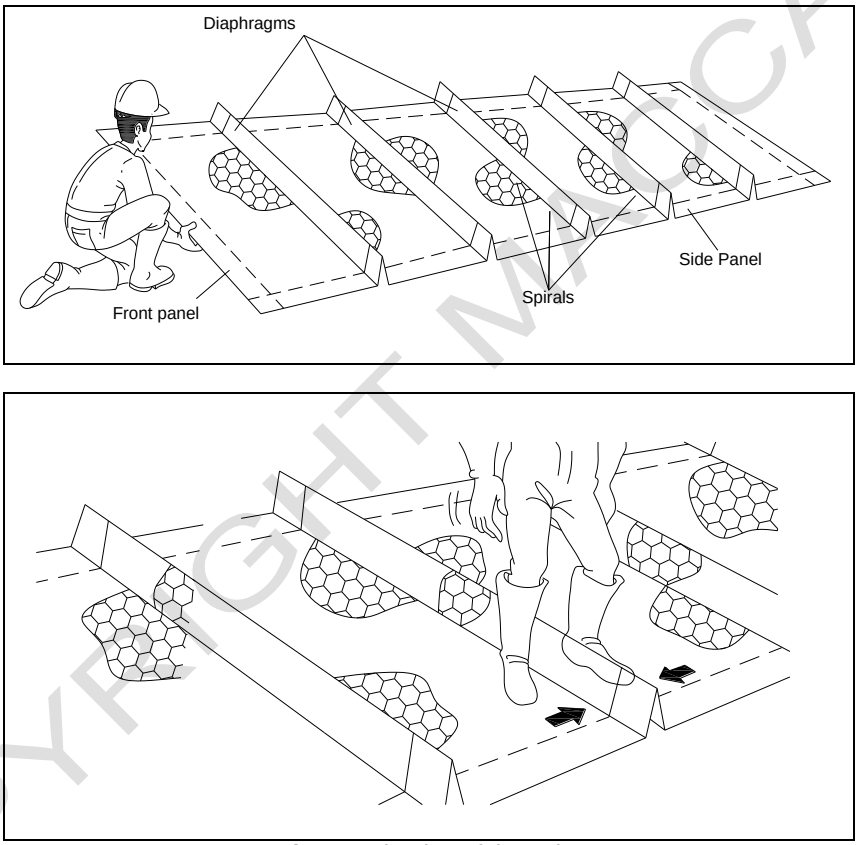

Fig. 7 – Shaping of the units

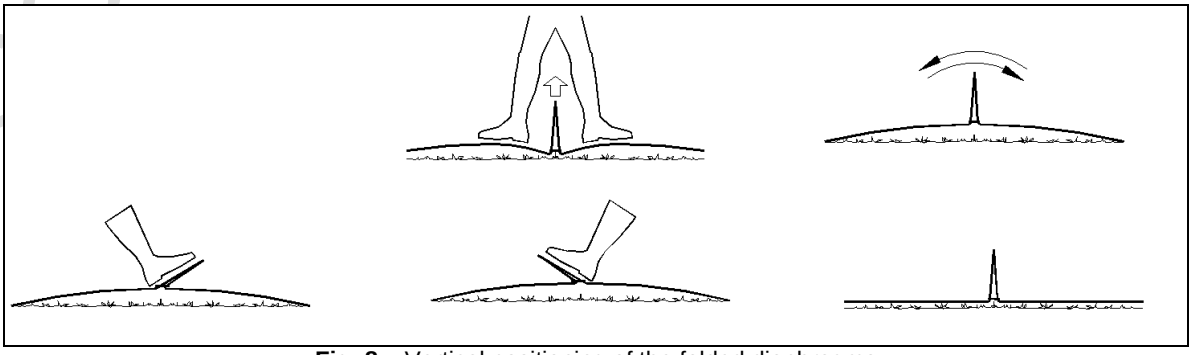

Fig. 8 – Vertical positioning of the folded diaphragms

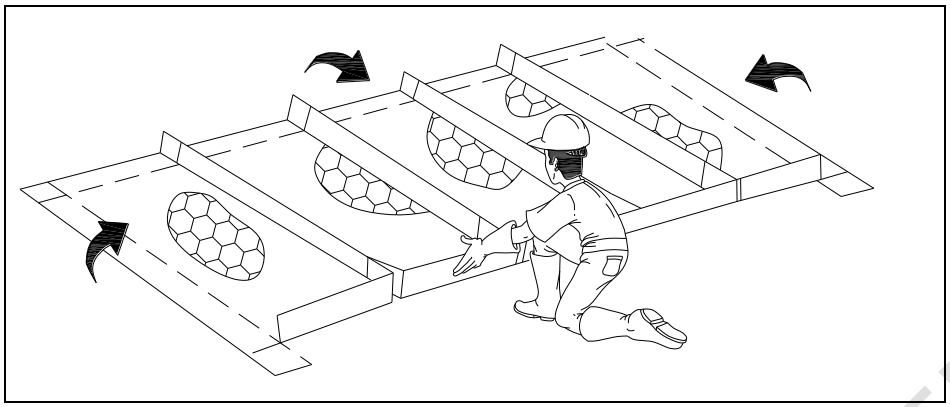

Fig. 9 – Vertical positioning of edge panels

Fold in the flap of the side panel and fasten to diaphragm (fig. 10).

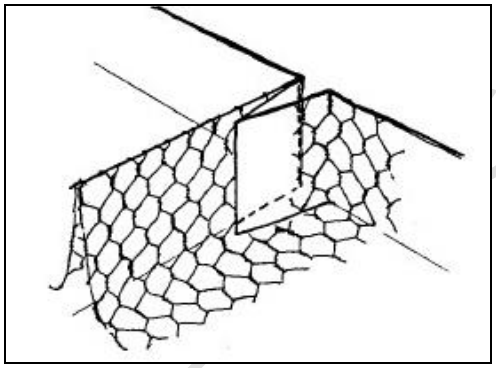

Fig. 10 – Folding in of the side panel flaps to diaphragm

Secure the lacing at the top corners of the panels to be joined and fastened from the top down.
If rings are used, they shall be installed at the top and the bottom connections of the end and centre diaphragms; a maximum spacing of 200 mm along all edges shall be used (Fig.11).

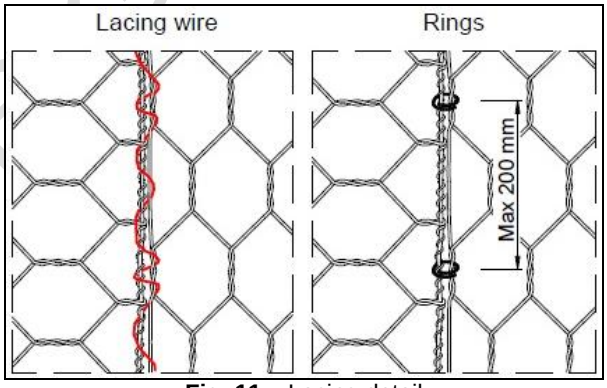

Fig. 11 – Lacing detail

4.3 PLACING THE UNITS

The placement of the Reno mattresses shall be in close conformity to the lines and grades as shown on the plans.
The pre-assembled mattresses shall be placed in position empty and shall be tied or fastened to adjacent mattresses along all contacting edges in order to form a continuously connected monolithic structural unit.

On slopes, the mattress shall be laid with the width perpendicular to the slope except for very small ditches. If the banks and bed are to be covered completely, the units of the bed should be laid in the direction of flow (fig. 12).

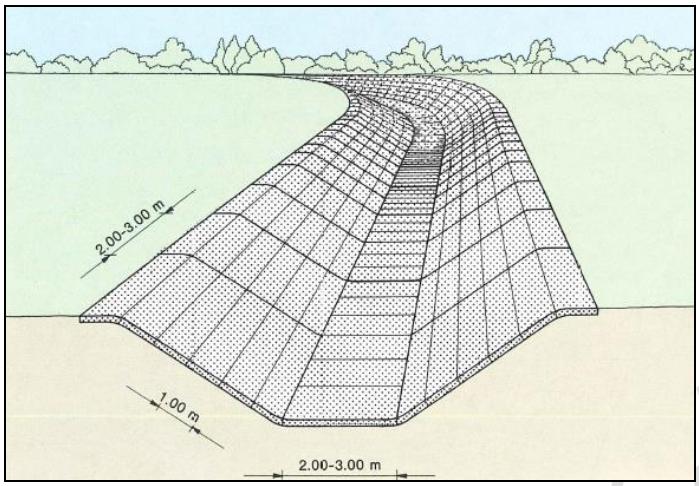

Fig. 12 – Placing Reno mattress on banks and bed

Mattresses shall be placed and securely attached while empty: empty units can be hardly connected to adjacent units already filled.
Mattresses can conform to bends up to a radius of 18-20 m without alteration and placed to the require curvature for filling; mattresses may be cut to form curves or bevels.
Where mattresses are to be placed on steep slopes (1.5 H/1 V or steeper), the unit may be secured by anchoring systems (hardwood pegs, pipes, steel bars, etc.) driven into the ground just below the upper end panel (Fig. 13). Diameter, distance apart and the length of the anchoring system shall be established by the engineer based on the slope, mesh opening and strength, mattress thickness or as specified in the project specifications

Fig. 13 – Staking of the upper end cell for installation on steep slopes (>1V/1.5H)

In case of steeper slopes (inclination greater than 40°), stone filling and the following lid closing shall be done starting from the bottom part of the mattress. The following stone filling and lid closing phases shall be carried out going upwards until the complete closure of the reno mattress.

4.4 FILLING AND BRACING THE MATTRESSES

Rock sizes shall be in accordance with Section 2.3.
Mattresses can be filled by any suitable appropriate size machine, such as a backhoe, crane, etc. Care shall be taken when placing the stone to ensure that the polymer coating on mattresses is not damaged; in general, the introduction of filling materials is performed using an excavator equipped with a large bucket, ditching bucket type; in this case the falling height of the filling material should not exceed 0.75 m.
Sufficient hand manipulation of the rock shall be performed to minimize voids and result in a maximum density of rock in the mattress, especially in the corners.
Each compartment shall be filled with a minimum two layers of rock to ensure uniform flexibility of the unit. Within the required range, large stones may be acceptable provided they have a flat shape and they are laid on the bottom of the unit.
On slopes, start the filling at the bottom (Fig. 14). Filling shall be done unit by unit, but several units shall be ready for filling at any one time. Adjacent lids can be securely attached in one operation. In cases where a number of adjacent bases are to be covered simultaneously, rolls of mesh can be used in place of unit size lids.
Ensure that the diaphragm tops are accessible for their fastening to the lids.

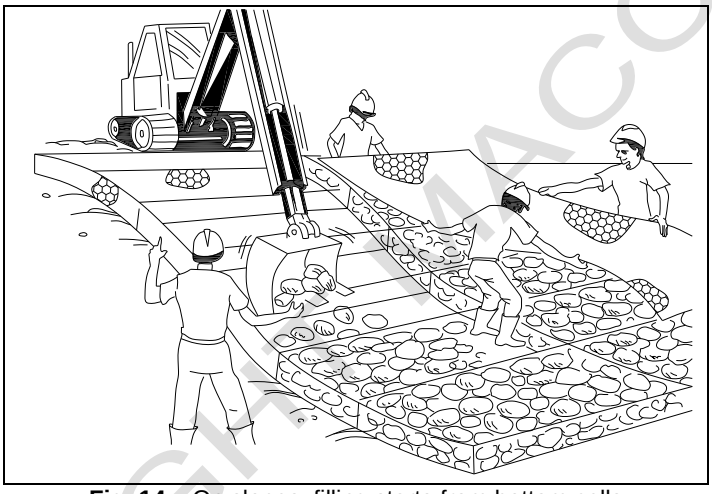

Fig. 14 – On slopes, filling starts from bottom cells

4.5 CLOSING

Fold the lid down, stretch into position with the aid of a suitable tool (Fig. 15), lace the lid to the front, the ends and the top of the diaphragm.
Securely attach the lids to the ends of the mattresses and then securely attach them to the sides and diaphragms, using alternate double and single loops or steel wire ring fasteners.

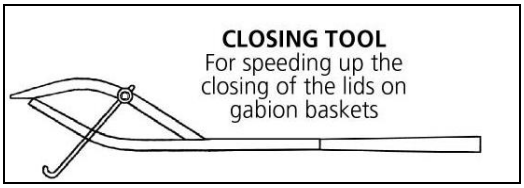

Fig. 15 – Closing tool

To allow for settlement, level off the fill 25 mm above the top of the mesh.
Lay the lid down, pull the edges of the panels to be connected where necessary using appropriate tool as a lid closer. The lids shall be tightly laced along all edges, ends and diaphragms in the same manner as described for assembling. Adjacent lids may be securely attached simultaneously. Securely fasten the lids to the ends of the mattresses and then securely attach them to the sides, and diaphragms.

In cases where a number of adjacent bases are to be covered at one time, rolls of mesh can be used in place of unit size lids (Fig. 16).

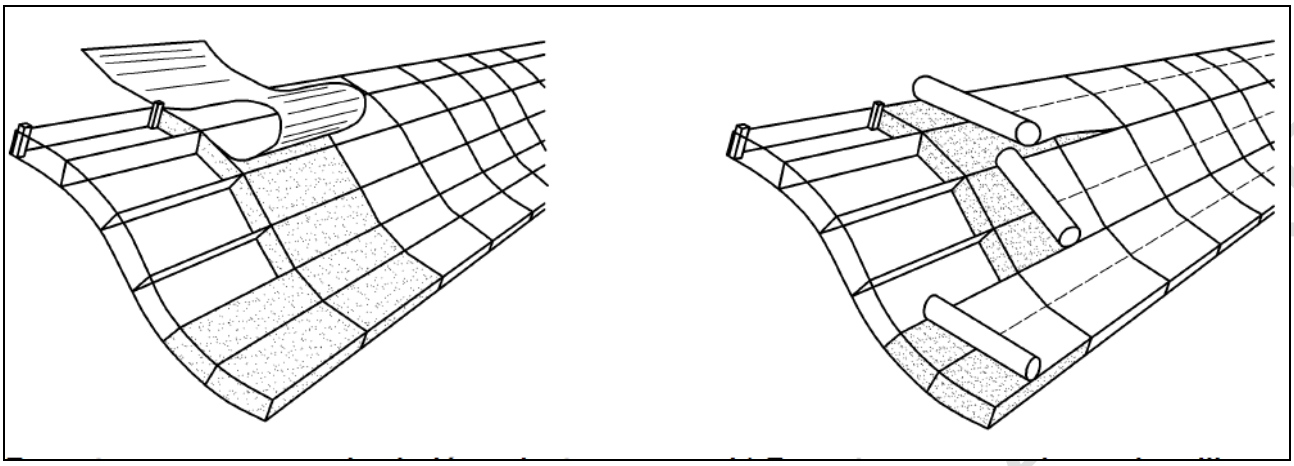

Fig. 16 – Closing with lids (left) or mesh rolls (right)

5. CONSTRUCTION DETAILS

5.1 ADDITIONAL CONSIDERATIONS FOR PLACEMENT

Geotextiles placement in channels
Placement of the geotextiles must be performed from the lowest channel elevation working up to the highest elevation. Install staples or pins to retain geotextile for subsequent placement of the mattresses system; this allows the geotextile to be shingled over the downstream panel.
Furthermore, this ultimately prevents water from flowing beneath the geotextile and erosion of the foundation soil. The placement pattern is depicted below.

Fig. 17 - Installation of geotextile with a shingled overlap

Steep slopes
It is generally recommended to use anchors when installing mattresses on slopes steeper than 3H:2V to guarantee stability. As alternative or in addition to the anchoring system shown in Section 4.3, Reno Mattresses can be secured by the inclusion of a gabion anchor trench at the top of the slope (Fig. 18).

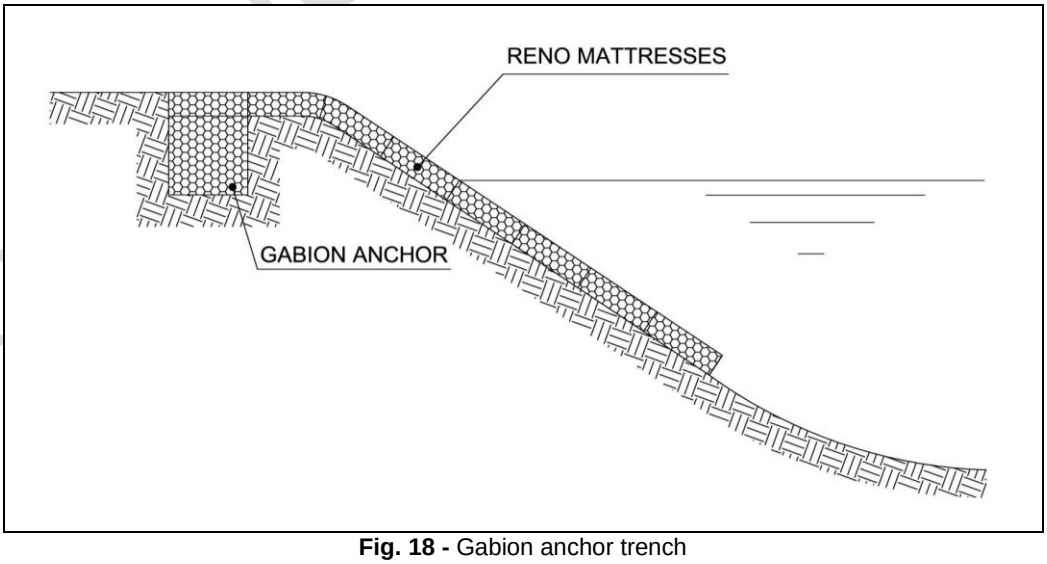

Fig. 18 - Gabion anchor trench

Double lid
Whenever heavy solid transport may cause abrasion damages to the wire mesh, double lid for the mattress units is recommended in order to assure their long durability.

5.2 INSTALLATION IN CORNERS AND CURVES

Curved structures create special considerations with Reno mattresses details. Two different placement procedures are available for convex and concave curves:

- Method 1 - Mattresses are to be cut and butted to form curves (Fig. 19);
- Method 2 - Mattresses are to be overlapped to form curves (Fig. 20).

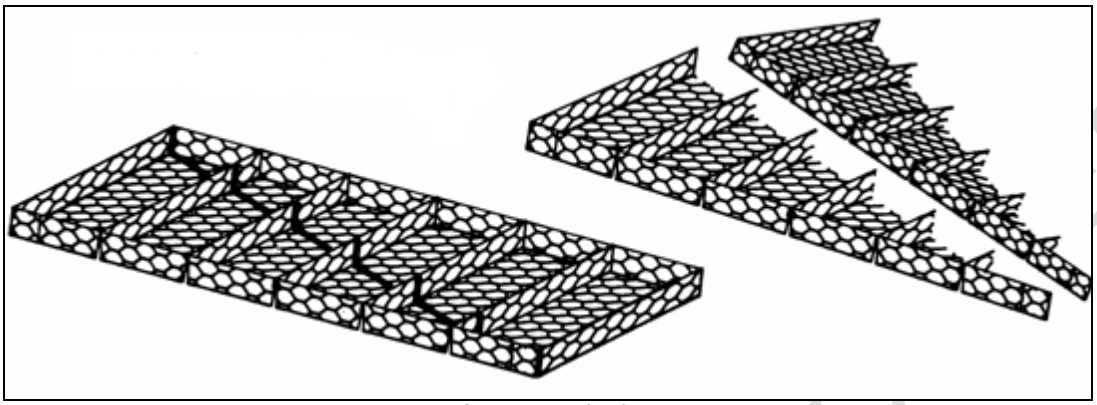

Fig. 19 - Method 1

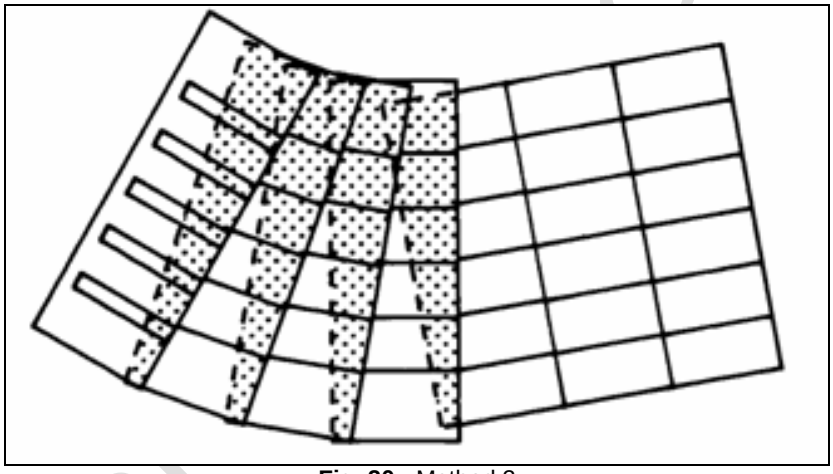

Fig. 20 - Method 2

5.3 INTERFERENCES, OBSTRUCTIONS AND FACING PENETRATIONS

Obstructions are structures which extend through the mattress unit and these are commonly due to utilities such as pipes; the mattress element should be designed to fit around the pipe such that these are stable.

Pipes penetration

The steel wire mesh of mattresses faces should be cut and bent into the inner side of the mattress in order to make way for the pipe. Fill the mattress element with stones up to the elevation if the pipe base and at this point place the pipe through the mattress and cover it with a protective mean if requested by the pipe manufacturer. The circle edges of the steel mesh should be tied using lacing wire and finally continue filling with stones up to the top of the mattress element.

Fig. 21 - Pipe crossing through a mattress unit

Vegetated mattresses

In order to accelerate the natural process of vegetation growth, live willow cuttings can be inserted in between the stones in the unit. Cuttings should extend into the soil underneath the mattress units, so the perforation of the MacTex N geotextile is needed.

Furthermore, top soil can be placed between the stones to fill the voids in the mattress to create a better environment for the development of the vegetation.

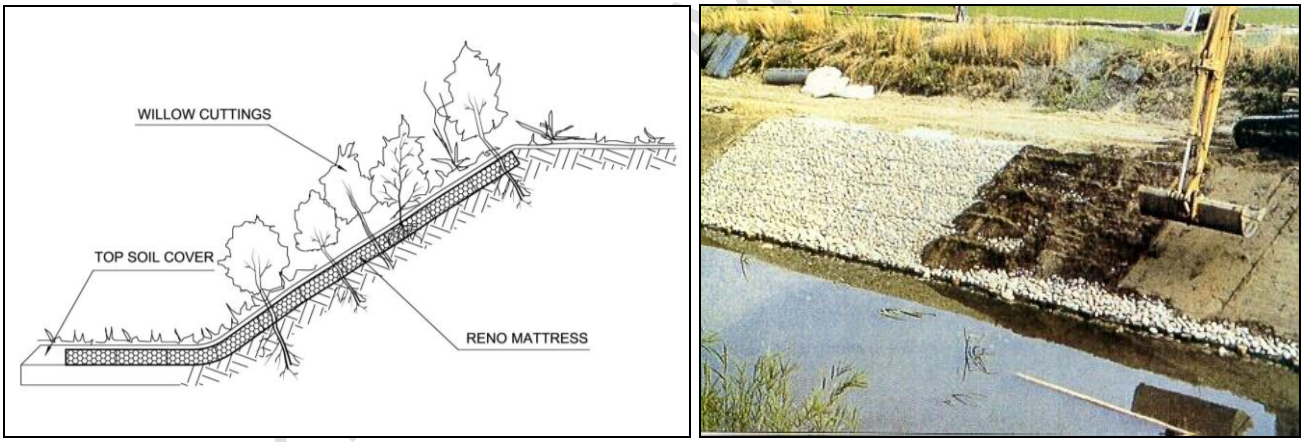

Fig. 22 - Vegetated mattresses

6. CAUSE-EFFECT RELATIONS

Gabions structures must be constructed in strict compliance with the structural requirements shown in the drawings and technical specification of the construction design and in the contract documents. The required result is obtained by the use of high-quality materials, adoption of the correct installation procedures and careful supervision of the works. In case improper practices or inacceptable deformations are observed, the necessary corrective measures must be adopted right away to ensure that the structure is brought back to the acceptable level.

Some of the most common and probable cause-effect relations are given in the following table.

<table>
<tr><th>CAUSES</th><th>EFFECTS</th></tr>
<tr><td>• Filling material too big
  </td><td rowspan="2">Scour of the foundation soil</td></tr>
<tr><td>• Absence of geotextile</td></tr>
<tr><td>• Filling material too fine</td><td>Loss of filling material</td></tr>
<tr><td rowspan="2">• Poor anchor on top of slope</td><td> 
Mattress sliding</td></tr>
<tr><td>• Solid transport not properly considered</td><td>Excessive abrasion of the mesh</td></tr>
</table>

7. MAINTENANCE

This section is intended to provide operational instructions in case the need arises for reparation works to the Reno Mattress, used for river bank protections and channel linings for erosion control projects.
Such interventions may be required due to local damage due to accidental events such as impacts with earth moving machines, vehicles or falling boulders, falling stones, floating objects (i.e. trunks, boats, ships), vandalism.
The prompt reparation of the damaged is important to restore designed effectiveness and to prevent damage or erosion of the slope or stream bank.

7.1 IRREGULARITIES

The following items have to be considered:
Mud should be removed from the exposed faces to facilitate inspection,

- Check for failed connections. Replace connections as necessary,
- Check for broken wires,
- Check signs of corrosion and coating damages,
- Check for developing voids within mattress. These mattresses will need to be opened up and refilled to ensure that stones do not move excessively and damage mesh under flow,
- Check for signs of undercutting or other instability of the system.

Denting and/or lid rupture caused by impacts
Deformation of the external surface of the lining structures may occur due to the impact of falling stones, floating objects, etc.; in the most severe cases, the wire mesh of Reno Mattress can be damaged and eventually cause a partial loss of the stones filling Reno Mattress.

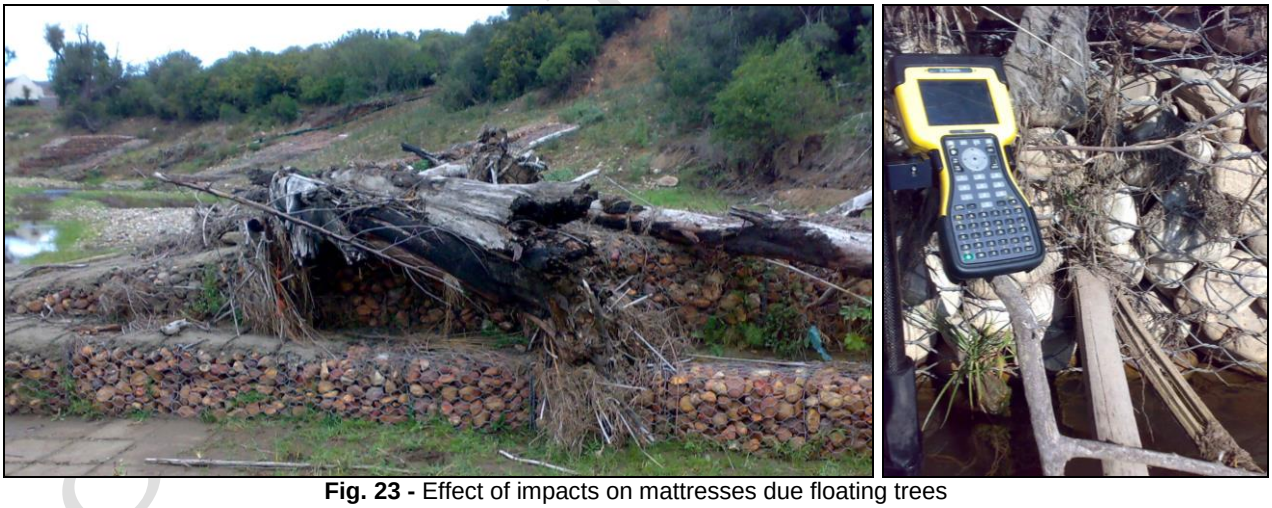

Fig. 23 - Effect of impacts on mattresses due floating trees

Abrasion caused by water flow
Reno Mattress used in river training works (such as for weirs, gabions, groynes) may be damaged by the mechanical abrasion due to suspended or bed load material transported by the river, which may also cause a partial loss of the stone fill.

7.2 CONTROLS PERFORMED BY QUALIFIED PERSONNEL

Controls have to be performed after the completion of the work by qualified personnel (surveyors and/or engineers, geologists).
The staff should have a maintenance manual where to record the detected problems, their extents and the expected repair costs, each time there is a control.

7.3 MAINTENANCE MADE BY QUALIFIED PERSONNEL

Fixing units due to denting and/or lid rupture caused by impacts

These areas should be patched with a new lid or the mattress should be removed and replaced. Immediate remediation may or may not be necessary, but should be considered as a recommended course of action.

The intervention shall consist of:

- Cutting and removal of the damaged DT lid;
- Filling the voids, if any, with stones, taking care to use stones of the appropriate size;
- Installation of a double twist wire mesh lid (with the same coating as the existing mesh) ensuring at least 20 cm overlap with the surrounding undamaged mesh;
- The double twist wire mesh lids shall be connected to the adjacent undamaged panels by C rings or lacing wire.

Fixing units due to abrasion caused by water flow

Same as above.

8. INSTALLATION PRODUCTIVITY

The installation productivity is dependent on face area, slope angle, length and access to working area.
By making reference to a typical 5 men working team (1 foreman, 1 backhoe loader operator, 3 workers) operating 8 hours a day, the following rates can be assumed for Reno mattresses (including the stone filling):

Mattress Height (m)	Units	Crew	Average productivity per crew	
			Minimum Unit/ Day / Crew	Maximum Unit/ Day / Crew
0.23-0.30	m^2	5	100	250

LIMITS OF RESPONSIBILITY OF MACCAFERRI

The installation manual is realized in order to show how the various elements have to be assembled in order to realize the Reno Mattress, it being understood that such installation manual is not intended to provide to the Contractor an exhaustive summary of guidance for the organization and control of the related operations relating to the construction of Reno Mattresses.

The Company reserves the faculty to bring modifications, integrations or improvements to the Manual, without that this can constitute reason to think inadequate the previous revision.

The Company declines every responsibility in case of:

- Accidents or incidents for improper use of the installation kit;
- Accidents or incidents that could happen during the installation of the elements;
- Wrong installation, lacked or wrong observance of the instructions supplied in the present Installation Manual;
- Any modifications not authorized from MACCAFERRI;
- Installation done by staff not adequately trained and equipped.

and more in general MACCAFERRI will not be liable for any inaccuracies or omissions in the execution results and will not bear the consequences of any connected liability.

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The quality of the installation depends also from the scrupulous observance of the Installation Manual, that it must be read before carrying out the installation of Reno Mattress.

At regard, in the construction of RENO MATTRESSES only the geometrical configurations and the components reported in the present Manual are admitted. Eventual variations must be preliminary agreed in writing with MACCAFERRI. In any case, the Company will not bear the consequences of any liability regarding the execution of RENO MATTRESSES.

Notwithstanding the above, the Manual shall not be considered as a Construction Design and, in no case, shall replace or substitute the technical drawing or projects approved by the relevant competent authority. Therefore, the Manual shall be considered only as a mere support to Contractor being understood that the latter shall be the sole responsible of the execution of Reno Mattress.

The information contained in this Manual is subject to change by MACCAFERRI without prior notice. MACCAFERRI gives no warranty of any kind whatsoever, either explicitly or implicitly, with respect to the information contained herein.

MACCAFERRI shall not be held responsible for damages of any kind, including – without limitation – bodily harm, injury or damage to property, in connection with handling system, installation, or compliance or non-compliance with the instructions set forth in this Manual.