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Installation Instructions

Maccaferri Box Gabions and Reno Mattress units

**The General notes on pages 1 and 2 must be
studied first**

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General Information

PLEASE READ THIS GENERAL SECTION BEFORE STARTING INSTALLATION

Maccaferri Box Gabions and Reno Mattress units are easily and quickly assembled by unskilled labour after the minimum of instruction. The information in this leaflet will help to ensure that a well packed, structurally sound, durable and attractive structure is obtained.

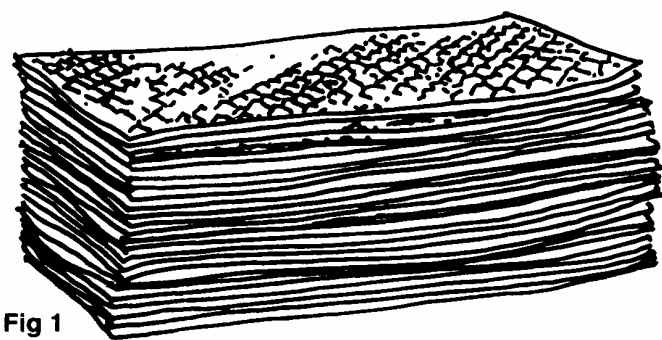


Fig 1

Packing

See Fig 1. The units are delivered to site folded flat and compressed into bundles weighing around 7/800kgs. The type and size of unit determines the number in each bundle. **Box Gabions** are usually wired together in pairs within the bundles. **Reno Mattress** bases and lids are usually packed in separate bundles and only occasionally with bases and lids in the same bundle. Check which type of pack has been supplied before starting work.

Stone Fill

The stone used should be hard and durable.

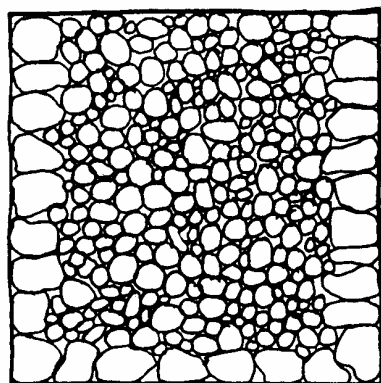


Fig 2

Unit Type	Grading:
All box gabions and 300mm deep mattress	100 to 200mm.
170mm deep mattress and 230mm deep mattress	75 to 150mm (but never greater than $\frac{2}{3}$ mattress depth).

A tolerance of 5% by weight of smaller stone is acceptable.

Where the correct size is difficult to obtain, the core can be filled with smaller material. See Fig 2.

Wiring

Manual lacing is carried out in a continuous wiring operation, not with individual ties or twists.

See Fig 3. Single and double twists are required alternately at approx. 100 to 150mm spacing (4 to 6ins).

A manageable length of binding wire is one complete turn from the coil as supplied.

Tests show that no other manual lacing method gives the necessary strength.

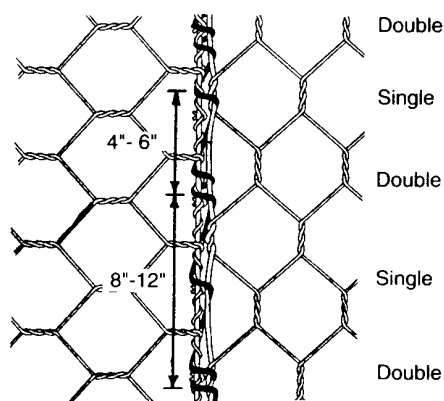


Fig 3

General Information

Plant and Tools

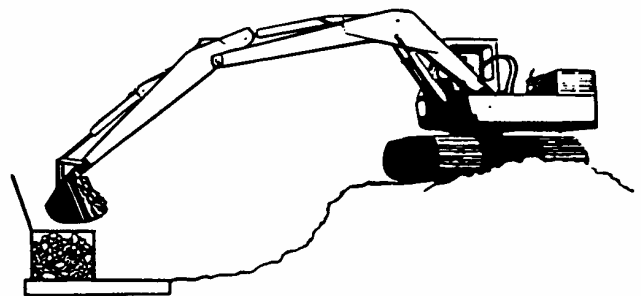
We recommend the use of 6"-8" long nose pliers to aid assembly and wiring of the units using the binding wire supplied with the gabions.

Suitable pliers, cable winches and a special lid closing tool can be purchased from Maccaferri Ltd.

Although a back-actor is often the most suitable machine for filling the units it may on occasions be more economical or practical to employ other similar machines already on site. However, the bucket must not be wider than the width of one compartment and in particular wide front hoe loaders are not recommended. On all but the smallest jobs, two gangs (of 4 men) can be used on most sites to ensure that the machine is used to the optimum.

Foundation Preparation

Apart from the obvious requirement of line and level, the foundation for gabions and mattress work needs only to be sensibly level. However, for ease of working a layer of stone or hoggin is often provided under box gabion structures, and some mattress work. This layer may also be laid at a slope to facilitate the construction of a battered wall.

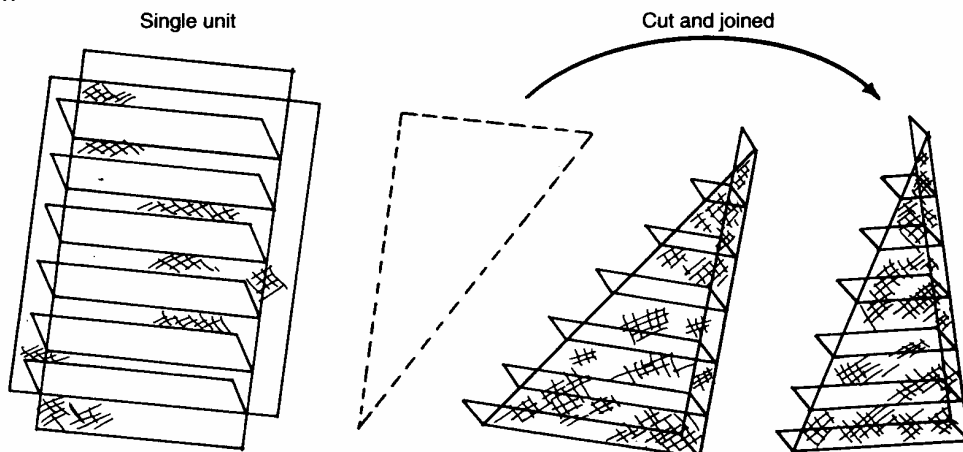


Non-rectangular Shapes

Maccaferri gabions units are flexible enough to conform to bends down to a radius of 20-25m without mitring: first wire a number of units together and offer them up to the curve set out previously, holding them in position during filling. For other shapes, bevels and mitres can be easily formed by cutting and folding the panels to the required angles. See Figs 4 & 5.

Mattresses

These may be cut to form sectors to construct curved sections as shown below.



Gabions

An example of modification steps required to form a bevel.

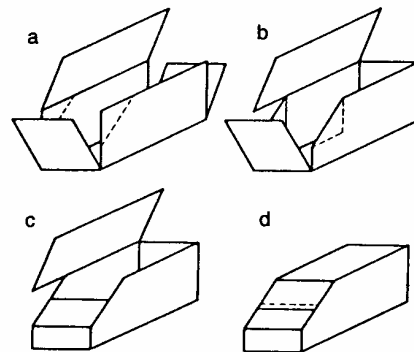


Fig 4

Fig 5

Instructions for

Assembly

- 1 Open and unfold the gabion on a hard surface. Press out the creases in the mesh and the kinks in the selvedge wires, since these are not intended to indicate the corners of the unit.

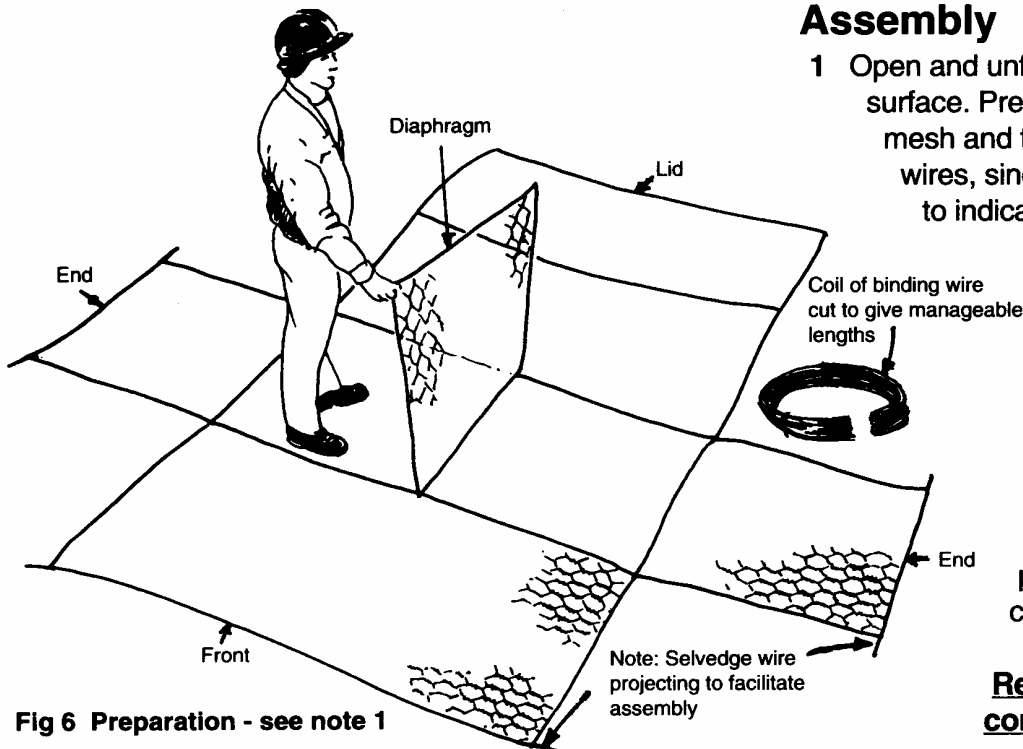


Fig 6 Preparation - see note 1

- 2 Lift up the sides, ends and diaphragms into a vertical position to form an open box shape. Ensure the tops of the corners are level and then join together with the thick selvedge wire projecting. Then lace the corners.

Refer to page 1 for correct lacing method.

Installation

- 3 Place a number of empty gabions in position and securely lace adjoining units together before they are tensioned and filled. A cable winch can be used to tension the units*.
- 4 Keep the gabions stretched and under tension longitudinally during filling to give a good alignment and finish.

See diagram opposite

* A winch is available for purchase.

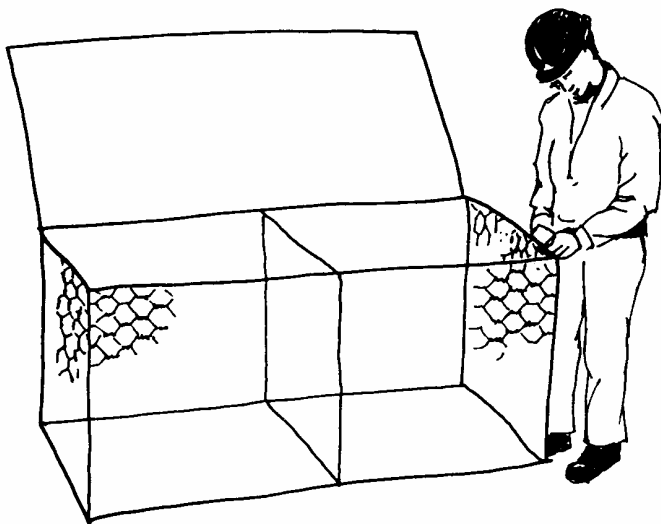


Fig 7 Forming - see note 2

ALWAYS MAINTAIN TENSION DURING FILLING

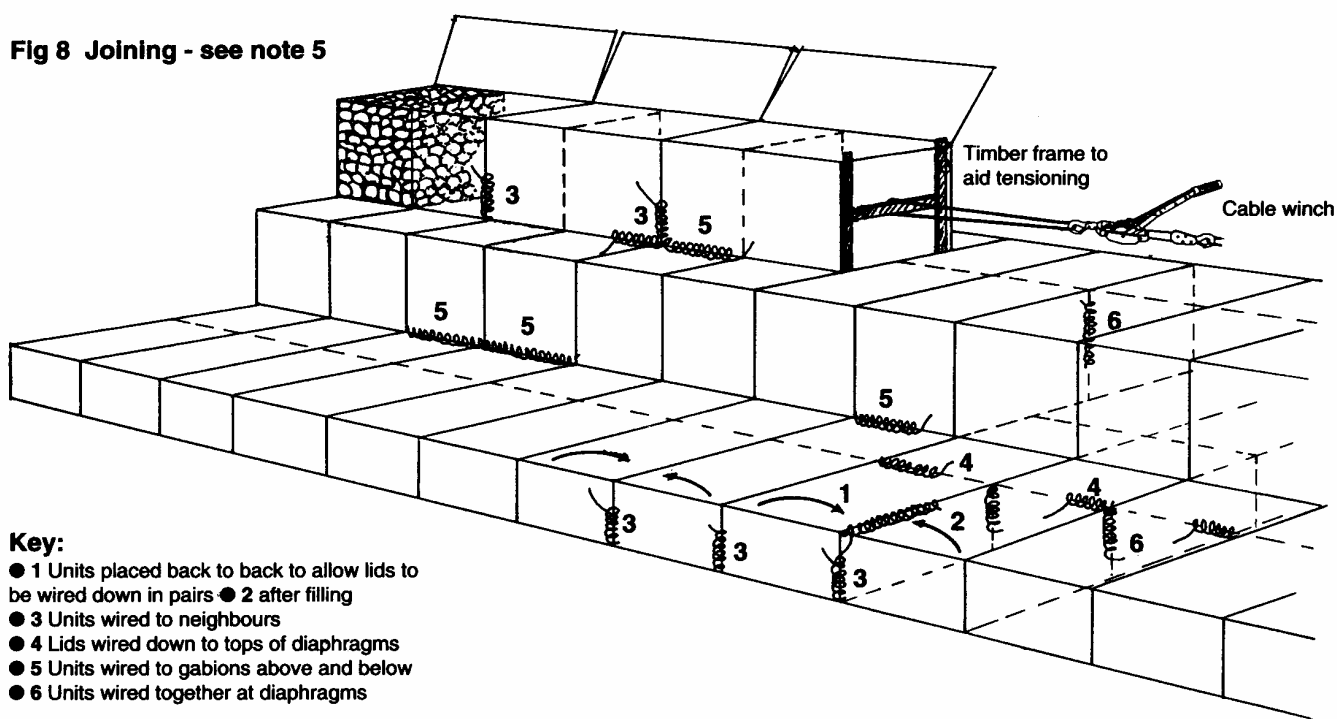
Box Gabions

Multi-layer structures

- 5 Almost all gabion structures consist of more than one course of gabions. In order that the individual gabions may become incorporated into one continuous structure, they should be wired to neighbouring gabions **before**, and the course below **after** tensioning, all before filling.

Treating the gabions individually by adding to the structure and filling them one at a time is time consuming, detrimental to the finished appearance, and may lead to a loss of structural integrity of the finished structure.

Fig 8 Joining - see note 5



Filling

- 6 Fill 1 metre high gabions with hard durable quarried or rounded stone in the size range 100 to 200mm, keeping the gabions under tension at all times. **See Note 4.**

Minimise the number of voids by using a well graded stone and avoid large stones in order to achieve a dense, compact compartment.

- 7 Fill each course of gabions in stages, stepping down towards the end of the row to prevent bulging of the transverse ends and diaphragms. The last compartment should be left empty to facilitate wiring on further gabions.

Bracing wires are introduced at the 1/3 and 2/3 height - see Note 8

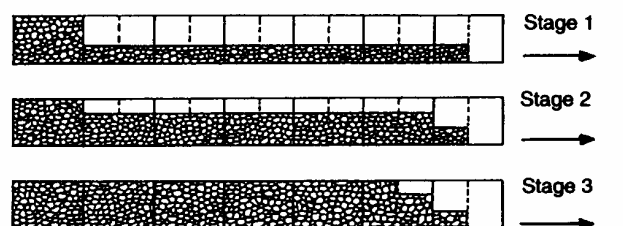


Fig 9

ALL LACING MUST BE IN ACCORDANCE WITH THE METHOD SHOWN ON PAGE 1.

Box Gabions

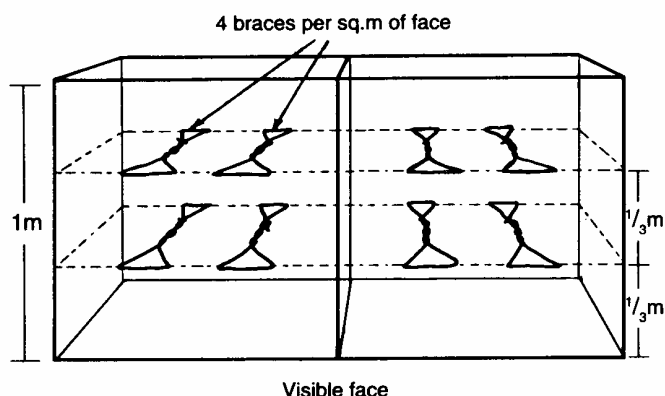


Fig 10 Bracing - see notes 8 & 9

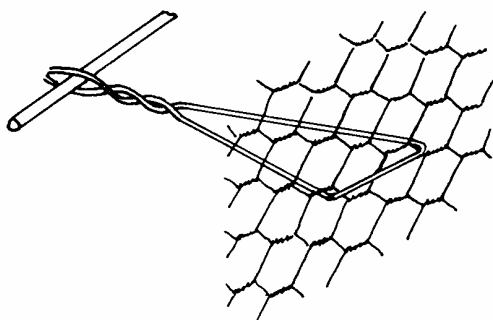


Fig 11 Method - see note 9

- 8 To ensure a good finished appearance all visible faces should be carefully hand-packed and braced to prevent bulging. Four bracing wires should be provided for each square metre of **visible** face, fixed at 1/3 and 2/3 levels for 1m deep gabions as shown in the sketch. For 0.5m deep units, bracing may be fixed at the half height level, if required.
- 9 Bracing wires are formed from a length of wire cut from the tying wire supplied. It has been found that two loops of a standard coil gives sufficient length of wire (approx. 2.7 - 3.0m) to form the brace. Thread the wire around two mesh openings on the front and rear faces and twist the ends together in the middle. Tension the brace by windlassing until the front face is in line. Care should be taken to ensure all the braces are of uniform length to avoid a concentration of load.
- 10 Overfill the gabion by approximately 50-75mm to allow for natural settlement. Take care to keep the top edge of the diaphragms exposed.
- 11 Fold the lid down, stretch into position with the aid of a suitable lever*, lace the lid to the front, the ends and to the top of the diaphragms.

* A special closing tool is available for purchase.

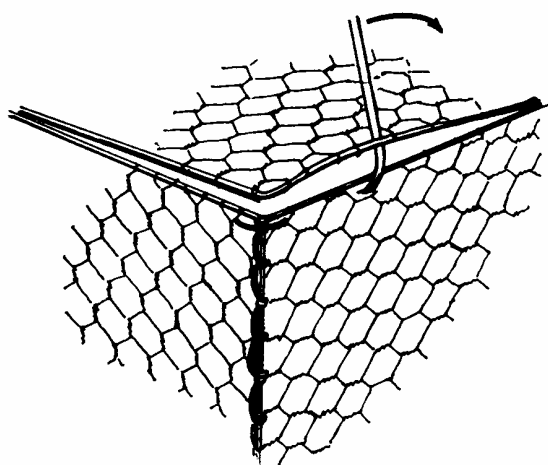


Fig 12 Closing the lid - see note 10

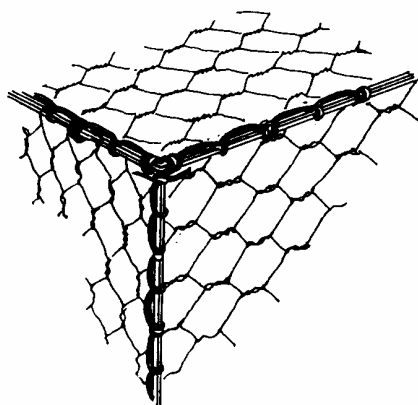


Fig 13 Lacing - see note 11 (& page 1)

Lifting pre-filled Gabions by crane

Maccaferri woven wire mesh gabions are strong enough to be lifted by crane from the top. Special lifting frames are available for hire from Maccaferri Ltd., to suit 2 x 1 x 1m and 2 x 1 x 0.5m Box units. The preparation of the units follows the general procedure indicated in this booklet, and in addition, the following notes should be read.

EVERY PRE-FILL AND LIFT GABION/MATTRESS OPERATION IS DIFFERENT. CUSTOMERS ARE STRONGLY RECOMMENDED TO CONTACT MACCAFERRI LTD., FOR ADVICE WHEN LIFTING PRE-FILLED UNITS IS BEING CONSIDERED FOR A SPECIFIC SCHEME.

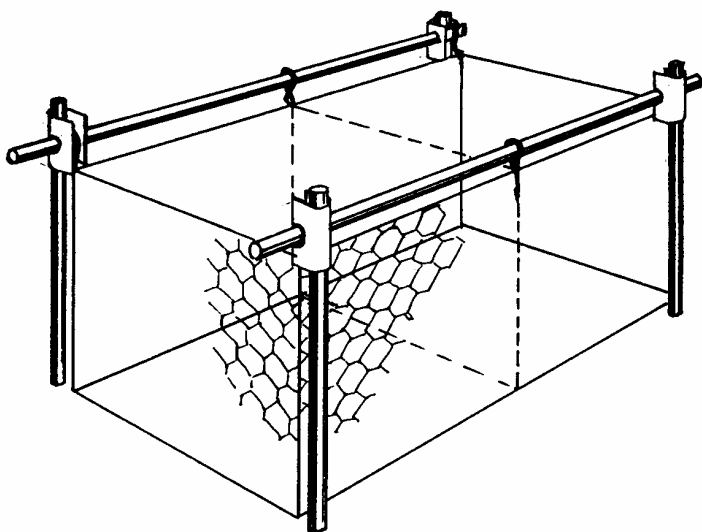


Fig 14 Filling - see note 2

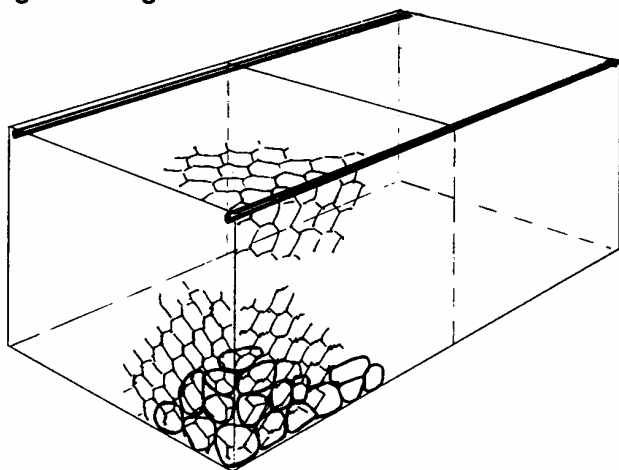


Fig 15 Lifting - see note 4

- 1 Unless it is intended to simply loose dump the gabions, every effort should be made to manufacture and keep the units in a rectangular form.
- 2 To help maintain the shape of the unit during filling, a frame of scaffolding or timber shuttering can be prepared slightly oversized in which the empty unit is assembled and stretched taut. Lacing should be generally as shown on page 1, but with **double** loops only, at 100 - 150mm spacing.
- 3 To prevent the faces from bulging, bracing wires must be fitted, at a minimum of four per square metre of face, as previously described, in both directions as the filling operation proceeds.
- 4 Stiffening the horizontal long sides of the top with re-bars helps considerably in maintaining the shape of the box when lifting. These rods should not project outside the box, unless they are to be removed later.
- 5 The lifting frames are provided with the correct number of slings for the size to be lifted, and all the slings should be used.

Weights of filled units	
2 x 1 x 1m	Up to 3.6 tonnes
2 x 1 x 0.5m	Up to 1.8 tonnes

Instructions for

Assembly

Reno Mattress bases and lids are usually packed in separate bundles and only occasionally with bases and lids in the same bundle. Check which type of pack has been supplied before starting work.

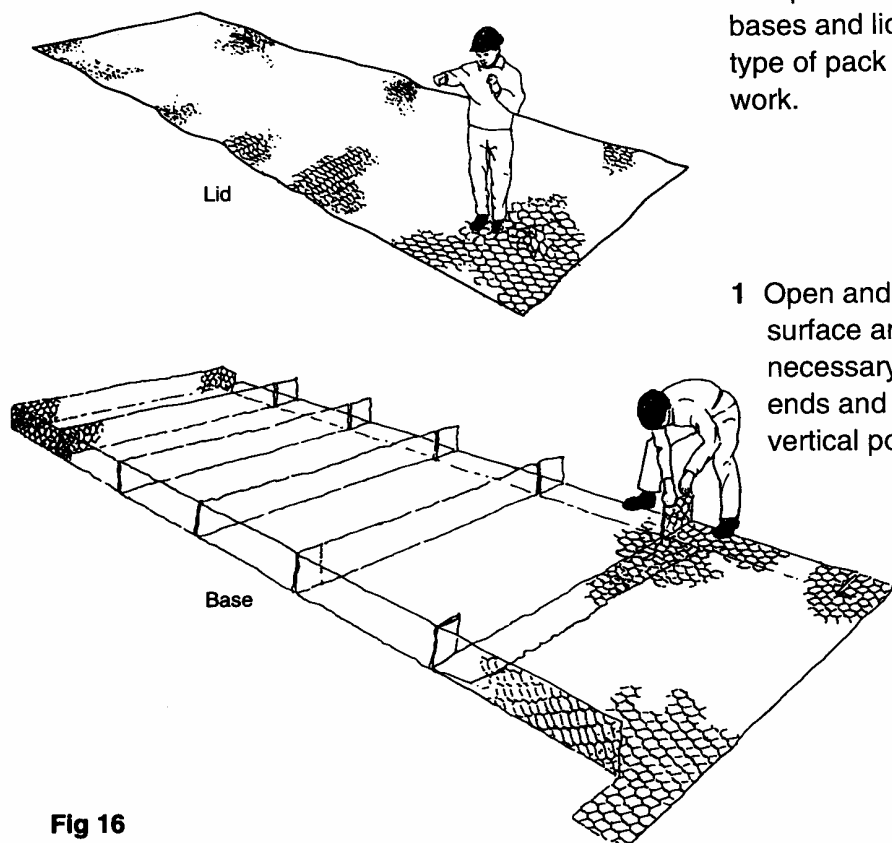


Fig 16

- 1 Open and unfold each mattress on a hard surface and press out any unwanted creases. If necessary use a board to form the folds at the ends and sides and then lift these into the vertical position.

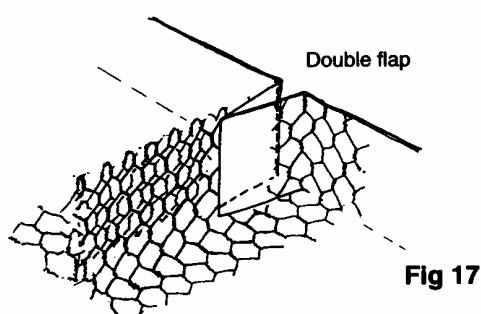


Fig 17

- 2 Fold in the double flap of the side panel and wire to the diaphragm. At the corners, fold the end flaps along the sides and lace up the joint.

Reno Mattresses

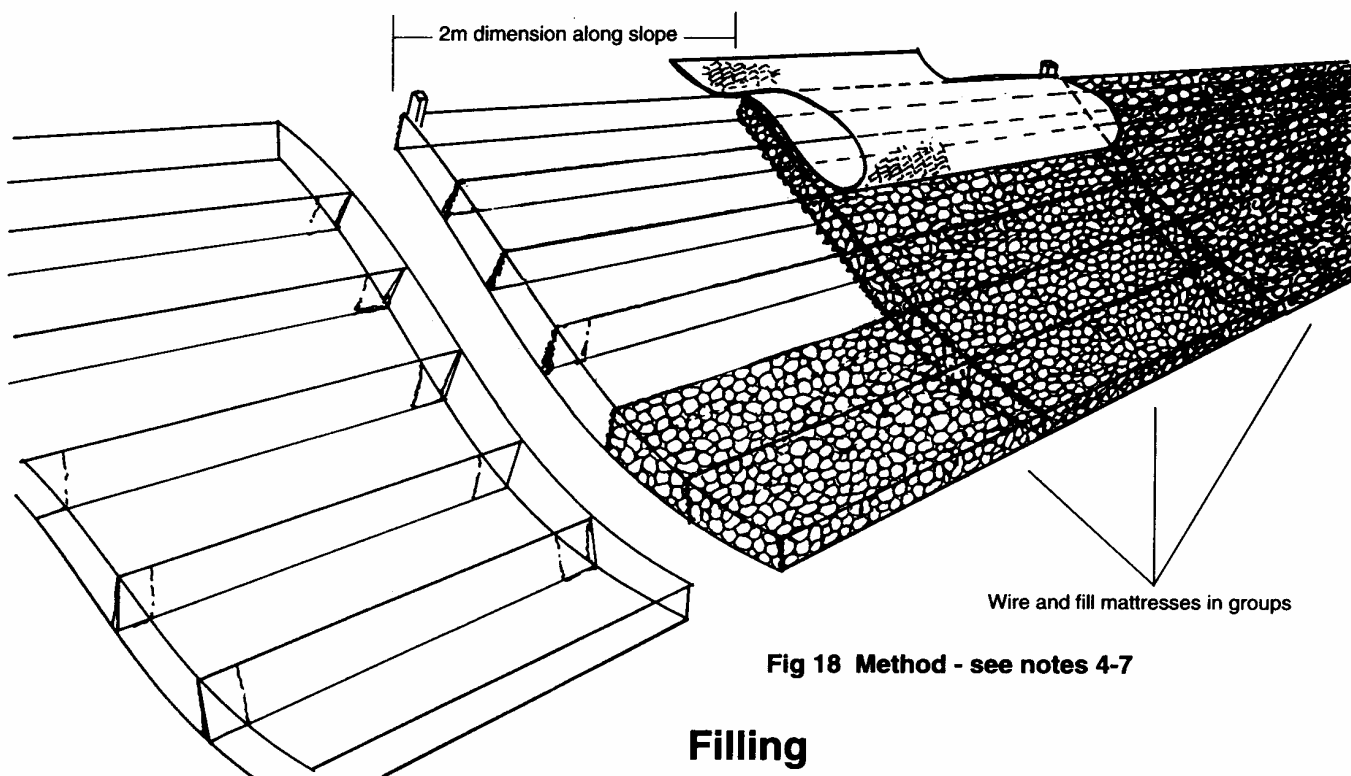


Fig 18 Method - see notes 4-7

Installation

- 4 Carry the wired-up mattress to its final position and wire it securely to the adjacent mattresses. On slopes, the mattress should be laid with the 2m dimension along the slope, not up and down it, except for very small ditches.

When the mattress is to be placed over a filter cloth, care must be taken to ensure that any projecting ends of wire are bent upwards to avoid puncturing or tearing the cloth.

Mattresses should be placed and wired together empty - it is difficult to wire two mattresses together when one is full of stone.

Where staking is specified on steep slopes, the unit should be secured by hardwood pegs driven into the ground just below the upper end panel, at 2m centres or as necessary. On soft or sandy slopes pegs may be used to hold the mattress in position during filling.

For preparing units for lifting after filling see page 9

Filling

- 5 On slopes, diaphragms TYPE B should be kept taut during the filling operation, using wire stays, boards etc. This helps to locate them when the lid is finally laced down to their top edges. This is not necessary with diaphragms TYPE A which are self supporting.
- 6 The fill material can be placed in the compartments by machine, but some hand placing is necessary to ensure the compartment is completely filled. Start at the bottom if on a slope. Filling should be done unit by unit, but several units should be ready for filling at any one time. Ensure that the diaphragm tops are accessible for wiring.
- 7 Slightly over-fill to allow for settlement. Tie down the lids to the **ends** of the mattresses and then securely wire them to the **sides, and diaphragms**, using alternate single and double loops. **See page 1.**

To save both time and binding wire, prepare more than one unit before covering with the lids, so that adjacent lids can be wired down in one operation. In cases where a number of adjacent bases are to be covered at one time, rolls of mesh 25 x 2m or 1m wide can be used, saving time and strengthening the structure.

Lifting pre-filled Reno Mattresses

Maccaferri woven wire mesh mattresses are strong enough to be lifted by crane from the top. Special lifting frames are available for hire from Maccaferri Ltd., to suit 3 x 2m and 6 x 2m mattresses. The preparation of the units follows the general procedure indicated in this booklet, and in addition, the following notes should be read.

Customers are strongly recommended to contact Maccaferri Ltd., for advice when lifting pre-filled units is being considered.

The assembly of a mattress for lifting follows the instructions given on pages 7 and 8 with the following modifications.

- 1 a) The open gusset at the bottom of each diaphragm should be securely laced up by continuous wiring. The lid must be laced down to each mesh node at the top of the diaphragm with a double loop.
- b) Check each end of the base panel. On current production units the selvedge is formed by folding the mesh back over the thick selvedge wire. This wire should be securely laced to the mesh to prevent it moving laterally during lifting operations.
- c) All lacing should be generally as shown on page 1 but with **double** twists only at approximately 100mm spacing.

- 2 There will be considerable deformation of the mesh as the units are lifted. This should not cause any concern since they will recover their shape after the units have been placed in their final position. If this is not acceptable from the point of view of appearance, 25mm bars may be fitted under the lids of the diaphragms to reduce the amount of distortion. These can be recovered if required.
- 3 For placing large areas of mattress, more sophisticated methods are available using purpose built pontoons etc. These can be used with either mastic grouted or ungrouted units.

Weights of filled units	
6 x 2 x 0.3m	Up to 6.5 tonnes

Fig 19 Reinforcing - see note 2

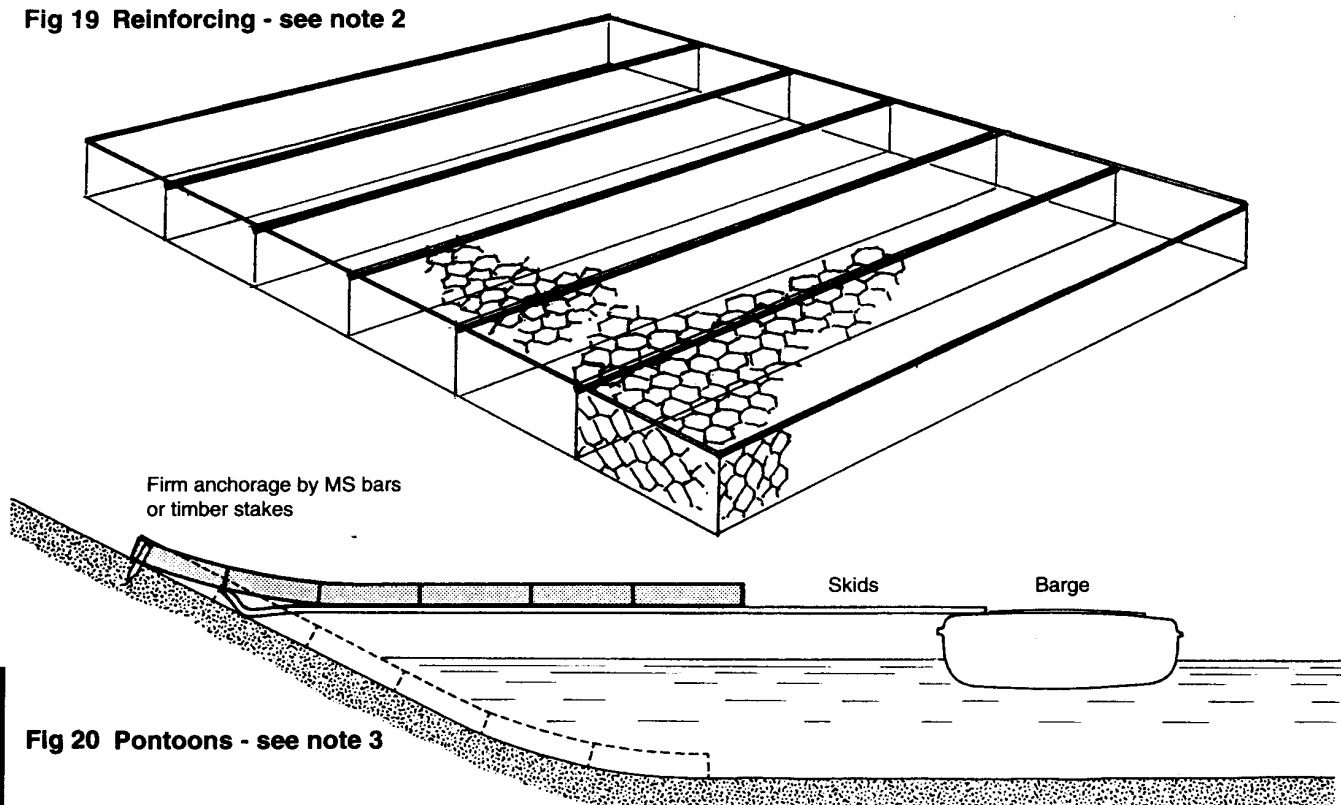
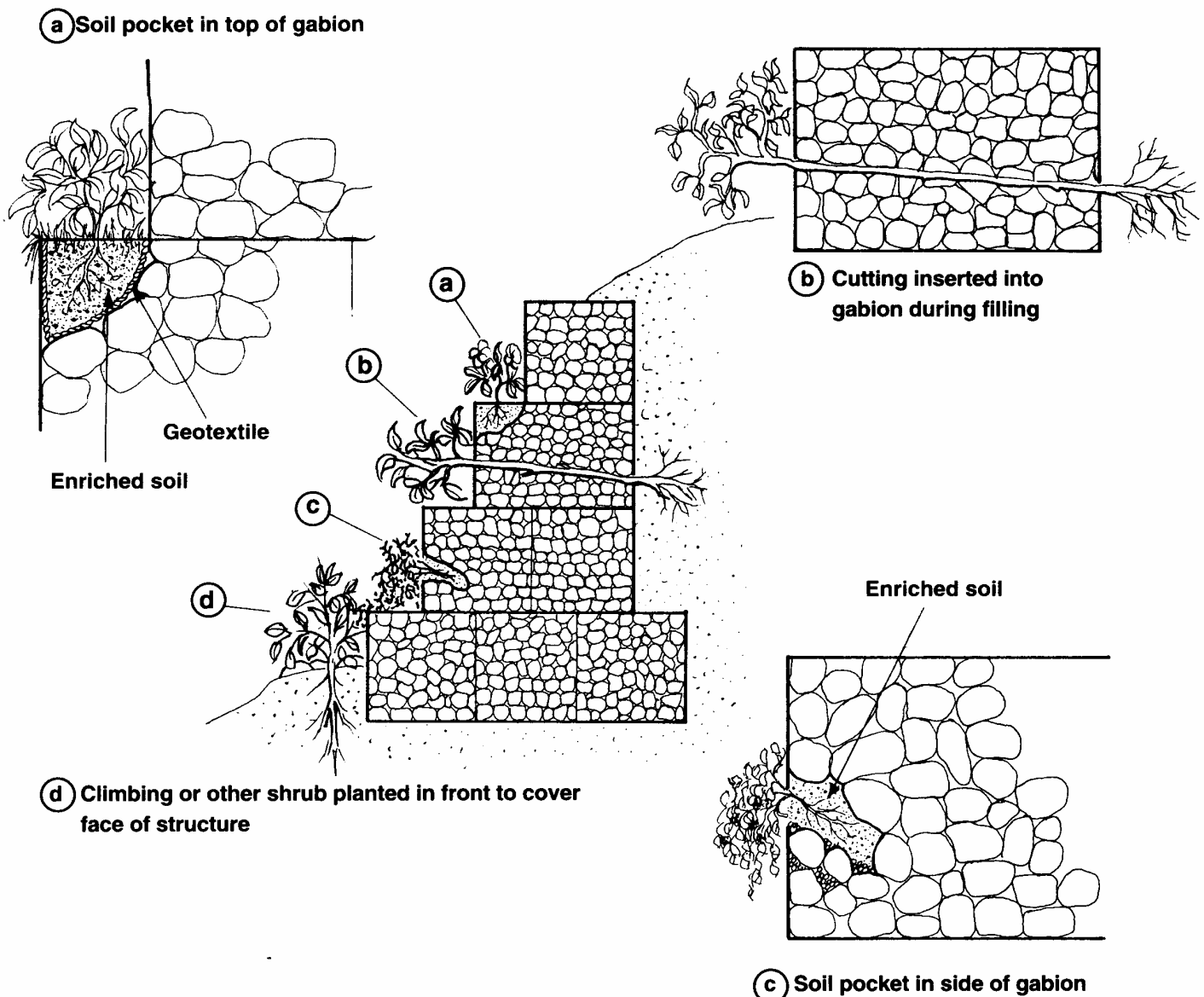


Fig 20 Pontoons - see note 3

“Greening” Gabion and mattress structures

In most cases the slow passage of water through the stone fill will deposit soil in the interstices and native vegetation will colonize the structure spontaneously. If an acceleration of the natural process is required then a few simple procedures as illustrated below may be implemented. Soil may be introduced into the structure during or after the stone filling operation and plants, shrubs or cuttings planted into it. Alternatively seeds can be scattered over the surface or incorporated into the soil. It is usual to enrich the soil with fertilizers to promote rapid initial growth.

Fig 21 Alternative methods of planting



“Greening” Gabion and mattress structures

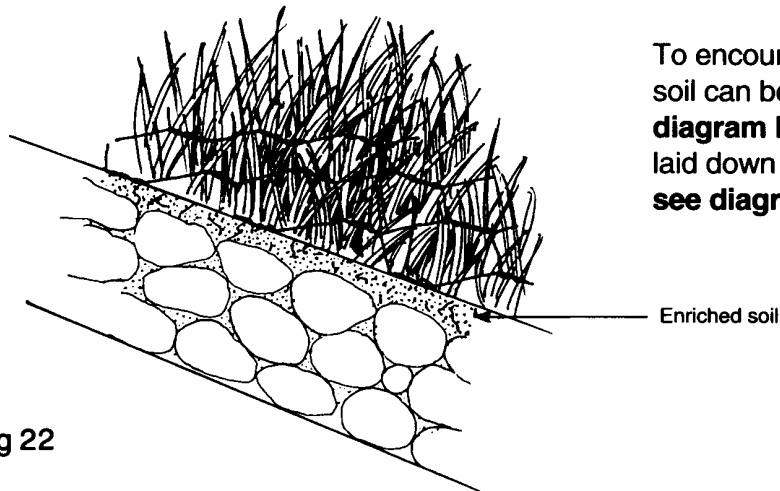


Fig 22

To encourage rapid growth on Reno mattresses, soil can be brushed into the stone fill - **see diagram left** - or alternatively bio-matting can be laid down before the mesh panel lid is placed - **see diagram below**.

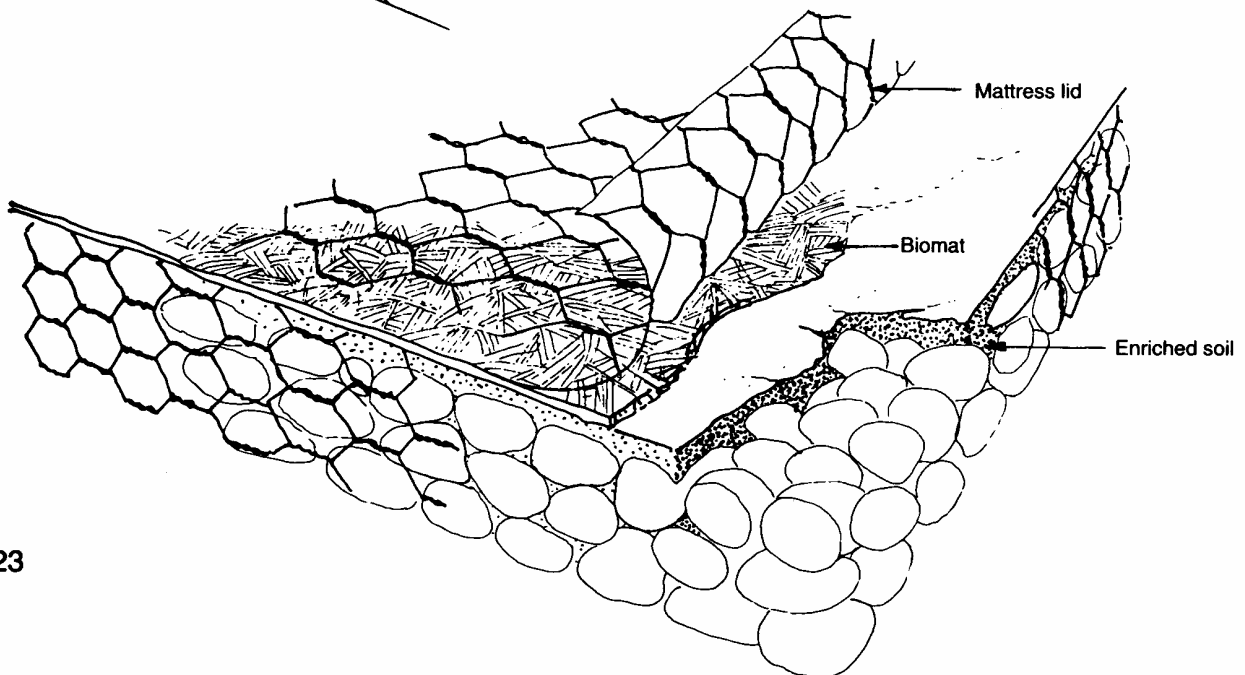


Fig 23

Useful addresses

Specialist Advice

Should you have any queries on any aspect of construction using Maccaferri woven wire mesh Gabions and Reno Mattress, please contact us.



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