

Advice for the Manufacture and Installation of Gabions and Mattresses

1: Introduction:

This advice is given in good faith to help customers to achieve the best possible results in situations where E'GRID Geogrids are appropriate materials for use in Gabions. Because the conditions of gabion projects vary so much no guarantee can be given by BOSTD Geosynthetics Qingdao Ltd. or NewGrids Limited that these products are suitable for any particular project.

Cut edges of geogrids can be sharp. Gloves to protect hands should be worn during manufacture and installation of geogrid gabions.

2: Gabion Sizes:

Generally a convenient maximum size of a single gabion has been found to be:

$$2\text{m}(W) \times 1\text{m}(D) \times 1\text{m}(H)$$

If the width (W) of a gabion is more than 1m then intermediate diaphragms should be fitted to ensure that the width of a cell (W_c) is not greater than 1m.

When choosing gabion sizes for a particular project try to choose sizes that can be economically cut from normal rolls of geogrid. For example, Gabions that are exactly 2m x 1m x 1m cannot be economically made from rolls of product that are 3.9m wide. With such product a suitable size is 2m(W) x 0.95m(D) x 1m(H). For this size a single piece of Geogrid that is 2m x 3.9m can be used for the top, back, bottom and front of a gabion.

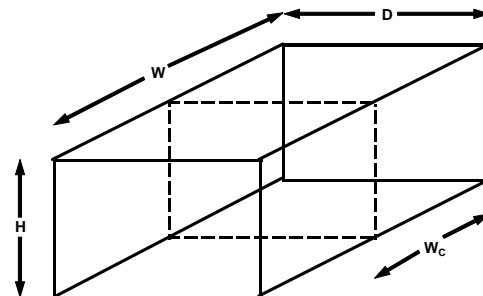


Figure 1: Gabion Dimensions

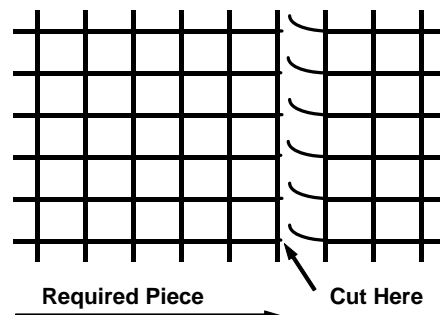


Figure 2: Cutting position

When designing for economic geogrid use remember that cutting must be close to a grid strand around all sides of each required piece, as shown in Figure 2.

3: Gabion Manufacture:

3.1: Cut a single piece of geogrid to form the top, back, bottom and front of a gabion.

Note: If this is not possible then 2 or more pieces may be used, joined along edges of the gabion.

3.2: Fold or mark this piece to show where the edges of the gabion will be, as shown in Figure 3.

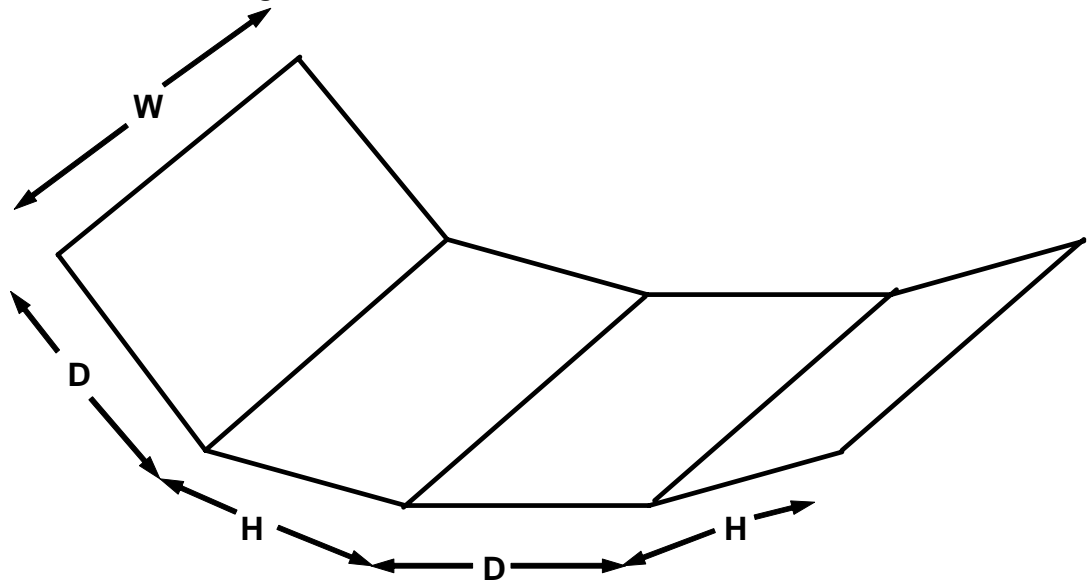


Figure 3: Top, back, bottom and front of gabion ready for assembly.

3.3: Lace end pieces and diaphragm(s) in place as shown in Figure 4:

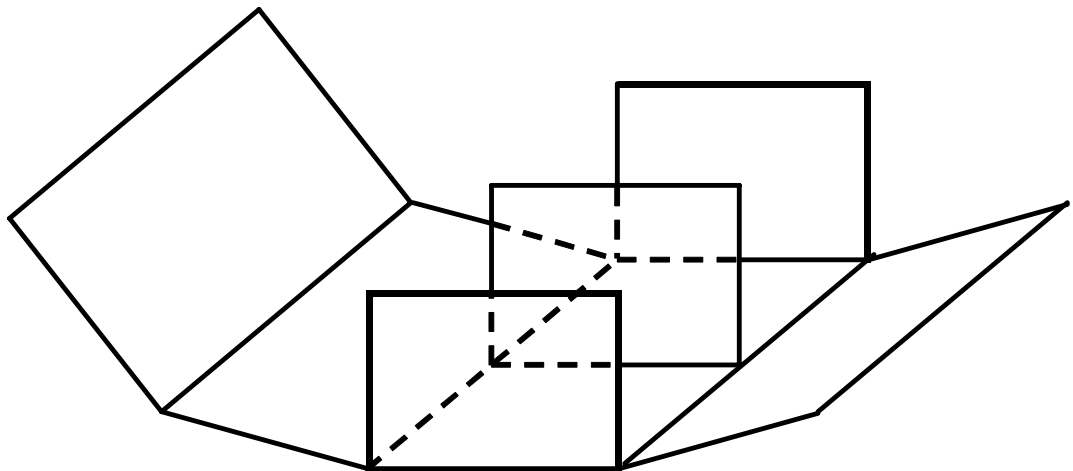


Figure 4: End pieces and diaphragm laced in position.

Notes: **1:** Lacing of joints should be done with HDPE braid of at least 200kg breaking load and containing at least 2% finely divided carbon black.

2: The pattern of lacing should be as shown in Figure 5 with stop-knots at 500mm spacing.

3: A curved bodkin as shown in Figure 6 can help lacing, particularly of diaphragms

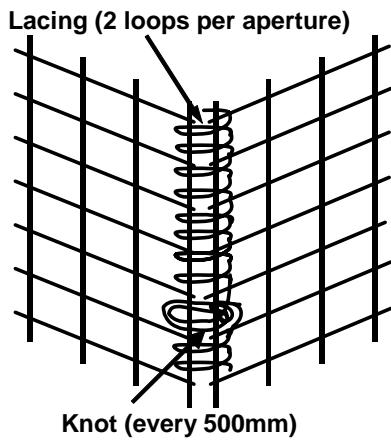


Figure 5: Lacing Pattern

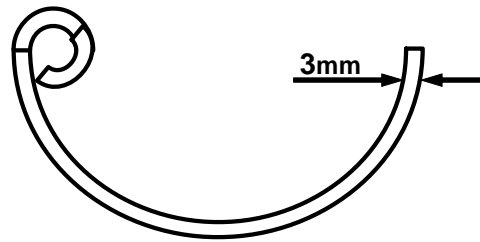


Figure 6: Bodkin to help lacing

3.4: Bend up front and back of gabion and lace to the end pieces and diaphragm(s) as shown in Figure 7

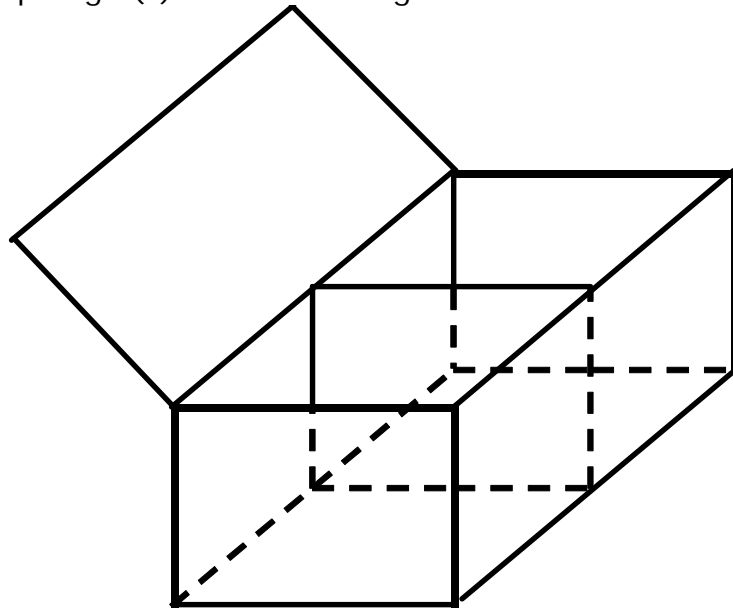


Figure 7: Assembled Gabion ready for installation

4: Gabion Installation:

- 4.1: Gabions must be installed on a surface prepared to the levels and quality of the engineer's specifications for the project.
- 4.2: Rockfill for the gabions must be quarried rock of sizes and quality in accordance with the engineer's specifications for the project.

- 4.3:** Before filling, gabions should be placed on the prepared surface and tensioned to ensure that the shape is good and that exposed surfaces are smooth and taut. A suitable tensioning arrangement is shown in Figure 8.

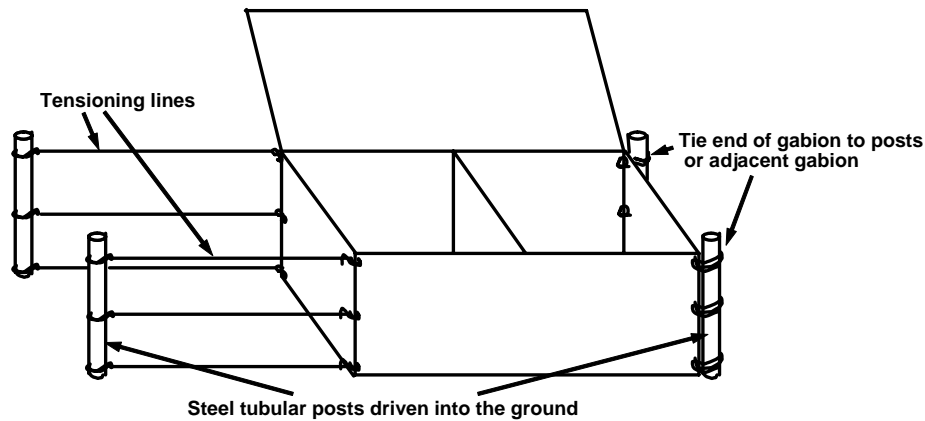


Figure 8: Tensioned gabion ready for filling.

Note: For speed of construction several gabions may be laced together end-to-end with fully laced joints as in Figure 5 on their adjoining vertical edges and tensioned as a unit

- 4.4:** Filling of gabions with rockfill may be by machine or hand taking care to minimise voids. However, exposed faces must be filled by hand using selected larger pieces of rock with flat faces to give a fair face to the rockfill inside the exposed geogrid face.

- 4.5:** If the gabion height (H) is more than 500mm then cross-ties of HDPE braid should be installed as shown in Figure 9 at vertical intervals of 250-400mm to improve stability and quality of finish.

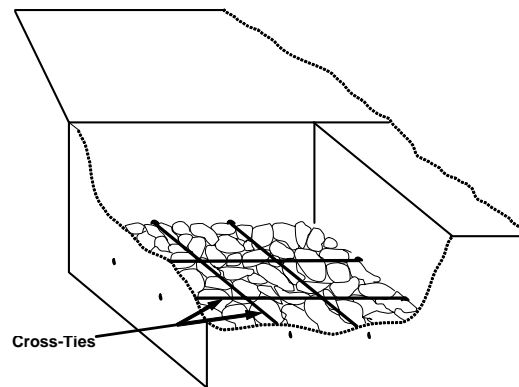


Figure 9: Cross-Ties in partially-filled gabion

- 4.6:** Slightly over-fill each gabion, using smaller stones on the surface, to allow for settlement. Encourage settlement, for example by walking on the rockfill.
- 4.7:** Adjust finished surface of rockfill as needed.
- 4.8:** Close down top of gabion and tightly lace, as in Figure 5, all edges and top-diaphragm joints.

5: Mattress Sizes

Generally convenient sizes of a single mattress have been found to be up to:

$$2\text{m}(W) \times 0.25\text{m}(H) \times 6\text{m}(L)$$

Because of the length of the mattress intermediate diaphragms should be fitted to ensure that the length of a cell (L_c) is not greater than 1m.

For the most economic use of material a mattress should have dimensions that add up to the width of the Geogrid from which it is produced, ie 3.90m

Eg: $W + H = 1.95\text{m}$

($W = 1.70\text{m}$ and $H=0.25\text{m}$

or:

$W = 1.75\text{m}$ and $H=0.2\text{m}$)

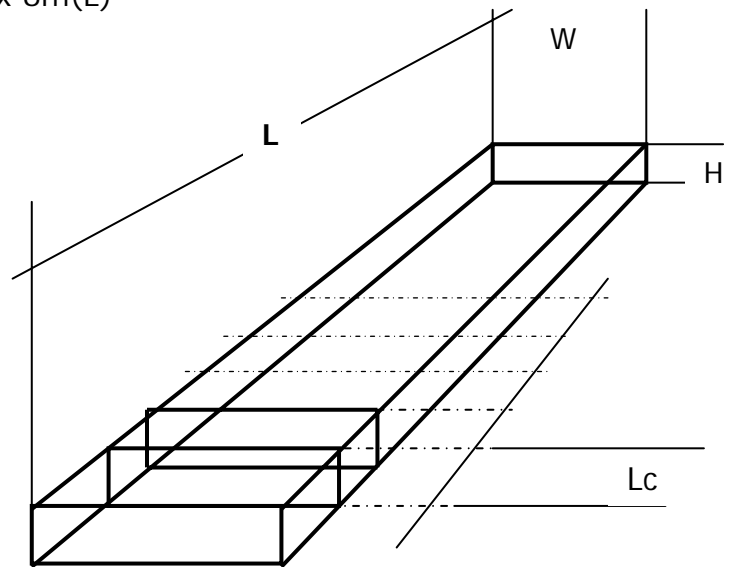


Figure 10: Mattress Sizes

6: Mattress manufacture

6.1: Cut a single piece of geogrid to form the top, bottom and sides of a mattress.

Note: If this is not possible then 2 or more pieces may be used, joined along edges of the mattress.

6.2: Fold or mark this piece to show where the edges of the mattress will be, as shown in Figure 11.

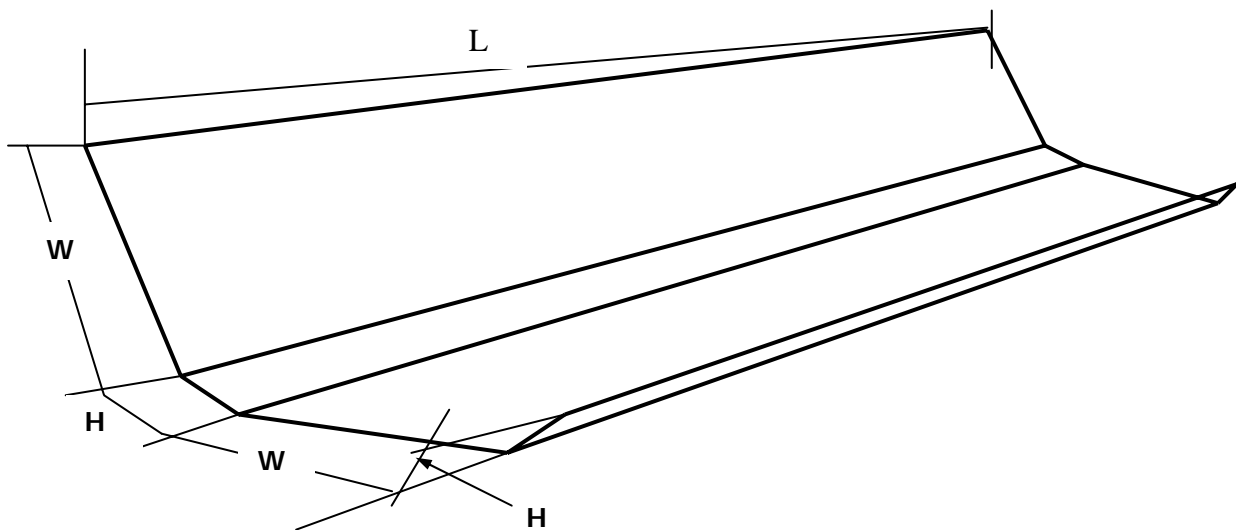


Figure 11: Folded main section of Mattress.

6.3: Lace End Pieces and Diaphragms in position as shown in Figure 12

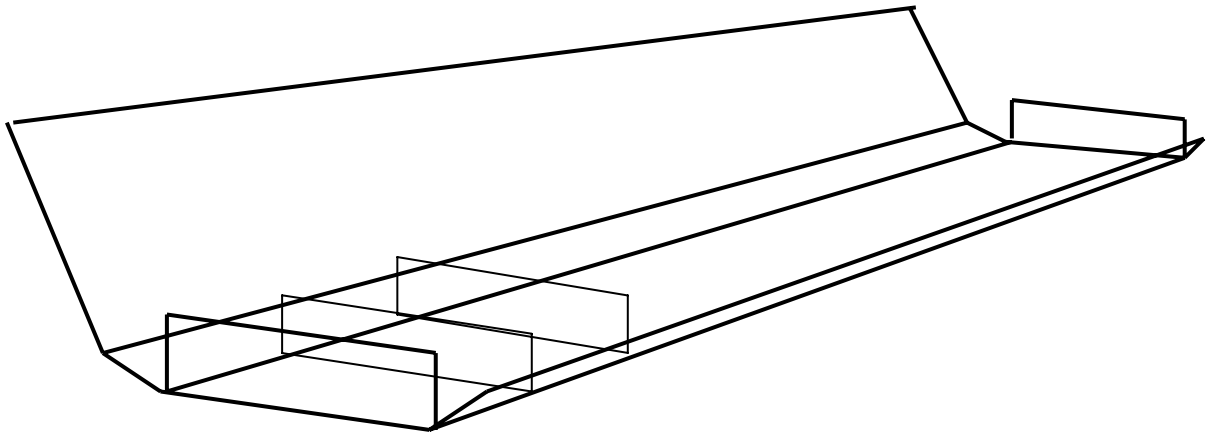


Figure 12: End pieces and diaphragm laced in position.

- Notes:
- 1:** Lacing of joints should be done with HDPE braid of at least 200kg breaking load and containing at least 2% finely divided carbon black.
 - 2:** The pattern of lacing should be as shown in Figure 5 with stop-knots at 500mm spacing.
 - 3:** A curved bodkin as shown in Figure 6 can help lacing, particularly of diaphragms

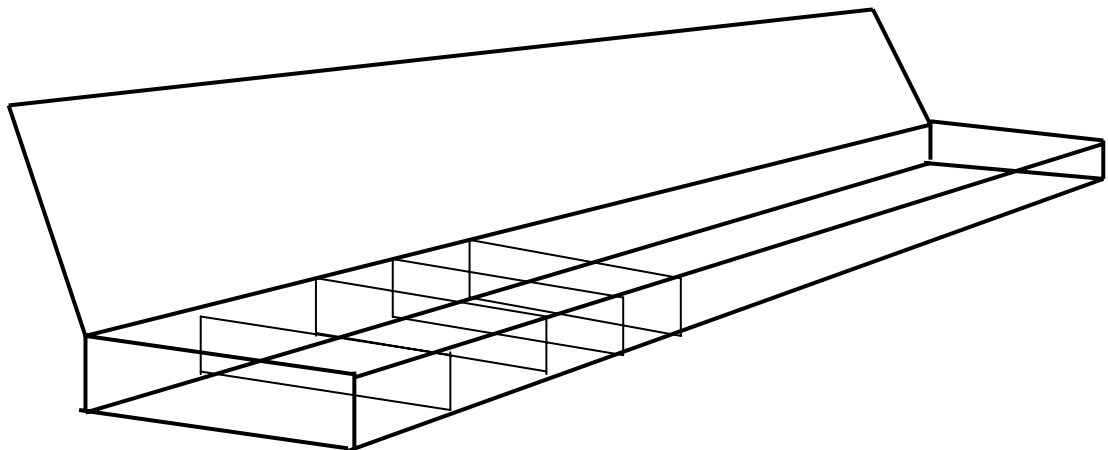


Figure 13: Finished mattress ready for filling

7: Mattress Installation

The materials, techniques and equipment for installation and filling of mattresses are the same as those described for Gabions in Section 4 above