

### GABION

#### Material Delivery

Gabions are manufactured with all components mechanically connected at the production facility, as per ASTM A975. All gabions are supplied in the collapsed form, either folded and bundled or rolled. The bundles are compressed and strapped together at the factory for easy shipping and handling. Lacing wire is shipped in coils. Fasteners are shipped in boxes. Preformed corner stiffeners are shipped in boxes.

#### Assembly

Open and unfold each gabion on a flat, hard surface and remove any shipping fold if necessary. This can be done by placing the fold over a 2" x 4" board and walking along the sides. Lift up the sides, ends and diaphragms into a vertical position to form an open box shape (Fig. 1). Connect the back and the front panels of the gabion to the end panels and center diaphragms. The top corner of the end panels and center diaphragms have the selvedge wire extending out approximately 4 in. (102 mm) from these panel edges. Raise the end panels and the diaphragms to a vertical position and wrap the selvedge wire around the edge wire of the top and back panels.

Connect the edges of the gabion and diaphragms by using either lacing wire or ring fasteners (Fig. 2). Ring fasteners shall not be spaced more than 6 in. (150 mm) apart. The procedure for using lacing wire consists of cutting a sufficient length of wire, and first looping and/or twisting the lacing wire to the wire mesh. Proceed to lace with alternating double and single loops through every mesh opening approximately every 6 in. (150 mm) pulling each loop tight and finally securing the end of the lacing wire to the wire mesh by looping and/or twisting. The use of pliers to aid assembly and tying of the units using the lacing wire supplied with the gabions is normally recommended.

Erect the diaphragms into the vertical position, and tie them to the side panels in the same manner.

#### Fastening Procedure

When using lacing wire, cut off a piece of wire approximately 1.5 times the length of the edge to be tied. Longer edges shall be joined by several lengths of wire. Tie wires shall be secured around the selvedge wire or heavier edge wire, where present, by looping and twisting the lacing wire around itself. Proceed tying with alternate double and single loops. Double loops shall be made at intervals not greater than 6 in. (150 mm). The baskets should be pulled tightly together during the tying operation. The other end of the tie wire shall be secured by again looping and twisting the wire around itself. When using lacing wire to assemble the units, pliers may be used to create tight joints. Care should be taken to avoid damaging the wire coating.

When steel ring fasteners are used, the use of either a mechanical or a pneumatic fastening tool is required. Spacing of the rings shall be in accordance with ASTM A975 Table 2, Panel to Panel connection, Pull-Apart Resistance. In any case, ring fasteners spacing shall not exceed 6 in. (150 mm). Rings shall be installed at the end and center diaphragms and along all edges. Care should be taken to ensure the steel ring fastener is completely closed after installation. When this is not possible, connection must be complemented with lacing wire.

#### Foundation Preparation

The foundation on which the gabions are to be placed shall be level, and graded to the elevations as shown on the project construction drawings. The foundation for gabions shall be level, smooth, and free of 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.). Geotextiles required to be installed behind gabion structures shall comply with the requirements for subsurface drainage applications.

#### Installation and Filling

After the foundation has been prepared, the pre-assembled gabions are placed in the desired location to form the structure. Gabions shall be connected together and aligned before filling the baskets with rock. All connections (panel-to-panel and basket-to-basket) shall be already carried out as described in the assembly operations.

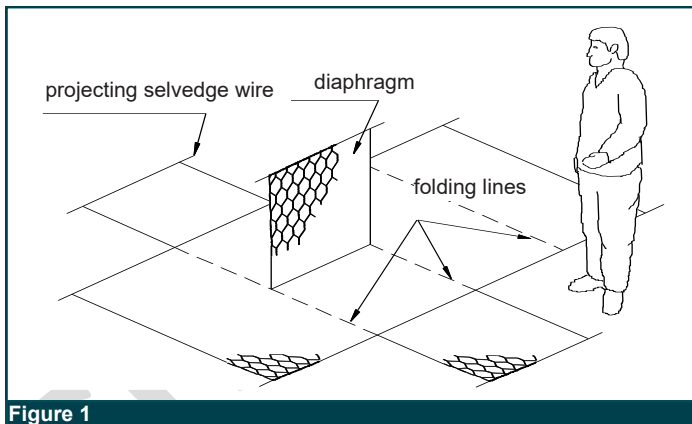


Figure 1

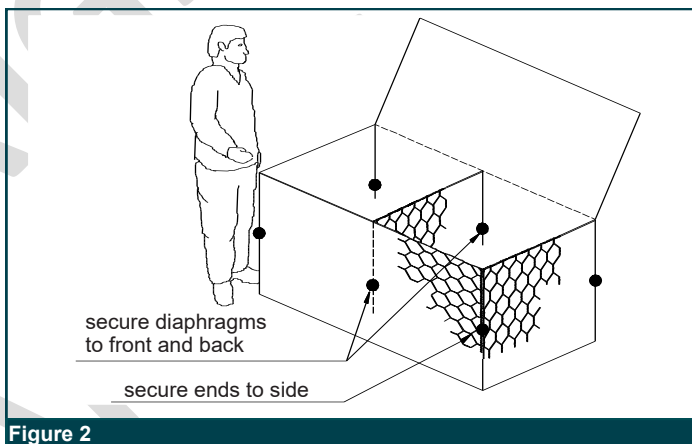


Figure 2

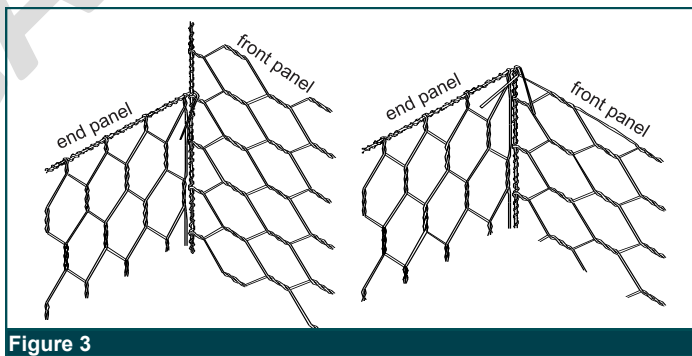


Figure 3

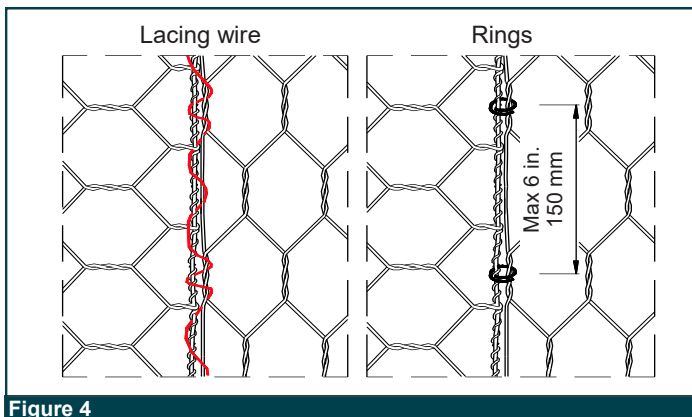


Figure 4

Rocks for gabions may be produced by any suitable quarrying method, and by the use of any device that yields the required sizes within the gradation limits chosen. Rocks shall be hard, angular to round, durable and of such quality that they shall not disintegrate on exposure to water or weathering during the life of the structure.

Gabion rocks shall range between 4-8 in. (100-200 mm). The range in sizes may allow for a variation of 5% oversize and/or 5% undersize rock, provided it is not placed on the gabion's exposed surface. In all cases, the oversize rock shall not be larger than 10 in. (250 mm), and the undersize rock shall not be smaller than 2 in. (50 mm).

During the filling operation some manual stone placement is required to minimize voids. The exposed faces of vertical structures may be carefully hand placed to give a neat, flat, and compact appearance. The cells shall be filled in stages so that local deformation may be avoided. That is, at no time, shall any cell be filled to a depth exceeding 1 ft (300 mm) higher than the adjoining cell (Fig. 6). When using PVC gabions, care should be taken when placing the stone to assure that the PVC coating on gabions will not be damaged.

Lacing wire stiffeners or preformed U-shaped stiffeners shall be installed as indicated (Fig. 5), fixed at 1/3 and 2/3 of the height for 3 ft or 1 m gabions as the cell is being filled. In 1.5 ft (500 mm) high units stiffeners may be fixed at the half height level, if required. Preformed corner stiffeners are installed at 45° to the face/side of the unit, extending an equal distance along each side being braced (approximately 1 ft [300 mm]). Stiffeners shall be installed only in a gabion cell that will be exposed or unsupported after the structure is completed. Minimize the number of voids by using a well-graded stone and avoid large stones in order to achieve a dense, compact stone fill. All corners should be securely connected to the neighboring gabions of the same layer before filling the units.

When more than one layer of gabions is required, in order for the individual units to become incorporated into one continuous structure, the next layer of gabions must be connected to the layer underneath after this layer has been securely closed (Fig. 7).

Gabion should be front to front and back to back, so that pairs of facing lids can be wired down in one process.

Secure the end from which the work is to start, by partially filling the end unit with rock.

## Closing

To allow for settlement, level off the fill 1-1.5 in. (25-40 mm) above the top of the mesh. In slow protection aprons downstream of weirs and places where water will fall directly on the gabions, install bracing wires vertically between the top and bottom mesh. Be sure to keep the top edge of the diaphragm exposed. Fold the lid down and pull the edges of the panels to be connected using an appropriate tool such as a lid closer (Fig. 8). The lids shall be tightly laced along all edges, ends and diaphragms in the same manner as described for assembling units (Fig. 4). Adjacent lids may be securely attached simultaneously. All end wires should then be turned in to avoid protrusions.



Figure 8

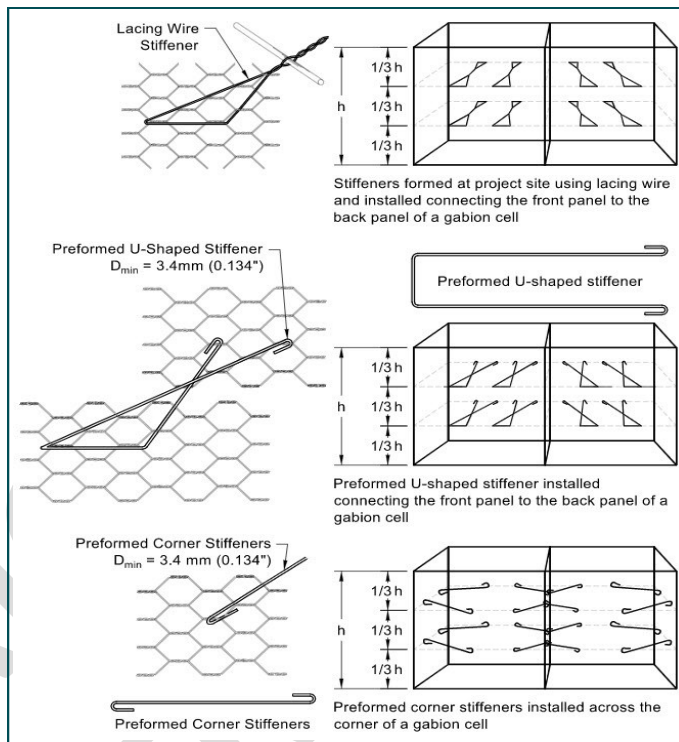


Figure 5

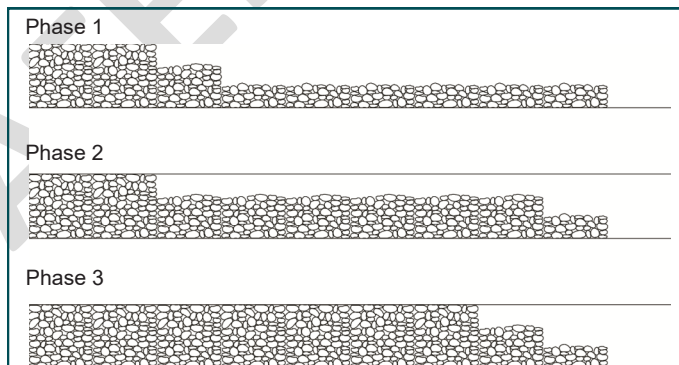


Figure 6

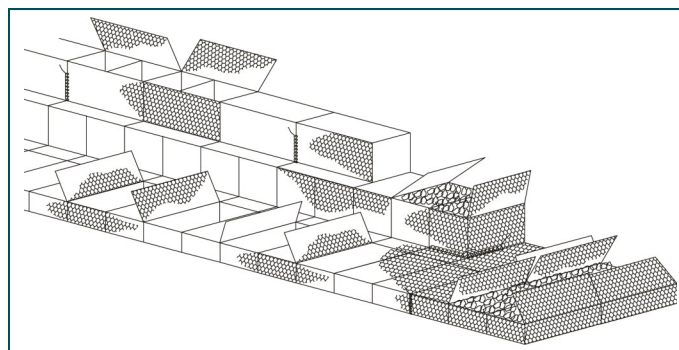


Figure 7

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