

PRODUCT STANDARD SPECIFICATIONS

Rev: 03, Issue Date 06.30.2013

GABION MAT GALVANIZED & PVC COATED

Gabion Mat-Galvanized & PVC Coated

1.0 Description

This work shall consist of furnishing, assembling and filling woven wire mesh containers with rock to form gabion mats as specified in the contract in conformity with the dimensions, lines and grades shown on the plans, or as determined by the engineer and manufacturer. These specifications are in accordance with ASTM A975 and include gabion mats manufactured by Maccaferri Inc. or equivalent.

2.0 Materials

2.1 Woven Mesh Gabion Mats

2.1.1 Wire (Zinc Coated)

All tests on wire must be performed prior to manufacturing the mesh.

- *Tensile strength*: both the wire used for the manufacture of gabion mats and the lacing wire, shall have a maximum tensile strength of 75,000 psi (515 MPa), in accordance with ASTM A641/A641M.
- *Elongation*: the test must be carried out on a sample at least 12 in. (30 cm) long. Elongation shall not be less than 12%, in accordance with ASTM A370.
- *Zinc coating*: minimum quantities of zinc according to ASTM A641/A641M, Class III soft temper coating.
- *Adhesion of zinc coating*: the adhesion of the zinc coating to the wire shall be such that, when the wire is wrapped six turns round on a mandrel having four times the diameter of the wire, it does not flake or crack when rubbing it with the bare fingers, in accordance with ASTM A641/A641M for zinc coating.

2.1.2 PVC (Polyvinyl Chloride) Coating

When specified in the plans:

- *Specific gravity*: 81-84 pcf 1.30-1.35 kg/dm³, in accordance with ASTM D792, Table 1,
- *Hardness*: between 50 and 60 Shore D, according to ASTM D2240,
- *Tensile strength*: not less than 2,985 psi (20.6 MPa), according to ASTM D412,
- *Modulus of elasticity*: not less than 2,700 (18.6 MPa), in accordance with ASTM D412,
- *Abrasion resistance*: the percentage of the weight loss shall be less than 12%, according to ASTM D1242.
- *Heat Aging Test*: prior to UV and Abrasion degradation, the PVC polymer coating shall have a projected durability life of 69 years when tested in accordance with UL 746B.

The accelerated aging tests are:

- *Salt spray test*: test period 3,000 hours, test method ASTM B117,
- *Exposure to UV rays*: test period 3,000 hours at 145°F (63°C), test method ASTM D1499 and ASTM G152.
- *Brittleness temperature*: no higher than 15°F (- 9°C), or lower temperature when specified by the purchaser, when tested in accordance with ASTM D746.

The properties after aging tests shall be as follows:

- *Appearance of coated mesh*: no cracking, stripping or air bubbles, and no appreciable variation in color;
 - *Specific gravity*: variations shall not exceed 6%;
 - *Hardness*: variations shall not exceed 10%;
 - *Tensile strength*: variations shall not exceed 25%;
 - *Modulus of elasticity*: variations shall not exceed 25%;
 - *Abrasion resistance*: variations shall not exceed 10%;
 - *Brittleness temperature*: shall not exceed +18°C.
-

2.1.3 Galvanized and PVC coated wire mesh gabions (8 x 10 mesh type):

- *PVC coating thickness:* Nominal – 0.02 in (0.5 mm), Minimum – 0.015 in (0.38 mm)
- *Mesh Wire:* Diameter – 0.106 in. (2.70 mm) internal, 0.146 in. (3.70 mm) external
- *Selvedge Wire:* Diameter – 0.134 in. (3.40 mm) internal, 0.174 in. (4.40 mm) external
- *Mesh Opening:* Nominal Dimension D = 3.25 in. (83 mm), as per Fig. 1.

2.1.4 Galvanized and PVC coated lacing wire and internal stiffeners:

- *PVC coating thickness:* Nominal – 0.02 in (0.5 mm), Minimum – 0.015 in (0.38 mm)
- *Lacing wire:* Diameter – 0.087 in. (2.20 mm) internal, 0.127 in. (3.20 mm) external
- *Cross Tie/Stiffener wire:* Diameter - 0.087 in. (2.20 mm) internal, 0.127 in. (3.20 mm) external
- *Preformed Stiffener:* Diameter – 0.134 in. (3.4 mm) internal, 0.174 in. (4.4 mm) external

2.1.5 Steel Mesh Properties

Mesh Tensile Strength shall have a minimum strength of 2900 lb/ft (42.3 kN/m) when tested in accordance with ASTM A975 section 13.1.1

Punch Test Resistance shall have a minimum resistance of 5300 lb (23.6 kN) when tested in accordance with ASTM A975 section 13.1.4

Connection to selvedges shall have a minimum resistance of 1200 lb/ft (17.5 kN/m) when tested in accordance with ASTM A975.

2.1.6 Spenax Fasteners (Overlapping Fasteners)

Stainless Steel overlapping fasteners may be used in lieu of, or to complement, lacing wire for basket assembly and installation.

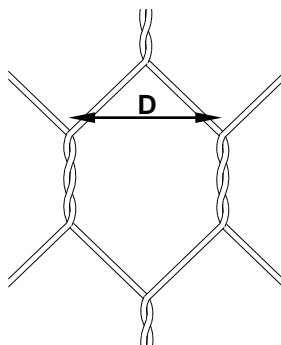
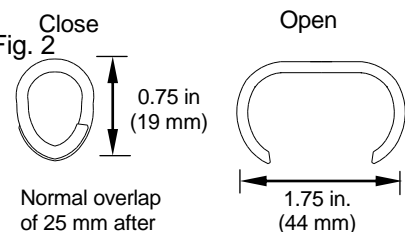
- *High tensile fasteners* shall have a nominal spacing of 4 in. (100 mm) not to exceed 6 in (150 mm) for all assembly and installation. This is based on a 1,200 lb/ft (17.5 kN/m) pull apart resistance for galvanized and PVC coated wire mesh with this spacing (ASTM A975 section 13.1.2).
- *Fasteners used for assembly and installation of the units on the field* shall be tested for compliance with the ASTM A975 section 13.1.2.2 Pull-Apart Resistance. Producer or supplier of the wire mesh shall provide certification no later than 15 days prior of starting construction.
- *When tested in accordance with section 13.1.2.1, the average maximum resistance of the fasteners from the field* shall not be lower than 90% of the resistance provided in the certification.
- *Stainless Steel Fasteners:* Diameter = 0.120 in. (3.05 mm), according to ASTM A313/A313M, Type 302, Class I.
- *Tensile strength:* 222,000 to 253,000 psi (1530-1744 MPA) in accordance with ASTM A764 (2001).
- *Proper installation of rings:* A properly formed Spenax fastener shall have a nominal overlap of one (1) in. after closure (Fig. 2).

2.2 Tolerances

- *Gabion Mats:* $\pm 5\%$ on the length and width, and $\pm 10\%$ on the height.
- *Mesh opening:* Tolerances on the hexagonal, double twisted wire mesh opening shall not exceed $\pm 10\%$ on the nominal dimension D values (see Fig.1).
- *Wire Tolerance:* zinc coating, in accordance with ASTM A641/A641M, Class III soft temper coating.

Fig. 1

| Mesh Type | Nominal Dimension D |
|-----------|---------------------|
| 8 x 10 | 3.25 in. (83 mm) |

**Fig. 2**

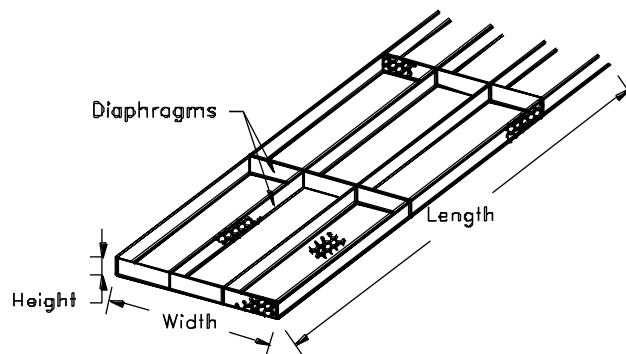
2.3 Standard Unit Size

| Table of sizes for gabion mats | | | |
|--------------------------------|-------------------|--------------------|------------|
| L=Length ft (m) | W=Width ft (m) | H=Height ft (m) | # of cells |
| 99 (30) | 6 (1.9) | 1 (0.3) | 22 |
| 99 (30) | 9 (2.8) | 1 (0.3) | 33 |
| 99 (30) | 6 (1.9) | 1.5 (0.45) | 22 |
| 99 (30) | 9 (2.8) | 1.5 (0.45) | 33 |
| 60 (19) | 6 (1.9) | 1 (0.3) | 14 |
| 60 (19) | 9 (2.8) | 1 (0.3) | 21 |
| 60 (19) | 6 (1.9) | 1.5 (0.45) | 14 |
| 60 (19) | 9 (2.8) | 1.5 (0.45) | 21 |

2.4 Fabrication

Gabion mattresses shall be manufactured with all components mechanically connected at the production facility with the exception of the lid, which is produced separately from the base. The base, sides and ends of the gabion mats shall be woven into a single unit. The diaphragms are connected to the base in the factory. All perimeter edges of the mesh forming the base and lid shall be selvedged with selvedge wire.

The gabion mat is divided into cells by means of diaphragms. The diaphragms create cells of 3 ft (1 m) by 9 ft (2.8 m). The diaphragms shall be secured in position of the base so that no additional tying is necessary at the jobsite.



2.5 Rock

The rock for gabions 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 in. (0.10 m) and 8 in. (0.20 m). The range in sizes shall allow for a variation of 5% oversize and/or 5% undersize rock, provided it is not placed on the gabion exposed surface. The size shall be such that a minimum of three layers of rock must be achieved when filling the gabions.

3.0 Construction Requirements

3.1 Assembly

Gabion mats are supplied in rolls, the base in one roll and the lid in another. The units shall be assembled individually by erecting the sides, ends and diaphragms ensuring that all panels are in the correct position and the tops of all sides are aligned. The four corners of the unit shall be connected first, followed by the internal diaphragms to the sides. All connections should be accomplished using lacing wire or fasteners as previously described in Section 2.1.4 and Section 2.1.6.

The recommended procedure to apply lacing wire consists of first cutting a sufficient length of wire. Secure one end of the wire by looping and twisting, then proceed to lace with alternating single and double loops every mesh opening (approximately every 4 in. (100 mm)) and securely fasten the other end of the lacing wire.

The installation of the fasteners specified in Section 2.1.6 shall be in accordance with the manufacturer's recommendations.

3.2 Installation

Initial assembly should occur with the gabion mats in their final position. The adjacent empty mats must be securely joined together using the same connecting procedure(s) described in Section 3.1 along the vertical, top and bottom edges of their contact surfaces.

3.3 Filling

Gabion mats shall be filled with rock as specified in Section 2.5. During the filling operation or placement some manual stone is required to minimize voids. Care shall be taken when placing fill material to ensure that the PVC sheathing is not damaged.

The cells in any row shall be filled in stages so that local deformation may be avoided. It is also recommended to slightly overfill the baskets 1 to 2 in. (25 to 50 mm) to allow for settlement of the rock.

3.4 Lid Closing

Once the mats are completely full, the lids shall be pulled tight using a tool such as a lid closer until the lid meets the perimeter edges of the mattress. The lid shall then be tightly laced and/or fastened along all edges, ends and tops of diaphragms in the same manner as described in Section 3.1.

3.4 Mesh cutting and folding

Where shown on the drawings or otherwise directed by the engineer, the gabion mat mesh shall be cut, folded and fastened together to suit existing site conditions. The mesh must be cleanly cut and the surplus mesh folded back and neatly wired to an adjacent gabion mat. The cut edges of the mesh shall be securely fastened together with lacing wire or fasteners in the manner described in Section 3.1. Any reshaped gabion mats shall be assembled, installed, filled and closed as specified in the previous sections.

4.0 Method of Measurement

4.1 The pay limits for excavation of gabion mats shall be a line coincident with the bottom and non-exposed side of the mattresses. Excavation quantities will be determined from the cross sections and paid for under the appropriate classified excavation items.

4.2 The quantity to be paid for "In Place Gabion Mats" shall be the number of square meters of mattresses measured in their final position. Job conditions and availability will determine the actual size of gabion mats to be used.

4.3 Excavated material beyond the limits of the mats shall be backfilled with gravel, crushed rock or other material meeting the approval of the engineer.

4.4 This bid price shall include the cost of furnishing all labor, materials, and equipment including mattresses, rock, and backfill material installed in place.

5.0 Basis of Payment

Accepted gabion mats will be paid for at the unit price for each of the pay items included in the contract.
