

**RENO MATTRESS
GALVANIZED****FORWARD**

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NOTES:

The following items have been changed or updated from previous versions. The current date of this specification is May 2005.

The following ASTM standards and specifications have been added or updated:

ASTM A975-97	Standard Specification for Double-Twisted Hexagonal Mesh Gabions and Revet Mattresses (Metallic-Coated Steel Wire or Metallic-Coated Steel Wire with Polyvinyl Chloride (PVC) Coating)
ASTM A641/A641M-03	Specification for Zinc Coated (Galvanized) Carbon Steel Wire
ASTM A370-97a	Test Methods and Definitions for Mechanical Testing of Steel Products
ASTM A313/A313M-98	Specification for Chromium-Nickel Stainless and Heat-Resisting Steel Spring Wire
ASTM A764-95(2001)	Specification for Steel Wire, Carbon, Drawn Galvanized and Galvanized at Size for Mechanical Springs

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1.0 Description

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 as determined by the engineer. These specifications are in accordance with ASTM A975-97 and include Reno mattresses as manufactured by Maccaferri, Inc.

2.0 Materials

2.1 Woven Mesh Reno Mattresses

2.1.1 Wire (Zinc Coated):

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

- *Tensile strength:* both the wire used for the manufacture of gabions and the lacing wire, shall have a maximum tensile strength of 75,000 psi (515 MPa), in accordance with ASTM A641/A641M-03.
- *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 A370-97a.
- *Zinc coating:* minimum quantities of zinc according to ASTM A641/A641M-03, 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 around 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-03.

2.1.2 Galvanized (zinc coated) woven wire mesh Reno mattresses (6 x 8 mesh type):

- *Mesh Wire:* Diameter – 0.087 in. (2.20 mm)
- *Selvedge Wire:* Diameter – 0.120 in. (3.00 mm)
- *Mesh Opening:* Nominal Dimension D 2.5 in. as per Fig.1.

2.1.3 Galvanized (zinc coated) lacing wire:

Lacing wire: Diameter – 0.087 in. (2.20 mm)

2.1.4 Steel Mesh Properties

Mesh Tensile Strength shall have a minimum strength of 2300 lb/ft (33.6 kN/m) when tested in accordance with ASTM A975 section 13.1.1

Punch Test Resistance shall have a minimum resistance of 4000 lb (17.8 kN) when tested in accordance with ASTM A975 section 13.1.4

Connection to selvedges shall have a minimum resistance of 700 lb/ft (10.2 kN/m) when tested in accordance with ASTM A975.

2.1.5 Spenax Fasteners (Overlapping Fasteners):

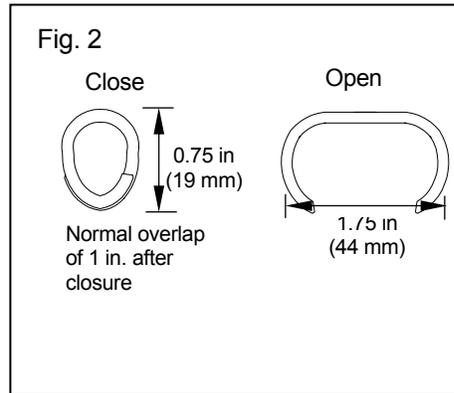
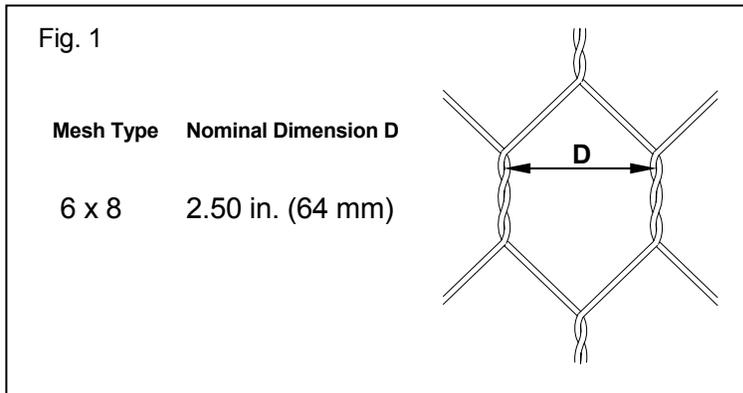
Overlapping fasteners may be used in lieu of, or to complement, lacing wire for basket assembly and installation. The spacing of the fasteners during all phases of assembly and installation shall be in accordance with spacing based on 700 lb/ft (10.2 kN/m) pull apart resistance for galvanized mesh and with a nominal spacing of 6 in. (150 mm), and not to exceed 8 in. (200 mm) max.

- *Galvanized Fasteners:* Diameter = 0.120 in. (3.05 mm), according to ASTM A313/A313M-98, Type 302, Class I.
- *Tensile strength:* 230,000 to 273,000 psi (1586-1882 MPa) in accordance with ASTM A764-95(2001).
- *Proper installation of rings:* A properly formed Spenax fastener shall have a nominal overlap of 1 in. after closure (Fig. 2).

2.2 Tolerances

Wire: Zinc coating, in accordance with ASTM A641/A641M-03, Class III soft temper coating.

- *Reno mattress sizes*: $\pm 5\%$ on the length, width, and 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):

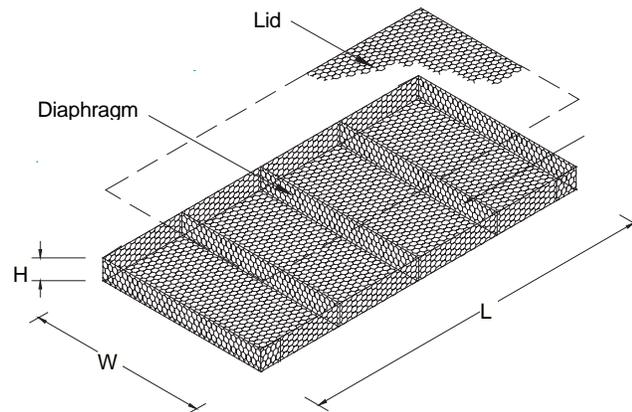


2.3 Standard Unit Size

Table of sizes for Reno mattresses			
L=Length ft (m)	W=Width ft (m)	H=Height in (mm)	# of cells
9 (2.7)	6 (1.8)	6 (150)	3
12 (3.6)	6 (1.8)	6 (150)	4
9 (2.7)	6 (1.8)	9 (230)	3
12 (3.6)	6 (1.8)	9 (230)	4
12 (3.6)	6 (1.8)	12 (300)	4

2.4 Fabrication

Reno mattresses shall be manufactured with all components mechanically connected at the production facility with the exception of the mattress lid, which is produced separately from the base. The ends and diaphragm(s) shall be formed in conjunction with the base. The lid shall be a separate piece made of the same type mesh as the basket. All perimeter edges of the mesh forming the basket and top, or lid, shall be selvaged with wire having a larger diameter. The Reno mattress is uniformly partitioned into internal cells. The diaphragms shall be secured in position to the base so that no additional tying is necessary at the jobsite.



2.5 Rock

The rock for Reno mattresses 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. Mattress rocks shall range between 3 in. (0.08 m) and 5 in. (0.13 m) for units of 9 in. (0.23 m) and 6 in. (0.15) and between 4 in. (0.1 m) and 8 in. (0.20 m) for units of 12 in. (0.30 m). 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 exposed surface. The size shall be such that a minimum of two layers of rock must be achieved when filling the mattress.

3.0 Construction Requirements

3.1 Assembly

Reno mattresses are supplied folded flat and packed in bundles. The units shall be assembled individually by erecting the sides, ends, and diaphragms ensuring that all panels are in the correct position. All connections should be accomplished using lacing wire or fasteners as previously described in Section 2.1.3 and Section 2.1.5.

The procedure for using lacing wire consists of cutting a sufficient length of wire, and first looping and/or twisting to secure 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 fasteners shall be in accordance with the manufacturer's recommendations as specified in Section 2.1.5.

3.2 Installation

After assembly, the Reno mattresses are carried to their final position and are securely joined together along the vertical and top edges of their contact surfaces using the same connecting procedure(s) described in Section 3.1.

3.3 Filling

Mattresses shall be filled with rock as specified in Section 2.5. During the filling operation some manual stone placement is required to minimize voids. It is also recommended to slightly overfill the baskets by 1 in. (25 mm) to allow for settlement and so that the rock is tightly confined by the Reno mattress lid, thereby minimizing any movement of the rock under hydraulic loads.

3.4 Lid Closing

Once the Reno mattresses are completely full, the lids will be pulled tight until the lid meets the perimeter edges of the basket. A tool like a lid closer can be used. The lid must then be tightly laced and/or fastened along all edges, ends and tops of diaphragm(s) in the same manner as described in Section 3.1.

3.5 Mesh Cutting and Folding

Where shown on the drawings or otherwise directed by the engineer, the mattress 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 mattress face. 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 mattress shall be assembled, installed, filled and closed as specified in the previous sections.

4.0 Method of Measurement

- 4.1 The limits of payment for excavation for Reno mattresses shall be a line coincident with the bottom and non-exposed side of the baskets. 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 Reno mattresses" shall be the number of square meters or square yards of mattresses measured in their final position. Job conditions and availability will determine the actual size baskets or Reno mattresses to be used.
- 4.3 Excavated material beyond the limits of the baskets 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 baskets, rock, and backfill material installed in place.

5.0 Basis of Payment

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

Headquarters: 10303 Governor Lane Boulevard Williamsport, MD 21795-3116, USA tel: 301-223-6910 / fax: 301-223-6134	MACCAFERRI INC. e-mail: hdqtrs@maccaferri-usa.com Website: www.maccaferri.com	West Coast: 3650 Seaport Boulevard West Sacramento, CA 95691-3400, USA tel: 916-371-5805 / fax: 916-371-0764
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