



Designation: D7014 – 04

Standard Practice for Assembly and Placement of Double-Twisted Wire Mesh Gabions and Revet Mattresses¹

This standard is issued under the fixed designation D7014; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers standard practice for assembly, placement and filling of double-twisted wire mesh gabions and revet mattresses used for various erosion control, soil retention or freestanding structures. The product size, type and alignment must be determined by the user. Gabions and Revet Mattresses shall be installed in accordance with project plans and specifications when available.

1.2 This standard is expressed in SI (metric) units. American (inch-pound) units are provided in parenthesis for information purposes.

1.3 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

[A975 Specification for Double-Twisted Hexagonal Mesh Gabions and Revet Mattresses \(Metallic-Coated Steel Wire or Metallic-Coated Steel Wire With Poly\(Vinyl Chloride\) \(PVC\) Coating\)](#)

[D6711 Practice for Specifying Rock to Fill Gabions, Revet Mattresses, and Gabion Mattresses](#)

2.2 AASHTO Standard:

[AASHTO M288 Geotextile Specification for Highway Application³](#)

¹ This practice is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.25 on Erosion and Sediment Control Technology.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001.

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *gabion, n*—a wire mesh container of variable sizes, uniformly partitioned into internal cells, interconnected with other similar units, and filled with stone at the project site to form flexible, permeable, monolithic structures such as retaining walls, sea walls, channel linings, revetments and weirs for erosion control projects.

3.1.2 *revet mattress, n*—a double-twisted wire mesh container uniformly partitioned into internal cells with relatively small height in relation to other dimensions, having smaller mesh openings than the mesh used for gabions: revet mattresses are generally used for river bank protection and channel linings.

3.1.3 *double-twisted wire mesh, n*—a non raveling mesh made by twisting continuous pairs of wires through three one half ($\frac{1}{2}$) turns (commonly called double-twisted) which are then interconnected to adjacent wires to form hexagonal-shaped openings.

3.1.4 *selvedge wire, n*—a terminal wire used to edge the wire mesh perpendicular to the double twist by mechanically wrapping the mesh wires around it at least 2.5 times or by inserting it through the twists and folding one mesh length.

3.1.5 *edge wire, n*—a terminal wire used to edge the wire mesh parallel to the double twist by continuously weaving it into the wire mesh.

3.1.6 *lacing wire, n*—for gabions and revet mattresses, a metallic coated steel wire or metallic coated steel wire with PVC coating used to assemble and interconnect empty units, to close and secure stone filled units and for internal stiffeners.

3.1.7 *fastener, n*—an alternate connector to lacing wire, used for binding operations for gabions and revet mattresses.

3.1.8 *stiffener, n*—for gabions, a length of metallic coated steel wire or metallic coated steel wire with PVC coating used for support of facing by connecting the front panel to the back panel of a gabion (stiffener formed at the project site using wire having the same diameter as for the lacing wire) or across the corners of a gabion cell (pre-formed stiffener as specified in Specification A975).

4. Significance and Use

4.1 Gabions and Revet Mattresses, as described in Specification A975, are used to achieve soil stability and prevent soil erosion and are also used as retaining wall structures to resist movements due to gravity. Their ability to function properly depends on correct design and installation. This standard practice describes the proper installation of gabions and revet mattresses to ensure the products function as intended by the manufacturers.

4.2 This practice offers a set of instructions for performing one or more specific operations and does not replace professional judgment. Not all aspects of this practice may be applicable in all situations. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project’s many unique aspects.

5. Material Delivery

5.1 Gabions and revet mattresses are manufactured with all components mechanically connected at the production facility with the exception of the mattress lid, which is produced separately from the base, as per Specification A975. All gabions and revet mattresses are supplied in the collapsed form, either folded and bundled or rolled, for shipping. The bundles are banded together at the factory for shipping and handling. Revet mattress bases and lids may be packed in separate bundles. Lacing wire is shipped in coils having a diameter approximately 0.60 m (2 ft). Fasteners are shipped in boxes. Preformed stiffeners are shipped in bundles.

5.2 All gabions and revet mattresses shall be labeled to show their dimensions, the number of pieces, and the manufacturer’s color code if applicable.

6. Assembly

6.1 *Gabions*—The folded units shall be taken out from the bundle and placed on a hard, flat surface. Gabions shall be opened, unfolded and pressed out to their original shape (Fig. 1). Front, back and end panels shall be lifted to a vertical position to form an open box shape (Fig. 2). Panels shall be fastened together with the projecting heavier gauge selvedge wire by firmly wrapping the selvedge wire around the selvedge or edge wire of the intersecting panel or the back panel (Fig. 3). Inner diaphragm panels shall be lifted into a vertical position and secured in the same manner. All edges of the diaphragms and end panels shall be tied or fastened to the front and back of the gabion as specified in Section 7.

6.2 *Revet Mattresses*—The folded units shall be taken out from the bundle and placed on a hard, flat surface. Revet mattresses shall be opened, unfolded and pressed out to their original shape. Front, back and end panels shall be lifted to a vertical position to form an open box shape (Fig. 4). End flaps shall be folded and/or overlapped, as appropriate. All edges of the diaphragms and end panels shall be tied or fastened to the front and back of the mattress, as specified in Section 7.

7. Fastening Procedure

7.1 All gabions and revet mattresses must be fastened as specified in 7.2 and 7.3 at each step of construction. Initial assembly, tying of adjacent units along the contacting edges, tying of the lid to sides, tying of lid to top of diaphragms, and re-tying of cut gabions or revet mattresses.

7.2 When using tie wire, cut a piece of wire approximately 1.5 times the length of the edge to be tied. The maximum length of the edge to be tied at one time shall not exceed 1 m (or 3 ft). Longer edges shall be joined by several lengths of wire. Tie wires shall be secured around the selvedge wire or

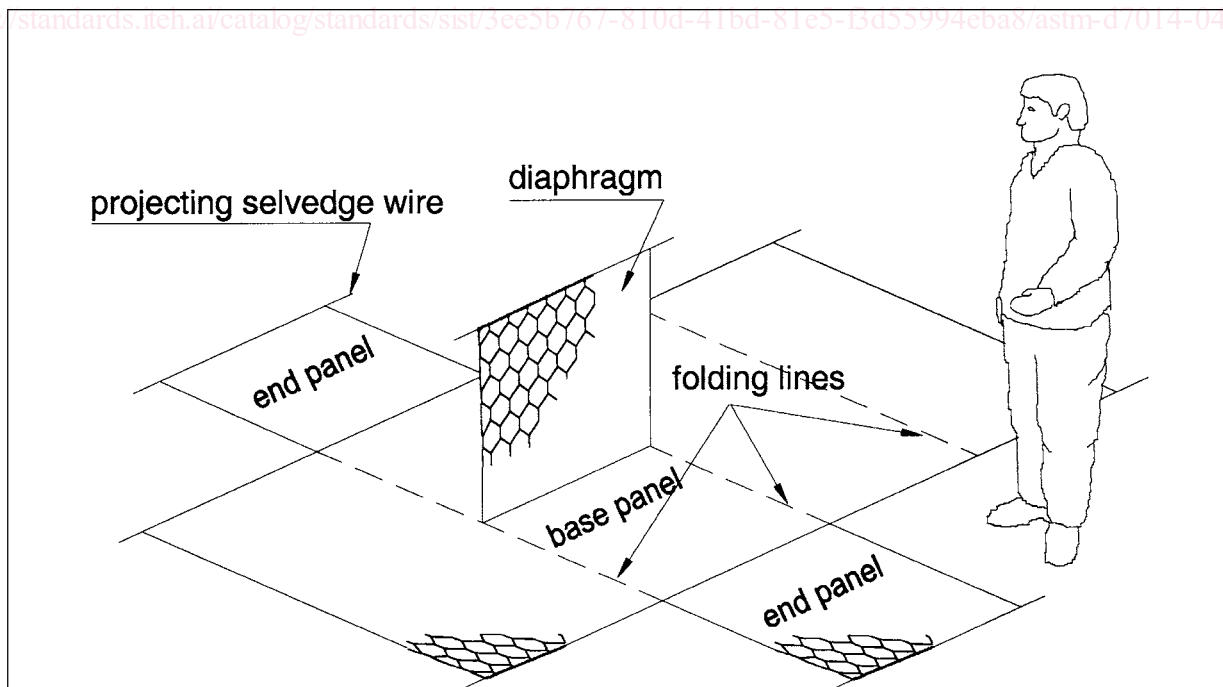


FIG. 1 Assembly—Gabions

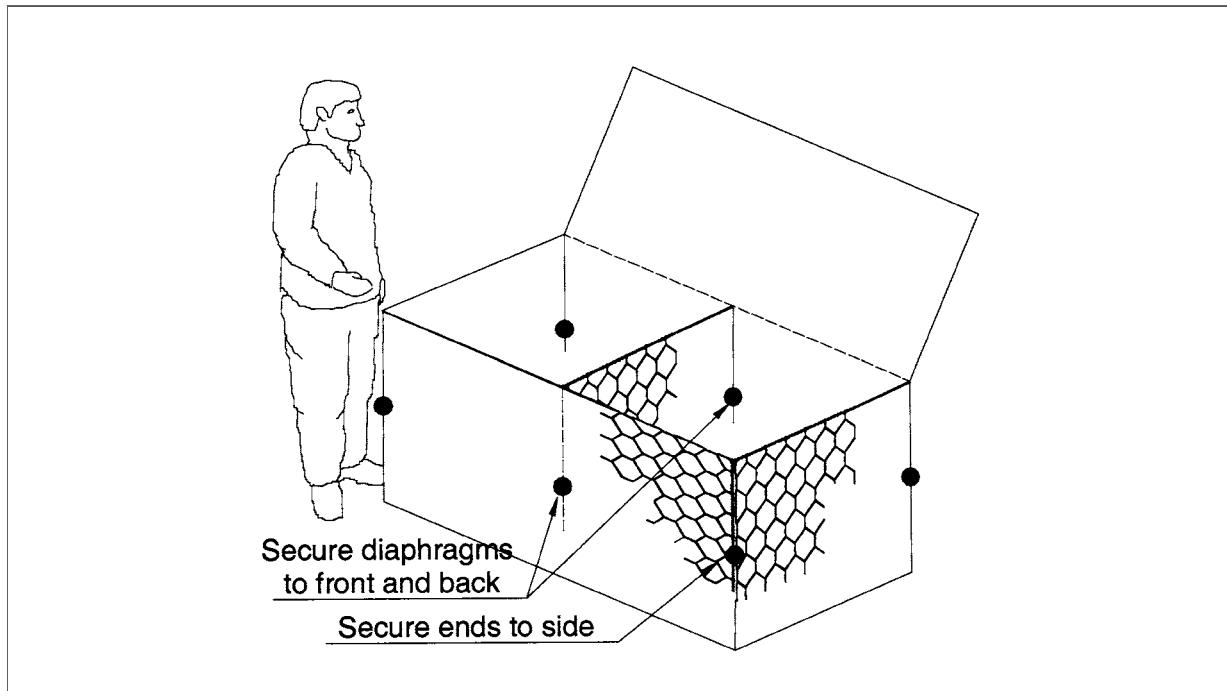


FIG. 2 Assembly—Gabions

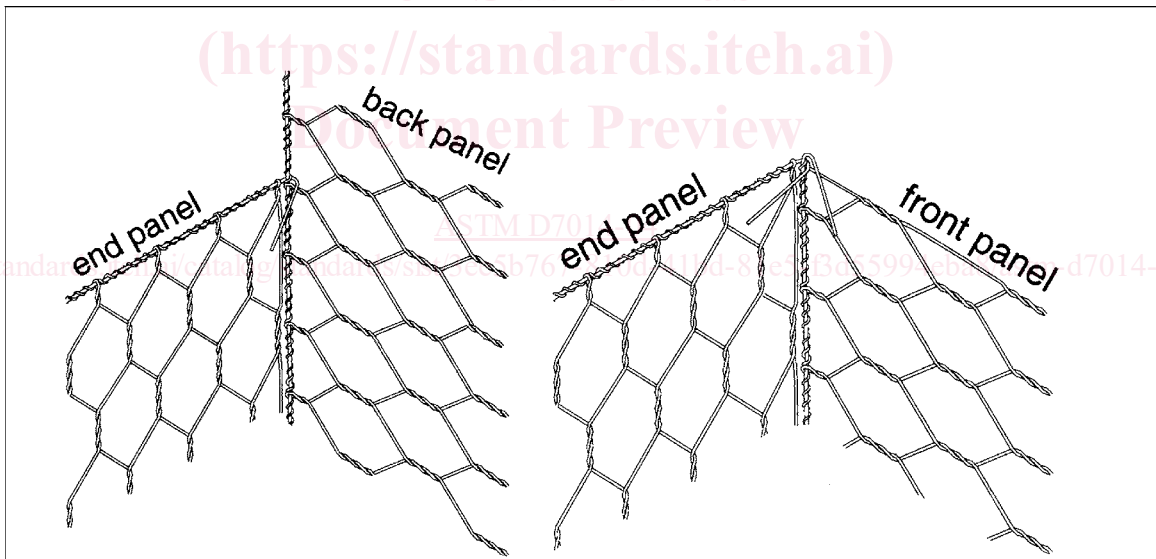


FIG. 3 Assembly—Gabions—Selvedge Connection End and Front Panel to Back Panel

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 0.10 m to 0.15 m (4 in to 6 in) (Fig. 5). The basket pieces should be pulled tightly together during the tying operation. The other end of the tie wire shall be secured again by looping and twisting the wire around itself. When using tie wire to assemble the units, pliers may be used to create tight joints. Care should be taken to avoid damaging the wire

coating. Minimum requirements for panel to panel joint strength using tie wire shall be as specified in Specification A975.

7.3 When steel wire ring fasteners are used, the use of either a mechanical or a pneumatic fastening tool is required. Rings shall be installed at the top and the bottom connections of the end and center diaphragms and then a maximum nominal spacing of 0.15 m (6 in.) along all edges shall be used (Fig. 5). Ring fasteners can be galvanized, stainless steel or Zinc-5 %

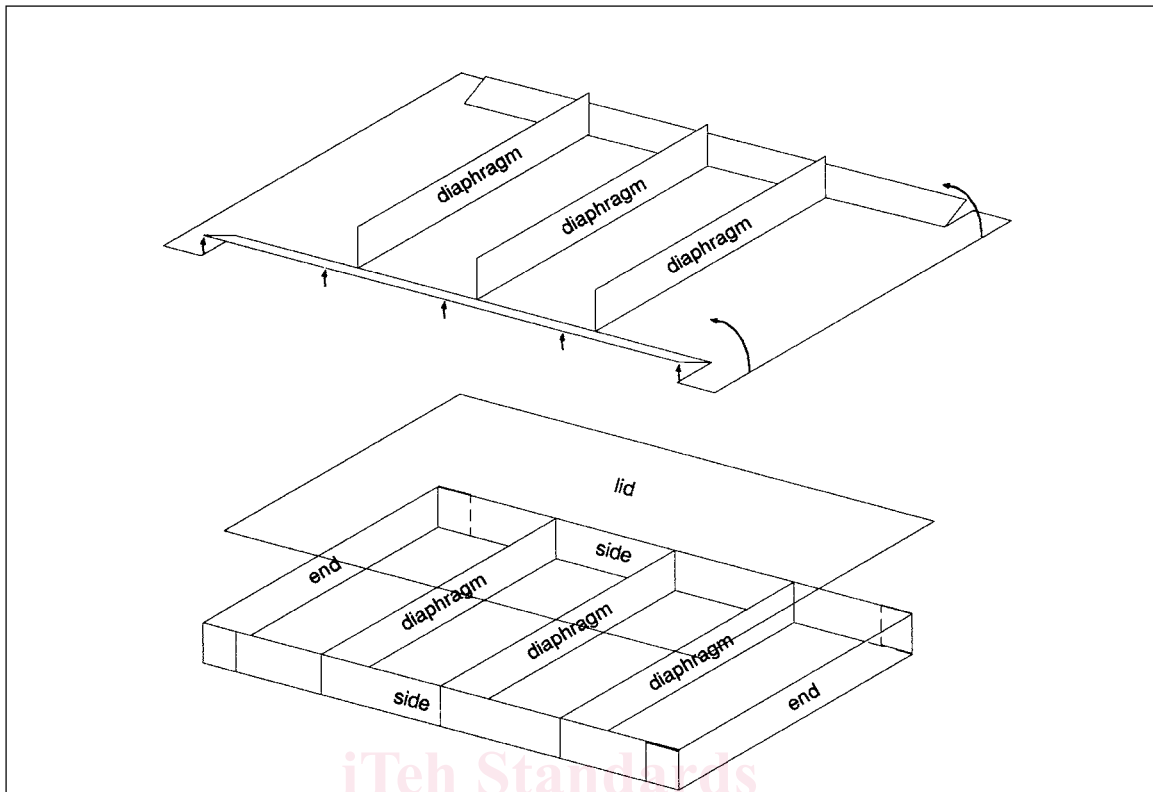


FIG. 4 Assembly—Revet Mattresses

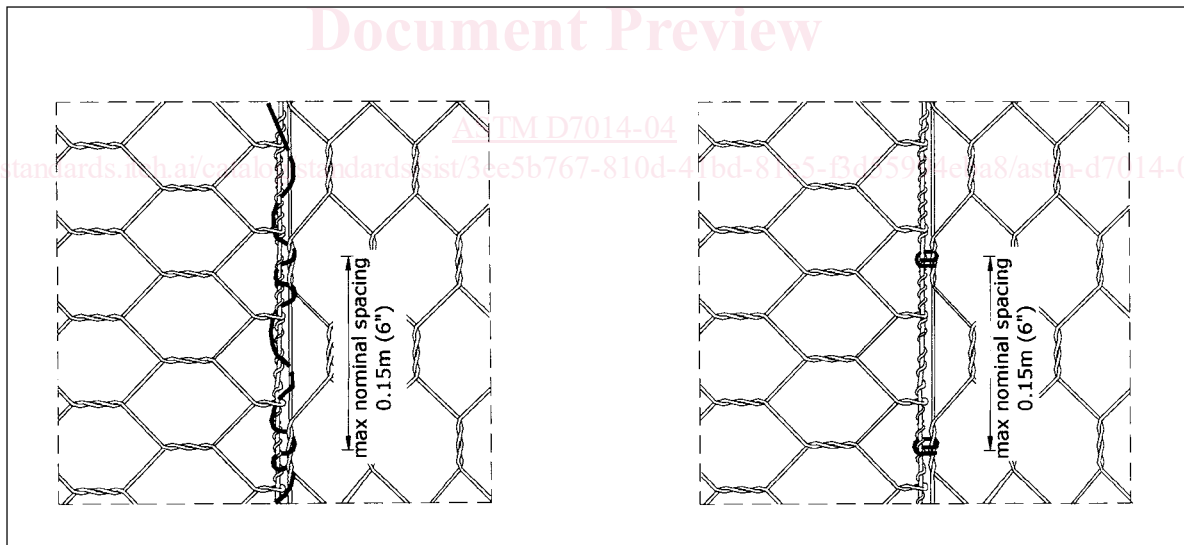


FIG. 5 Fastening Procedure—Connection Using Lacing Wire or Ring Fasteners

aluminum-mischmetal alloy coated, depending on the type of wire specified in A975, section 6.3. Minimum requirements for the panel to panel joint strength using ring fasteners, as well as the mechanical and physical characteristics of the ring fasteners shall be as specified in Specification A975, section 7.2.

8. Foundation Preparation

8.1 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 and revet mattress shall be level, smooth, and free of surface irregularities, loose material, and vegetation. Appropriate measures shall be taken for filtering and drainage of the foundation, (geotextile or graded aggregate filters, drain pipes, etc.). Geotextiles required to be installed behind or underneath