

Construction Specification 64—Gabions and Gabion Mattresses

1. Scope

The work consists of furnishing, assembling, and installing rock-filled wire-mesh gabion baskets and gabion mattresses. Gabions are at least 12 inches high. Gabion mattresses are no more than 12 inches high.

2. Material Types

Gabions and gabion mattresses shall consist of rectangular wire mesh formed containers filled with rock. Gabions will conform to one of the following types. The wire coating shall be as specified in Section 7.

Twisted-mesh—Nonraveling, double twisted, hexagonal wire mesh consisting of two wires twisted together in two 180-degree turns. Twisted-mesh, fasteners, and stiffeners shall conform to the requirements of ASTM A975.

Lacing wire is the standard fastener for twisted-mesh gabions and gabion mattresses. Ring fasteners may be used and shall be made of stainless steel. Ring fasteners must provide the minimum strength per lineal foot that is specified in ASTM A975 for gabions and gabion mattresses.

Welded mesh—Welded mesh with a uniform square or rectangular pattern and a resistance weld at each intersection. Welded mesh and stiffeners shall conform to the requirements of ASTM A974 with the exception that welded-mesh may be delivered in component form, either rolled or stacked, for assembly at the job site.

Spiral binders are the standard fastener for welded-mesh gabions and gabion mattresses. Spiral binders shall conform to the requirements of ASTM A974. Alternate fasteners for use with welded-mesh gabions and gabion mattresses, such as ring fasteners or lacing wire, shall be formed from wire meeting the same quality and coating thickness requirements as specified for the gabions and gabion mattresses. Ring fasteners shall be made of stainless steel. Standard fasteners and alternate fasteners must provide the minimum strength per lineal foot that is specified in ASTM A974 for gabions and gabion mattresses.

Rock—Rock shall conform to the quality requirements in Material Specification 523, Rock for Riprap, unless otherwise specified in section 7. At least 85 percent of the rock particles, by weight, shall be within the predominant rock size range.

Gabion basket or mattress height	Predominant rock size (in)	Minimum rock dimension (in)	Maximum rock dimension (in)
12-, 18-, or 36-inch basket	4 to 8	4	8
6-, 9-, or 12-inch mattress	3 to 6	3	6

At least 30 days before delivery to the site, the contractor shall inform the engineer in writing of submit in writing the source from which the rock will be obtained. The test data, and other information by which the material was determined by the contractor to meet needed to document that the rock meets the requirements of this specification are included. The contractor shall provide the engineer free access to the source for the purpose of obtaining samples for testing and source approval.

Bedding or filter material—Bedding or filter material, when specified, shall meet the gradation shown on the plans, or as specified in section section 7, and the requirements of Material Specification 521, Aggregates for Drain-fill and Filters. Geotextile, when specified, shall conform to the requirements specified in section section 7 and those of Material Specification 592, Geotextile.

3. Foundation preparation

The foundation on which the gabions and gabion mattresses are to be placed shall be cut or filled and graded to the lines and grades shown on the drawings. Surface irregularities, loose material, vegetation, and all foreign matter shall be removed from the foundation. When fill is required, it shall consist of material conforming to the specified

requirements specified in section 7. Fill shall be compacted as specified in section 7. Gabions, gabion mattresses, and bedding or specified geotextiles shall not be placed until the foundation preparation is completed and foundation the subgrade surfaces have been inspected and approved by the COTR meets the requirements of this specification.

Compaction of bedding or filter material is required as specified in section section 7. The surface of the finished material shall be to grade and free of mounds, dips, or windrows. Geotextile shall be installed in accordance with the requirements of Construction Specification 95.

4. Assembly and placement

Where a gabion or gabion mattress unit must be modified, welded-mesh panels may be cut to fit. Twisted-mesh panels may be folded and neatly wired but shall not be cut.

Assembly—Use ring-type fasteners or lacing wire for the assembly and placement of twisted-mesh panels. Wrap the lacing wire with alternating single and double half-hitches at 4- to 6-inch intervals and secure by tying a double half-hitch at each end. Use spiral or ring type fasteners for the assembly and placement of welded-mesh panels. Where spiral fasteners are used, crimp the ends to secure the spirals in place. Where ring type fasteners are used, install the fasteners at a maximum spacing of 6 inches.

Interior diaphragms are required where any inside dimension exceeds 3 feet. Use the same type fasteners and fastening procedures to install interior diaphragms and lids as used in the panel assembly. Diaphragms are installed to assure that no open intervals are present that exceed 3 feet.

Placement—Place the empty gabions or gabion mattresses on the foundation and use lacing wire to interconnect the all adjacent horizontal and vertical edges adjacent gabions along the top, bottom, and vertical edges using lacing wire. Wrap the wire with alternating single and double half-hitches at 4- to 6-inch intervals. Welded-mesh gabions and gabion mattresses may be interconnected with spiral fasteners, ring-type fasteners, or lacing wire. Unless otherwise specified in section 8, lacing wire will be the only fastener allowed for interconnecting woven mesh gabions. Spiral fasteners, ring type fasteners, or lacing wire. Where spiral fasteners are used, crimp the ends to secure the spirals in place. Where ring type fasteners are used, install the fasteners at a maximum spacing of 6 inches. are commonly used for the assembly and interconnection of welded mesh gabions. Spirals are screwed down at the connecting edges then each end of the spiral is crimped to secure it in place. Lacing may be used as needed to supplement the interconnection of welded mesh gabions and the closing of lids.

Interconnect each layer of gabions and gabion mattresses to the underlying layer of gabions along the front, back, and sides. Stagger the vertical and horizontal joints between the gabions of adjacent rows and layers by at least half one-fourth of a cell length.

5. Filling operation

Twisted-mesh—After adjacent empty twisted-mesh units are set to line and grade and common sides properly connected, they shall be placed in straight line tension and stretched to remove any kinks from the mesh and to gain a uniform alignment. Units may be staked to maintain the established proper alignment before the rock is placed. No stakes shall be placed through geotextile material. Fasteners shall be attached during the filling operation as needed to preserve the strength and shape of the structure.

Internal connecting crosstie wires shall be placed in each unrestrained gabion and gabion mattress unit of more than 18 inches in height, including units left temporarily unrestrained. Two internal connecting wires shall be placed concurrently with rock placement at each 12-inch interval of depth. These crossties shall be evenly spaced along the front face and connected to the back face. All crosstie wires shall be looped around two mesh openings and each wire end shall be secured by a minimum of five 180-degree twists around itself after looping.

Welded-mesh—Welded-mesh units do not require stretching. Units may be staked to maintain the established proper alignment before the rock is placed. No stakes shall be placed through geotextile material. Fasteners shall be attached during the filling operation as needed to preserve the strength and shape of the structure.

Internal crossties or stiffeners shall be placed in each unrestrained gabion and gabion mattress unit of more than 18 inches in height, including units left temporarily unrestrained. Crossties or stiffeners shall be placed concurrently with rock placement at each 12-inch interval of depth. They shall be placed across the corners of the gabions (at 12 inches from the corners) providing diagonal bracing. Lacing wire or preformed hooked wire stiffeners may be used.

Twisted and welded-mesh—The gabions and gabion mattresses shall be carefully filled with rock in a manner that will ensure alignment, avoid bulges, and provide a compact mass that minimizes voids. Machine placement requires supplementing with hand work to ensure the desired results. The units or cells in any row shall be filled in stages so that the depth of rock placed in any one cell does not exceed the depth of rock in any adjoining cell by more than 12 inches. Along the exposed faces, the outer layer of stone shall be carefully placed and arranged by hand to ensure a neat, compact placement with a uniform appearance.

The last layer of rock shall be uniformly leveled to the top edges of the cells. Lids shall be stretched tight over the rock filling. The use of crowbars or other single point leverage bars for lid closing is prohibited as they may damage the baskets. The lid shall be stretched until it meets the perimeter edges of the front and end panels. The gabion lid shall then be secured to the sides, ends, and diaphragms with lacing wire, spiral binders, or approved alternate fasteners. Lacing wire shall be wrapped with alternating single and double half-hitches at 4- to 6-inch intervals. Where spiral fasteners are used, crimp the ends to secure the spirals in place.

Any damage to the wire or coatings during assembly, placement, and or filling shall be repaired promptly in accordance with the manufacturer's recommendations or replaced with undamaged gabion basket materials.

6. Measurement and payment

Method 1—For items of work for which specific unit prices are established in the contract, the volume of rock is measured within the neat lines of the gabion structure and computed to the nearest cubic yard. Payment for gabions is made at the contract unit price and includes the wire mesh and rock. Such payment is considered full compensation for all labor, material, equipment, and all other items necessary and incidental to completion of the work.

Method 2—For items of work for which specific unit prices are established in the contract, the volume of the gabions is measured within the neat lines of the gabion structure and computed to the nearest cubic yard. Payment for the gabions is made at the contract unit price and includes the wire mesh, rock, and specified bedding material or geotextile. Such payment is considered full compensation for all labor, material, equipment, and all other items necessary and incidental to the completion of the work.

Method 3—For items of work for which specific unit prices are established in the contract, the surface area is measured within the neat lines of the gabion mattress structure and computed to the nearest square yard. Payment for the gabion mattress is made at the contract unit price and includes the wire mesh and rock. Such payment is considered full compensation for all labor, material, equipment, and all other items necessary and incidental to the completion of the work.

Method 4—For items of work for which specific unit prices are established in the contract, the surface area is measured within the neat lines of the gabion mattress structure and computed to the nearest square yard. Payment for the gabion mattress is made at the contract unit price and includes the wire mesh, rock, and specified bedding material or geotextile. Such payment is considered full compensation for all labor, material, equipment, and all other items necessary and incidental to the completion of the work.

All methods—The following provisions apply to all methods of measurement and payment. Unless otherwise specified in section 8, no deduction in volume is made for any void or embedded item (e.g. a pipe passing through a gabion wall). Compensation for any item of work described in the contract, but not listed in the bid schedule, is included in the payment for the item of work to which it is made subsidiary. Each item and the items to which they are made subsidiary are identified in section 8 of this specification.

7. Items of work and construction details

