
CONSTRUCTION SPECIFICATION
CS-OR-064 GABIONS AND GABION MATTRESSES

064.1 SCOPE

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

064.2 MATERIAL

Gabions and gabion mattresses shall consist of rectangular wire mesh formed containers filled with rock. The wire coating shall be as specified in Section 064.6 of this specification.

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.

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 MS-OR-523, Rock for Riprap, unless otherwise specified in Section 064.6 of this specification. At least 85 percent of the rock particles, by weight, shall be within the predominant rock size range.

TABLE 064-1			
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 submit in writing the source from which the rock will be obtained, test data, and other information needed to document that the

rock meets the requirements of this specification. The contractor shall provide the engineer free access to the source for the purpose of obtaining samples for testing.

Bedding or filter material — Bedding or filter material, when specified, shall meet the gradation shown on the plans, or as specified in Section 064.6 of this specification, and the requirements of MS-OR-521, Aggregates for Drainfill and Filters. Geotextile, when specified, shall conform to the requirements specified in Section 064.6 of this specification and those of MS-OR-592, Geotextile.

064.3 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 requirements specified in Section 064.6 of this specification. Fill shall be compacted as specified in Section 064.6 of this specification. Gabions, gabion mattresses, and bedding or geotextiles shall not be placed until the foundation meets the requirements of this specification.

Compaction of bedding or filter material is required as specified in Section 064.6 of this specification. 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 CS-OR-095, Geotextile.

064.4 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 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 dimension exceeds 3 feet. Use the same type fasteners and fastening procedures to install interior diaphragms and lids as used in the panel assembly.

Placement — Place the gabions or gabion mattresses on the foundation and use lacing wire to interconnect all adjacent horizontal and vertical edges. 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. 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.

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

064.5 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, or filling shall be repaired promptly in accordance with the manufacturer's recommendations or replaced with undamaged materials.

064.6 ITEMS OF WORK AND CONSTRUCTION DETAILS