CONSTRUCTION SPECIFICATION

MI-169. WIRE MESH GABIONS AND MATTRESSES

1. Scope

The work consists of furnishing, assembling, and installing rock filled wire mesh gabion baskets and mattresses.

2. Types

Gabions shall consist of rectangular wire mesh formed containers filled with rock. Gabions will be nonraveling, double twisted, hexagonal wire mesh consisting of two wires twisted together in two 180-degree turns.

3. Material

Gabions shall be fabricated, assembled, and installed in accordance with the nominal wire sizes and dimensions shown in tables 64–1 and 64–2, using the following materials.

Table 64–1 Minimum requirements*

Gabion baskets—height 12, 18, or 36 inches (0.3, 0.6, or 0.9 m); length as specified

Type of wire	Mesh size in (mm)	Wire diameter in (mm)	Galvanized coating oz./ft^2 (kg/m^2)
Woven mesh	3.25 x 4.5 (85 x 115)	0.118 (3)	0.80 (0.24)
Selvage		0.153 (3.9)	0.80 (0.24)
Lacing and internal connecting wire		0.086 (2.2)	0.70 (0.21)

Table 64–2 Minimum requirements*

Gabion mattresses—height 6, 9, or 12 inches (0.15, 0.22, or 0.3 m); length as specified

Type of wire	Mesh size in (mm)	Wire diameter in (mm)	Galvanized coating oz./ft^2 (kg/m^2)
Woven mesh	2.5 x 3.25 (65 x 85)	0.086 (2.2)	0.70 (0.21)
Selvage		0.105 (2.6)	0.80 (0.24)
Lacing and internal connecting wire		0.086 (2.2)	0.70 (0.21)

***** Note: The wire sizes shown are nominal sizes. The wire sizes include the galvanizing coating thickness.

Wire mesh gabions and mattresses shall be fabricated within a dimension tolerance of plus or minus 5 percent.

Wire for fabrication and assembly shall be hot-dipped galvanized. The wire shall have a minimum tensile strength of 60,000 pounds per square inch (450 Mpa). Galvanized steel wire shall conform to ASTM A 641, Class 3, Soft Temper.

Alternate fasteners for use with wire mesh gabions, such as ring fasteners, shall be formed from wire meeting the same quality and coating thickness requirements as specified for the gabions.

Standard fasteners and alternate fasteners must provide a minimum strength of 1,400 pounds per lineal foot (2000 kg/m) for gabion baskets and 900 pounds per lineal foot (1300 kg/m) for gabion mattresses. When used to interconnect gabion baskets or mattresses with PVC coating, ring fasteners shall be made of stainless steel and spiral fasteners will be PVC coated. All fasteners shall meet all of the closing requirements of the gabion manufacturer.

Rock shall conform to the quality requirements in Specification 164, Loose Rock Riprap. At least 85 percent of the rock particles, by weight, shall be within the predominant rock size range of 4 to 8 inches (100 to 200 mm).

4. Foundation preparation

The foundation on which the gabions 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. Gabions and bedding or specified geotextiles shall not be placed until the foundation preparation is completed and the subgrade surfaces have been inspected and approved by the NRCS inspector.

Compaction of bedding or filter material is required as shown on the drawings. 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 Specification 165.

5. Assembly and placement

The assembly and placement of gabions shall be in accordance with the following procedures:

Assembly—Rotate the gabion panels into position and join the vertical edges with fasteners for gabion assembly. Where lacing wire is used, wrap the wire with alternating single and double half-hitches at 4- to 5-inch (100 to 125 mm) intervals. Where ring type alternate fasteners are used for basket assembly, install the fasteners at a maximum spacing of 6 inches (150 mm). Use the same fastening procedures to install interior diaphragms where they are required.

Interior diaphragms are required where any inside dimension exceeds 3 feet (0.9 m). Diaphragms are installed to ensure that no open intervals are present that exceed 3 feet (0.9 m).

Placement—Place the empty gabions on the foundation and interconnect the 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 (100 to 150 mm) intervals. Lacing wire will be the only fastener allowed for interconnecting woven mesh gabions.

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

6. Filling operation

After adjacent empty woven wire gabion 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. Welded-mesh gabions do not require stretching. The gabions may be staked to maintain the established proper alignment before the rock is placed. No stakes shall be placed through geotextile material. Connecting lacing wire and other fasteners (as allowed) shall be attached during the filling operation to preserve the strength and shape of the structure.

Internal connecting crosstie wires shall be placed in each unrestrained gabion cell of more than 18 inches (450 mm) in height, including gabion cells left temporarily unrestrained. Two internal connecting wires shall be placed concurrently with rock placement at each 12-inch (300 mm) interval of depth. In woven mesh gabions these crossties are placed evenly spaced along the front face and connecting 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.

The gabions shall be carefully filled with rock by machine or hand methods to ensure alignment, avoid bulges, and provide a compact mass that minimizes voids. Machine placement requires supplementing with handwork to ensure the desired results. The 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 (300 mm). 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 gabions. Lids shall be stretched tight over the rock filling using only approved lid closing tools as necessary. 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 spiral binders, approved alternate fasteners, or lacing wire wrapped with alternating single and double half-hitches in the mesh openings.

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