

**STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 838
GABIONS
April 15, 2005**

838.01 Description

838.02 Material

838.03 Construction

838.04 Method of Measurement

838.05 Basis of Payment

838.01 Description. This item shall consist of furnishing and installing gabions and fill material, excavation and other work necessary to install the gabions (baskets) as shown in the plans or as directed by the Engineer.

838.02 Material.

A. Basket

1. Dimension. Wire mesh baskets shall be supplied as specified on the plans. Gabions shall be supplied pre-assembled by the manufacturer in collapsed form with all appurtenances attached to the main gabion body. The horizontal width of the basket shall not be less than 36 inches (0.90 m). The horizontal length of the basket shall not be less than 72 inches (1.8 m). The gabion lengths shall be multiples (2, 3 or 4) of the horizontal width. Dimensions are subject to a tolerance limit of ± 5 percent.

2. Wire Mesh. The wire shall be steel welded wire or twisted wire mesh, fabricated in such a manner that the sides, ends, lids and diaphragms can be assembled at the construction site into rectangular units.

The wire for twisted wire mesh shall have a minimum nominal diameter of U.S. Steel Wire Gage No. 11 for galvanized and U.S. Steel Wire gage No. 12 for galvanized with PVC or epoxy coating. The wire shall have a minimum tensile strength of 60,000 psi (413 MPa). The mesh openings shall be 4½ inches (115 mm) maximum and the area of any mesh opening shall not exceed 10 sq. inches (6500 mm²).

The twisted wire mesh shall be formed in a uniform hexagonal pattern with nonraveling double twists. The perimeter edges of the mesh for each panel shall be tied to a selvedge wire having a minimum nominal diameter of U.S. Steel Wire Gage No. 9 for galvanized and U.S. Steel Gage No. 10 for galvanized with PVC or epoxy coating so that the selvedge to mesh connector is at least the same strength as the body of the mesh.

The welded wire mesh shall be formed in a nominal 3 inch by 3 inch (75 mm by 75 mm) square pattern with a resistance weld at each connection. The wire for welded wire mesh shall have a minimum nominal diameter of U.S. Steel Gage Wire No. 11 for galvanized

and U.S. Steel Wire Gage No. 12 for galvanized with PVC or epoxy coating. The wire shall have a minimum strength of 60,000 PSI (413 MPa). The weld shear strength shall be 400 pounds (1.78 kN) for U.S. Steel Gage No. 11 wire and 300 pounds (1.33 kN) for U.S. Steel Gage No. 12 wire. The spiral binders for joining welded wire mesh panels shall be formed from coated wire having a minimum nominal diameter of U.S. Steel Wire Gage No. 12 and a minimum tensile strength of 60,000 PSI (413 MPa). The ends shall terminate with two tight complete revolutions with a half hitch or in such a manner to maintain strength during pull-apart forces. They shall have a maximum pitch of 3 inches (75 mm)

3. Joining Wire. The joints shall be tied in such a manner that strength and flexibility at the point of connection is at least equal to the mesh. The connecting wire is to meet or exceed the same specifications as the wire used in the mesh.

Lacing wire for assembling baskets and interconnecting adjacent baskets and internal connecting wire for reinforcing side panels shall be coated steel wire having a minimum nominal diameter of U.S. Steel Wire Gage No. 13.5. Spiral binders for welded wire mesh shall pass through the openings and be tied at both ends.

Alternate methods and fasteners for assembling baskets and interconnecting adjacent baskets in lieu of lacing wire and spiral bindings must be approved by the Engineer. Alternate fasteners must remain closed when subjected to a 600 pound (2.67 kN) tensile force while confining the maximum number of wires to be confined by the fastener gabion structure. The submitted fastener must produce a joint strength of 1400 pounds per lineal foot (20.4 kN per meter). Installation procedures, fastener test results, and gabion manufacturer's acceptance shall be submitted for approval to the Engineer of alternate methods and fasteners.

4. Coatings. The wire shall be galvanized with a zinc coating in conformance with ASTM A 641 class 3 finish 5. When additional coating is required by the plans the galvanized wire shall be coated with fusion bonded or extruded PVC or a fusion bonded epoxy.

5. Certification. Each shipment of units to a job site shall be accompanied by a certification which states that the material conforms to the requirements of this specification. A shipment shall consist of all material arriving at the job site at substantially the same time. Submit certified test data according to 101.03.

6. Test

a. Elongation - Twisted Mesh. The wire mesh shall have sufficient elasticity to permit elongation of the mesh equivalent to a minimum of 10 percent of the length of the section of the mesh under test without reducing the gage or tensile strength of the individual wire. Elongation testing shall occur prior to coating and fabrication of the mesh.

b. Load Test - Twisted Mesh. A section of the mesh 6 ft.(1.8 m) long and not less than 3 ft.(0.90 m) wide, after first being subjected to the elongation test described above, shall withstand a load test of 6,000 pounds (26.7 kN) applied to an area of one square foot (0.093 m²) approximately in the center of the section under test.

c. Single Strand Cut - Twisted Mesh. The wire mesh shall be fabricated in such a manner as to be non-raveling. This is defined as the ability to resist pulling apart at any of the twists or connections forming the mesh.

d. Weld Shear - Welded Mesh. The minimum average shear value in Newtons (pounds - force) shall not be less than 35000 lbf (241 N) multiplied by the nominal area of wire (based on the diameter of the metallic coated wire) in square inches (mm²) when tested.

e. Tensile Strength - Welded or Twisted Mesh. The test shall be conducted on the wire mesh in accordance with details described in ASTM A 392 except that strength shall be as listed under load test. Tensile testing shall occur prior to coating and fabrication of the mesh.

f. Zinc Coating - Welded or Twisted Mesh. The test shall be conducted in accordance with details described in ASTM A 90/A 90 M.

g. PVC Coating (Minimum Thickness 0.015 inches (0.38 mm) - Welded or Twisted Mesh. Specific gravity shall be 1.30 to 1.40 as specified in ASTM D 792. Hardness shall be 50 to 60 as specified ASTM D 2240. Resistance to abrasion shall be tested as per ASTM D 1242 with the loss of weight not being more than 0.195 g. Exposure to ultraviolet rays shall be tested according to ASTM D 1499 for 2000 hours at 145° F (63° C) .

h. Fusion Bonded Epoxy Coating. The epoxy shall be fusion bonded in accordance with ASTM A 884. Abrasive resistance shall be tested as per ASTM D 1242 with the loss of weight not being more than 0.19 g.

B. Fill

1. Size. Gabion baskets shall be filled with approved aggregate with a minimum size of 4 inches (100 mm) and a maximum size of 8 inches (200 mm) , with both stone measurements made in the greatest dimension.

2. The aggregate shall meet the requirements of 703.19.B.

838.03 Construction.

A. Assembly. Assembly and erection of the baskets shall be as per manufacturer's recommendations.

B. Installation. The units shall be assembled and carried to the job site and placed in their proper location. For structural integrity, all adjoining empty baskets shall be connected along the perimeter of their contact surface in order to obtain a monolithic structure.

C. Filling. Baskets shall be filled with stone carefully placed by hand or machine to assure alignment and avoid bulges with a minimum of voids. Along all exposed faces and edges, the outer layers of stone shall be carefully placed and packed by hand, ensuring a neat, compact, square appearance.

Thirty six inch (900 mm) high gabions shall be filled in three layers, approximately one foot (300 mm) at a time. Two connecting wires or preformed stiffeners shall be placed between each layer in all cells along all exposed faces of the gabion structure. Diagonal tack ties manufactured from U.S. Steel Wire Gage No. 9 wire are acceptable. All connecting wires shall be looped around two mesh openings and the wire terminals shall be securely twisted to prevent their loosening. The hooked ends of all stiffeners shall be closed by crimping with pliers.

The cells in any row shall be filled in stages so that local deformation may be avoided; that is, at no time shall a cell be filled to a depth exceeding 12 inches (300 mm) more than the adjoining cell.

The last layer of stone shall be leveled with the top of the welded wire gabion to assure proper closing of the lid and provide an even surface for the next course. The last layer of stone shall be overfilled a minimum of 2 inches (50 mm) from the top of the twisted wire gabion to allow for settlement and provide an even surface for the next course.

D. Lid Closing. The lids shall be closed tight over the filling until the lid meets the perimeter edges of the front and end panels. The lid of twisted mesh gabions shall be closed with an approved lid closure tool to minimize mesh deformation; single point tools (stakes or pry bars) are not permitted. The lid shall be tightly closed (laced or fastened) along all edges, ends and diaphragms in the same manner as described above for assembly.

838.04 Method of Measurement. Measurement of gabions shall be the number of cubic yards (cubic meters) of volume completed and accepted.

838.05 Basis of Payment. This item shall include the gabions, fill material, excavation, and all equipment, labor and material to completely install the basket. Payment shall be the cubic yards (cubic meters) in place and accepted. Payment shall be made under:

Item	Units	Description
838	Cubic yard (Cubic meter)	Gabions
838	Cubic yard (Cubic meter)	Gabions with additional coating

Designer Note: Put this item in the contract when recommended by the Office of Structures.