



TERRAQUA Inc.

**ROCKFALL AND SAFETY
NETTING (PVC)**

For Loose Rock Face

All Rockfall Netting is manufactured
According to ASTM A-641 and
ASTM 975-20 guidelines for Double
Twisted Hexagonal mesh

MATERIALS:

The PVC coated rockfall protection netting shall be of non-raveling construction and consist of a uniform double twisted hexagonal mesh of hot dipped galvanized steel wire having a diameter of 2.7mm (0.1063 inches) after galvanization. The steel wire used shall be galvanized prior to weaving into mesh. All wire used shall equal or exceed Federal Specification QQ-W-461H, Finish 5, Class 3 in accordance with current ASTM A-641, Class 3, Soft Temper and tested in accordance to ASTM A370-92. The weight of zinc coating shall be as determined by ASTM test designation A-90. Mesh openings shall be hexagonal in shape and uniform in size measuring not more than 8 x 10 cm (3 ¼” inches x 4 ½” inches). The mesh wire shall be 2.7mm (0.106 inches) prior to PVC coating; the overall diameter of the mesh wire (galvanized wire core plus PVC coating) shall be 3.7mm (0.146 inches) after the PVC coating has been added. Selvedge wire shall be of heavier gauge than the mesh wire with a diameter of 3.4mm (0.133 inches) after galvanization and 4.4mm (0.173 inches) after PVC coating. Lacing and connecting wire shall meet the same specification as the wire used for the netting except that its diameter shall be of 2.2 mm (.087 inches) after galvanization and 3.2mm (0.127”) after the PVC coating.

The use of alternate wire fasteners shall be permitted in lieu of tie wire provided the alternate fasteners meets ASTM A-764 and have a closed position tensile strength of 3033 Newton (700 lb.) while remaining in a positive locked closed condition. The inside opening area shall be 4.84 square cm (.75 square inches). Alternative fasteners are an approved alternate to lacing material

All of the above wire diameters are subject to a tolerance limit of +/- 0.004 inches in accordance with ASTM A-641.

DIMENSIONS:

Netting is supplied in rolls of the following dimensions:

Width: .91m to 4.52m (3 ft. – 15 ft.)
Length: 91.44m maximum (300 ft.)

Terra Aqua Unit Standard Sizes:

Roll unit size	Square Yards
6'x150'	100
12'x150'	200
15'x150'	250
6'x300'	200
12'x300'	400
15'x300'	500

- These dimensions are subject to 10.16 cm (4 inches) for both width and length. In order to simplify the installation procedure, the total length of a roll is recommended to be multiple of the height of the slope.

Minimum Strength requirements of Terra Aqua Double Twisted Mesh

Test Description	Galvanized/Galfan	Pvc Coated
Tensile strength of wire		
mesh parallel to twist	3500 lbs/ft	2900 lbs/ft
Tensile strength of wire		
mesh perpendicular to twist	1800 lbs/ft	1400 lbs/ft
Connection to selvages	1400 lbs/ft	1200 lbs/ft
Panel to Panel	1400 lbs/ft	1200 lbs/ft
Punch strength of mesh	6000 lbs/ft	5300 lbs/ft

Material data:

PVC coated galvanized steel wire: mesh opening 3 1/4" by 4 1/2" (8x10cm)

- * diameter of mesh core wire: 0.1063 inches (2.7mm)
- * diameter of mesh core wire plus PVC coating: 0.146 inches (3.7mm)
- * diameter of selvedge core wire: 0.1338 inches (3.4mm)
- * diameter of selvedge core wire plus PVC coating: 0.173 inches (4.4mm)
- * diameter of lacing core wire: 0.091 inches (2.2mm)
- * diameter of lacing core wire plus PVC coating: 0.127 inches (3.2mm)
- * Zinc coating of wire: finish 5 class 3 zinc coating - ASTM A-641 tested in accordance with ASTM A370-92 for tensile strength.
- * tensile of wire: soft temper in accordance with ASTM A-641-92; Shall have a maximum tensile strength of 70,000 psi (515 MPa) and minimum tensile strength of 60,000 psi
- * weight of zinc coating of wire: shall be determined by ASTM A-90
- * core wire for mesh: 0.85 oz/sf of zinc
- * core wire for selvedge: 0.90 oz/sf
- * core wire for lacing: 0.80 oz/sf
- * weight of mesh is 3 lbs. per square yard (0.33 lbs. per square foot)

- * grade of zinc coating of wire: high grade or special high grade in accordance with ASTM A641, Table 1
- * uniformity of coating: shall be determined by ASTM A-239
- * elongation: not less than 12% in accordance with ASTM A -370-92
- * nominal thickness of PVC coating: 0.0216 inches not less than 0.015 inches

All of the above wire diameters are subject to tolerance limit of 0.004 in accordance with ASTM A-641

INSTALLATION:

- 1.) The edges of the panels shall be wired or fastened to each other to form a continuous covering. The lacing wire shall be tightly looped around every other mesh opening along the edges in such a manner that single and double loops are alternated.
 - The alternative wire fastener shall be applied at approximately 6 inch (15 cm) intervals on both vertical and horizontal lap on each side of the overlap.
- 2.) In the curve stretches of the road, and in order to avoid weakening the protective structure, the net shall not be cut to shape the curve and overlaps of the netting shall be allowed. The same binding operation described in paragraph 1 shall be done where these overlaps occur.
- 3.) On the slopes where a wire cable/rope grid system is designed, tie wires used for lacing the wire mesh to the wire rope shall be galvanized 2.7mm (0.106 inches) and shall be laced horizontally and vertically in accordance with the details.
- 4.) Alternative wire fasteners shall be allowed in lieu of the galvanized 2.7mm (0.106 inches) tie wire when spaced at 30.5 cm (12 inches). The wire rope used to establish the grid shall be .95 cm to 1.9 cm (3/8 inches to 3/4 inches), as directed by the engineer.

Terra Aqua Gabions
1415 North 32nd
Fort Smith, Arkansas 72904
800-736-9089

Polyvinyl chloride coating (pvc) data:

A. PVC (Poly Vinyl Chloride) Coating. The coating shall be gray in color and shall have a nominal thickness of 0.0216 inches but not less than 0.015 inches in thickness. The protective PVC plastic shall be suitable to resist deleterious effects from exposure to light, immersion in salt or polluted water and shall not show any material difference in its initial properties. The PVC compound is also resistant to attack from acids and resistant to abrasion.

B. Initial properties of the PVC coating shall meet the following requirements:

B.1 Specific Gravity:

According to ASTM D-2287 and ASTM D-792; in the range 1.30 to 1.34

B.2 Tensile Strength:

According to ASTM D-412; not less than 2980 psi

B.3 Modulus of Elasticity:

According to ASTM D-412; not less than 2700 psi at 100% strain.

B.4 Resistance to Abrasion:

According to ASTM 1242; weight loss < 12% (Method B)

B.5 Brittleness Temperature:

According to ASTM D-746, Procedure A ; shall be at least 8.3 degrees centigrade below the minimum temperature at which the gabions will be handled or placed but not higher than -9.4 degrees centigrade.

B.6 Hardness:

According to ASTM D-2240; shall be between 50 and 60 Shore D when tested.

B.7 Creeping Corrosion:

Maximum corrosion penetration to the wire core from a square cut end section shall not be more than 25mm when the specimen has been immersed for 2000 hours in a 50% SOLUTION HC1 (hydrochloric acid 12 Be.)

C. Variation of the initial properties will be allowed, as specified below, when the specimen is submitted to the following accelerated aging tests:

C.1 Accelerated Aging Tests

C.1.1 Salt Spray Test:

According to ASTM B-117
Period of test – 3000 hours.

C.1.2 Exposure to ultraviolet rays:

According to ASTM D – 1499 and ASTM G-23 (Apparatus Type E).
Period of Test – 3000 hours at 63 degrees centigrade.

C.1.3 Exposure to high temperatures

Testing period: 240 hours at 105 degrees centigrade, when test in accordance with ASTM D- 1203 and ASTM D-2287.

After the above tests have been performed, the PVC compound shall exhibit the following properties.

D. Properties after aging tests:

D.1 Appearance:

The vinyl coating shall not crack , blister or split and shall not show any remarkable change in color.

D.2 Specific Gravity:

Shall not show change of higher than 6% of it initial value.

D.3 Durometer Hardness:

Shall not show change higher than 10% of its initial value.

D.4 Tensile strength:

Shall not show change higher than 25% of its initial value.

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D.5 Elongation:

Shall not show a change higher than 25% of its initial value.

D.6 Modulus of Elasticity:

Shall not show change higher than 25% of its initial value.

D.7 Resistance to Abrasion :

Shall not show change higher than 10% of its initial value.

D.8 Brittleness Temperature:

Cold Bend Temperature - Shall not be higher than - 20 degrees centigrade.

Cold Flex Temperature - Shall not be higher than + 18 degrees centigrade.

ASTM A975-20

Proudly Made in the USA

Plant location:

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800-736-9089

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