ROCKFALL NETTING

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Rockfall protection netting is used to prevent rocks and debris from falling onto roads, railways or where there is a possibility of loss of property or life.

The steel wire used in the manufacture of Rockfall Netting is heavily zinc coated according to SANS 675:1997. If required, a PVC coating is extruded over the galvanised wire to provide added protection for use in polluted environments such as acidic soils or water, in salt water, in water carrying a high abrasive sediment load or wherever the risk of corrosion is present. The PVC coating has a nominal thickness of 0,5 mm. The tolerances of mesh and wire are shown in Tables 1 and 2.

Rockfall Netting is made of hexagonal woven wire Mesh Type 80 commonly referred to as double twist mesh as per SANS 1580:2005 (Tables 1 and 2). Rockfall Netting is supplied in standard lengths and widths. The properties of the wire are given in Table 2. Dimensions and sizes for Rockfall Netting are shown in Table 3. When specifying Rockfall Netting in the tender documents or bill of quantities, please refer to Table 4.
Depending on the geo-morphology of the rock face and the rock type, superior drapery systems for rockfall, i.e. SteelGrid or HEA panels may be more appropriate solutions. Please refer to the appropriate technical data sheets for further information.

Anchoring

The distribution of the top anchorages must be calculated on the basis of the maximum load that may occur at each anchorage bearing in mind the breaking strain of the double twist mesh. In all cases it is preferable to link the individual anchorages with a steel rope which must be tied to the mesh.

When a small amount of material is likely to collect at the toe of the slope, the following alternatives may be considered:

- leave approximately 0,3 m of the lower end of the netting open to facilitate removal of the debris deposited,
- close the netting at the foot to contain the loose material.

The bottom fixing must allow for periodic removal of the accumulated debris after which the netting must be anchored again.

On the rock face, the sheets of netting must be securely and continuously laced together using binding wire of diameter equal to or greater than the wire used for the manufacture of the mesh. Alternatively, metal stakes of various sizes can be used. When necessary, the sheets of netting should be close together to prevent fragments of rock from rolling off. In addition suitable anchorages must be provided at the rate of one anchor every 15 to 30 m^2 of covered area.

Wire

All tests on wire must be performed prior to manufacturing the mesh.

1. Tensile strength: The wire used for the manufacture of the gabions has a tensile strength between 350-575 N/mm^2 according to SANS 675:1997.
2. Elongation: Elongation shall not be less than 10% in accordance with EN 10223-3. Tests are carried out on a sample at least 25 cm long.
3. Adhesion of zinc: The adhesion of the zinc coating to the wire is such that, when the wire is wrapped six turns around a mandrel having four times the diameter of the wire, it does not flake or crack when rubbed with the bare fingers, in accordance with SANS 675:1997.
4. Ductility: The ductility of the zinc-coated wire is such that when the wire is wrapped at least eight times around a wire having the same diameter of the test specimen at a rate not exceeding 15 turns per minute and then unwrapped at the same rate, it does not show any sign of fracture of the underlying steel wire in accordance with SANS 675:1997.

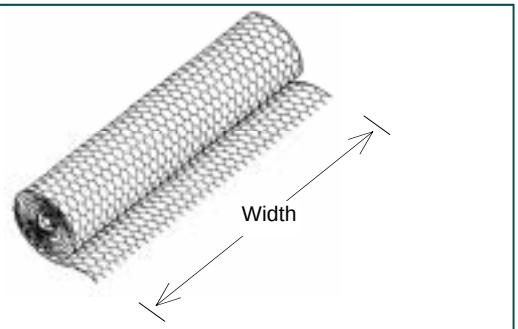
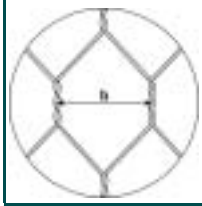


Figure 1 - Drawing of product

STANDARD MESH-WIRE			
Mesh Designation	b	Tolerance (mm)	OD Wire Ø (mm)
Mesh Type 60 Galvanised Galvanised + PVC	60	-4 +10	2,2 2,2 / 3,2
Mesh Type 80 Galvanised Galvanised + PVC	80	-4 +10	2,7 2,7 / 3,7



MESH TOLERANCE
The tolerance on the opening of mesh "b" being the distance between the axis of two consecutive twists according to SANS 1580:2005.

Table 1

PROPERTIES OF WIRE			
Use	Units	Lacing	Mesh
Wire** Galvanised Galvanised + PVC	Ø mm	2,2 2,2 / 3,2	2,7 2,7 / 3,7
Wire Tolerance*	Ø mm	±0,08	±0,08
Quantity of zinc*	g/m^2	245	245
Tensile strength*	N/mm^2	350-575	

* According to SANS 675:1997
** According to SANS 1580:2005 and SANS 675:1997

Table 2

Figure 2

PVC Coating Characteristics

The properties of the PVC material adheres to the following:

Colour: Grey RAL 7037 according to ASTM D1482-57T;
Specific gravity: 1,30-1,38 kg/dm³ in accordance with ASTM D792 Table 1;
Hardness: between 55 and 65 Shore D, according to ASTM D2240;
Tensile strength: not less than 20,6 MPa, according to ASTM D412-92;
Modulus of elasticity: not less than 18,6 MPa, in accordance with ASTM D412-92;
Abrasion resistance: the percentage of the weight loss is less than 12%, according to ASTM D1242-92;
Creeping corrosion: max. penetration of corrosion of the wire from a square cut end is 25 mm when the specimen has been immersed for 2,000 hrs in a 5% solution HCl (hydrochloric acid 12 Be).
The accelerated aging tests are:
Salt spray test: test period 3,000 hours, test method ASTM B117-94;
Exposure to UV rays: test period 3,000 hours at 63°C, test method ASTM D1499-92a and ASTM G23-93 apparatus Type E;
Brittleness temperature: no higher than -9°C, or lower temperature when specified by the purchaser, when tested in accordance with ASTM D746.

The properties after aging tests are as follows:

Appearance of coated mesh: no cracking, stripping or air bubbles, and no appreciable variation in color;
Specific Gravity: variations do not exceed 6%;
Hardness: variations do not exceed 10%;
Tensile strength: variations do not exceed 25%;
Modulus of elasticity: variations do not exceed 25%;
Abrasion resistance: variations do not exceed 10%;
Brittleness temperature: do not exceed +18°C.

STANDARD ROCKFALL NETTING SIZES	
Mesh Type	Roll Size (m)
60	25x2 50x2
80	25x2 50x2
Tolerances : Length : ±3%; Width : ±b All sizes and dimensions are nominal.	

Table 3

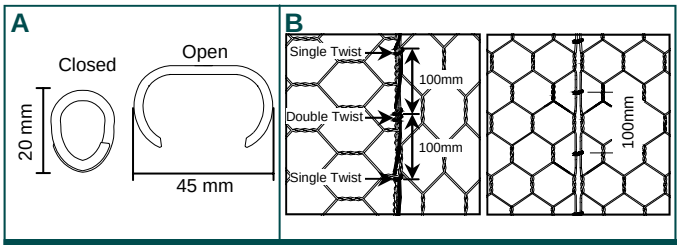


Figure 3

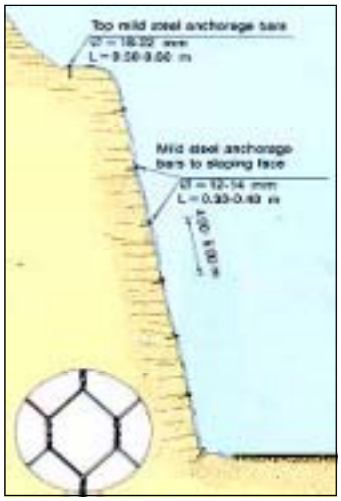


Figure 4

1. Pliers 2. Pliers with nipper 3. Nipper	Manual Spenax Tool	Closing tool

Figure 5

BILL OF QUANTITIES					
Item No	Description	Unit	Quantity	Rate	Amount (R)
1	ROCKFALL NETTING (Double twist hexagonal wire mesh rolls to SANS 1580:2005). (Including material and delivery).				
1.1 (a)	Mesh Type 60 with 2,2 mm, Class A Galvanised wire. Length x Width	m²			
(b)	Mesh Type 60 with 2,2/3,2 mm, Class A Galvanised and PVC coated wire. Length x Width	m²			
1.2 (a)	Mesh Type 80 with 2,7 mm, Class A Galvanised wire. Length x Width	m²			
(b)	Mesh Type 80 with 2,7/3,7 mm, Class A Galvanised and PVC coated wire. Length x Width	m²			
2	Installation of Rockfall Netting (including unrolling, fixing and lacing).	m²			
3	Fixing anchors (supplied by others).	No.			

Table 4