

SACK GABIONS

Sack Gabions

Sack gabions consist of a single mesh panel made of hexagonal woven wire Mesh Type 80, commonly referred to as double twist wire mesh as per SANS 1580:2005 (Figure 1 and Table 1). Sack gabions are filled with rock at the project site to form flexible, permeable, monolithic structures used for emergency and river training works where local conditions require fast installation or where the water does not allow for easy access to the site and where underwater installation is necessary.

The steel wire used in the manufacture of the Sack gabion is heavily zinc coated Class A as per SANS 675:1997. If required, a PVC coating is extruded over the galvanised wire to provide added protection for use in aggressive environments. The PVC coating has a nominal thickness of 0,5 mm. The tolerances of mesh and wire are shown in Tables 1 and 2. The end of the mesh is edged with steel rods inserted during the manufacturing process to allow for faster closing during installation. Dimensions and sizes of galvanised and PVC coated Sack gabions are shown in Table 3. When specifying Sack gabions in the tender documents or bill of quantities, please refer to Table 4.

Filling and Lacing

The Sack gabion is assembled by rolling the mesh panel into a cylindrical shape and lacing the overlapped edges (Figure 4). Once the one end of the cylinder is tied and laced closed, the Sack gabion is filled with rock ranging between 100 mm and 200 mm or any other material of suitable size. The range in sizes may allow for a variation of 5% oversize and / or 5% undersize rock, provided it is not placed at the exposed surface. In all cases, oversize rock shall not be larger than 300 mm and the undersize rock shall not be smaller than 100 mm. Rocks shall be hard, angular to round, durable and of such quality that they shall not disintegrate on exposure to water or weathering during the life of the structure. Care should be taken when placing the stone to ensure that the PVC coating on the Sack gabion is not damaged. Once filled the opposite end is tied and laced closed before installation. To expedite installation, two or more Sack gabions can be tied together before installation. In place of lacing wire, lacing operations can be made by using a Spenax tool (Figure 3) available from our offices together with stainless steel rings (Figure 5A) having the following specifications:

- diameter: 3mm
- tensile strength: 156-178 kg/mm²

Spacing of the rings or loops must not exceed that shown in Figure 5B.

Wire

All tests on wire are 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/mm² according to SANS 675:1997.
2. **Elongation:** Elongation is not 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.

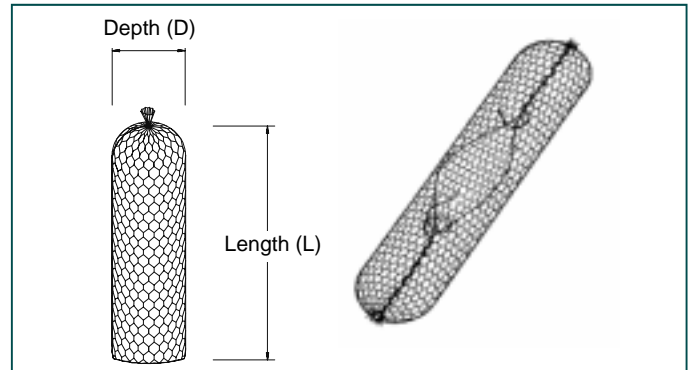


Figure 1

STANDARD MESH-WIRE			
Mesh Type 80	b	Tolerance (mm)	OD Wire Ø (mm)
Galvanised	80	-4 +10	2,7
Galvanised + PVC	80	-4 +10	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	Selvedge
Wire**				
Galvanised	Ø mm	2,2	2,2	3,4
Galvanised + PVC		2,2 / 3,2	2,7 / 3,7	3,4 / 4,4
Wire Tolerance*	Ø mm	±0,08	±0,08	±0,1
Quantity of zinc*	g/m ²	245	275	275
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 20,6MPa, 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.

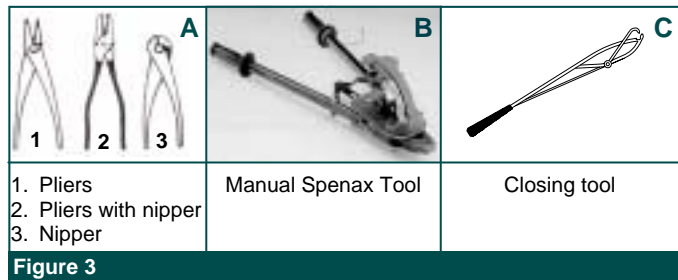


Figure 3

STANDARD SACK GABION SIZES			
Length (m)	Diameter (m)	Capacity (m ³)	Units/Bundle
2,0	0,65	0,66	25
3,0	0,65	1,00	25

Tolerances : Length, Diameter : ±5%
 All sizes and dimensions are nominal.

Table 3

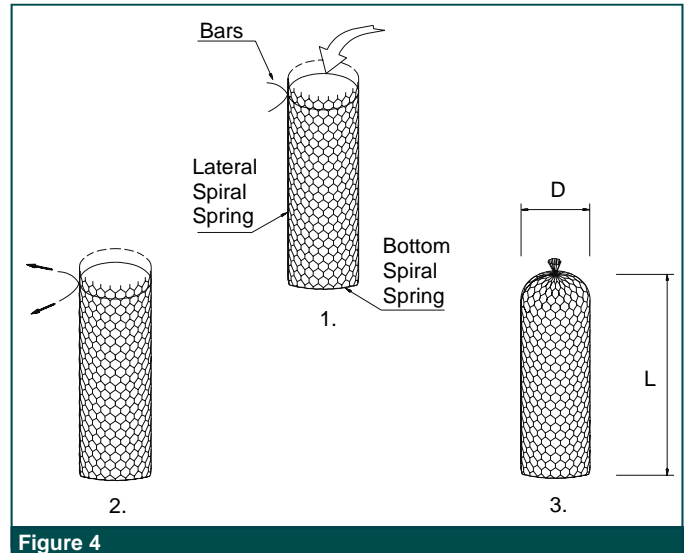


Figure 4

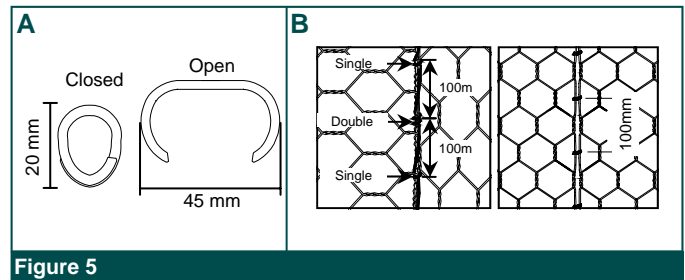


Figure 5

BILL OF QUANTITIES

Item No.	Description	Unit	Quantity	Rate	Amount (R)
	GABIONS - SANS 1200DK:1995 (Double twist hexagonal wire mesh to SANS 1580:2005).				
1	SACK GABIONS (Including material and delivery).				
1.1	Mesh Type 80 with 2,7mm, Class A Galvanised wire. Length x Diameter	m ³			
1.2	Mesh Type 80 with 2,7/3,7mm, Class A Galvanised and PVC coated wire. Length x Diameter	m ³			
2	Installation of Sack Gabions (Including placing, filling and lacing).	m ³			
3	Rockfill.	m ³			
4	AG GEOTEXTILE (Including material, delivery, unrolling, cutting and placing). Continuous Polyester Filament Double Needle-Punched				
4.1	AG150 - Minimum Energy Absorption of 4,0 kN/m	m ²			
4.2	AG200 - Minimum Energy Absorption of 6,5 kN/m	m ²			
4.3	AG300 - Minimum Energy Absorption of 10 kN/m	m ²			
4.4	AG400 - Minimum Energy Absorption of 12 kN/m	m ²			

Table 4