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मानक

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“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 16014 (2012): Mechanically woven, double -twisted, hexagonal Wire Mesh Gabions, Revet Mattresses and Rock fall Netting(Galvanized steel wire or Galvanized steel wore with PVC coating) - Specification [MED 10: Wire Ropes and Wire Products]



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“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

यांत्रिक पद्धति से बुनी दोहरी ऐंठित, षटकोणीय तार मैश
गेबियन, रिवेट मैट्रेस एवं रॉक फाल नैटिंग
(जस्तीकृत इस्पात तार अथवा पीवीसी चढ़ी
जस्तीकृत इस्पात की तार) — विशिष्टि

Indian Standard

MECHANICALLY WOVEN, DOUBLE-TWISTED,
HEXAGONAL WIRE MESH GABIONS, REVET
MATTRESSES AND ROCK FALL NETTING
(GALVANIZED STEEL WIRE OR GALVANIZED STEEL
WIRE WITH PVC COATING) — SPECIFICATION

ICS 25.220.99; 77.140.65

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NEW DELHI 110002

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Wire Ropes and Wire Products Sectional Committee had been approved by the Mechanical Engineering Division Council.

Gabions are widely used to protect land from erosion, channel lining, construction of earth retaining structures, etc. It was therefore felt necessary to develop an Indian Standard on mechanically woven gabions due to large use of the item for hilly areas, river beds, forest area as well as near sea beds for protection of land and minimize land erosion. This standard also specifies the requirements for revet mattresses and rock fall netting. Based on its use gabions may be galvanized with PVC coating therefore, those requirements have also been added in this standard.

There is a separate Indian Standard which lays down requirements for welded wire fabric gabions and gabion mattresses (metallic-coated or metallic-coated with PVC coating).

This standard does not intend to address all of the safety concerns, associated with the use of gabions and gabion mattresses. It is the responsibility of the manufacturers and users of this standard to establish and employ appropriate safety measures and also to ensure compliance to applicable regulations.

In the formulation of this standard guidance has been taken from ASTM A975-97 'Standard specification for double-twisted hexagonal mesh gabions and revet mattresses [metallic-coated steel wire or metallic-coated steel wire with polyvinyl chloride (PVC) coating]'.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

MECHANICALLY WOVEN, DOUBLE-TWISTED, HEXAGONAL WIRE MESH GABIONS, REVET MATTRESSES AND ROCK FALL NETTING (GALVANIZED STEEL WIRE OR GALVANIZED STEEL WIRE WITH PVC COATING) — SPECIFICATION

1 SCOPE

This standard covers gabions; revet mattresses and rock fall netting produced from double-twisted galvanized wire mesh, and galvanized wire for lacing wire, used for manufacturing, assembling, and installation of the product. This standard also covers gabions, revet mattresses and rock fall netting in which the wire mesh and lacing wire are PVC coated after the galvanizing. Double-twisted wire mesh for gabions, revet mattresses and rock fall netting is produced in different classes based on type of coating.

2 REFERENCES

The following standards contain provisions which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

<i>IS No./Other National Standards</i>	<i>Title</i>
280 : 2006	Mild steel wire for general engineering purposes (<i>fourth revision</i>)
4454	Steel wires for mechanical springs — Specification :
(Part 1) : 2001	Cold drawn unalloyed steel wires (<i>third revision</i>)
(Part 4) : 2001	Stainless steel wire (<i>second revision</i>)
4826 : 1979	Specification for hot dipped galvanized coatings on round steel wires (<i>first revision</i>)
12753 : 1989	Electrogalvanized coatings on round steel wire — Specification
13360	Plastics — Methods of testing:
(Part 3/Sec 1) : 1995	Physical and dimensional properties, Section 1 Determination of density and relative density of non-cellular plastics

IS No./Other National Standards

Title

(Part 5/Sec 1) : 1996	Mechanical properties, Section 1 Determination of tensile properties — General principles
(Part 5/Sec 11) : 1992	Mechanical properties, Section 11 Determination of indentation hardness of plastics by means of durometer (shore hardness)
Part 8/Sec 14) : 2005	Permanence/Chemical properties, Section 14 Determination of the effect of exposure to damp heat, water spray and salt mist
ASTM A975-97	Standard specification for double-twisted hexagonal mesh gabions and revet mattresses [metallic-coated steel wire or metallic-coated steel wire with polyvinyl chloride (PVC) coating]

3 TERMINOLOGY

For the purpose of this standard, following definitions shall apply.

3.1 Gabion — A wire mesh container of variable sizes, uniformly partitioned into internal cells, interconnected with other similar units, and filled with stone at the project site to form flexible, permeable monolithic structures for earth retaining and erosion control purposes, such as retaining walls, sea walls, channel linings, revetments, offshore bunds, dykes and weirs (*see* Fig. 1 to Fig. 5).

3.2 Revet Mattress — Revet mattress a wire mesh container uniformly partitioned into internal cells with relatively smaller height in relation to other dimensions, having smaller mesh openings than the mesh used for gabions, revet mattresses are generally used for riverbank protection and channel linings (*see* Fig. 6).

3.3 Rock Fall Netting — A wire mesh supplied in the form of rolls which is used to prevent rocks and debris from falling on to roads, railways or any other area which needs protection (*see* Fig. 7).

3.4 Double-Twisted Wire Mesh — A non-raveling mesh made by twisting continuous pairs of wires through three one-half turns (commonly called double-twisted) to form hexagonal shaped openings which are then interconnected to adjacent wires to form hexagonal openings.

3.5 Selvedge Wire — A terminal wire used to edge the wire mesh perpendicular to the double twist by mechanically wrapping the mesh wires around it at least 2.5 times (see Fig. 1).

3.6 Edge Wire — A terminal wire of the same diameter as the selvedge wire used to edge the wire mesh parallel to the double twist by continuously weaving it mechanically into the wire mesh (see Fig. 1).

3.7 Lacing Wire — A galvanized wire or galvanized wire with PVC coating used to assemble and

interconnect empty units, to close and secure stone-filled units, and for internal stiffeners (see Fig. 2 and Fig. 3).

3.8 Spenax Fasteners/Overlapping Fasteners/Steel Rings — A galvanized or stainless steel ring which is used instead of, or to compliment lacing wire for basket assembly and installation (see Fig. 4).

3.9 Diaphragm — An internal partition made of same wire mesh panel in a gabion/revet mattress that is attached to the bottom, the sides, and, after the gabion cage is packed with stones, to the lid of the cage (see Fig. 5).

3.10 Bracing Wire/Stiffener — A length of galvanized wire or galvanized wire with PVC coating used for support of facing by connecting the front panel to the back panel of a gabion and having the same diameter as the lacing wire (see Fig. 6 to Fig. 8).

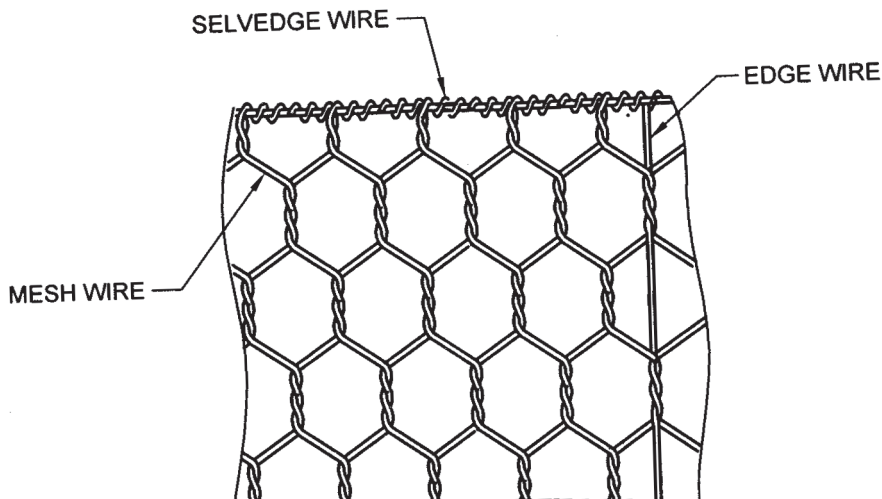


FIG. 1 MESH WIRE, SELVEDGE AND EDGE WIRE

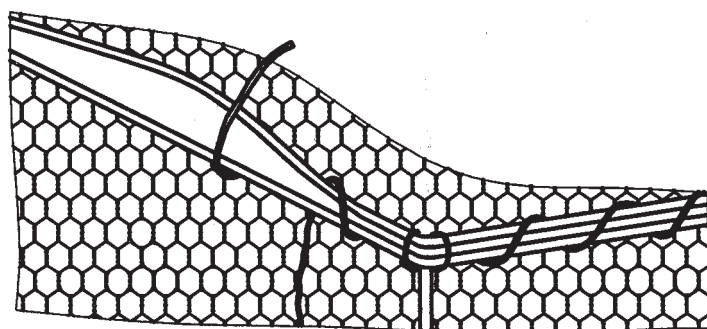


FIG. 2 LACING WIRE FOR TYING

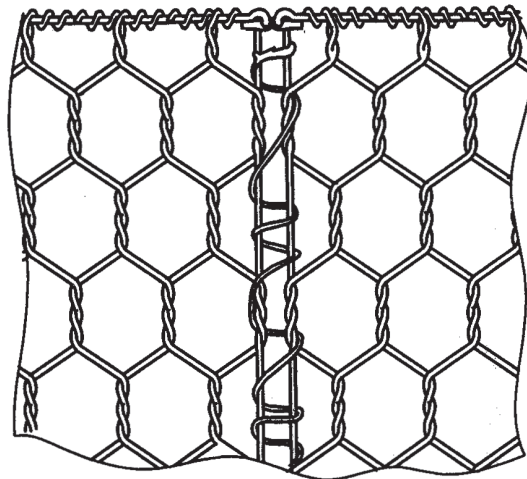


FIG. 3 LACING WIRE FOR TYING ADJACENT PANELS IN SINGLE AND DOUBLE LOOP FASHION

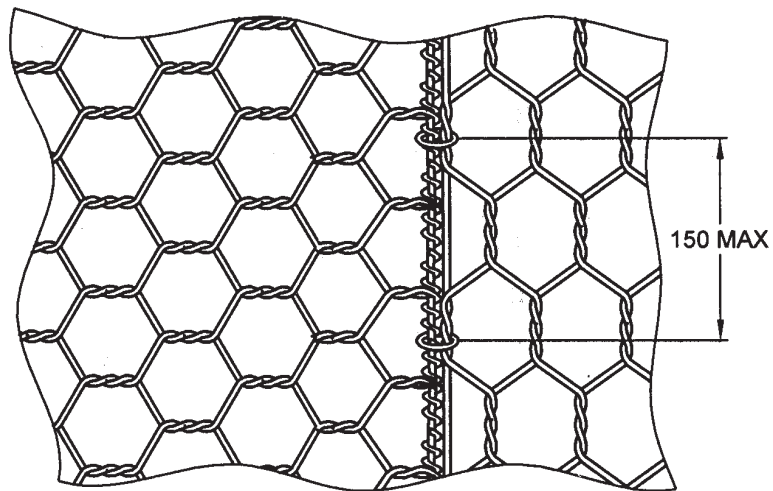


FIG. 4 RINGS FOR JOINING ADJACENT PANELS INSTEAD OR WITH LACING WIRE

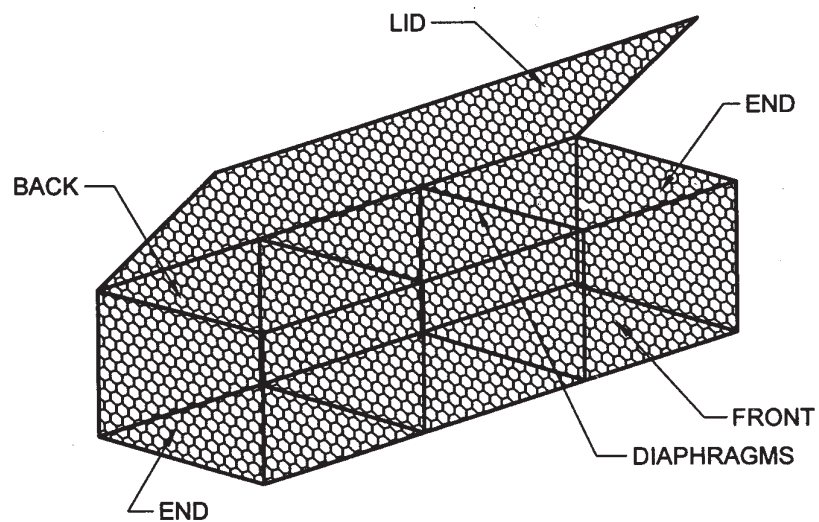


FIG. 5 GABION BOX

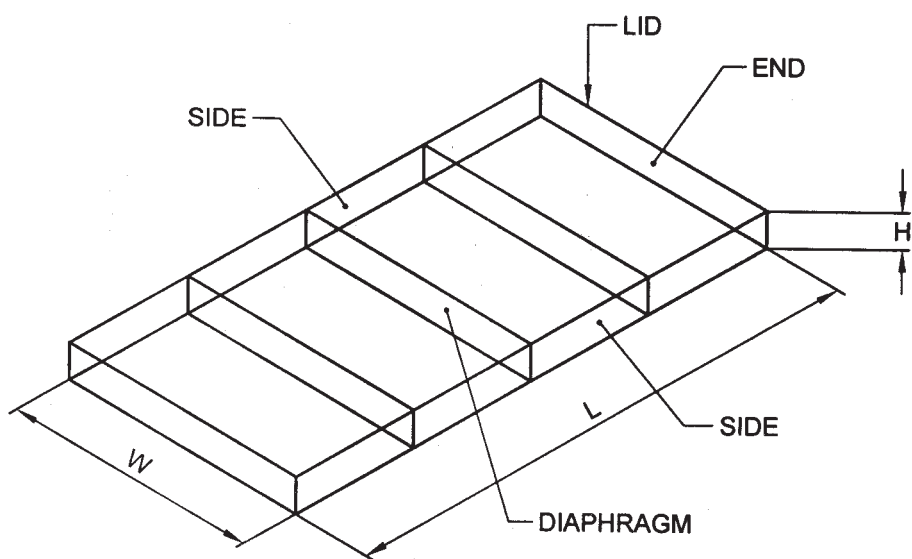


FIG. 6 REVET MATTRESS

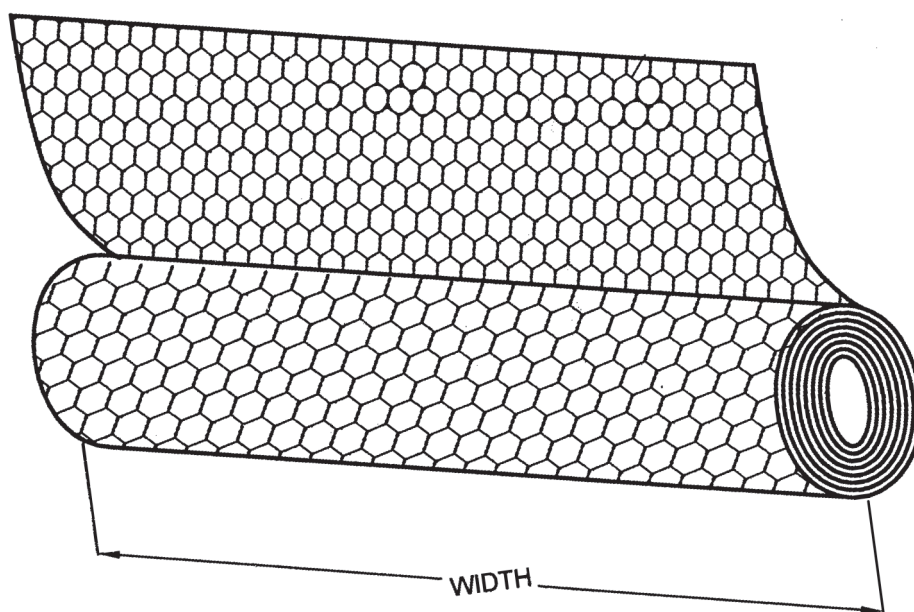


FIG. 7 ROCKFALL NETTING

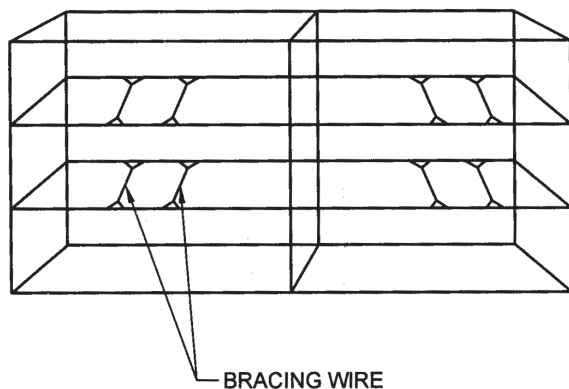


FIG. 8 BRACING WIRE/STIFFNER

3.11 Mesh Size — The average distance, measured at right angles between twisted sides over 10 meshes (*see* Fig. 9).

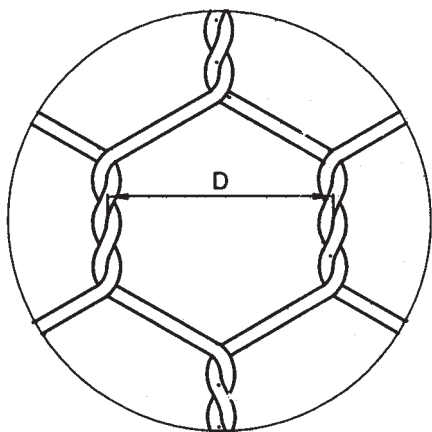


FIG. 9 MESH TYPE AND NOMINAL SIZE 'D'

4 CLASSIFICATION

Double-twisted wire mesh gabions, revet mattresses and rock fall netting are classified according to coating, as follows:

- a) *Class 1* — Consists of double-twisted wire mesh made from wire which is zinc coated before being double-twisted into mesh. Fasteners, lacing wire and stiffeners are produced from zinc-coated wire; and
- b) *Class 2* — Consists of double-twisted wire mesh, lacing wire and stiffeners as Class 1 and over coated with PVC. Fastener shall be of stainless steel wire.

5 MATERIAL AND MANUFACTURE

5.1 The wire used in the manufacture of double-twisted mesh for use in gabions, revet mattresses and rock fall

netting shall conform to IS 280 and to the requirement of **5.1.1** or **5.1.2** as appropriate for the class ordered except that the tensile strength shall conform to **6.1**.

5.1.1 Class 1 double-twisted mesh shall be manufactured from zinc-coated steel wire conforming to IS 4826, heavily coated and soft type or IS 12753 (heavily coated).

5.1.2 Class 2 double-twisted mesh shall be manufactured from the same type of galvanized steel wire as Class 1 with an additional PVC coating extruded onto the galvanized steel wire. The PVC coating shall conform to the requirements given in **7.2**.

5.2 Gabions and revet mattresses shall be manufactured with all components mechanically connected at the production facility with the exception of the mattress lid which is produced separately from the base. All gabions, revet mattresses and rock fall netting shall be supplied in the collapsed form, either folded and bundled or rolled for shipping.

5.3 Lacing wire and stiffeners shall be made of wire having the same coating material as the double-twisted wire mesh furnished on the order and conforming to IS 4826 or IS 12753 (heavily coated) and tensile strength conforming to **6.1**.

5.4 The spacing of the steel rings to compliment lacing wire during all phases of assembly and installation shall be in accordance with spacing based on pull apart resistance for mesh when tested in accordance with **13.1.2** of ASTM A975 with a nominal spacing of 100 mm and not to exceed 150 mm.

5.4.1 Galvanized Rings

Fasteners made from galvanized steel wire of 3 mm diameter shall be used for products of Class 1 type mesh. The galvanized steel wire for fastener shall conform to SM Grade of IS 4454 (Part 1) with minimum tensile strength of 1 550 MPa and shall be galvanized with mass of zinc coating not less than that given in Table 5.

5.4.2 Stainless Steel Fasteners

Fasteners made from stainless steel wire of 3 mm diameter shall be used for products of Class 2 type mesh. The stainless steel wire for fastener shall conform to Grade 1 steel of IS 4454 (Part 4) with minimum tensile strength of 1 550 MPa.

5.5 The standard sizes of gabion boxes, revet mattresses and rock fall netting are given in Tables 1, 2 and 3 respectively. Any other size as agreed to between the purchaser and the manufacturer.

Table 1 Mesh and Box Characteristics for Gabions
(Clauses 5.5, 8.1, 8.2, 8.6 and 12.3.2)

SI No.	Characteristics	Mesh Type					
		10 × 12 D = 100 mm			8 × 10 D = 80 mm		
		Only zinc coated		Zinc + PVC coated	Only zinc coated		Zinc + PVC coated
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Mesh wire dia, mm	2.70	3.00	2.70/3.70 ¹⁾	2.70	3.00	2.70/3.70 ¹⁾
ii)	Edge/Selvedge wire dia, mm	3.40	3.90	3.40/4.40 ¹⁾	3.40	3.90	3.40/4.40 ¹⁾
iii)	Lacing wire dia, mm	2.20	2.20	2.20/3.20 ¹⁾	2.20	2.20	2.20/3.20 ¹⁾
iv)	PVC coating thickness, mm	N. A		Nominal – 0.50 Minimum – 0.40	N. A		Nominal – 0.50 Minimum – 0.40
v)	Typical sizes Length × Width × Height (m) (Number of diaphragms)	4 × 1 × 1 (3 Nos.), 3 × 1 × 1 (2 Nos.), 2 × 1 × 1 (1 No.), 1.5 × 1 × 1 (0 No.), 2 × 1 × 0.5 (1 No.), 3 × 1 × 0.5 (2 Nos.), 4 × 1 × 0.5 (3 Nos.), 2 × 1 × 0.3 (1 No.), 3 × 1 × 0.3 (2 Nos.), 4 × 1 × 0.3 (3 Nos.)					
vi)	Tolerances in size of gabion boxes	Length and Width... ± 5 percent; Height > 0.3 m... ± 5 percent and Height ≤ 0.3 m... ± 10 percent					

¹⁾ Internal diameter/External diameter of PVC coated wire.

Table 2 Mesh and Box Characteristics for Revet Mattresses
(Clauses 5.5, 8.1, 8.2, 8.6 and 12.3.2)

SI No.	Characteristics	Mesh Type	
		6 × 8 D = 60	
		Only Zinc Coated (3)	Zinc + PVC Coated (4)
(1)	(2)	(3)	(4)
i)	Mesh wire dia, mm	2.20	2.20/3.20 ¹⁾
ii)	Edge/Selvedge wire dia, mm	2.70	2.70/3.70 ¹⁾
iii)	Lacing wire dia, mm	2.20	2.20/3.20 ¹⁾
iv)	PVC coating thickness, mm	N. A	Nominal – 0.50 Minimum – 0.40
v)	Typical sizes Length × Width × Height (m) (Number of diaphragms)	4 × 2 × 0.17 (3 Nos.), 3 × 2 × 0.17 (2 Nos.), 2 × 2 × 0.17 (1 No.), 4 × 2 × 0.23 (3 Nos.), 3 × 2 × 0.23 (2 Nos.), 2 × 2 × 0.23 (1 No.), 4 × 2 × 0.30 (3 Nos.), 3 × 2 × 0.30 (2 Nos.), 2 × 2 × 0.30 (1 No.)	
vi)	Tolerances in size of revet mattresses	Length and Width ...± 5 percent: Height ≤ 0.3m ... ± 10 percent	

¹⁾ Internal diameter/External diameter of PVC coated wire.

6 MECHANICAL PROPERTIES

6.1 Tensile Strength

The tensile strength of wire used for double-twisted mesh, lacing wire, and stiffener, when tested shall be in accordance with the requirements of IS 280 for soft wire (350-550 MPa) at a minimum elongation of 10 percent, performed on a gauge length of test specimen as 200 mm.

6.2 Mesh Panel Strength

The minimum strength requirements of the mesh, when

tested in accordance with 12.1, shall be as shown in Table 4.

7 PHYSICAL PROPERTIES

7.1 Zinc Coating

7.1.1 Mass of Zinc Coating

The coating mass shall conform to the requirements of IS 4826 heavily coated and soft type. See Table 5 for the minimum mass of zinc coating for different wire sizes.

Table 3 Mesh and Roll Characteristics for Rockfall Netting
(Clauses 5.5, 8.1, 8.2, 8.8 and 12.3.2)

SI No.	Characteristics	Mesh Type							
		10 × 12 D = 100 mm		8 × 10 D = 80 mm		6 × 8 D = 60 mm			
(1)	(2)	Only zinc coated	Zinc + PVC coated	Only zinc coated	Zinc + PVC coated	Only zinc coated	Zinc + PVC coated		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	Mesh wire dia, mm	2.70	3.00	2.70/3.70 ¹⁾	2.70	3.00	2.70/3.70 ¹⁾	2.20	2.20/3.20 ¹⁾
ii)	Edge/Selvage wire dia, mm	3.40	3.90	3.40/4.40 ¹⁾	3.40	3.90	3.40/4.40 ¹⁾	2.70	2.70/3.70 ¹⁾
iii)	Lacing wire dia, mm	2.20	2.20	2.20/3.20 ¹⁾	2.20	2.20	2.20/3.20 ¹⁾	2.20	2.20/3.20 ¹⁾
iv)	PVC coating thickness, mm	N. A		Nominal – 0.50 Minimum – 0.40	N. A		Nominal – 0.50 Minimum – 0.40	N.A.	Nominal – 0.50 Minimum – 0.40
v)	Typical sizes of rolls	Length × Width, m 25 × 2, 25 × 3 and 25 × 4							
vi)	Tolerances in size of netting rolls	Length + 1.0 m to – 0.0 m, Width ± 'D'							

¹⁾ Internal diameter/External diameter of PVC coated wire.

Table 4 Minimum Tensile Strength and Requirements of Mesh Panel
(Clauses 6.2 and 11.2)

SI No.	Characteristics	Mesh Type						
		10 × 12		8 × 10		6 × 8		
(1)	(2)	Zn	Zn + PVC	Zn	Zn + PVC	Zn	Zn + PVC	(9)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	Mesh wire dia, mm	2.70	3.00	2.70	3.00	2.70	2.20	2.20
ii)	Parallel to twist, kN/m	32.0	40.0	32.0	51.0	42.5	33.5	34.0
iii)	Perpendicular to twist, kN/m	15.5	20.5	15.5	26.5	20.5	13.0	13.0

Table 5 Minimum Mass of Zinc Coating for Heavily Coated, Soft Type for Different Wire Sizes Used in Gabion, Revet Mattresses and Rockfall Netting
(Clauses 5.4.1 and 7.1.1)

SI No.	Nominal Diameter of Galvanized Wire	Mass of Zinc Coating	Permitted Tolerances on Wire Diameters
(1)	mm	g/m ²	mm
(1)	(2)	(3)	(4)
i)	2.00	240	± 0.05
ii)	2.20	240	± 0.06
iii)	2.40	260	± 0.06
iv)	2.70	260	± 0.07
v)	3.00	270	± 0.08
vi)	3.40	270	± 0.09
vii)	3.90	280	± 0.10

7.1.2 Adhesion of Zinc Coating

The zinc coating shall remain adherent to the steel wire and conform to IS 4826 such that zinc coating does not flake off, nor crack to such an extent that there is possibility of removing any zinc by rubbing with bare fingers, the use of finger nails being not allowed.

7.2 PVC for Coating

The initial properties of PVC coating material shall conform to the following requirements:

- Specific gravity* — In the range from 1.30 to 1.35 when tested in accordance with IS 13360 (Part 3/Sec 1).
- Tensile strength* — Not less than 20.6 MPa when tested in accordance with IS 13360 (Part 5/Sec 1).
- Hardness* — Shore 'D' between 50 and 60, when tested in accordance with IS 13360 (Part 5/Sec 11).
- Resistance of PVC coating to sodium chloride solution* — When PVC coated wire is tested in accordance with 12.4 there shall be no loss of mass.
- Salt spray exposure* — The PVC shall show no effect after 3 000 h of salt spray exposure in accordance with IS 13360 (Part 8/ Sec 14).

8 DIMENSIONS AND TOLERANCES

8.1 The diameter of galvanized steel wire shall conform to the values as per Table 1 for gabions, Table 2 for revet mattresses and Table 3 for rock fall netting. The diameter of the wires shall also conform to the tolerance values as shown in col 4 of Table 5 as per IS 280 for galvanized steel wire.

8.2 The minimum and nominal thickness of PVC coating uniformly applied in a quality workmanlike manner shall be as shown in Tables 1, 2 and 3.

8.3 Gabions shall be manufactured with a 10 × 12 or 8 × 10 mesh type (*see* Fig. 9) having a nominal mesh opening size as per Table 6. Dimensions are measured at right angles to the centre axis of the opening and parallel to the twist along the same axis.

8.4 Revet mattresses shall be manufactured with a 6 × 8 mesh type (*see* Fig. 9) having a nominal mesh opening size as per Table 6. Dimensions are measured at right angles to the centre axis of the opening and parallel to the twist along the same axis.

Table 6 Mesh Types and Sizes
(Clauses 5.4.1, 8.3, 8.4, 8.8 and 8.9)

Sl No. (1)	Mesh Type (2)	'D' Nominal Size (3)	Tolerances (4)
i)	10 × 12	100	} +16 percent to -4 percent
ii)	8 × 10	80	
iii)	6 × 8	60	

8.5 Rock fall netting shall be manufactured with a 10 × 12, 8 × 10 or 6 × 8 mesh type having a nominal mesh opening size as per Table 6.

8.6 The width and length of the gabions and revet mattresses as manufactured shall not differ more than ± 5 percent from the ordered size prior to filling. (Typical gabion and rivet mattress sizes are shown in Tables 1 and 2 respectively.)

8.7 The height of the gabions and revet mattresses as manufactured shall not differ more than ± 10 percent, if the height is less than or equal to 0.3 m and shall not differ more than ± 5 percent if the height is more than 0.3 m from the ordered size prior to filling.

8.8 The tolerance on the roll length of rock fall netting shall be +1 m to 0 m. The tolerance on the width shall be ± *D* (mesh size). See Table 3 for the typical sizes of netting rolls.

8.9 Mesh Opening Tolerances

Tolerances on the hexagonal, double-twisted wire mesh opening shall not exceed +16 percent to -4 percent on the nominal dimension *D* values mentioned in Table 6.

9 WORKMANSHIP

Wire of proper grade and quality, when fabricated in

the manner herein required, shall result in a strong, serviceable mesh type product have substantially uniform openings. It shall be fabricated and finished with good workmanship as determined by visual inspection and shall conform to this standard.

10 SAMPLING

10.1 Samples for determining the mechanical and physical properties of double-twisted wire mesh shall be in accordance with the samples, dimensions, and requirements described in 12.

10.2 Samples for determining the mechanical and physical properties of coated steel wire used for mesh, lacing wire and stiffeners shall be selected at random from wire coils used for manufacturing.

11 NUMBER OF TESTS

11.1 The tensile strength, galvanizing weight, and PVC coating thickness of the coated steel wire used in the fabrication of mesh, lacing wire and stiffeners shall be certified by the steel wire/PVC coated steel wire producers for conformance to the requirements of 6, 7 and 8.

11.2 A minimum of three tests each for conformance to strength of galvanized steel wire mesh parallel to twist and perpendicular to twist shall be performed. A retest for conformance with the aforementioned strength tests shall be required when changes of the physical characteristics of the mesh products occur. For galvanized steel wire with PVC coating, follow the same requirements as for the galvanized steel wire mesh. The results of all three tests shall meet the requirements of Table 4.

12 TEST METHODS

12.1 Tensile Strength of Wire Mesh Panel

The wire mesh specimens shall be representative of proper field construction as to materials, mesh geometry, and workmanship, and shall be as large as practical to minimize the effect of variations. The tests shall be run with the load applied parallel to the axis of the twist and repeated on a separate test specimen with the load applied perpendicular to the axis of the twist.

12.1.1 Place the mesh into the machine grips such that the gripped mesh will be maintained in the mesh geometry characteristic of field use. The specimen of approximately 0.8 m width and 0.5 m height shall be tested. The effective width to be considered for test specimen shall be the distance between two extreme gripping points. The specimen should extend by at least one mesh repetition beyond the extreme gripping points on either side. However, specimen should not extend more than two mesh repetitions beyond extreme gripping points. The mesh shall be pre-loaded to 10 percent of the specified minimum strength and machine head travel stopped. The mesh gauge

dimensions shall be recorded at this time and taken as the initial dimensions of the specimen where such dimensions are required. The loading shall then continue uniformly maintaining the displacement rate of 75 to 100 mm/min, until first fracture or unwrapping of an individual wire in the system occurs. The distortion of the mesh or changes in gauge length shall be measured to accuracy consistent with reporting the percent elongation to the nearest 0.5 percent.

12.2 Metallic Coating Mass

Perform coating mass tests and adhesion tests as specified in IS 4826 or IS 12757 as applicable.

12.3 PVC Coating Thickness

12.3.1 The thickness of the PVC coating shall be determined on a randomly chosen individual piece of wire removed from the coil at 3 places 1 m apart.

12.3.2 Measure the diameter of the galvanized steel wire with PVC coating with a micrometer. Determine the thickness of the PVC coating by stripping the PVC coating from the wire and measure the reduced diameter with a micrometer. The thickness of the coating is the difference between the diameter of the galvanized steel wire with PVC coating and the measured diameter of the galvanized steel wire divided by two. The average value of thickness of the coating, shall be in accordance with 8.2 and Tables 1, 2 and 3. When removing the PVC coating by stripping, care to be taken, not to remove any of the metallic surfaces.

12.4 PVC Coating — Resistance to Sodium Chloride Solution

12.4.1 Apparatus

12.4.1.1 Chamber or room, where the temperature is between 5°C and 30°C.

12.4.1.2 Scales, accurate to within 0.1 mg.

12.4.1.3 Test tube

12.4.2 Reagents — Saturated sodium chloride solution.

12.4.3 Preparation of Test Specimen

Bend a 200 mm long piece of PVC coated wire into a U-shaped that it can fit in to the test tube.

12.4.4 Procedure

Weigh the test specimen and put it in the test tube. Fill the test tube with the sodium chloride solution such that the ends are 5 mm above the solution. After at least 60 h remove the test specimen from the solution, wash it, dry it and reweigh it. Check for compliance to 7.2 (d).

13 MARKING

13.1 Each finished product shall be marked legibly and indelibly with the following details on a metal tag:

- a) Name of manufacturer;
- b) Product type (gabions, revet mattresses or rock fall netting);
- c) Mesh type (10 × 12, 8 × 10 or 6 × 8);
- d) Class of coating;
- e) Mesh wire size, in mm;
- f) Size, in m (length × width × height — For gabions and revet mattresses and length × width — for netting rolls);
- g) Batch No. or date of manufacturing; and
- h) Any other information as specified by the purchaser.

13.2 BIS Certification Marking

The details available with the Bureau of Indian Standards.

13.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.

13.3 The following information shall be supplied by to the purchaser/indenter:

- a) Gabions, revet mattresses or rock fall netting;
- b) Mesh type (10 × 12, 8 × 10 or 6 × 8);
- c) Class;
- d) Mesh size and mesh wire diameter, in mm;
- e) Size, in m (length × width × height — For gabions and revet mattresses and length × width — for netting rolls);
- f) IS number and year of issue;
- g) Quantity (number of units) for each class and size;
- h) Manufacturer's certificate, if required (*see 14*); and
- j) Any other requirement.

14 CERTIFICATES

When specified in the purchase order or contract, a manufacturer's certificate shall be furnished to the purchaser that the material has been manufactured, tested, and inspected in accordance with requirements of this standard and has been found to be conforming to the requirements. When specified in the contract or purchase order, reports of the test results for each batch supplied shall be furnished.

15 INSTALLATION MANUAL

The manufacturer shall supply installation manual for installation of the product.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Wire Ropes and Wire Products Sectional Committee, MED 10

<i>Organization</i>	<i>Representative(s)</i>
Directorate General of Mines Safety, Dhanbad	SHRI G. N. VENKATESH (<i>Chairman</i>)
Amar Promoters Pvt Ltd, Solan	SHRI VIRENDER AGARWAL SHRI JATINDER AGARWAL (<i>Alternate</i>)
Bharat Coking Coal Ltd, Dhanbad	SHRI K. K. S. SINHA SHRI U. S. PANDEY (<i>Alternate</i>)
Bharat Wire Ropes Ltd, Mumbai	SHRI D. M. SHAH SHRI ASHWINI LOKHANDE (<i>Alternate</i>)
Central Institute of Mining and Fuel Research, Dhanbad	SHRI AWADESH MAHTO SHRI S. K. RITOLIA (<i>Alternate</i>)
Directorate of Quality Assurance, New Delhi	COL K. SURESH COL V. V. KADAM (<i>Alternate</i>)
Directorate General Factory Advice Service and Laboratory Institute, Mumbai	SHRI G. M. E. K. RAJ SHRI S. N. BORKER (<i>Alternate</i>)
Directorate General of Civil Aviation, New Delhi	SHRI R. C. GUPTA SHRI M. M. KAUSHAL (<i>Alternate</i>)
Directorate General of Supplies and Disposals (Quality Assurance Wing), New Delhi	SHRI AKHILESH KUMAR SHRI R. K. AGARWAL (<i>Alternate</i>)
Directorate General of Aeronautical Quality Assurance, New Delhi	SHRI S. C. SHARMA SHRI RISHI KUMAR (<i>Alternate</i>)
Eastern Coalfields Ltd, Kolkata	SHRI CHATERJEE SHRI KAPIL K. RAI (<i>Alternate</i>)
Garware Wall Ropes Ltd, Pune	SHRI RAVI SHANKAR SINGH SHRI S. G. WANKHEDE (<i>Alternate</i>)
Ministry of Shipping, New Delhi	SHRI A. R. RAO SHRI D. J. BASU (<i>Alternate</i>)
Maccaferri Environmental Solutions (P) Ltd, Pune	SHRI ASHISH D. GHARPURE SHRIMATI MININMOL KORULLA (<i>Alternate</i>)
National Test House, Kolkata	SHRI S. P. ROY SHRI R. N. RAM (<i>Alternate</i>)
Oil and Natural Gas Commission, Dehradun	SHRI R. K. GARG SHRI P. K. SOOD (<i>Alternate</i>)
Orient Wire Ropes, Indore	SHRI SAMEER GOLWELKAR SHRI SHISHIR AKARTE (<i>Alternate</i>)
Paradip Port Trust, Paradip	SHRI B. B. PANIGRAHI SHRI MOHAN PATEL KHETRA (<i>Alternate</i>)
South Eastern Coalfields Ltd, Bilaspur	SHRI S. K. MISHRA SHRI G. RAMASWAMI (<i>Alternate</i>)
Tata Steel Ltd, Dhanbad	SHRI SOUMENDU K. MAJHI SHRI A. K. SIL (<i>Alternate</i>)
The Shipping Corporation of India Ltd, Mumbai	SHRI G. S. BHALLA CAPT R. MODI (<i>Alternate</i>)
The Singareni Collieries Co Ltd, Kothaagudem	SHRI I. V. N. PRASADA RAO SHRI P. V. RAGHAVA RAJU (<i>Alternate</i>)
Usha Breco Ltd, Distt Ghaziabad	SHRI RAJESH PRASAD SHRI MANOJ PANWAR (<i>Alternate</i>)
Usha Martin Industris Ltd, Ranchi	SHRI SUBRATA DUTTA SHRI S. B. N. SHARMA (<i>Alternate</i>)

Organization

Vidarbha Hardware Industries, Akola

BIS Directorate General

Representative(s)

SHRI OM PRAKASH DALMIA

SHRI SANJAY O. DALMIA (*Alternate*)

SHRI C. K. VEDA, Scientist 'F' and Head (MED)

[Representing Director General (*Ex-officio*)]

Member Secretary

SHRI D. K. DAS

Scientist 'E' (MED), BIS

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