



उत्पाद मैनुअल

आई एस 16014: 2024 के अनुसार

सिविल इंजीनियरिंग प्रयोजनों के लिए मशीन से बुना हुआ दोहरे ऐंठन वाली, षट्कोनिय तार की जालीदार गैबियन, रिवेट के मैट्रेस, शैल पात जाल एवं अन्य उत्पाद (जस्तिकृत इस्पात के तार या पालीमर लेपित जस्तिकृत इस्पात की तार) के लिए

दस्तावेज संख्या – पी एम/आई एस 16014/3/ जनवरी 2025

भारतीय मानक ब्यूरो की स्कीम-1 (अनुरूपता मूल्यांकन) विनियम, 2018 के तहत यह उत्पाद मैनुअल प्रमाणीकरण के प्रचालन में रीति और पारिश्रिता की सुसंगतता सुनिश्चित करने के लिए सभी क्षेत्रीय/शाखा कार्यालयों और लाइसेंसी द्वारा संदर्भ सामग्री के रूप में उपयोग किया जाएगा। बीआईएस प्रमाणीकरण लाइसेंस/ प्रमाणपत्र प्राप्त करने के इच्छुक भावी आवेदकों द्वारा भी इस दस्तावेज का उपयोग किया जा सकता है।

**PRODUCT MANUAL FOR
MECHANICALLY WOVEN, DOUBLE – TWISTED, HEXAGONAL WIRE
MESH GABIONS, REVET MATTRESSES, ROCK FALL NETTING AND
OTHER PRODUCTS FOR CIVIL ENGINEERING PURPOSES
(GALVANIZED STEEL WIRE OR GALVANIZED STEEL WIRE WITH
POLYMER COATING)
ACCORDING to IS 16014:2024**

Document No.- PM/IS 16014/3/January 2025

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

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**PRODUCT MANUAL FOR
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1.	Product	:	IS 16014: 2024
	Title	:	Mechanically Woven, Double – Twisted, Hexagonal Wire Mesh Gabions, Revet Mattresses, Rock Fall Netting and Other Products for Civil Engineering Purposes (Galvanized Steel Wire or Galvanized Steel Wire with Polymer Coating)
	No. of Amendments	:	Nil
2.	Sampling Guidelines:		
a)	Raw material	:	(i) Mild Steel Wire – IS 280 (ii) Galvanized Steel Wire for fasteners – Grade SM of IS 4454(part 1) (iii) Stainless Steel Wire for fasteners – Grade 1 of IS 4454(Part 4)
b)	Grouping guidelines	:	Please refer ANNEX – A
c)	Sample Size	:	(i) Wire Mesh – 2m length in full width (ii) Mesh wire – 2m long (iii) Fastener wire – 2m long
3.	List of Test Equipment	:	Please refer ANNEX – B
4.	Scheme of Inspection and Testing	:	Please refer ANNEX – C
5.	Possible tests in a day	:	All tests, except for Pull- apart resistance test (Cl. 12.3), tests on polymer coating (Cl. 12.6 and 12.7)
6.	Scope of the Licence	:	Please refer ANNEX- D

ANNEX--A

GROUPING GUIDELINES

1. IS 16014: 2024 covers “Mechanically Woven, Double – Twisted, Hexagonal Wire Mesh Gabions, Revet Mattresses, Rock Fall Netting and other Products for Civil Engineering Purposes (Galvanized Steel Wire or Galvanized Steel Wire with Polymer Coating)”, which are classified into different varieties based on the following:
 - a) Type of product:
 - Gabion Box (Fig. 5)
 - Revet Mattress (Fig.6)
 - Rockfall Netting (Fig. 7)
 - Sack Gabion (Fig. 8)
 - Facia Units for vertical facing reinforced soil structures (Fig. 9)
 - Facia Units for vertical inclined reinforced soil structures (Fig. 10)
 - b) Mesh type: 10 X 12, 8 X 10, 6 X 8 (as applicable for different types of products)
 - c) Class of coating: Class 1/ Class 2
2. Considering the above, the following grouping guidelines shall be followed for GoL/CSoL:
 - i) Sample of each Product type of each Mesh type (as applicable to respective product type) and each class of coating, as above, shall be tested separately for all requirements.
3. The Firm shall declare the Varieties of various types of Gabions/Revet mattress, rock fall netting etc. they intend to cover in the Licence. The Scope of Licence may be restricted based on the Manufacturing and Testing capabilities of the Manufacturer.
4. During the operation of license, it shall be ensured that all varieties covered in the license are tested in rotation, to the extent possible.

Annex-B
List of Test Equipment

Indicative list of major test equipment required to test as per the Indian Standard

Sl. No.	Tests used in with Clause Reference	Test Equipment
1.	Dimensions (Clause 5.5)	(i) Degree Protector (ii) Feeler Gauge (iii) Measuring Tape (iv) Micrometer (v) Snap Gauges (vi) Vernier calipers
2.	Tensile Strength (Clause 6.1)	Tensile Testing Machine
3.	Mesh Panel Strength (Clause 6.2 and 12.1)	(i) Gripping Vices (ii) Measuring scale (iii) Stopwatch (iv) Weights
4.	Adhesion test, Cl. 7.1.2	Equipment as per IS 4826
5.	Test for ageing and corrosion resistance, Cl. 7.1.3	Sulphur dioxide solution, chamber and other apparatus as per ISO 22479
6.	Tests on Polymers for coating (Cl. 7.2)	Equipment as per IS 13360-3-10/11/12 for Specific gravity test, Equipment as per IS 13360-5-1 for Tensile strength, Shore Hardness tester as per IS 13360-5-11 for Hardness test, Salt spray chamber as per IS 13360-8-14 for Salt spray exposure test, Equipment as per ISO 37 for Modulus of elasticity test, Equipment as per ISO 974 for Brittleness temperature test, Equipment as per ISO 4829-3 for UV ray exposure test
7.	Punch Test (Clause 12.2)	(i) Hammer (ii) Steel punch and cutter
8.	Metallic Coating Mass Test (Clause 12.4)	(i) Micro balance (ii) Stop watch (iii) Sulphur Acid and other chemicals
9.	Polymer Coating Thickness Test (Clause 12.5)	(i) Knife or stripper (ii) Measuring Tape (iii) Micrometer
10.	Polymer Coating – Resistance	(i) Measuring Tape

	to Sodium Chloride Solution (Clause 12.6)	(ii) Salt spray Chamber (iii) Sodium Chloride Solution (iv) Test tube (v) Thermometer (vi) Watch (vii) Weighing balance
11.	Pull apart resistance test/Slevedge Strength/Panel to Panel connection, Cl. 12.3	Test Set up as per Cl. 12.3 of IS 16014
12.	Polymer Coating- Abrasion resistance test, Cl. 12.7.1	Abrading wire, Linear Abrader, Load, Test set up as per Cl. 12.7.1 and Fig. 14
13.	Polymer Coating- Corrosion spread test, Cl. 12.7.2	5 % Solution of HCl as per Cl. 12.7.2

The above list is indicative only and may not be treated as exhaustive.

ANNEX C**Scheme of Inspection and Testing****1. QUALITY ASSURANCE PLAN**

1.1 It is expected that manufacturers (licensees/applicants) will implement a Quality Assurance Plan i.e. a plan of regular testing and in-process controls, designed to ensure that the product bearing the Standard Mark conforms to all requirements of the Indian Standard.

1.2 The manufacturers shall define a Quality Assurance Plan defining the control unit i.e. Batch and the levels of control (i.e. the frequency and number of samples for conducting the different tests as per the Indian Standard) and submit the same to BIS Branch Office for information. The manufacturer shall comply with the same and maintain test records in accordance with para 2.4 below.

1.3 RECOMMENDED LEVELS OF CONTROL/CONTROL UNIT:

1.3.1 **Control Unit:** For the guidance of manufacturers, the recommended definition of Control Unit is quantity of the product of same type, same mesh type and same class of coating manufactured under identical condition of production.

1.3.2 For the guidance of manufacturers in preparing the Quality Assurance Plan, recommended levels of control are given in **Table 1**.

1.3.3 The manufacturer shall ensure inspection and testing as per the Quality Assurance Plan submitted by them on the whole production of the factory which is covered by this plan. Alternatively, the manufacturer has the option of adherence to the quality plan as per levels of control recommended in column 3 of Table 1.

1.4 However, all manufacturers shall ensure compliance of their products to all the requirements of the Indian Standard.

2. ENSURING COMPLIANCE THROUGH TESTING- It is expected that manufacturers (licensees/applicants) will establish a suitably equipped and staffed in-house laboratory (In house testing facility) for testing at least those parameters of the Indian Standard which require routine testing for ensuring quality of the product. This includes in-process controls as may be defined and put in place by the manufacturer, and testing parameters/requirements which can only be performed in the factory.

2.1 For the guidance of manufacturers, Table 1 giving the recommended levels of control is given below. Column 2 of Table 1 indicates routine tests where test equipment is required in-house as “R” or other tests which can be sub-contracted as “S”. Subcontracting is permitted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.2 For MSME manufacturers, the requirement of maintaining a laboratory/in-house testing facility for routine tests (indicated as “R” in Column 2 of Table 1) is also optional.

2.2.1 MSME manufacturers may utilize common cluster based facilities as per guidelines for the utilization of cluster based test facilities by MSMEs or the provisions of Sharing of testing facilities or get testing done from BIS recognized/empaneled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.3 Large Scale manufacturers shall maintain an in-house laboratory equipped at least with test facilities for routine tests (indicated as “R” in Column 2 of Table 1), where different tests given in the specification shall be carried out in accordance with the method given in the specification. They shall also implement a calibration plan for the in-house test equipment.

2.3.1 Alternatively, in lieu of an in-house laboratory, large scale manufacturers can also utilize the provisions of Sharing of testing facilities as per the Guidelines for Grant of Licence available on BIS website www.bis.gov.in. (Under Conformity Assessment>Product Certification Process). Even for subcontracted tests, provisions for sharing of testing facilities can be utilized.

2.4 TEST RECORDS- The manufacturers maintaining an in-house laboratory or utilizing common cluster based facilities or shared test facilities shall maintain test records for the tests carried out to establish conformity. For the tests being subcontracted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025, test reports issued by the laboratories shall be available for inspection by BIS.

3. LABELLING AND MARKING – As per the requirement of IS 16014:2024. The Standard Mark, as given in the Schedule of the licence, shall be marked on a metal tag attached to each Gabion/Revet mattress/Rock fall netting etc., provided always that the product thus marked conforms to all the requirement of the specification. In addition, the licence no. CM/L-_____ and details of BIS website shall be marked at an appropriate place on product or package as follows: “For details of BIS certification please visit www.bis.gov.in”.

3.1 TEST CERTIFICATE: In addition a certificate of conformance, if required by purchaser, may also be supplied along with each consignment of wire ropes as per format given in **Annexure- I**, as per Cl. 14 of IS 16014: 2024. Copies of all such certificates be preserved for future reference.

4. REJECTION - All the production which conforms to the Indian Standard and covered under scope of the licence shall be marked with Standard Mark. Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act,2016.

TABLE 1

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Method			No. of Sample	Frequency	Remarks
		Clause	Reference				
5	Materials and Manufacture						
5.1, 5.3 , 5.4.1, 5.4.2	Material	5.1, 5.3, 5.4.1, 5.4.2	IS 16014	S	One	Each consignment	No further testing is required if accompanied with test certificate or ISI Marked
5.2, 5.4, 5.5	Manufacture	5.2	IS 16014	R	Manufacturer shall exercise adequate levels of control to ensure that entire production should conform to the Standard. Appropriate records of testing indicating conformity shall be maintained		
		5.4, 5.5	IS 16014	R			
6	Mechanical Properties						
6.1	Tensile strength	6.1	IS 16014	R	Three	Each Control unit	--

6.2, 12.1	Mesh Panel Strength	6.2, 12.1	IS 16014	R	Three	Each Control unit	--
7	Physical Properties						
7.1.1, 12.4	Mass of Zinc/Zinc alloy coating	7.1.1	IS 16014 IS 4826	S	Three	Once in a month	--
7.1.2, 12.4	Adhesion of coating	7.1.2	IS 16014 IS 4826	S	Three	Once in a month	--
7.1.3	Ageing and Corrosion resistance	7.1.3	IS 16014	S	Three	Once in a month	--
7.2	Polymer for coating						
7.2 (a)	Specific gravity	7.2 (a)	IS 16014 IS 13360-3-10/11/12	S	One	Each Consignment	No further testing is required in case received with test certificate
7.2 (b)	Tensile strength	7.2 (b)	IS 16014 IS 13360-5-1	S			
7.2 (c)	Hardness	7.2 (c)	IS 16014 IS 13360-5-11	S			
7.2 (d)	Resistance to Sodium chloride	7.2 (d) 12.6	IS 16014	S	One	Once in 3 months	No further testing is required in case received with test certificate
7.2 (e)	Salt spray exposure	7.2 (e)	IS 16014 IS 13360-8-14	S	One	Once in a year	

7.2 (f)	Modulus of elasticity	7.2 (f)	IS 16014 ISO 37	S	One	Each Consignment	
7.2 (g)	Brittleness temperature	7.2 (g)	IS 16014 ISO 974	S	One	Each Consignment	No further testing is required in case received with test certificate
7.2 (h)	Resistance to UV rays	7.2 (h)	IS 16014 ISO 4829-3	S	One	Once in a year	
8	Dimensions and tolerances	8	IS 16014	R	Manufacturer shall exercise adequate levels of control to ensure that entire production should conform to the Standard. Appropriate records of testing indicating conformity shall be maintained		
9	Workmanship	9	IS 16014	R			
12.2	Punch test	12.2	IS 16014	S	One	Once in a month	--
12.3	Pull apart resistance test/Slevedge Strength/Panel to Panel connection	12.3	IS 16014	S	One		
12.5	Polymer coating thickness	12.4	IS 16014	S	Three		
12.7	Polymer coating-Abrasion resistance test	12.7.1	IS 16014	S	One	Once in a year	--
	Polymer coating-Corrosion spread test	12.7.2	IS 16014	S			

ANNEXURE- I
(Para 3.1 of Scheme of Inspection and Testing and Cl. 14 of IS 16014: 2024)



Test Certificate (Name of licensee with Address)
if required by purchaser

Purchaser_____

Certificate No._____

Order No._____

Date _____

We certify that the “Gabion Boxes / Revet Mattresses/ Rock Fall Netting/ Sack Gabions/Soil reinforcement facia units (vertical or inclined)”- *Product type as applicable*, mentioned below conform to IS 16014:2024. Properties of the Product as tested in accordance with scheme of Inspection & Testing contained in BIS Certification Marks License No.CM/L_are as indicated against each reel/Drum etc. as applicable

{PLEASE REFER TO IS 16014:2024 FOR DETAILS OF SPECIFICATION REQUIREMENTS}

Test Results

Size, in m (LXWH- For Gabions, Revet mattress, Soil reinforcement facia units, and Length and diameter for Sack gabions, LXW for netting rolls)	Quant ity	Mesh Type	Coating class	Dimensions	Tensile strength	Mesh Panel Strength	Coating tests

Authorized Signatory of the firm

(Designation)

ANNEX D

Scope of Licence

“Licence is granted to use Standard Mark as per IS 16014:2024 with the following scope:	
Name of the product	Gabion Boxes / Revet Mattresses/ Rock Fall Netting/ Sack Gabions/Soil reinforcement facia units (vertical or inclined)
Mesh Type	
Class	