



उत्पाद मैनुअल

**Geosynthetics - Needle Punched Nonwoven Geobags For Coastal And Waterways Protection-
Specification**

IS 16653:2017 के अनुसार

PRODUCT MANUAL

**Geosynthetics - Needle Punched Nonwoven Geobags For Coastal And Waterways Protection-
Specification**

According to IS 16653:2017

विभिन्न उत्पादों के लिए भारतीय मानक ब्यूरो (अनुरूपता मूल्यांकन) विनियम, 2018 की योजना- I के तहत प्रमाणन के संचालन में अभ्यास और पारदर्शिता के संचालन में पारदर्शिता सुनिश्चित करने के लिए इस उत्पाद मैनुअल का उपयोग सभी क्षेत्रीय / शाखा कार्यालयों और लाइसेंसधारियों द्वारा संदर्भ सामग्री के रूप में किया जाएगा। दस्तावेज़ का उपयोग बीआईएस प्रमाणन लाइसेंस/प्रमाणपत्र प्राप्त करने के इच्छुक संभावित आवेदकों द्वारा भी किया जा सकता है।

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.

1.	उत्पाद Product	:	IS 16653:2017
	शीर्षक Title	:	Geosynthetics - Needle Punched Nonwoven Geobags For Coastal And Waterways Protection- Specification
	संशोधनों की संख्या No. of amendments	:	01
2.	नमूना दिशानिर्देश Sampling Guidelines		

a)	कच्चा माल Raw material	:	Material of geobags shall conform to the requirements of Cl. 4.1 and Cl. 4.2 of IS 16653 Polyester/polypropylene thread used for pre-fabrication of geobags shall conform to the requirements of Cl 4.3 of IS 16653 Conformity of these raw materials may be established through supplier's test certificate or test report of BIS recognized/empaneled lab or test report of other NABL accredited lab or in house testing. No testing is required if material is ISI marked.
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b)	समूहोंकरण दिशानिर्देश Grouping Guidelines	:	Please refer Annex-A
c)	नमूने का आकार Sample Size	:	7 Small size bags or 2 Large size bags
d)	Sampling guidelines for surveillance	:	Only one factory sample and one market sample shall be tested in a year. The test for UV resistance after 500 h, retained tensile strength in machined and cross machined direction shall be done only on one Factory Sample in a single operative year
3.	परीक्षण उपकरणों की सूची List of Test Equipment	:	Please refer Annex-B
4.	निरीक्षण और परीक्षण की स्कीम Scheme of Inspection and Testing	:	Please refer Annex-C
5.	एक दिन में संभावित परीक्षण Possible tests in a day		
	All tests except Abrasion test depending upon tester type and UV resistance test (not including time for conditioning of test specimen)		
6.	लाइसेंस का दायरा /Scope of the Licence:		
	"Licence is granted to use Standard Mark as per IS 16653:2017 with the following scope:		
	Name of the product	Geosynthetics - Needle Punched Nonwoven Geobags For Coastal And Waterways Protection- Specification	
	Material	Polyester or Polypropylene (PP)	
	Type	1/2/3	
	Size	Large/Small	

ANNEX-A

GROUPING GUIDELINES

IS 16653:2017 classifies Geobags according to:

- i) Material: Polyester or Polypropylene
- ii) Type: Types 1/2/3
- iii) Size: large/small

For the purpose of grant of licence, and change in scope of licence, the following grouping guidelines shall apply:

Sample(s) of **each material (PES/PP)** and of **each type (1/2/3)** and **any of the sizes (large/small)**, intended to be covered in the scope of licence shall be drawn and tested.

However, scope of licence shall be restricted according to the manufacturing and testing facilities available

During operation of licence, samples of all varieties covered in the scope of licence, shall be drawn in rotation, to the extent possible

ANNEX – B

LIST OF TEST EQUIPMENTS

Major test equipment required to test as per the Indian Standard

Sl. No.	Tests Used In With Clause Reference	Test Equipment/Chemical
1.	Material of geobags and prefabrication thread (Identification of constituent fibre), CI 4.1.1	Compound microscope 500X, dissecting needles, glass slides, cover glasses, cross sectioning device, Forceps, Microburner, Hot Plate, Thermometer <u>Chemicals for Polyester</u> Zinc Chloride, Pottasium Iodide, Iodine Shirlastain A, Distilled water, Alcohol, Necarmine W, Ammonia, Copper sulphate Ammonia, Sodium Hydroxide, Ammonia Sulphuric Acid, Phenol/m-Cresol, Dimethylformamide <u>Chemicals for PP</u> Cyclohexanone, Decalin As per IS 667
2.	Isophthalic acid content of virgin polyester, CI 4.1.3	PPE's like safety goggles, apron, surgical hand gloves - Gas chromatograph, - capillary column Dispensette or pipette - Volumetric Flask - Beaker, Funnel, 50ml flask, - Heating Mental - AR grade Dimethyl Isophthalate, Benzyl Alcohol, Chloroform, Isopropyl Titnate, Dimethyl Suburate
3.	Wide width tensile strength and elongation, CI 4.1.1	Tensiletesting machine CRE with facility to record force-displacement, suitable clamps and facility to measure elongation, Vernier caliper LC 1mm, Humidity chamber
4.	Seam strength, CI 4.1.1	Tensiletesting machine CRE with facility to record force-displacement, suitable clamps and facility to measure elongation, Vernier caliper LC 1mm, Humidity chamber, water, nonionic wetting agent
5.	Abrasion resistance, CI 4.1.1	Abrasion testing machine of rotary or reciprocating type that simulates abrasion loads on geobags at coastal and waterways areas as per IS 14714 or Annex B of IS 16653
6.	Trapezoidal tear strength, CI 4.1.1	Tensiletesting machine CRE/CRT type with autographic recorder, suitable clamps, Trapezoidal Template as per IS 14293
7.	CBR Puncture Resistance, CI 4.1.1	Tensile testing machine CRE/CRT type with autographic recorder, Stainless Steel

		plunger, clamping system, as per IS 16078:2013
8.	Permittivity, CI 4.1.1	Constant and Falling head permeability apparatus, De-airing system with dissolved oxygen meter or PPM test kit as per IS 14324
9.	Apparent opening size, CI 4.1.1	Spherical glass beads, Pan, cover, 200 mm diameter Sieves, Balance LC 0.05g, Mechanical sieve shaker, equipment for static elimination, drying oven, distilled water as per IS 14294
10.	Thickness at 2 kPa, CI 4.1.1	Thickness tester incorporating removable presser foot, reference plate, gauge and timer with conditioning chamber as per IS 13162 (part 3)
11.	Mass, Mass of sand filled geobag, CI 4.1.1	Electronic Weighing Balance 10mg LC, GSM cutter/cutting die, conditioning chamber as per IS 14716
12.	Length and width, construction (prefabrication) , CI 4.1.1	Steel Rule/Measuring tape range at least 3m, Smooth flat surface table as per IS 1954
13.	UV resistance after 500 h, retained tensile strength in machine and cross machine direction, CI 4.1.1	Tensile testing machine CRE with facility to record force-displacement Xenon-Arc apparatus with facility for light only at 65±5C black panel temperature and 30±5% RH, followed by water spray and light as per IS 13162 (Part 2)

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

ANNEX C

SCHEME OF INSPECTION AND TESTING

1. **LABORATORY-** A laboratory shall be maintained, which shall be suitably equipped (as given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the method given in the specification.

1.1 The manufacturer shall prepare and implement a calibration plan for the test equipment.

2. **TEST RECORD-** The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. **PACKING AND MARKING** - The Standard Mark as given in the Schedule of the licence shall be printed on each geobag provided always that the material so marked conforms to each requirement of the specification. **“FOR GEOBAGS ONLY”** shall be marked on top of the standard mark printed on each geobag.

3.2 Geobags/bundles thereof shall be elevated and protected with a waterproof cover. 50 geobags are laid flat in an HDPE tube or wrapped in an HDPE film of minimum thickness of 60 microns and tied with HDPE/PP tape. Each bundle shall be labeled and tagged to provide product identification sufficient for field identification as well as inventory control and quality control purpose

3.3 The following shall also be marked on printed labels affixed to each geobag

- a) Identification of the geotextile material as per manufacturer's recommendation, for example, polypropylene nonwoven geobags for coastal/waterways protection
- b) Type of geobag/mass in g/m² of the fabric used for manufacture of geobag
- c) Dimensions (length and width of bag)
- d) Lot number and date of manufacture
- e) Manufacturer's name, initials and trade mark
- f) Country of origin
- g) Any other information required by law or any instruction by the manufacturer
- h) BIS licence number and “For BIS certification details please visit www.bis.gov.in” (this may be printed on a separate label in case enough space is not available)

5. **STORAGE AND HANDLING:** Bundles shall be stored in a manner which protects them from adverse impact of weather. During storage, geobags shall be elevated off the ground and adequately protected from site construction damage, excessive precipitation, extended exposure to sunlight, aggressive chemicals, flames or temperature in excess of 60 deg. C, excessive mud, concrete, epoxy or other deleterious materials coming in contact with and affixing to the geotextile material, any other environment conditions that may damage the physical property values. The geobags shall be stored at temperature above 10 deg. C and below 40 deg. C. The geobags shall be laid flat. The geobags shall not be directly exposed to sunlight for a period longer than the period recommended by manufacturer. The geobags shall be kept dry until installation and shall not be stored directly on the ground.

6. **CONTROL UNIT**- For the purpose of this scheme, entire quantity of geobags of the same material and same type produced in a day shall be taken as one control unit.

7. **LEVELS OF CONTROL** :- The tests as indicate in Table 1 and at the levels of controls in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and records maintained in accordance with paragraph 2 above.

7.1 All the production which conforms to the Indian Standard and covered under the scope of this licence shall be marked with the Standard Mark.

8. **REJECTION** - 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.

TABLE1
LEVELS OF CONTROL

(1)				(2)	(3)		
Test Details				Test equip ment requir ement R: required (or)S: Sub- contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods Clause Reference			No. of Sample	Frequency	Remarks
4.1, 4.3	Material of geobags and prefabrication thread	4.1, 4.3	IS 16653:2017	S	One	Each consignment	No testing is required if material is accompanied by supplier's test certificate and/or test report from BIS recognized or empaneled lab or any other NABL accredited lab (for isophthalic acid content, identification of fibre) or if ISI marked
4.3	Construction of geobags (prefabrication) i.e. seam stitch density, distance of sewing from the edges, distance of two rows of stitches, length of loose loop, uniformity of stitching etc.	4.3	-do-	R	30 geobags	Each control unit	

4.1.1	<u>Requirements for needle punched nonwoven geobags for coastal/waterways protection as per Table 1 of IS 16653:2017</u>						
A.	Mechanical Properties						
i)	Wide width tensile strength		IS 16635#	R	5 geobags	Each Control Unit	
ii)	Elongation		-do-	R	5 geobags	Each Control Unit	
iii)	Seam strength, percent of actual fabric strength		IS 15060	R	5 geobags	Each Control Unit	
iv)	Abrasion resistance, retained tensile strength in machine and cross machine direction		IS 14714 or Annex B of IS 16653*	R	5 geobags	Once a month for each polymer material (PE/PP) and Type	*As per agreement between buyer and seller, abrasion resistance test is to be carried by either test method
v)	Trapezoidal tear strength		IS 14293	R	5 geobags	Each Control Unit	
vi)	CBR puncture resistance		IS 16078	R	5 geobags	Each Control Unit	

B	Hydraulic properties						
i)	Permittivity		IS 14324	R	5 geobags	Each Control Unit	
ii)	Apparent opening size (AOS)		IS 14294	R	5 geobags	Each Control Unit	
C	Physical properties						
i)	Thickness at 2 kPa		IS 13162 (Part 3)	R	30 geobags	Each control unit	
ii)	Polymer type		IS 667	S	One	Each consignment	No testing is required if material is accompanied by supplier's test certificate and/or test report from BIS recognized or empaneled lab or any other NABL accredited lab (for isophthalic acid content, identification of fibre) or if ISI marked
iii)	Mass		IS 14716	R	5 geobags	Each Control Unit	
iv)	Length of geobag		IS 1954	R	30 geobags	Each control unit	

v)	Width of geobag		-do-	R	30 geobags	Each control unit	
vi)	Mass of sand filled geobag		IS 16653	R	5 geobags	Each Control Unit	
vii)	UV resistance after 500 h, retained tensile strength in machine and cross direction		IS 13162 (Part 2)	S	2 geobags	Once a year or whenever there is change in polymer composition	

#IS 13162 (Part 5): 1992 has been superseded by IS 16635:2017

Note-1: Whether test equipment is required or sub-contracting is permitted in column 2 shall be decided by the Bureau and shall be mandatory. Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-2: Levels of control given in column 3 are only recommendatory in nature. The manufacturer may define the control unit/batch/lot and submit his own levels of control in column 3 with proper justification for approval by BO Head.