



उत्पाद मैनुअल
भूकृत्रिम तटीय और जलमार्ग संरक्षण के लिए मल्टी फिलामेंट पोलीप्रोपाइलीन
बुने हुए जियोबैग विशिष्टि
IS 16654 : 2017 के अनुसार

PRODUCT MANUAL
Geosynthetics - Polypropylene Multifilament Woven
Geobags for Coastal and Waterways Protection -
Specification According to IS 16654:2017

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 16654:2017
	शीर्षक Title	:	Geosynthetics - Polypropylene Multifilament Woven Geobags for Coastal and Waterways Protection - Specification
	संशोधनों की संख्या No.of amendments	:	0
2.	नमूना दिशानिर्देश Sampling Guidelines		
a)	कच्चा माल Raw material	:	Material of geobags i.e. PP Multifilament woven fabric/geotextile shall conform to the requirements of Cl. 4.1.1 of IS 16654. Polyester/polypropylene thread used for pre-fabrication of geobags shall conform to the requirements of Cl 4.3 of IS 16654 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. For the inertness requirement

		(Cl. 4.1.1), manufacturer's declaration may also be accepted.
b)	समूहीकरण दिशानिर्देश Grouping Guidelines	: Please refer Annex-A
c)	नमून का परिमाण 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 व परीक्षण 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 कार्यक्षेत्र /Scope of the Licence:	
	IS 16654 : 2017 के अनुसार मानक मुहर का उपयोग करने के लिए लाइसेंस निम्नलिखित कार्यक्षेत्र के लिए प्रदान किया जाता है Licence is granted to use Standard Mark as per IS 16654:2017 with the following scope:	
	Name of the product	Geosynthetics - Polypropylene Multifilament Woven Geobags for Coastal and Waterways Protection - Specification
	Type	1 / 2
	Size	Large/Small

**BUREAU OF INDIAN STANDARDS
MANAK BHAVAN,9, BAHADUR SHAH ZAFAR MARG,
NEW DELHI-110002**

ANNEX-A

GROUPING GUIDELINES

IS 16654:2017 classifies Geobags according to:

- i) Type: Types 1/2
- ii) 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 type (1/2)** 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
3.	Prefabrication of Geobags, Cl. 4.3 (Stitch density, distance of sewing from edge, distance between two rows of stitches etc.)	- Steel Scale/Vernier Calliper - Visual
4.	Tensile Strength and Elongation at Designated Tensile strength, Cl 4.1.1, Table 1	Digital Tensile testing machine CRE with facility to record force-displacement, suitable clamps and facility to measure elongation(Digital Extensometer), Humidity chamber/Conditioned Laboratory with thermo-hygrometer
5.	Seam strength, Cl 4.1.1, Table 1	Digital Tensile testing machine CRE with facility to record force-displacement, suitable clamps and facility to measure elongation(Digital Extensometer), Humidity chamber/Conditioned Laboratory with thermo-hygrometer, Water and Non-Ionic Wetting Agent
6.	Abrasion resistance, Cl 4.1.1, Table 1	Abrasion testing machine of rotary or reciprocating type that simulates abrasion loadson geobags at coastal and waterways areas as per IS 14714
7.	Trapezoidal tear strength, Cl4.1.1, Table 1	Tensile testing machine CRE/CRT type with autographic recorder, suitable clamps, Trapezoidal Template as per IS 14293
8.	Index Puncture Resistance, Cl 4.1.1, Table 1	Tensile/Compression testing machine CRE type with Force recorder, Ring Clamp attachment, Solid Steel Rod
9.	Water permeability at 100 mm water head, Cl 4.1.1, Table 1	Constant and Falling head permeability apparatus, De-airing system with dissolved oxygen meter or PPM test kit as per IS 14324
10.	Apparent opening size, Cl 4.1.1, Table 1	Spherical Glass Beads or Graded Sand Particles, Pan, cover, 200 mm diameter Sieves, Balance LC 0.05g, Mechanical sieve shaker, equipment for static elimination device, drying oven, Pan, for Collecting Sieved Beads or Graded Sand Particles, distilled water as per IS 14294
11.	Mass, Mass of sand filled geobag, Cl 4.1.1, Table 1	Electronic Weighing Balance 10mg LC, Laser cutter/Scissor, Flat wooden table and Humidity chamber/Conditioned Laboratory as per IS14716
12.	Length and width, Cl 4.1.1, Table 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, Cl 4.1.1, Table 1	Tensile testing machine CRE with facility to record force-displacement, Xenon-Arc apparatus with facility for light only at 65±5°C black panel temperature and 30±5% RH, followed by water spray and light as per IS 13162 (Part 2)

The above list is indicative only and may not be treated 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. **3.1 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. 100 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 labelled 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 geobag material as per manufacturer's recommendation, for example, polypropylene woven geobags for coastal/waterways protection
- b) Type of geobag/mass in g/m² of fabric used for manufacture of geobags
- 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)

4. **STORAGE AND HANDLING:** Bundles shall be stored in a manner which protects them from adverse impact of weather. If stored outdoors, they shall be elevated and protected with a waterproof cover. 100 geobags are laid flat in a HDPE tube or wrapped in a HDPE film of minimum thickness of 60 microns and tied with a HDPE/PP tape so as to remove excess air and protect them from heat moisture etc. 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.

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

6. **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.

7. **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 equipment requirement R: required (or)S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods Clause Reference			No. of Sample	Frequency	Remarks
4.1.1, 4.3	Material of geobags(UV stabilization) and prefabrication thread(UVstabilization and Linear Density)	4.1.1, 4.3	IS 16654:2017	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 or if ISI marked
4.2, 4.3	Dimensional Stability, 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.	4.2 and 4.3	-do-	R	30 geobags	Each control unit	

4.1.1	<u>Requirements for Polypropylene Multifilament Woven Geobags for Coastal and Waterways Protection as per Table 1 of IS 16654:2017</u>						
A.	Mechanical Properties						
i)	Tensile Strength(MD and CMD)		IS 1969(Part 1)	R	5 geobags	Each Control Unit	
ii)	Elongation at designated Load(MD and CMD)		-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	R	5 geobags	Once a month for each Type(Whichever manufactured)	
v)	Trapezoidal tear strength(MD and CMD)		IS 14293	R	5 geobags	Each Control Unit	
vi)	Index puncture resistance		Annex-B, IS 16654	R	5 geobags	Each Control Unit	
B	Hydraulic properties						
i)	Water permeability at 100 mm water head		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)	Mass		IS 14716	R	5 geobags	Each Control Unit	

ii)	Length of geobag		IS 1954	R	30 geobags	Each control unit	
iii)	Width of geobag		-do-	R	30 geobags	Each control unit	
iv)	Mass of sand filled geobag		IS 16653	R	5 geobags	Each Control Unit	
v)	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	

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