



उत्पाद मैनुअल

Geosynthetics — Geotextiles for Subsurface Drainage, Subgrade Separation, Subgrade Stabilization, Filtration and Erosion Control (In Hard Armor Systems) Applications — Specification

IS 16362: 2024 के अनुसार

PRODUCT MANUAL FOR

Geosynthetics — Geotextiles for Subsurface Drainage, Subgrade Separation, Subgrade Stabilization, Filtration and Erosion Control (In Hard Armor Systems) Applications — Specification

as per IS 16362: 2024

ववशभन्न उत्पादों के शलए भारतीय मानक ब्यूरो) अनुरूपता मूलयांकन (ववननयम, 2018 की योजना -I के तहत प्रमाणन के संचालन में एकरूपता और पारदशििता के शलए इस उत्पाद मैनुअल का उपयोग सभी क्षेिीय / िाखा कायािलियों और लाइसेंसधाररयों द्वारा संदभि सामग्री के रूप में ककया जाएगा। दथतावेज़ का उपयोग बीआईएस प्रमाणन प्राप्त करने के इच्छुक संभाववत आवेदकों द्वारा भी ककया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure uniformity 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.

1.	मानक संख्या IS No.	:	IS 16362: 2024
	शीर्षक Title	:	Geosynthetics — Geotextiles for Subsurface Drainage, Subgrade Separation, Subgrade Stabilization, Filtration and Erosion Control (In Hard Armor Systems) Applications — Specification
	संशोधनों की संख्या No. of amendments	:	01
2.	नमूना दिशानिर्देश Sampling Guidelines		

a)	कच्चा माल Raw material	:	The materials used in the manufacturing of Geotextiles shall conform to the requirements specified at cl.4.1, cl.4.2 and cl.4.3 of IS 16362: 2024. Conformity of raw materials shall be established through supplier's test certificates, or test reports from BIS recognized/empaneled labs or other labs having valid NABL accreditation as per IS/ISO/IEC 17025 or in house testing or combination thereof. Note: This section indicates the requirements for raw material (if specified in the IS) for which compliance is to be established during Grant of Licence/Change in Scope of Licence/Factory Surveillance
b)	समूहीकरण दिशानिर्देश Grouping Guidelines	:	Sample of each variety shall be tested to cover in the scope of licence.
c)	नमूने का परमाण Sample Quantity	:	Full width sample with sufficient length to form a minimum of 06 sqm and if polymer is used in the fasteners, threads to join the rolls; then in this case separate sample is required of approx. 1 kg. Note: This section indicates the quantity of the sample of the product and/or the raw material (if applicable), required to be sent to the laboratory for testing, for the purpose of Grant of Licence/Change in Scope of Licence/Factory Surveillance (in case of market surveillance, effort may be made to procure the required quantity of product sample, as far as possible since raw material sample may not be available in market)
d)	परीक्षण अनुरोध में घोषित किए जाने वाले पैरामीटर Parameters to be Declared in Test Request	:	i. Type ii. Material iii. Class iv. Strain Percent v. Application Note: Apart from the above, any other requirements/parameters may also be declared as per the standard, as applicable.
3.	परीक्षण उपकरणों की सूची List of Test Equipment	:	Please refer Annex- A
4.	ननरीक्षण और परीक्षण की थकीम Scheme of Inspection and Testing	:	Please refer Annex- B
5.	एक ददन में संभावित परीक्षण Possible tests in a day		All tests are possible to be carried out in a day except for Apparent Opening Size (A.O.S), Durability Properties, provided that conditioned samples are available. Note: This section is for the guidance of BIS Certification Officers/Technical Auditors of BIS Authorized Outside Surveillance Agencies (OSAs) during factory inspection to provide ready reference regarding the tests which can be witnessed during the inspection in the factory by the officer/auditor.

6.	लाइसेंस का दायरा /Scope of the Licence:	
	Licence is granted to use Standard Mark as per IS 16362: 2024 with the following scope:	
	Name of the product	Geosynthetics — Geotextiles for Subsurface Drainage, Subgrade Separation, Subgrade Stabilization, Filtration and Erosion Control (In Hard Armor Systems) Applications — Specification
	Type	Woven/Non-Woven
	Material	Polyolefins (Polypropylene or Polyethylene), Polyesters & Polyamides
	Class	• Class 1H • Class 2H • Class 3H • Class 1R • Class 2R
	Strain (Percent)	• Strain < 50 % • Strain $\geq$ 50%
	Applications	• Subsurface Drainage • Subgrade Separation • Subgrade Stabilization • Erosion Control in Hard Armor Systems • Separation/Filtration Applications in Railway Formation

BUREAU OF INDIAN STANDARDS

Manak Bhawan, 9, Bahadur Shah
Zafar Marg, New Delhi – 110002

Annexure A

LIST OF TEST EQUIPMENTS

(INDICATIVE LIST, FOR GUIDANCE ONLY)

Sl. No.	Tests Used in with Clause Reference	Test Equipment/Chemicals and Identification Numbers (Where applicable)
1.	Roll Length & Roll Width, Clause 5.2, 7.2, Table 1 & Table 6	Calibrated Steel Rule of atleast 2 m, Flat Surface, Conditioning Chamber
2.	Grab Strength, Clause 5.2, 7.2, Table 1 & Table 6	Constant Rate of Extension Tensile Testing Machine or CRT Type with Autographic Recorder, Clamps, Sample Preparation/Cutting Equipment, Conditioning Chamber, Vernier Caliper, Steel Scale, Non-Ionic Wetting Agent
3.	Sewn Seam Strength, Clause 5.2 & Table 1	Constant Rate of Extension Tensile Testing Machine or CRT Type with Autographic Recorder, Jaws, Sample Preparation/Cutting Equipment, Conditioning Chamber, Vernier Caliper, Steel Scale
4.	Trapezoidal Tear Strength, Clause 5.2, 7.2, Table 1 & Table 6	Constant Rate of Extension Tensile Testing Machine or CRT Type with Autographic Recorder, Clamps, Trapezoidal Template, Water Bath maintained at 27 ± 2 °C, Non-Ionic Wetting Agent, Sample Preparation/Cutting Equipment, Conditioning Chamber, Vernier Caliper, Steel Scale
5.	CBR Puncture Strength, Strength, Clause 5.2, 7.2, Table 1 & Table 6	Puncture Strength Machine capable of constant rate of displacement of 50 ± 5 mm/min with autographic recorder, Stainless Steel Plunger, Clamping System, Sample Preparation/Cutting Equipment, Conditioning Chamber
6.	Abrasion Strength, Clause 5.2, 7.2, Table 1 & Table 6	Abrasion tester essentially consisting of Balanced Head and Block Assembly as per clause 5.1.1 of IS 14714, Indicator for indicating the number of cycles (1 cycle = 1 double stroke), Weights for applying a vertical load to the specimen.
7.	Resistance to installation damage, Percent retained strength, SC/SW/GP, Clause 5.2 & Table 1	Conditioning Chamber, Compression Machine, Test Container, Loading Plate, Aggregate
8.	Ultraviolet Stability at 500h, Retained strength, Percent of original strength Clause 5.2, 7.2, Table 1 & Table 6	Conditioning Chamber, Sample Preparation/Cutting Equipment, Xen on Arc Apparatus, Tensile Test Apparatus
9.	Permittivity, Clause 5.2, 6, Table 2, Table 3, Table 4 & Table 5	Water Permeability Tester, De-Aired Water, Conditioning Chamber

10.	Apparent Opening Size (AOS), Clause 5.2, 6, 7.2, Table 2, Table 3, Table 4, Table 5 & Table 6	Mechanical Seive Shaker, Pan, Cover, 200 mm Diameter Sieves, Spherical Glass Beads or Graded Sand Particles, Balance (L.C. 0.05 g), Static Eliminating Device or Anti-Static Device, Drying Oven, Pan for collecting Sieved Beads, Distilled Water
11.	Elongation at Break, Clause 7.2 & Table 6	Tensile testing machine (of the constant-rate-of extension (CRE) or constant-rate-of-traverse (CRT) type with autographic recorder.), Clamps (having all gripping surfaces parallel, flat, and capable of preventing slipping of the specimen during a test. Each clamp should have one jaw face measuring 25.4 mm × 50.8 mm, with the longer dimension parallel to the direction of application of the load. The other jaw face of each clamp be at least as large as its mate), Sample Preparation/Cutting Equipment, Conditioning Chamber, Vernier Caliper, Steel Scale, Non-Ionic Wetting Agent
12.	Water flow rate normal to plane, Clause 7.2 & Table 6	Constant-head normal to plane water flow apparatus as per clause 5.2.1 of IS 14324, Water as per clause 5.2.2 of IS 14324, Dissolved-oxygen meter, Stopwatch, Thermometer(with an accuracy of 0.5 °C), Measuring vessel, of appropriate size for determining the volume of water to an accuracy of 1 % of the capacity of the vessel, Measurement device for determining the applied head, to an accuracy of 3 %, non-ionic surfactant
13.	Minimum Retained ultimate tensile strength(for 100 years service life), Clause 7.2 & Table 6	Tensile testing machine (of the constant-rate-of extension (CRE) or constant-rate-of-traverse (CRT) type with autographic recorder.), Clamps (having all gripping surfaces parallel, flat, and capable of preventing slipping of the specimen during a test. Each clamp should have one jaw face measuring 25.4 mm × 50.8 mm, with the longer dimension parallel to the direction of application of the load. The other jaw face of each clamp be at least as large as its mate), Sample Preparation/Cutting Equipment, Conditioning Chamber, Vernier Caliper, Steel Scale, Non-Ionic Wetting Agent, Container as per Clause D-3.1 of IS 16362, Thermometer capable of measuring the temperature with an accuracy of ± 1 °C, a thermostatically regulated oven with an internal volume of sufficient size, capable of exposing test specimens to a temperature of (100 ± 1) °C, adjustable ventilation opening, glass or other chemically inert fixtures, A pressured vessel (autoclave), A pressure transducer, to measure the oxygen pressure above the test liquid, with an accuracy of ±1 % operating pressure, A temperature sensor, to measure the temperature, with an accuracy of ±0.5 °C, Specimen holders, Stirring device, Valves, Drain-off valve, Heating device, Monitoring device, Pressure release safety equipment, diluted sulphuric acid with a pH of 3.0, Oxygen, at a purity of at least 99.5 % by volume, Water, Grade 3 or higher quality in accordance with ISO 3696.

ANNEXURE B

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. lot/batch etc.) 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.

1.3 RECOMMENDED LEVELS OF CONTROL/CONTROL UNIT:

1.3.1 For the guidance of manufacturers, the recommended definition of control unit is: Entire quantity of Geotextiles of the same type, class & strain (percent) manufactured under similar conditions in a single day for a particular application from the same material.

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 subcontracted 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. PACKING AND MARKING - The Standard Mark as given in the Schedule of the licence shall be incorporated legibly and indelibly on each roll provided always that the material so marked conforms to each requirement of the specification.

3.1 Packing and Marking shall be done as per the Indian Standard.

3.2 **Additional Marking requirements:** The material shall also be marked with the following additional requirement on each roll:

a) “For BIS certification details please visit www.bis.gov.in”

3.3 Information as specified in the standard shall be supplied by the manufacturer to the purchaser.

4. IDENTIFICATION, DELIVERY, HANDLING AND STORAGE – Requirements of the Indian Standard shall be complied with by the manufacturer.

5. TEST CERTIFICATE - For each consignment of BIS Certified material conforming to IS 16362:2020 there shall be a test certificate which shall contain the Standard Mark, the Control Unit number and the corresponding test results (as given in Annexure-I enclosed)

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

(ONLY FOR GUIDANCE PURPOSE)

(1)				(2)	(3)		(4)
TEST DETAILS					LEVELS OF CONTROL		REMARKS
Clause	Requirements	Test Method		Test equipment requirement R: required (or) S: Sub- contracting permitted	No. of Samples	Frequency	
		Clause	Reference				
4	Requirements	4.1, 4.2, 4.3	IS 16362 IS 667 Annex B	S	Adequate inspection to ensure that the material used for the manufacture of Geotextiles shall conform to the requirements of the specification. However, the manufacturer shall maintain appropriate records for evidence of conformity.		
Clause 5.2, 6 Table 1	Strength and Durability Requirements for Different Classes of Geotextiles						
i)	Index properties:						
a)	Type of geotextile	--	IS 16362	R	----	----	Visual
b)	Roll Length	--	IS 1954	R	Adequate inspection to ensure that each roll conforms to the length as per specification or as agreed.		
c)	Roll Width	--	IS 1954	R	Adequate inspection to ensure that each roll conforms to the width as per specification or as agreed.		
d)	Grab Strength	--	IS 16342	R	One	Each Control Unit	
e)	Sewn Seam Strength	--	IS 15060	R	One	Each Control Unit	
f)	Trapezoidal Tear Strength	--	IS 14293	R	One	Each Control Unit	
g)	CBR Puncture Strength	--	IS 16078	R	One	Each Control Unit	
h)	Abrasion Strength	--	IS 14714	R	One	Each Control Unit	

ii)	Durability Properties						
a)	Resistance	--	IS 17420	S	One	Once in 5 years and whenever there is change in raw material/raw material Supplier.	
b)	Ultraviolet stability at 500h, Retained strength, Percent of original strength	--	IS 13162 (Part 2)	S	One	Once in a year and whenever there is change in raw material/raw material Supplier.	
Clause 5.2, 6, Table 2, 3, 4 & 5	Requirements of Geotextiles for Subsurface Drainage Applications, Subgrade Separation Applications, Subgrade Stabilization Applications & Erosion Control Application in Hard Armor Systems						
i)	Geotextile class	Table 1	IS 16362	--	Adequate inspection to ensure that the material used for the manufacture of Geotextiles for Subsurface Drainage Applications, Subgrade Separation Applications, Subgrade Stabilization Applications & Erosion Control Application in Hard Armor Systems shall conform to the requirements of the specification. However, the manufacturer shall maintain appropriate records for evidence of conformity.		
ii)	Permittivity	--	IS 14324	S	One	Once in a month	
iii)	Apparent Opening Size	--	IS 14294	S	One	Once in a month	
Clause 5.2, 7.2 & Table 6	Requirements of Geotextiles for Separation/Filtration Applications						
i)	Index properties:						
a)	Type of geotextile	--	IS 16362	R	----	----	Visual
b)	Roll Length	--	IS 1954	R	Adequate inspection to ensure that each roll conforms to the length as per specification or as agreed.		
c)	Roll Width	--	IS 1954	R	Adequate inspection to ensure that each roll conforms to the width as per specification or as agreed.		

d)	Elongation at break	--	IS 16342	R	One	Each Control Unit	
e)	Grab Strength	--	IS 16342	R	One	Each Control Unit	
f)	Trapezoidal Tear Strength	--	IS 14293	R	One	Each Control Unit	
g)	CBR Puncture Strength	--	IS 16078	R	One	Each Control Unit	
ii)	Hydraulic Properties						
a)	Apparent Opening Size	--	IS 14294	S	One	Once in a month	
b)	Water Flow rate normal to plane		IS 14324	S	One	Once in a month	
	Durability Properties						
a)	Abrasion Strength	--	IS 14714	R	One	Each Control Unit	
b)	Resistance to UV light weathering, Percentage strength retained in breaking load after 500 h UV exposure	--	IS 13162 (Part 2)	S	One	Once in a year and whenever there is change in raw material/raw material Supplier.	
c)	Minimum retained ultimate tensile strength(for 100 years life)	Annex-C & D	IS 16362	S	One	Once in a year and whenever there is change in raw material/raw material Supplier.	

Scheme of Inspection and Testing

TEST CERTIFICATE FORMAT

Annexure-I

Test Certificate for Geosynthetics — Geotextiles for Subsurface Drainage, Subgrade Separation, Subgrade Stabilization, Filtration and Erosion Control (In Hard Armor Systems) Applications — Specification

TEST CERTIFICATE NO. _____ **DATED** _____

TO M/s _____

It is certified that the material described below fully conforms to IS 16362: 2024.All requirements of the product, as tested in accordance with the Scheme of Inspection and Testing contained in the BIS Certification Marks Licence No. CM/L-__are as indicated below against each order no. etc.

(PLEASE REFER TO IS 16362: 2024 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

Order No. & Date	Type (Woven /Non- Woven)	Class (1H/2H ,3H/1R /2R)	Material [Polyolefins (Polypropylene or Polyethylene), Polyesters & Polyamides]	Percentage Strain (<50%/>50 %)	Roll Length and Width	Elongation at break	Grab Strength	Sewn Seam Strength	Trapezoidal Tear Strength	CBR Puncture Strength	Abrasion Strength	Permittivity	A.O.S	Water flow rate normal to plane	Resistance to installation damage, Percent retained strength, SC/SW/GP	Ultraviolet Stability at 500h, Retained strength, Percent of original strength	Minimum retained ultimate tensile strength (for 100 years service life), percent

REMARKS SHIPPING ADVICE NO.
WAGON NOS.

FOR XYZ TEXTILE COMPANY