



उत्पाद मैनुअल
भुकृत्रिम — अत्यंत नरम मिट्टी के त्वरित समेकन के लिए पूर्व निर्मित ऊर्ध्वाधर नालियां — विशिष्टि
IS 18309 : 2023 के अनुसार

PRODUCT MANUAL FOR
Geosynthetics — Prefabricated Vertical Drains for Quick Consolidation of Very Soft Plastic
Soil — Specification as per IS 18309 : 2023

विभिन्न उत्पादों के लिए भारतीय मानक ब्यूरो) अनुरूपता मूल्यांकन (विनियम, 2018 की योजना -I के तहत प्रमाणन के संचालन में एकरूपता और पारदर्शिता 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 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 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 18309 : 2023
	शीर्षक Title	:	Geosynthetics — Prefabricated Vertical Drains for Quick Consolidation of Very Soft Plastic Soil — Specification
	संशोधनों की संख्या No. of amendments	:	NIL
2.	नमूनाकरण दिशा निर्देश Sampling Guidelines		
a)	कच्चा माल Raw material	:	The materials used in the manufacturing of Geosynthetics — Prefabricated Vertical Drains for Quick Consolidation of Very Soft Plastic Soil — Specification shall conform to the requirements specified at cl.5.1 and cl.5.2 of IS 18309:2023 Conformity of raw materials to the prescribed requirements may be established through test certificate of supplier, test report from BIS recognized/empaneled lab or other accredited lab 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)	समूहिकरण दिशा निर्देश Grouping Guidelines	: NA (Each type to be tested)
c)	नमूने का परिमाण Sample Size	: 1 pc of 50 meter in full width 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 (incase 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)
3.	परीक्षण उपकरणों की सूची List of Test Equipment	: Please refer Annex – A
4.	निरीक्षण व परीक्षण स्कीम Scheme of Inspection and Testing	: Please refer Annex - B
5.	एक दिन में संभावित परीक्षण Possible tests in a day	: On pre-conditioned samples: All tests are possible to be carried out in a day except for Pore Size, Discharge Capacity 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.	Guidelines for sampling during surveillance	: Only one factory sample and one market shall be tested per year for all requirements (except raw material)
7.	लाइसेन्स का कार्यक्षेत्र /Scope of the Licence :	
	IS 18309:2023 के अनुसार मानक मुहर का उपयोग करने के लिए लाइसेन्स निम्नलिखित कार्यक्षेत्र के लिए प्रदान किया जाता है Licence is granted to use Standard Mark as per IS 18309:2023 with the following scope:	
	Name of the product	Geosynthetics — Prefabricated Vertical Drains for Quick Consolidation of Very Soft Plastic Soil — Specification
	Type	Type-1 and/or Type-2

BUREAU OF INDIAN STANDARDS

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

Annex- 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.	Discharge capacity, Table 1, Sl no. I of A)	Constant-head in-plane water flow apparatus (capable of maintaining a constant head loss at different water levels) with loading mechanism, Dissolved-oxygen meter, Stopwatch, Thermometer
2.	Tensile Strength, table 1 Sl no ii of A & B)	Constant Rate of Extension Tensile Testing Machine with extensometer, Distilled Water, Non-ionic wetting agent, Sample Preparation/Cutting Equipment, Conditioning Chamber/Conditioning room, Vernier Caliper, Steel Scale
3.	Thickness, table 1 sl. No v of A)	Thickness tester with Removable presser-foot and Reference plate, Gauge with accuracy of 0,01 mm, Means of measuring time with an accuracy of ± 1 s.
4.	Roll length, Roll width, table 1, sl no (vi & vii of A)	Calibrated Steel Rule, Flat Surface, Conditioning Chamber/Room, Length counter meter
5.	Mass per unit area, table 1 (sl no I of B)	Sample Preparation/Cutting Equipment, Analytical Balance (10 mg Accuracy), Steel Scale, Vernier Caliper
6.	Grab Tensile Strength, table 1 sl no (iii of B)	Constant Rate of Extension Tensile Testing Machine with Autographic Recorder, Clamps, Sample Preparation/Cutting Equipment, Conditioning Chamber/ Room, Vernier Caliper, Steel Scale, Non-Ionic Wetting Agent,, Grade 3 water
7	Index Puncture strength, table 1, (sl no v of B)	Constant Rate of Extension Tensile Testing Machine with Autographic Recorder, Ring Clamp Attachment and Solid Steel Rod
8.	Trapezoidal Tear Strength, Table 1, sl no vi of B	CRE type Tensile Testing Machine, Clamps, Trapezoidal Template, Water Bath maintained at 27 ± 2 °C, Non-Ionic Wetting Agent, Sample Preparation/Cutting Equipment, Conditioning Chamber/Room, Vernier Caliper, Steel Scale
9.	Permeability, Table 1, sl no vii)	Water Permeability Tester, De-Aired Water, Conditioning Chamber/Room
10.	Pore Size, Table 1, sl no viii)	Mechanical Seive Shaker, Pan, Cover, 200 mm Diameter Sieves, Spherical Glass Beads or Graded Snad Particles, Balance (L.C. 0.05 g), Static Eliminating Device, Drying Oven, Pan for collecting Sieved Beads, Distilled Water

Annex-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: The entire quantity of Geotextiles of the same type, manufactured from the same consignment of raw materials under similar conditions in a single day.

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/package 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/package:

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

4. 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				
5	Materials						
5.1	Construction	5.1	IS 18309	R	Firm to have adequate in-process controls and inspection to check compliance of this parameter as per the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity		
5.2	Material identification and properties	5.2	IS 18309 IS 667	S	One	Each consignment	Conformity of raw materials to the prescribed requirements may be established through test certificate of supplier, test report from BIS recognized/empaneled lab or other accredited lab or in house testing or combination thereof.
Clause 6, Table 1	Requirements of Prefabricated Vertical Drains						
a)	Dimensional stability	6.1	IS 18309	R	Firm to have adequate in-process controls and inspection to check compliance of this parameter as per the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity		
Requirements for overall drain							
i)	Discharge Capacity a) At 300 kPa, i = 1.0, Straight condition,	----	IS 17179	R	One	Once in a week	

	b) At 300 kPa, i = 1.0, Buckled condition						
ii)	Tensile Strength		IS 16635	R	One	Each Control Unit	---
iii)	Elongation at 1 kN		IS 16635	R	One	Each Control Unit	
iv)	Elongation at break		IS 16635	R	One	Each Control Unit	
c)	Thickness		IS 13162 (part 3)	R	Firm to have adequate in-process controls and inspection to check compliance of this parameter as per the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity		
d)	Width	----	IS 1954	R	Firm to have adequate in-process controls and inspection to check compliance of this parameter as per the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity		
e)	Roll Length		IS 1954	R	Firm to have adequate in-process controls and inspection to check compliance of this parameter as per the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity		
Requirements for Filter							
a)	Mass per unit area		IS 14716	R	One	Each Control Unit	
b)	Wide width tensile strength		IS 16635	R	One	Each Control Unit	
c)	Grab tensile Strength	----	IS 1969 (part 2)	R	One	Each Control Unit	----
d)	Index Puncture strength		IS 16348	R	One	Each Control Unit	
e)	Trapezoidal Tear Strength	----	IS 14293	R	One	Each Control Unit	----
f)	Permeability		IS 14324	S	One	Once in a month	
g)	Pore Size		IS 14294	S	One	Once in a month	

9	Packing	----	IS 18309	R	Manufacturer shall ensure that each roll or package is packed as per the requirements of the specification.
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TEST CERTIFICATE FORMAT

Annexure-I

Test Certificate for Geosynthetics- Geotextiles Used in Sub-Grade Separation in Pavement Structures-Specification

TEST CERTIFICATE NO. _____
DATED _____

TO M/s _____

It is certified that the material described below fully conforms to IS 18309:2023. 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 18309:2023 FOR DETAILS OF SPECIFICATION

REQUIREMENTS)

Order No. & Date	Type (Type 1/Type 2)	Requirements for overall drain					Requirements for filter						
		Discharge capacity	Tensile strength	Thickness	Width	Roll Length	Mass per unit area	Wide width tensile strength	Grab tensile strength	Index puncture strength	Trapezoidal tear strength	Permeability	Pore size

REMARKS SHIPPING ADVICE NO.
WAGON NOS.
FOR XYZ TEXTILE COMPANY

