



**उत्पाद मैनुअल**  
**भुक्त्रिम - सुरक्षा (अथवा कुशनिंग) हेतु भुवस्तादि सामग्री - विशिष्टि**  
**IS 16090:2013 के अनुसार**

**PRODUCT MANUAL FOR**  
**Geo-synthetics -Geo-Textiles used**  
**As Protection (or Cushioning) Materials- Specification as per IS 16090:2013**

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<br>IS No.                    | : | IS 16090:2013                                                                                                                                                                                                                                                                                                                                                                                                    |
|    | शीर्षक<br>Title                          | : | Geo-synthetics -Geo-Textiles used As Protection (or Cushioning) Materials- Specification                                                                                                                                                                                                                                                                                                                         |
|    | संशोधनों की संख्या<br>No. of amendments  | : | 01                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2. | नमूना दिशानिर्देश<br>Sampling Guidelines |   |                                                                                                                                                                                                                                                                                                                                                                                                                  |
| a) | कच्चा माल<br>Raw material                | : | <p>The materials used in the manufacturing of Geotextiles shall conform to the requirements specified at cl.4.1 to cl.4.6 of IS 16090:2013</p> <p>Conformity of raw materials shall be established through suppliers 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.</p> |

|    |                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                                                                                | 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) | <b>समूहीकरण दिशानिर्देश</b><br><b>Grouping Guidelines</b>                      | : Two samples one of having the highest mass per unit area and one having the lowest mass per unit area among the Classes of Geotextiles intended to be covered in the scope of the licence shall be drawn and tested to cover all classes. For example: If sample of Class I and Class VI are drawn and tested, recommendation may include Class II, III, IV, V as well.<br><br>However, separate samples for each material (Polyolefin, Polyester) used for the manufacture of Geotextiles shall be drawn and tested.                                                                                                                                      |
| c) | <b>नमूने का परिमाण</b><br><b>Sample Quantity</b>                               | : Full width sample with sufficient length to form a minimum of 06 sq m and if polymer is used in the fasteners, threads to join the rolls ; then in this case separate sample is required approx. 1 kg.<br><br>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) |
| 3. | <b>परीक्षण उपकरणों की सूची</b><br><b>List of Test Equipment</b>                | : Please refer Annex – A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4. | <b>निरीक्षण और परीक्षण की स्कीम</b><br><b>Scheme of Inspection and Testing</b> | : Please refer Annex - B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 5. | <b>Sampling Guidelines for Surveillance</b>                                    | : During each operative year, one factory sample shall be tested for all requirements including Maximum UV Resistance (after 500h exposure).<br><br>Further, one factory sample and one market sample shall be tested for all requirements other than Maximum UV Resistance (after 500h exposure) in an operative year.                                                                                                                                                                                                                                                                                                                                      |
| 6. | <b>एक दिन में संभावित परीक्षण</b><br><b>Possible tests in a day</b>            | : <b>On pre-conditioned samples:</b><br>All tests are possible to be carried out in a day except for Maximum UV Resistance (after 500h exposure)<br><br>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.                                                                                                                                                                                          |

|    |                                                                                        |                                                                                    |
|----|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| 7. | लाइसेंस का दायरा /Scope of the Licence                                                 |                                                                                    |
|    | Licence is granted to use Standard Mark as per IS 16090:2013 with the following scope: |                                                                                    |
|    | <b>Name of the product</b>                                                             | Geosynthetics- Geotextiles used in Subsurface Drainage Applications –Specification |
|    | <b>Material</b>                                                                        | Polyolefin (Polypropylene or Polyethylene), Polyester                              |
|    | <b>Class</b>                                                                           | I/II/III/IV/V/VI                                                                   |

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**Annexure A**

**LIST OF TEST EQUIPMENTS**

***(INDICATIVE LIST, FOR GUIDANCE ONLY)***

| <b>Sl. No.</b> | <b>Tests Used in with Clause Reference</b>                                                                                          | <b>Test Equipment/Chemicals and Identification Numbers (Where applicable)</b>                                                                                                                                             |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.             | Mass per unit area, Requirements for Geo-textiles Used as Geo-membrane Protection (or Cushioning) Materials, Table 1                | Sample Preparation/Cutting Equipment, Analytical Balance (0.1% Accuracy), Steel Scale, Vernier Caliper                                                                                                                    |
| 2.             | Tensile Strength, Requirements for Geo-textiles Used as Geo-membrane Protection (or Cushioning) Materials, Table 1                  | Tensile Testing Machine, Extensometer, Distilled Water, Non-ionic wetting agent, Sample Preparation/Cutting Equipment, Conditioning Chamber                                                                               |
| 3.             | Trapezoidal Tear Strength, Requirements for Geo-textiles Used as Geo-membrane Protection (or Cushioning) Materials, Table 1         | CRE type Tensile Testing Machine, Clamps, Trapezoidal Template, Water Bath maintained at $27 \pm 2$ °C, Non-Ionic Wetting Agent, Sample Preparation/Cutting Equipment, Conditioning Chamber, Vernier Caliper, Steel Scale |
| 3.             | CBR Puncture Resistance, Strength, Requirements for Geo-textiles Used as Geo-membrane Protection (or Cushioning) Materials, Table 1 | Puncture Strength Machine capable of constant rate of displacement of $50 \pm 5$ mm/min with autographic recorder, Stainless Steel Plunger, Clamping System, Sample Preparation/Cutting Equipment, Conditioning Chamber   |
| 4.             | Burst Strength, kPa, Requirements for Geo-textiles Used as Geo-membrane Protection (or Cushioning) Materials, Table 1               | Bursting Tester, Sample Preparation/Cutting Equipment, Conditioning Chamber                                                                                                                                               |
| 5.             | Maximum UV Resistance (after 500 h exposure), Requirements for Geo-textiles Used as Geo-membrane Protection (or                     | Conditioning Chamber, Sample Preparation/Cutting Equipment, Xenon Arc Apparatus, Tensile Test Apparatus                                                                                                                   |

|  |                                   |  |
|--|-----------------------------------|--|
|  | Cushioning) Materials,<br>Table 1 |  |
|--|-----------------------------------|--|

## **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 : The entire quantity of Geotextiles of the same class and manufactured under similar conditions in a single day 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/empaneled 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](http://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](http://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 16090:2013 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<br>R: required (or) S: Sub-contracting permitted | No. of Samples                                                                                                                                                                                                                           | Frequency                                                                          |         |
|                     |                                                                                         | Clause      | Reference         |                                                                             |                                                                                                                                                                                                                                          |                                                                                    |         |
| 4                   | Requirements                                                                            | 4.1 to 4.6  | IS 16090          | 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 4.4, Table 1 | Requirements for Geo-textiles Used as Geo-membrane Protection (or Cushioning) Materials |             |                   |                                                                             |                                                                                                                                                                                                                                          |                                                                                    |         |
| i)                  | Mass per unit area                                                                      | ----        | IS 14716          | R                                                                           | One                                                                                                                                                                                                                                      | Each Control Unit                                                                  | ----    |
| ii)                 | Tensile Strength                                                                        | ----        | IS 16635          | R                                                                           | One                                                                                                                                                                                                                                      | Each Control Unit                                                                  |         |
| iii)                | Trapezoidal Tear Strength                                                               | ----        | IS 14293          | R                                                                           | One                                                                                                                                                                                                                                      | Each Control Unit                                                                  | ----    |
| iv)                 | CBR Puncture Resistance                                                                 | ----        | IS 16078          | R                                                                           | One                                                                                                                                                                                                                                      | Each Control Unit                                                                  | ----    |
| ix)                 | Maximum UV resistance (after 500 h exposure)                                            | ----        | IS 13162 (Part 2) | S                                                                           | One                                                                                                                                                                                                                                      | Once in an year and whenever there is change in raw material/raw material supplier | ----    |
| 7                   | Packing                                                                                 | ----        | IS 16090          | R                                                                           | Adequate inspection to ensure that each roll e is packed as per the requirements of the specification                                                                                                                                    |                                                                                    |         |

## TEST CERTIFICATE FORMAT

### Annexure-I

#### **Test Certificate for Geo-synthetics -Geo-Textiles used As Protection (or Cushioning)**

**Materials- Specification TEST CERTIFICATE NO. \_\_ DATED \_\_**

**TO M/s \_\_\_\_**

It is certified that the material described below fully conforms to IS 16090:2013. 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 16090:2013 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

| Order No. & Date | Class<br>(I,II,III,IV,V,VI) | Material<br>(Polyolefin<br>(Polypropylene<br>or<br>Polyethylene) | Requirements of Geo-textiles Used as Geo-membrane<br>Protection (or Cushioning ) Materials |                             |                              |                                         |                                   |                                         |
|------------------|-----------------------------|------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------|------------------------------|-----------------------------------------|-----------------------------------|-----------------------------------------|
|                  |                             |                                                                  | Mass<br>per<br>unit<br>area                                                                | Tens<br>ile<br>Stre<br>ngth | Sewn<br>Seam<br>Strengt<br>h | Trapezo<br>idal<br>Tear<br>Strengt<br>h | CBR<br>Puncture<br>Resistanc<br>e | Maximum<br>UV<br>Resistance<br>at 500 h |
|                  |                             |                                                                  |                                                                                            |                             |                              |                                         |                                   |                                         |

REMARKS SHIPPING ADVICE NO.  
WAGON NOS.