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उत्पाद मानुयल

**Geosynthetics – Reinforced HDPE membrane for effluents and
chemical resistance lining**

IS 17374:2020 के अनुसार

PRODUCT MANUAL FOR

**Geosynthetics – Reinforced HDPE membrane for effluents and
chemical resistance lining**

ACCORDING TO IS 17374:2020

भारतीय मानक ब्यूरो (अनुरूपता मूल्यांकन) विनियम की स्कीम-I के तहत यह उत्पाद मानुयल प्रमाणीकरण के प्रचलन में रीति और पारदर्शिता के सुसंगत सुनिश्चित करने के लिए सभी क्षेत्रीय/शाखा कार्यालयों एवं लाइसेन्स धारियों द्वारा संदर्भ सामग्री के रूप में उपयोग किया जाएगा। बीआईएस लाइसेन्स/प्रमाण पत्र प्राप्त करने के इच्छुक भावी आवेदकों द्वारा भी इस दस्तावेज़ का उपयोग 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 17374 : 2020
	शीर्षक Title	:	Geosynthetics – Reinforced HDPE membrane for effluents and chemical resistance lining – Specification
	संशोधन संख्या No. of amendments	:	0
2.	नमूनाकरण दिशा निर्देश Sampling Guidelines		
a)	निगरानी नमूना दिशानिर्देश Surveillance sampling guidelines		During one operative year of licence only one factory sample will be tested for all requirements of the standard and other factory and market samples will be tested for all requirements except long duration tests-Resistance to chemicals test (CI 5.4 Table 2), Retention of OIT after ageing (SI No xix of Table 1) and tests of Retention of breaking load, Seam strength, and Hydrostatic resistance after UV exposure (SI No viii, xiv, and xvi of Table 1)

b)	कच्चा माल Raw material	:	HDPE woven fabric, LDPE/LLDPE film shall be used in manufacture of Reinforced HDPE membrane. The coating (LDPE/LLDPE)film shall be UV stabilized by incorporating UV stabilizer and/or carbon black to enhance the performance of membranes (may be established through a supplier certificate or manufacturer's declaration, as applicable) . The film, if manufactured by using carbon black, shall contain minimum 2.5 percent of carbon black by mass with satisfactory dispersion when tested as per IS 2530 (may be established through a supplier's test certificate or third party lab test report). The LDPE impervious film shall be manufactured from virgin polyethylene resins which shall be UV stabilized by adding suitable UV stabilizer (may be established through a supplier certificate or manufacturer's declaration, as applicable)
c)	समूहिकरण दिशा निर्देश Grouping Guidelines	:	NA- Geomembranes of each type and each end use to be tested (Also refer ANNEX – <u>A</u>)
d)	नमूने का परिमाण Sample Size	:	Complete geomembrane- 4m width X 6m length, unlaminated fabric- 3m, coating film- 1m, sandwich- 1m, black lamination film- 2m, Raw material-1kg
3.	परीक्षण उपकरणों की सूची List of Test Equipment	:	Please refer ANNEX – <u>B</u>
4.	निरीक्षण व परीक्षण स्कीम Scheme of Inspection and Testing	:	Please refer ANNEX – <u>C</u>
5.	एक दिन में संभावित परीक्षण Possible tests in a day		
	Thickness, Mass, Dimensions, Carbon black content and dispersion, breaking load before UV exposure, strain at maximum load, impact failure load, Puncture resistance, Seam strength		
6.	लाइसेन्स का कार्यक्षेत्र/Scope of the Licence:		
	IS 17374:2020 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 17374:2020 with the following scope:		
	Name of the product	Geosynthetics – Reinforced HDPE membrane for effluents and chemical resistance lining	
	Type	I/ II/ III/ IV/ V/ VI	
	End use	Acid/ Base/ Fuel/ Synthetic leachate/ Any site specific leachate (In case exposure is to a chemical/mixture not specified under H-3.1 to H-3.4, the chemical/mixture shall be specified in scope of licence)	

ANNEX A
Grouping Guidelines

Following classification of product has been made:

- a. Type: I, II, III, IV, V, VI
- b. End Use: Acid, Base, Fuel, Synthetic leachate or Any site specific leachate

Sample of each type to be tested to cover the same in the scope of license.

Every type of geomembrane shall be tested for each chemical/effluent as per end use of the product.

Depending upon the end use, membrane shall be tested for acid, base, fuel, synthetic leachate or any other site specific chemical or effluent . Membrane may be tested for more than one chemical/effluent specified above.

Scope of license should be restricted to reflect clearly as to which chemicals/effluents the product has been exposed to and found conforming.

ANNEX B
List of Test Equipment

Major test equipment required to test as per the Indian Standard

S. No.	Test Used in with Clause reference	Test Equipment
1	Thickness, Cl.5.3 Table 1	Dead weight type dial thickness gauge with LC 0.02 mm and specifications as per Cl 5.1.1 of IS 7016 (Part 1):1982
2	Mass (g/m ²) Cl.5.3 Table 1	Weighing device with a calibrated scale accurate at full scale deflection to 0.10 percent
3	Dimensions (length and width) Cl.5.3 Table 1	Measuring tape, Flat Table
4	Carbon black content Cl.5.3 Table 1	Combustion Boat, Combustion Tube, Gas Flow meter, Thermometer, Furnace, gases and reagents as per Cl. 10 of IS 2530:1963
5	Carbon black dispersion Cl.5.3 Table 1	Projection microscope along with microscope slides, Hot Plate along with temperature Controller, weighing balance
6	Breaking load on 20 cm × 10 cm strip before UV exposure Cl.5.3 Table 1	Tensile testing machine (with extensometer), conditioning chamber, Distilled Water, Non-ionic wetting agent
7	Strain at maximum load Cl.5.3 Table 1	Tensile testing machine (with extensometer), conditioning chamber, Distilled Water, Non-ionic wetting agent
8	Retention of breaking load on 20 cm × 10 cm strip after UV exposure of 144 h Cl.5.3 Table 1	UV Resistance test apparatus with Fluorescent UV-Lamp Type B as per Annex B of IS 17374:2020 Tensile testing machine (with extensometer), conditioning chamber, Distilled Water, Non-ionic wetting agent (for determination of original average breaking strength of the membrane and seam strength test) Mullen-type hydrostatic tester (for hydrostatic strength test)
9	Impact failure load, at 1524 mm drop, Min gram force at 50 percent failure Cl.5.3 Table 1	Free Falling Dart Impact Tester M/C, With suitable attachments & Masses
10	Tear resistance Cl.5.3 Table 1	Tensile Testing Machine, as per IS 7016 (Part 3) conditioning chamber
11	Puncture resistance Cl.5.3 Table 1	Tensile/Compression Testing Machine, of the constant-rate-of extension (CRE) type. Ring Clamp Attachment, consisting of concentric plates with an open internal diameter of 45 ± 0.025 mm Solid Steel Rod, with a diameter of 8 ± 0.01 mm having a flat end with a 45° × 0.8 mm chamfered edge

		conditioning chamber
12	Bursting strength (Ball burst) Cl.5.3 Table 1	Tensile testing machine with bursting attachments (ring clamp, steel ball), conditioning chamber
13	Seam strength before UV exposure Cl.5.3 Table 1	Tensile testing machine
14	Seam strength after UV exposure of 144 h Cl.5.3 Table 1	UV Resistance test apparatus with Fluorescent UV-Lamp Type B as per Annex H of IS 17374:2020 Tensile testing machine
15	Hydrostatic resistance before UV exposure Cl.5.3 Table 1	Hydrostatic Tester as per Annex E of IS 16352:2020
16	Hydrostatic resistance after UV exposure of 144 h Cl.5.3 Table 1	UV Resistance test apparatus with Fluorescent UV-Lamp Type B as per Annex B of IS 17374:2020
17	Low temperature crack resistance at minus 30 °C ± 1°C Cl.5.3 Table 1	Impact Device with suitable attachment as per Annex-F of IS: 17374, Cooling chamber to house the impact device, Thermometer, graduated in 0.5°C, or thermocouple, with an accuracy of 0.5°C
18	Oxidative induction time (OIT), minutes Cl.5.3 Table 1	For Standard OIT: Differential Scanning calorimeter as per ISO 11357-6:2018 with Gas-selector switch and regulators, Crucibles made of Aluminium or other materials, flowmeter, oxygen (99.5% purity or better), air, nitrogen, or For High Pressure OIT : High pressure differential scanning calorimeter and other apparatus as per ASTM D 5885:2017
19	Oven ageing at 85°C, Retention of oxidative induction time (OIT) after 90 days Cl.5.3 Table 1	For Standard OIT: Differential Scanning calorimeter as per ISO 11357-6:2018 with Gas-selector switch and regulators, Crucibles made of Aluminium or other materials, flowmeter, oxygen (99.5% purity or better), air, nitrogen, or For High Pressure OIT : High pressure differential scanning calorimeter and other apparatus as per ASTM D 5885:2017
20	Stress crack resistance Cl.5.3 Table 1	Blanking Die, Notching Device, Blade, Stress Cracking Apparatus and reagent as per IS 16346: 2015
21	Abrasion resistance Cl.5.3 Table 1	Abrasion resistance tester as per IS 14714
22	Ash content Cl.5.3 Table 1	Weighing balance, Silica Crucibles, Bunsen Burner, Silica Triangle and Tripod, Desiccator, Gloves and Crucible Holder, Muffle furnace
23	Resistance to chemical test Cl. 5.4 Table 2	Exposure Tank with sample holder & stirrer and temperature controller equipment & Lid, Deionized water, water absorbent, lint-free paper towels, Air tight bag or container Analytical Balance (accuracy of 0.001 g) Dead Weight Micrometer(s), (accuracy of 0.002 mm)

		Air Circulating Oven, (105 ± 2 °C) Tensile Testing m/c Thermometer Reagents- as per Annex-H of IS: 17374, 10 percent solution of sulfuric acid (Exposure under Acidic Conditions) solution containing 2.5 grams of calcium hydroxide per litre (Exposure under Basic Conditions) mixture of 35 percent diesel fuel by volume, 35 percent paraffin by volume and 30 percent lubricating oil HD 30 by volume (Solvation and Swelling) Mixture as per H-3.4 (Synthetic Leachate)
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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 per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 The manufacturer shall prepare a calibration plan for the test equipments.

2. TEST RECORDS – The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. LABELLING AND MARKING – The Standard Mark, as given in the Schedule of the licence, shall be marked on each roll and/or piece of Reinforced HDPE membrane or on a label affixed to it, provided always that the product thus marked conforms to every requirements of the specification.

3.1 Labelling and marking shall be done as per the provisions of the Indian Standard. In addition, the following details shall be marked on the label of each roll:-

a) BIS Licence No. CM/L -----.

b) BIS website details i.e. –“For details of BIS certification please visit www.bis.gov.in

3.2 Guidelines for installation of HDPE Geomembrane as per Annex J of IS 17374:2020 may be supplied with each consignment/order of Reinforced HDPE membrane bearing Standard Mark.

4. CONTROL UNIT – For the purpose of this scheme, all Reinforced HDPE membrane of same type and same end use manufactured from same material under similar conditions, in the same shift (of maximum 8 hours) shall constitute a control unit.

5. LEVELS OF CONTROL - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

6. REJECTIONS – 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: LEVELS OF CONTROL

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Method			No. of Sample	Frequency	Remarks
		Clause	Reference				
3	Material	3	IS 17374	S	1	Each Consignment	See Note-3
3	Manufacture	3	IS 17374	R	Each roll		
5.1	Workmanship	5.1	IS 17374	R	Each roll		
5.2	Joints/Seams	5.2	IS 17374	R	2	Each Control Unit	-
5.3- Table 1 Sr. No.							
i	Thickness	-	IS 7016 (part 1)	R	2	Each Control Unit	-
ii	Mass (g/m2)	-	IS 7016 (part 1)	R	2	Each Control Unit	-
iii	Dimensions (length and width)	Annex B	IS 11652	R	2	Each Control Unit	-
iv	Carbon black content	-	IS 2530	R	1	Each Control Unit	-
v	Carbon black dispersion	-	IS 2530	R	1	Each Control Unit	-
Vi	Breaking load on 20 cm × 10 cm strip before UV exposure	-	IS 16635	R	5	Each Control Unit	-

vii	Strain at maximum load	-	IS 16635	R	5	Each Control Unit	-
viii	Retention of breaking load on 20 cm × 10 cm strip after UV exposure of 144 h	-	Annex B and IS 16635	S	5	Once in six months	Samples of all types and end use to be tested by rotation
ix	Impact failure load, at 1524 mm drop, Min gram force at 50 percent failure	Annex C	IS 17374	R	2	Each Control Unit	-
x	Tear resistance	-	A-1 of IS 7016 (Part 3)	R	2	Each Control Unit	-
xi	Puncture resistance	Annex D	IS 17374	R	2	Each Control Unit	-
xii	Bursting strength (Ball burst)	-	IS 7016 (Part 6)	R	2	Each Control Unit	-
xiii	Seam strength before UV exposure	-	IS 15060	R	5	Each Control Unit	-
xiv	Seam strength after UV exposure of 144 h	-	Annex B and IS 15060	S	5	Once in six months	Samples of all types and end use to be tested by rotation
xv	Hydrostatic resistance before UV exposure	Annex E	IS 17374	R	3	Each Control Unit	-
xvi	Hydrostatic resistance after UV exposure of 144 h	Annex B and Annex E	IS 17374	S	3	Once in six months	Samples of all types and end use to be tested by rotation
xvii	Low temperature crack resistance at minus 30 °C ± 1°C	Annex F	IS 17374	R	2	Each Control Unit	-
xviii	Oxidative induction time (OIT), minutes	-	ISO 11357 (Part 6) ASTM D 5885	S	1	Once in six months	Samples of all types and end use to be tested by rotation
xix	Oven ageing at 85°C, Retention of oxidative		Oven method of IS 7016 (Part	S	1	Once in six months	Samples of all types and end use to be tested by

	induction time (OIT) after 90 days		8), ISO 11357- 6 and ASTM D 5885				rotation
xx	Stress crack resistance	-	IS 16346	S	1	Once in six months	Samples of all types and end use to be tested by rotation
xxi	Abrasion resistance	-	IS 14714	R	10	Each Control Unit	-
xxii	Ash content	Annex G	IS 17374	R	3	Each Control Unit	-
5.4	Resistance to chemical test	Annex H	IS 17374	R	6	Once in a year	Samples of all types and end use to be tested by rotation

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 empaneled 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 to BO head.

Note-3: No testing is required, In case consignment of material is accompanied with manufacturer's test certificate, or BIS Recognized Lab's test report indicating conformity or is ISI marked.