



उत्पाद मानुयल
लाइनिंग के लिए पी वी सी भू झिल्ली
IS 15909:2020 के अनुसार

PRODUCT MANUAL FOR
PVC Geomembranes for Lining
According to IS 15909:2020

भारतीय मानक ब्यूरो (अनुरूपता मूल्यांकन) विनियम की स्कीम-1 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 15909:2020
	शीर्षक Title	:	लाइनिंग के लिए पी वी सी भू झिल्ली PVC Geomembranes for Lining
	संशोधन संख्या No. of amendments	:	0
2.	नमूनाकरण दिशा निर्देश Sampling Guidelines		
a)	कच्चा माल Raw material	:	Category A — PVC geomembrane shall be suitably manufactured from vinyl chloride resin homo polymer. Water soluble compounding ingredient shall not be used. Plasticizers that are resistant to migration and bacterial growth shall be used. The PVC geomembrane shall be pigmented to produce an uniform colour. Any dark colour like black, blue, grey and brown etc shall not be used for manufacturing so as to avoid use of recycled material. Category B — PVC waterproofing membrane for unexposed applicable shall be made from virgin raw material and shall have a smooth surface. Water soluble compounding ingredient shall not be used. Plasticizers that are resistant to migration and bacterial growth shall be used. The membrane shall be manufactured in twin colour with white signal layer (top layer) of 0.20 mm (with tolerance of ± 0.02 mm) to allow a visual check of the condition of the membrane in case of any damage during

			the installation. The bottom layer of the membrane shall preferably be in light orange colour. Any dark colour like black, blue, grey and brown etc shall not be used for manufacturing of bottom layer so as to avoid use of recycled material.
b)	समूहिकरण दिशा निर्देश Grouping Guidelines	:	लागू नहीं Not Applicable
c)	नमूने का परिमाण Sample Size	:	1 full width piece of PVC geomembrane of 3 m length
3.	परीक्षण उपकरणों की सूची List of Test Equipment	:	कृपया Annex-A देखें Please refer Annex –A
4.	निरीक्षण व परीक्षण स्कीम Scheme of Inspection and Testing	:	कृपया Annex-B देखें Please refer Annex - B
5.	एक दिन में संभावित परीक्षण Possible tests in a day	:	All tests except Resistance to soil burial , Stability to ultraviolet radiations, percent retention in tensile strength and elongation at break and Behaviour after storage in aqueous solution, resistance to acid and alkali after 28 days (if conditioned specimen are available)
6.	लाइसेन्स का कार्यक्षेत्र/Scope of the Licence :		
	IS 15909:2020 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 15909:2020 with the following scope:		
	उत्पाद का नाम Name of the product	लाइनिंग के लिए पी वी सी भू झिल्ली PVC Geomembranes for Lining	
	Category	Category A/Category B	
	Type	Type I/II/III/IV/V	

ANNEX A

TEST EQUIPMENT

Major test equipment required to test as per the Indian Standard

Sr No	NAME OF EQUIPMENT	FOR TEST WITH CL. REF.
1.	Steel Tape (Capable of measuring up to nearest 1 mm) Roll Length Counter or Length Measuring Wheel (Capable of measuring to the nearest 0.01 mm)	Measurement of Width & Length as per Cl 5 and Table 1 & 2 and Dimensions & Tolerances as per Cl 6
2.	Micrometer	Measurement of Thickness as per Cl 5 and Table 1 & 2
3.	Weighing Balance with LC 0.01 g	Specific Gravity as per Cl 5 and Table 1 & 2 and Volatile Loss as per Cl 5 and Table 1
4.	Non-absorbent wire or thread	
5.	Tensile Testing Machine (Digital) with Dumbbell Die , Tear Dumb-bell die and Ring clamp attachment.	Tensile Strength, Elongation at break, as per Cl 5 and Table 1 & 2 and Seam Strength, Resistance to soil burial and Peel Strength as per Cl 5 and Table 1
6.	Tear Resistance Testing machine with dies Conditioning Chamber	Tear resistance as per Cl 5 and Table 1
7.	Tensile/Compression Testing Machine Ring Clamp Attachment Solid Steel Rod	Index Puncture Resistance as per Cl 5 and Table 1
8.	Low Temperature Chamber 40 mm Diameter Mandrel	Low temperature crack resistance as per Cl 5 and Table 1
9.	Magnifier (4X) and lighting	
10.	Mullen Type Hydrostatic Tester	Hydrostatic Resistance as per Cl 5 and Table 1
11.	Air Oven with Timer	Volatile Loss as per Cl 5 and Table 1
12.	Ethyl Acetate	Peel Strength as per Cl 5 and Table 1
13.	pH meter	Resistance to soil burial as per Cl 5 and Table 1
14.	Cotton Duck, Soil rich in cellulose destroying microorganism	
15.	Filter paper	Water extraction as per Cl 5 and Table 1
16.	Weighing balance with LC 1 mg	
17.	Xenon Arc apparatus	Stability to UV radiations as per Cl 5 and Table 1
18.	Holding attachment for PVC geomembrane with slight Tension	Pin Holes and Cracks as per Cl 7.1
19.	Bright Light source	
20.	Thickness tester incorporating an interchangeable presser foot, reference plate, gauge and timing device	Thickness at 20 kPa pressure, Cl 5 and Table 2
21.	Tensile Testing Machine of 2000 N Capacity with a constant speed of	Tear Propagation Strength, Cl 5 & Table 2

	grip separation (1000±10mm/min.)	
22.	Constant Rate of Displacement of (50 ± 5) mm/min tensile testing machine ; Stainless steel plunger with a diameter of (50 ± 0,5) mm and radius of the leading edge of the plunger shall be (2,5 ± 0,2) mm; Clamping System	Behaviour during perforation (Static puncture test), CI 5 and Table 2
23.	Steel cylinder of 25 mm diameter and 130 mm length, with a mass of 500 g; Stand to which the suspension mechanism is attached so as to be adjustable in height.	Height of Fall without perforation (impact resistance), CI 5 and Table 2
24.	Slot Pressure Testing apparatus as given in Annex P to IS 15905:2020	Hydrostatic Pressure Resistance, CI 5 and Table 2
25.	A circulating air oven having thermostatic control that shall maintain a temperature of 80 ± 2 °C	Dimensional Stability, CI 5 and Table 2
26.	Oven with circulating air and a maximum temperature deviation of ± 2 °C in the test area Stand for hanging the samples. Suitable measuring device capable of measuring to an accuracy of 0.1 mm.	CHANGE OF DIMENSION AFTER HEATING AT 70 °C FOR 2 HOURS, CI 5 and Table 2
27.	Tensile testing machine of at least 2000 N capacity with a constant speed of grip separation (100 ± 10 mm/min). NaCl, H ₂ SO ₃ and Ca(OH) ₂ Beakers and bottles of minimum 500 ml capacity	BEHAVIOR AFTER STORAGE IN AQUEOUS SOLUTION RESISTANCE TO ACID AND ALKALINE, CI 5 and Table 2
28.	Tensile testing machine shall be at least 2 000 N capacity with a constant speed of grip separation (100 ± 10 mm/min)	STRENGTH OF WELDED SEAM SHEAR RESISTANCE, CI 5 and Table 2
29.	Apparatus with guide rail, loading rod, loading discs, puncturing tool, support. Vacuum or pressure device as described in Annex U to IS 15905:2020	RESISTANCE TO STATIC PUNCTURING, CI 5 and Table 2
30.	Combustion Chamber as described in Annex A of IS 15061:2002 (horizontal burning rate) Apparatus as described in Annex B	Flammability test, , CI 5 and Table 2

	of IS 15061:2002 (vertical burning rate)	
31.	Conditioning Chambers	Conditioning, CI 9

The above lists are indicative only and may not be treated as exhaustive.

ANNEX - B

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.

The manufacturer shall prepare a calibration plan for the test equipment.

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

3. LABELLING AND MARKING – Standard Mark as given in the Schedule of the Licence shall be printed on each roll of PVC Geomembranes, provided always that the product thus marked conforms to each requirement of the specification. Packing and Marking shall be done as per the provisions of the standard.

3.1 In addition to requirements of IS 15909:1981, Batch/Lot. Numbers shall be labelled on the primary and secondary packing of individual rolls. Details of BIS website www.bis.gov.in shall also be marked on the primary or secondary packing: "For details of BIS certification visit www.bis.gov.in"

4. CONTROL UNIT- Every 1000 rolls of particular size manufactured from the same batch of raw material shall be considered as a control unit.

5. LEVELS OF CONTROL - The tests as indicated in column 1 of **Table 1 & 2** and the levels of control in column 5 & 6 of **Table 1 & 2**, 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.

All the production which conforms to the Indian Standards and covered by the licence should be marked with StandardMark.

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
FOR CATEGORY A PVC GEOMEMBRANES

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Clause Reference	Test Method IS		No. of Sample	Frequency	Remarks
3	Material and Manufacture	3.1 and 3.3	IS 15909: 2020	S	One	Each consignment	No testing required if material is ISI marked or accompanied with test certificate of supplier
5	Requirement of PVC Geomembranes, Category A						
i.	Length and width	Annex A	IS 15909: 2020	R		Each Roll	
ii.	Thickness,	3.2	IS 3464	R	5	Each control unit	
iii.	Specific gravity	Appendix A (Method A)	IS 2076	R	5	-do-	
iv.	Tensile strength	Appendix B	-do-	R	5	-do-	
v.	Elongation at break	-do-	-do-	R	5	-do-	
vi.	Tear resistance	Annex B	IS 15909:2020	R	2	-do-	
vii.	Index puncture resistance	Annex C	-do-	R	2	-do-	
viii.	Low temperature crack	Annex D	-do-	R	2	-do-	

	resistance						
ix.	Hydrostatic resistance,	Annex E	-do-	R	3	-do-	
x.	Seam strength	Annex F	-do-	R	5	-do-	
xi.	Volatile loss,	7	IS 3464	R	2	-do-	
xii.	Peel strength	12	-do-	R	2	-do-	Applicable only when the product manufactured is having two or more layers laminated by heat fusion technology to make a homogeneous product of required dimension
xiii.	Resistance to soil burial	Annex G	IS 15909:2 020	S	2	Once in 2 months	
xiv.	Water extraction	Annex H	-do-	R	2	Each control unit	
xv.	Stability to ultraviolet radiations, percent retention in tensile strength and elongation at break	Annex J	-do-	S	5	Once in a month	
6	Dimensions and Tolerances	Annex A	-do-	R		Each Roll	
7	Colour, Surface Characteristics and Freedom from Defects	Annex K	-do-	R		-do-	

Table-2:
LEVELS OF CONTROL
FOR CATEGORY B PVC GEOMEMBRANES

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Clause Reference	Test Method IS		No. of Sample	Frequency	Remarks
3	Material and Manufacture	3.2 and 3.3	IS 15909: 2020	S	One	Each consignment	No testing required if material is ISI marked or accompanied with test certificate of supplier
5	Requirement of PVC Geomembranes, Category B						
i.	Length and width	Annex A	IS 15909: 2020	R		Each Roll	
ii.	Thickness at 20 kPa pressure	Method A	IS 13162 (Part 3)	R	5	Each control unit	
iii.	Specific gravity	Appendix A (Method A)	IS 2076	R	5	-do-	
iv.	Tensile strength	Annex L	-do-	R	5	-do-	
v.	Elongation at break	-do-	-do-	R	5	-do-	
vi.	Tear propagation strength	Annex M	IS 15909:2020	R	2	-do-	
vii.	Behaviour during perforation (Static		IS 16078	R	2	-do-	

	puncture test),						
viii.	Height of fall without perforation	Annex N	IS 15909:2 020	R	2	-do-	
ix.	Cold crack resistance at low temperature	Annex D	-do-	R	2	-do-	
x.	Hydrostatic pressure resistance	Annex P	-do-	R	3	-do-	
xi.	Dimensional stability at 80 °C for 6 h	Annex Q	-do-	R	2	-do-	
xii.	Change of dimensioning after heating at 70 °C for 2 h	Annex R	-do-	R	2	-do-	
xiii.	Behaviour after storage in aqueous solution, resistance to acid and alkali after 28 days	Annex S	-do-	R	2	Once in 2 months	
xiv.	Strength of welded seam shear resistance	Annex T	-do-	R	2	Each control unit	
xv.	Resistance to static puncturing	Annex U	-do-	R	2	-do-	
xvi.	Flammability test, horizontal and vertical rate of burning	Annex A and B	IS 15061	R	2	-do-	

6	Dimensions and Tolerances	Annex A	-do-	R		Each roll	
7	Colour, Surface Characteristics and Freedom from Defects	Annex K	-do-	R		-do-	

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 by BO Head.