

ANALYTICAL REPORT FOR PVC MEMBRANE

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Date of Booking	26/04/16	Effective Date	04/05/16

CIN No: U74220DL1998PLC092698

**PARTIAL REPORT
FOR
PVC MEMBRANE**

Test Report Issued to
TechnoNICOL India Private Limited
102 Joy Villa, Jawahar Nagar, Road No.4
Goregaon, Mumbai 400104



Test Report By
SPECTRO ANALYTICAL LABS LTD.
E-41, Okhla Industrial Area Phase-II,
New-Delhi-11020

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TESTS:

1. Determination of thickness according EN 1849-2
2. Determination of tensile properties according EN 12311-2
3. Determination of tear resistance according EN 12310-2
4. Determination of resistance Static according EN ISO 12236
5. Determination of water tightness according EN 1928
6. Determination of Change of Dimension after heating EN 1107-2
7. Determination of Cold Bending according EN 495-5

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1. Determination of Thickness according EN 1894-2

(A) Test Procedure

1.1 Test:

- Test Equipment: Digital Dial gauge, (At 20kPa, 10 mm diameter)
- Type of measurement surface: Flat
- Conditioning of specimen: 2 hours at $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \% \text{ RH}$

1.2 Specimens:

- Type of specimens: 100 mm X 100 mm
- Number of specimens: 3

1.3 Environment conditions:

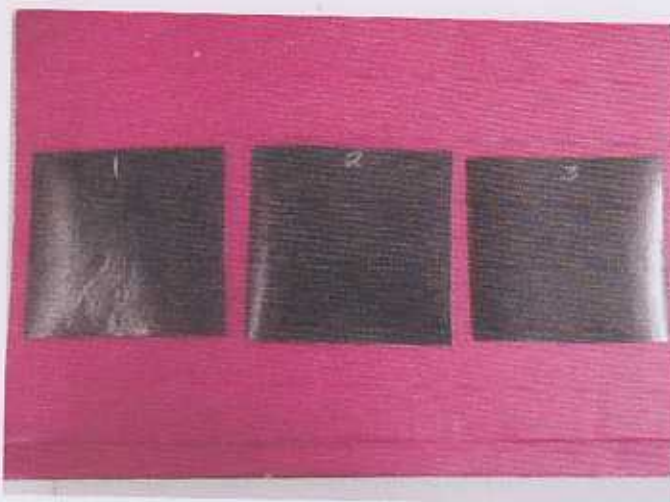
- Temperature: $(23 \pm 2) ^\circ\text{C}$
- RH: $(50 \pm 5) \%$

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(B) Test Specimen



(C) Instrument used



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(D) Test Result

1.4 Thickness of PVC membrane at 20 kPa

Specimen	Thickness (mm)
1	2.02
2	2.01
3	2.00
4	2.02
5	2.02
6	2.01
7	1.99
8	2.02
9	1.99
10	2.02
Average	2.01

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2. Determination of Tensile properties according EN 12311-2

(A) Test Procedure

2.1 Tests:

- Speed of test: 100 mm/minute
- Distance between grips: 80 mm
- Gauge length: 25 mm
- Grips: Mechanical
- Conditioning of specimen: 20 hours at $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \% \text{ RH}$

2.2 Environment conditions:

- Temperature: $(23 \pm 2) ^\circ\text{C}$
- RH: $(50 \pm 5) \%$

2.3 Specimen:

- i) -Material: PVC Membrane
- ii) -Type: Method B (width 6 mm)
- iii) -Preparation: Punched
- iv) -Dimensions: 115 mm die (Method B)
- v) -Number of specimens: 5 (Five) each direction

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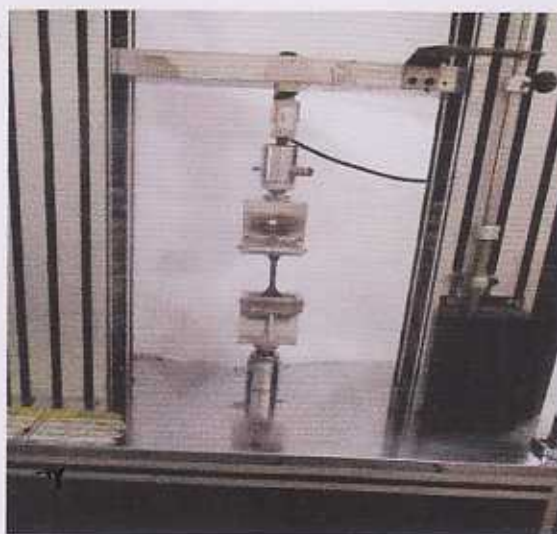
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(B) Test Specimen



(C) Instrument used



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(D) Test Result

2.4 Tensile Strength

(a) Lengthwise:

Test	Thickness (mm)	Width (mm)	Load (N)	Tensile Strength (N/mm ²)	Elongation at break (%)
1	2.01	5.98	226.5	18.8	348
2	1.99	5.95	222.4	18.8	340
3	2.01	5.98	225.1	18.7	360
4	2.01	5.96	226.8	18.9	364
5	1.98	5.98	232.1	19.6	348
Average				18.9	352

(b) Transverse:

Test	Thickness (mm)	Width (mm)	Load (N)	Tensile Strength (N/mm ²)	Elongation at break (%)
1	2.02	5.98	195.6	16.2	332
2	1.99	5.97	205.2	17.3	340
3	2.01	6.00	208.3	17.3	372
4	1.99	6.00	216.8	18.2	380
5	2.00	5.98	200.5	16.8	376
Average				17.2	360

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3. Determination of tear resistance according EN 12310-2

(A) Test Procedure

Tear Resistance:-

3.1 Test:

- Speed of test: 100 mm/minute
- Distance between grips: 50 mm
- Grips: Mechanical

3.2 Specimens:

- Material: PVC Membrane
- Type: EN 12310-2
- Preparation: handmade
- Dimensions: 130 x 50 mm
- Number of samples piled up: 5 (Five) each direction
- Conditioning: 20 hours at $(23 \pm 2)^{\circ}\text{C}$ and $(50 \pm 5) \% \text{ RH}$

3.3 Environment:

- Temperature: $(23 \pm 2)^{\circ}\text{C}$
- RH: $(50 \pm 5) \%$

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(B) Test Specimen



(C) Instrument used



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(D) Test Result

3.4 Tear Resistance

(a) Lengthwise:

Test	Thickness (mm)	Load (N)	Tear resistance (N/mm)
1	1.98	217.8	110
2	2.01	225.5	112.2
3	1.98	218.7	110.5
4	1.99	213.6	107.3
5	2.01	205.5	102.2
Average			108.4

(b) Transverse:

Test	Thickness (mm)	Load (N)	Tear resistance (N/mm)
1	1.98	201.6	101.8
2	2.01	202.8	100.9
3	1.98	202.2	102.1
4	1.99	199.4	100.2
5	2.00	202.2	101.1
Average			101.2

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4. Determination of water tightness according EN 1928

(A) Test Procedure

Water Tightness:-

4.1 Test:

- Method: B
- Immersion time: 24 hours
- Test Pressure: 5 bar
- Face of applying pressure: Hydrostatic pressure

4.2 Specimens:

- Number of specimens: 3 (Three)
- Type: diameter 130 mm
- Conditioning: 6 hours at $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \% \text{ RH}$

4.3 Environment:

- Temperature: $(23 \pm 2) ^\circ\text{C}$
- RH: $(50 \pm 5) \%$

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(B) Test Specimen



(C) Instrument used



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(D) Test Result

4.4 Water Tightness:

Test	Thickness (mm)	Results
1	2.02	Satisfactory No leakages observed
2	1.99	
3	1.98	

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5. Determination of resistance Static test DIN EN ISO 12236
(A) Test Procedure

Resistance of punching:-

5.1 Test:

- Speed: 50 mm/min
- Plunger dia: 50 mm diameter
- Grip: Clamping system 150 ± 0.5 mm

5.2 Specimens:

- Type: 300 x 300 mm
- Number of samples: 5
- Conditioning: 24 hours at $23 \pm 2^{\circ}\text{C}$

5.3 Environment:

- Temperature: $(23 \pm 2)^{\circ}\text{C}$
- RH: $(50 \pm 5) \% \text{RH}$

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(B) Test Specimen



(C) Instrument used



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(D) Test Result

5.4 Resistance to punching

Test	Thick ness (mm)	Dia in (mm)	Load (N)
1	2.02	150	3305
2	1.99	150	3315
3	1.98	150	3290
4	2.02	150	3303
5	2.01	150	3298
Average			3302

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6. Determination of Change of Dimension according EN 1107

(A) Test Procedure

Dimensional Stability

6.1 Test:

- Conditioning: 2 hour at 70°C
- Equipments: air circulating oven
- Post conditioning: 20 hour at (23 ± 2) and (50 ± 5) % RH

6.2 Specimens:

- Type: (250 X 250) mm
- Number of samples: 3 (Three)

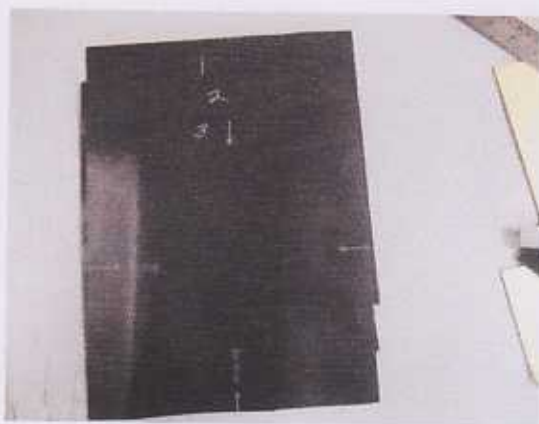
6.3 Environment:

- Temperature: (23 ± 2) °C
- RH (50 ± 5) %

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(B) Test Specimen



(C) Instrument Used



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(D) Test Result

6.4 Dimensional stability:

(a) At 70°C for 2 hour

Specimen	Initial Measurements		Final Measurements
	Length (mm)	Width (mm)	
1	200	200	No change in Dimension observed
2	200	200	No change in Dimension observed
3	200	200	No change in Dimension observed

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7. Determination of Foldability at low temperature according EN 495-5

(A) Test Procedure

7.1 Test:

-Temperature : -35°C
-Duration : 1 hour

7.2 Specimens:

-Average thickness: : 2.01 mm
-Sample size: : 100x50 mm
-Number of specimen : 02 each direction
-Equipment: : Deep - Freezer
-Conditioning: : 24 hours at (23 ± 2) °C and (50 ± 5) % RH

7.3 Environment:

-Temperature: : (23 ± 2) °C
-RH : (50 ± 5) %

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(B) Test Specimen



(D) Instrument used



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(D) Test Result

7.4 Foldability at low temperature:

Specimen	Thickness	Minimum temperature reached without cracks (° C)	Result
1	1.99	-35° C	No Cracks Observed
2	1.98	-35° C	
3	2.00	-35° C	
4	1.99	-35° C	

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Test			Results
Name of Test	Test Method	Unit	
Thickness	EN 1849-2	mm	2.01
Tensile properties	Tensile strength	EN 12311-2	N/mm ² L 18.9 W 17.2
	Elongation at break	EN 12311-2	% L 352 W 360
Tear Resistance	EN 12310-2	N/mm	L 108.4 W 101.2
Water tightness	EN1928	-	Waterproof at 5 bar
Dimensional stability	DIN EN 1107-2	-	No change in Dimension observed
Foldability at low temperature	EN 495-5	-	No Cracks observed
Resistance to Static Test	EN 12236	N	3302

[Signature]
Analyst


Authorized Signatory