BELGIAN BUILDING RESEARCH INSTITUTE
INSTITUTION RECOGNISED BY APPLICATION OF THE DECREE-LAW OF 30 JANUARY 1947

N° 42-TEST

All tests in this report are executed according to the ISO 9001
certified Quality management system of the BBRI

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TEST REPORT

Laboratory	MA – CONSTRUCTION MATERIALS	**O/References**	DE-MA-0149 MA-19-170-02/EXT Page 1/5

Requested by	INTELLIGENT MEMBRANES LTD. Clopton Farm Lower Road Croydon Cambridgeshire SG8 0EF UK		
Date of the order	11/12/2019	**Samples registration**	S2016-40-14
		Date of reception of samples	27/09/2016
Date of the report	10/01/2020		
Test carried out	Determination of the water vapour transmission properties of the product PASSIVE PURPLE EXTERNAL (wet cup)		
References	NBN EN ISO 12572 (2001) Hygrothermal performance of building materials and products – Determination of water vapour transmission properties		

This test report contains 5 pages. This test report may only be reproduced in its entirety. Each page of the original report has been stamped (in red) by the laboratory and initialled by the head of laboratory. The results and findings are only valid for the tested samples.

- ☐ *No sample*
- ☑ *Sample(s) subjected to destructive test*
- ☐ *Sample(s) to be removed from our laboratories 30 calendar days after sending of the report, save in the case of a further written request*

Ir. E. Nguyen
In charge of the test

CSTC WTCB MA

Ir. S. Charron
Head of laboratory

1 Introduction

The purpose of the test is to determine the water vapour permeability performances of the product designated by the demander as "PASSIVE PURPLE EXTERNAL" (acrylic dispersion of pure polymer, with fillers and additives, coating).

In this purpose 4 sheets of PASSIVE PURPLE EXTERNAL (applied on a substrate) were delivered at the test centre of BBRI in Limelette and registered under the lab number MA-19-170.

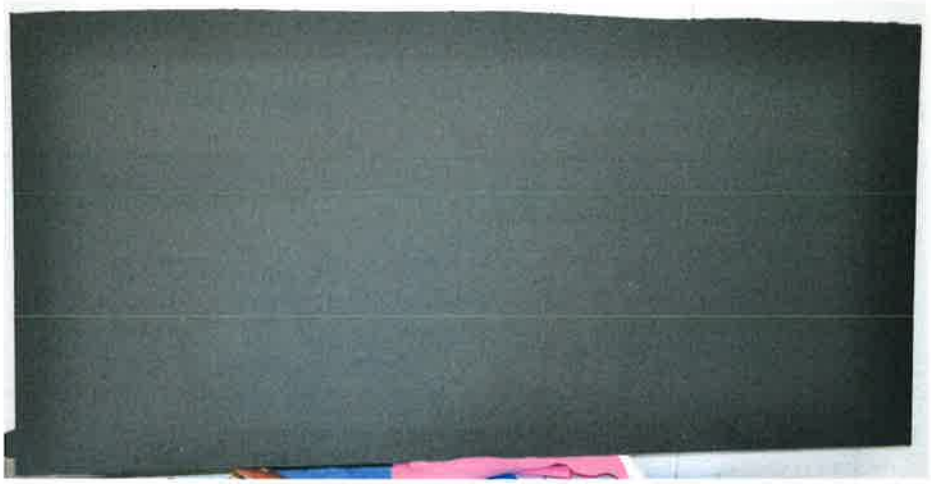

Figure 1 – Delivered sheet of PASSIVE PURPLE EXTERNAL

2 Preparation of specimens

Five square shaped samples (20cm * 20cm) were cut from the sheet and the samples were then carefully removed from the substrate. Those samples have been stuck on a glass cup with black adhesive tape and then coated with paraffin (see Figure 2).

Inside the glass cup, an aqueous salt solution ($NH_4H_2PO_4$) was placed in order to obtain 93% of relative humidity (in accordance with the method C of the standard NBN EN ISO 12572).

Figure 2 – Test assembly

The determination of the water vapour resistance of the product "PASSIVE PURPLE EXTERNAL" was achieved by periodic weighings of the assemblies. The water vapour permeability (δ), the water vapour resistance (μ), and the water vapour diffusion-equivalent air layer thickness (Sd) of the product "PASSIVE PURPLE EXTERNAL" are then determined by calculation.

3 Tests

The testing method followed is in conformity with the European standard EN ISO 12572 (2001).
After the preparation as described above, the test assemblies have been placed in a temperature and humidity controlled test chamber.

Test conditions:

- Temperature in the test chamber: 23 ± 2 °C;
- Relative humidity on a side of the test-specimen (test chamber): 50 ± 3% RH;
- Relative humidity on the other side of the test-specimen (side cup out of glass): 93 ± 3% RH.

And by periodic weighings of the assemblies, the rate of water vapour transmission in the steady state was determined.

4 Results

4.1. Thickness

For the thickness determination, four measurements by test-specimen have been carried out with a caliper: Mitutoyo NTD13-15CX.

Measurements of the test-samples, expressed in mm, are deferred in the following table.

Table 1 – Averaged thickness of the product PASSIVE PURPLE EXTERNAL

Test-specimens	Thickness (mm)				Averaged thickness (mm)
	Measurement 1	Measurement 2	Measurement 3	Measurement 4	
1	0.24	0.29	0.24	0.26	**0.26**
2	0.25	0.26	0.25	0.26	**0.26**
3	0.29	0.28	0.26	0.24	**0.27**
4	0.28	0.28	0.25	0.26	**0.27**
5	0.27	0.30	0.28	0.27	**0.28**

4.2. *Calculation*

- Appointed period:

  04.10.2016 – 12.12.2016

- Average conditions in the climatic room during the above-mentioned period:

  Temperature: 22.9°C

  Relative humidity: 49.8%

- Average atmospheric pressure during the above-mentioned period:

  1002.8 hPa

- Average diameter of the specimen: *8 cm*

The table below summarizes the water vapour transmission properties of the product PASSIVE PURPLE EXTERNAL.

Table 2 – Water vapour transmission properties of the product PASSIVE PURPLE EXTERNAL.

Properties	1	2	3	4	5	**Average**	***Standard deviation***
Water vapour permeability δ (kg/m.s.Pa)	7.6E-14	8.2E-14	9.21E-14	8.2E-14	9.7E-14	**8.6E-14**	***9E-15***
Water vapour resistance factor μ (-)	2590	2415	2132	2398	2024	**2312**	***229***
Water vapour diffusion-equivalent air layer thickness s_d (m)	0.7	0.6	0.6	0.6	0.6	**0.6**	***0.00***

It has to be noted that five successive determinations of change in mass for each test specimen were always above 5% of the mean value of this specimen but the regression line between mass and time, needed for the determination of the water vapour permeability, was calculated with a correlation coefficient (R^2-value) higher than 0.99.

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Definition:

"The water vapour resistance factor μ indicates how much greater the resistance of the material is compared to an equally thick layer of stationary air at the same temperature".

Notice:

In order to correctly calculate the water vapour permeability δ_a, the formula of the standard included in the book "Moisture analysis and condensation control in building envelopes" (2001):

$$\lambda_{ma} = \frac{\frac{0.083}{3600}}{R_D \times T} \times \frac{p_0}{p} \times \left(\frac{T}{273}\right)^{1.81}$$

is used instead of the formula mentioned in standard NBN EN ISO 12572 (2001):

$$\delta_a = \frac{0.083 \times p_0}{R_D \times T \times p} \times \left(\frac{T}{273}\right)^{1.81}$$

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