REPORT 242/L DATE 08.07.2020

Laboratory	GFC Chimica Srl Laboratorio Chimico Viale Marconi, 73 44122 Ferrara
Customer	START&UP INVESTMENTS S.R.L. VIA TRE SETTEMBRE, 154 47899 DOGANA (RSM)
Sample identification[1]	05062001 – EASYSTOONE CONSOLIDATE
Description of the sample	Coating
Samples receiving (date)	05.06.2020
Analysis beginning (date)	05.06.2020
Analysis end (date)	06.05.2020

1 Introduction

It was tested, on behalf of the company START&UP INVESTMENTS S.R.L. di Dogana (RSM), hereinafter referred to as the customer, a sample of a coating identified and described as reported in the table above.

As agreed with the customer the coating was assessed in order to determinate the following laboratory tests:

a) determination of the water-vapour transmission rate (test method UNI EN ISO 7783-2:2012),
b) determination of the liquid water permeability (test method UNI EN 1062-3:2008).

Products sampling was performed by the customer.

2 Results

2.1 Determination of water-vapour transmission rate

The coating was applied, by brush (mass applied = 6 gr), on 3 substrate based on fiber glass (thickness about 200 µm; area 113 cm^2) then it was assessed using the test method UNI EN ISO 7783 (wet cup method) as supported film. After the application the specimens were dried for 7 days at T = 23±2 °C and HR=50±5% and conditioned using the following cycles (carried out 3 times):

- 24 h in water at T= 23 ±2 °C
- 24 h in oven at T = 50 ±2 °C

After the last cycle the specimens were stored at T= 23 ± 2 °C and HR = 50 ± 5% for 24h.

[1] The code 05062001 is an internal one of GFC Chimica used to mark the sample during the tests. Amendment report 236/L date 06.07.2020

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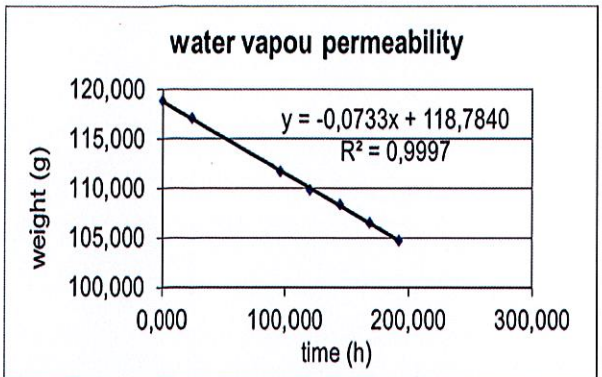
The water vapour permeability is expressed as the thickness value equivalent of air (Sd), that is the resistance to the transport of the water offered from the external render in examination. The coefficient of permeability to the vapour (μ) is considered, too. The values of Sd and μ are calculated using the following diagrams.

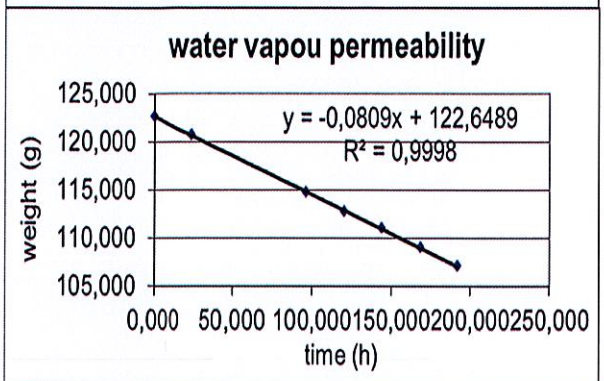
First data

Time (h)	Weight (gr)
0,000	118,796
24,000	117,095
96,000	111,663
120,000	109,841
144,000	108,297
168,500	106,490
192,000	104,735



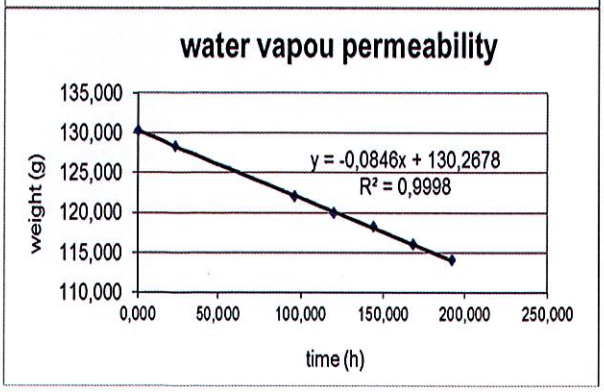
Second data

Time (h)	Weight (gr)
0,000	122,650
24,000	120,778
96,000	114,807
120,000	112,790
144,000	111,089
168,500	109,065
192,000	107,120



Third data

tempo (h)	peso (gr)
0,000	130,265
24,000	128,310
96,000	122,071
120,000	119,962
144,000	118,182
168,500	116,063
192,000	114,017



Starting from the resistance of the fiber glass support (Sd = 0.0546 m) for the product in examination, the following average value of resistance to the transport is obtained:

Sd = 0, 0665 ± 0,0139 m

The uncertainty value is reported as an extended uncertainty with a confidence level of 95% (coverage factor k = 2).

From the value of the thickness[2] applied, 138 micron, the permeability to the vapour obtained is:

$$\mu = Sd/S = 482$$

Starting from the classification reported in the test method[3] it can be concluded that the product has a **high permeability to the vapour** (Class V_1).

2.2 Determination of liquid water permeability

The coating was applied, by brush (mass applied = 6 gr), on 3 substrate based on cement with high water absorption coefficient. The superficial area of specimen is 0.02 m^2.
After the application the specimens were dried for 7 days at T = 23±2 °C and HR=50±5% and conditioned using the following cycles (carried out 3 times):

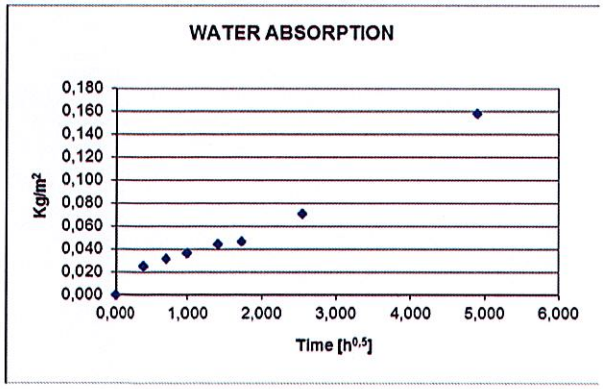
- 24 h in water at T= 23 ±2 °C
- 24 h in oven at T = 50 ±2 °C

After the last cycle the specimens were stored at T= 23 ± 2 °C and HR = 50 ± 5% for 24h.
The liquid water absorption offered from the product is obtained through the determination of the water coefficient absorbed for unit of surface in the time unit. In order to standardize the result the value of the coefficient was calculated after 24 hours. The values of the parameter w was calculated using the following diagrams.

FIRST DATA

Coated area = 0. 017199 m^2

Weight (g)	Water absorbed (g)	Time (min)	Time (h)	ΔKg/m^2	Time $(h)^{0,5}$
975,78	0,00	0	0,000	0,000	0,000
976,21	0,43	10	0,167	0,025	0,408
976,32	0,54	30	0,500	0,031	0,707
976,40	0,62	60	1,000	0,036	1,000
976,54	0,76	120	2,000	0,044	1,414
976,57	0,79	180	3,000	0,046	1,732
976,99	1,21	390	6,500	0,070	2,550
978,49	2,71	1440	24,000	0,158	4,899



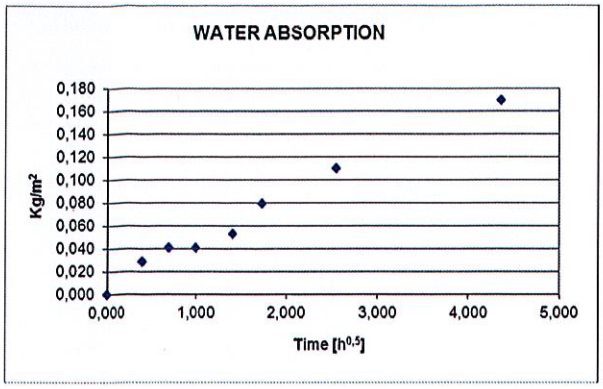
W = 0.032 kg/($m^2h^{0.5}$)

[2] The measured thickness is indicative due to the extremely liquid nature of the product. It has been partially absorbed by the substrate.
[3] Classification of water vapour permeability
CLASS V_1 (HIGH PERMEABILITY) Sd < 0.14 m
CLASS V_2 (MEDIUM PERMEABILITY) 0.14 ≤ Sd < 1.4 m
CLASS V3 (LOW PERMEABILITY) Sd ≥ 1.4 m

SECOND DATA

Coated area = 0. 017177 m²

Weight (g)	Water absorbed (g)	Time (min)	Time (h)	ΔKg/m²	Time $(h)^{0,5}$
950,60	0,00	0	0,000	0,000	0,000
951,09	0,49	10	0,167	0,029	0,408
951,29	0,69	30	0,500	0,040	0,707
951,30	0,70	60	1,000	0,041	1,000
951,50	0,90	120	2,000	0,052	1,414
951,96	1,36	180	3,000	0,079	1,732
952,49	1,89	390	6,500	0,110	2,550
953,51	2,91	1140	19,000	0,169	4,359

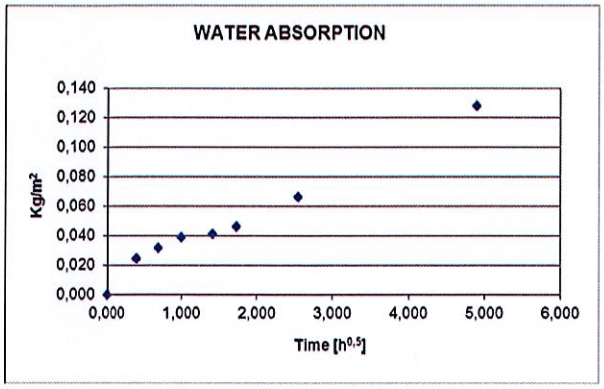


W = 0.039 kg/(m²h^0.5)

THIRD DATA

Coated area = 0. 017460 m²

Weight (g)	Water absorbed (g)	Time (min)	Time (h)	ΔKg/m²	Time $(h)^{0,5}$
904,25	0,00	0	0,000	0,000	0,000
904,67	0,42	10	0,167	0,024	0,408
904,80	0,55	30	0,500	0,032	0,707
904,93	0,68	60	1,000	0,039	1,000
904,97	0,72	120	2,000	0,041	1,414
905,05	0,80	180	3,000	0,046	1,732
905,40	1,15	390	6,500	0,066	2,550
906,48	2,23	1440	24,000	0,128	4,899



W = 0.026 kg/(m²h^0.5)

Coefficient of water absorption - w = 0.032 ± 0.003 kg/(m²h^0.5)

The uncertainty value is reported as an extended uncertainty with a confidence level of 95% (coverage factor k = 2).

Starting from the classification reported in the test method[4] it can be concluded that the product has a **low liquid water permeability (Class W_3).**

[4] Classification of liquid water permeability:
CLASS W_1 (HIGH PERMEABILITY) $w_1 > 0.5$ Kg/m²h^0.5
CLASS W_2 (MEDIUM PERMEABILITY) $0.1 < w_2 \leq 0.5$ Kg/m²h^0.5
CLASS W_3 (LOW PERMEABILITY) $w_3 \leq 0.1$ Kg/m²h^0.5

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END OF THE REPORT