

AMENDMENT TO THE REPORT N° 206/L DATE 21.09.2007

Laboratory	GFC Chimica S.r.l. Laboratorio Chimico Viale Marconi, 73 44100 Ferrara
Customer	LABORATORI ECOBIOS S.r.l. Via B. Cellini, 28 73033 Corsano (LE)
Samples description and identification	02080701 – Solaria Universal con latte e aceto di vino 02080702 – Solaria Universal con latte e aceto di mele 02080703 – SUNLIFE con latte ed aceto di vino 02080704 – SUNLIFE con latte ed aceto di mele 27080701 – ECOBIOS LED PLUS (fissativo acrilvinilico)
Samples receiving (date)	02.08.2007 and 27.08.2007
Analysis beginning (date)	27.08.2007
Analysis end (date)	14.09.2007
Ref.	Dr. De Francesco
Ref.	Dr. De Francesco

1 Introduction

GFC Chimica has analyzed four samples of paints called as described above by order of LABORATORI ECOBIOS of Corsano (LE). As stated between the parties, the GFC Chimica laboratory has assessed the sample in order to:

1. determinate the permeability of paints and coatings films to diffusion of water vapour. (Test method: UNI EN ISO 7783-2:2001),
2. determinate the VOC (volatile organic contents) in building and car refinishing* following the European Directive 2004/42/CE. (Test method UNI EN ISO 11890-2:2006 modified. The modify is refers to the execution in single of the analysis).

*NOTE: the tests signed with * are not accounted by SINAL.



2 Experimental conditions

2.1 Determination of water vapour permeability

All the samples have been add with the vinyl-acrylic primer called ECOBIOS LED PLUS (+25% w/w). The products therefore prepared have been applied on paper glass supports after 7 days and assessed using the test method UNI EN ISO 7783-2. 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 paint in examination. The coefficient of permeability to the vapour (μ) is considered, too. The measures have been carried out after 7 days of drying in climatic room at $T=23\pm 2^{\circ}\text{C}$ and $\text{HR}=50\pm 5\%$.

2.2 Determination of VOC (volatile organic contents)

All the samples have been analyzed using gas-chromatographic test method for the determination of volatile organic compounds. The products have been delivered to the laboratory in the original cans and ready to the use and as such they have been tested. For the calculation of volatile organic content (expressed in gr/lt) it has been used the following formula:

$$\text{VOC} = \Sigma m \cdot d \cdot 1000$$

where:

- Σm is the mass (gr) of all organic compounds contained in 1 gr of the sample ready to the use,
- d is the density of the sample (gr/ml)
- 1000 is a conversion factor.

3 Results

3.1 02080701 – Solaria Universal con latte e aceto di vino

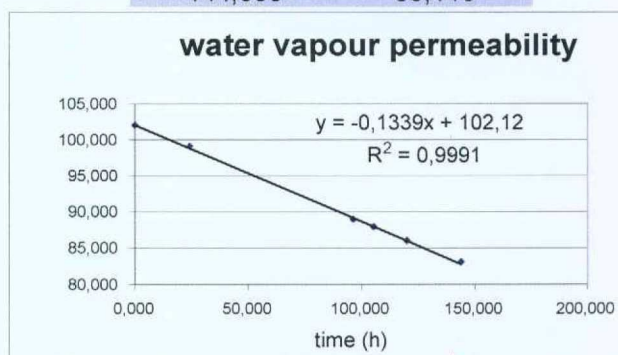
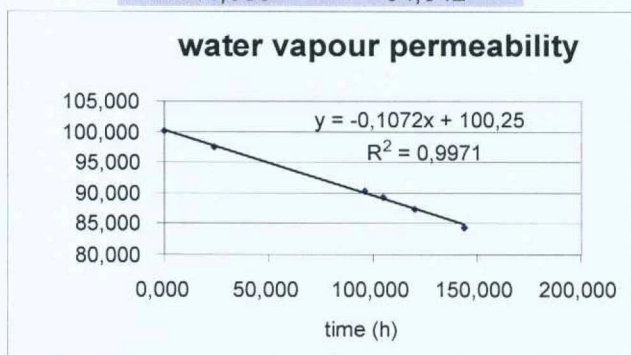
Determination of water vapour permeability

First series of data

Time (h)	weight (gr)
0,000	100,152
24,000	97,528
96,000	90,375
105,000	89,319
120,000	87,350
144,000	84,342

Second series of data

Time (h)	weight (gr)
0,000	102,078
24,000	99,127
96,000	88,938
105,000	87,930
120,000	86,025
144,000	83,116



Starting from the resistance of the fiber glass support ($S_d = 0,007 \text{ m}$) for the product in examination, the following average value of resistance to the transport is obtained:

$$S_d = 0.001 \text{ m}$$

Uncertainty for $S_d \pm 0.012 \text{ m}$ with factor of $K=3$ (Probability 99,5%).

From the value of the thickness applied, 387 micron, the permeability to the vapour obtained is:

$$\mu = S_d/S = 2.6$$

Starting from the classification reported in the test method¹ it can be concluded that the product has a high permeability to the vapour.

¹ Classification of water vapour permeability:

HIGH $S_d \leq 0.14 \text{ m}$

MEDIUM $0.14 < S_d \leq 1.4 \text{ m}$

LOW $S_d > 1.4 \text{ m}$

Determination of VOC (volatile organic contents)

Density= 1.45 gr/ml

Parameter	Result	Units
Dipropilenglycol	607	mg/Kg
Organic substances with temperature of boiling < 250°C	5564	mg/Kg

VOC = 9.09 gr/lt

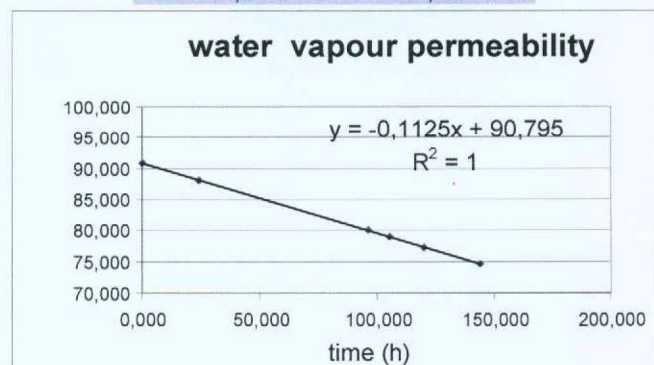
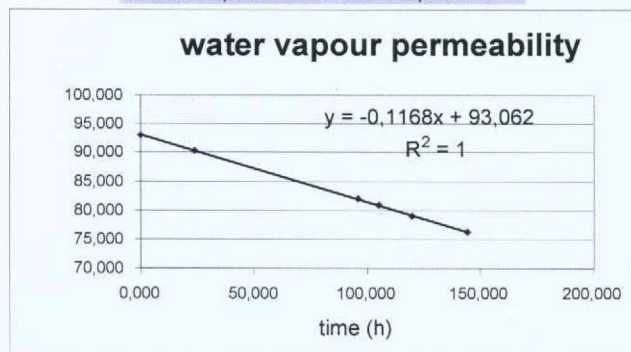
3.2 02080702 – Solaria Universal con latte e aceto di mele

First series of data

Time (h)	Time (h)
0,000	93,057
24,000	90,249
96,000	81,873
105,000	80,811
120,000	79,082
144,000	76,207

Second series of data

Time (h)	Time (h)
0,000	90,823
24,000	88,053
96,000	79,991
105,000	79,043
120,000	77,284
144,000	74,591



Starting from the resistance of the fiber glass support ($S_d = 0,007$ m) for the product in examination, the following average value of resistance to the transport is obtained:

$$S_d = 0.001 \text{ m}$$

Uncertainty for $S_d \pm 0.012$ m with factor of $K=3$ (Probability 99,5%).

From the value of the thickness applied, 422 micron, the permeability to the vapour obtained is:

$$\mu = S_d/S = 2.4$$

Starting from the classification reported in the test method it can be concluded that the product has a high permeability to the vapour.

Determination of VOC (volatile organic contents)

Density = 1.53 gr/ml

Parameter	Results	Units
Dipropilenglycol	397	mg/Kg
Organic substances with temperature of boiling < 250°C	3695	mg/Kg

VOC = 6.26 gr/lit

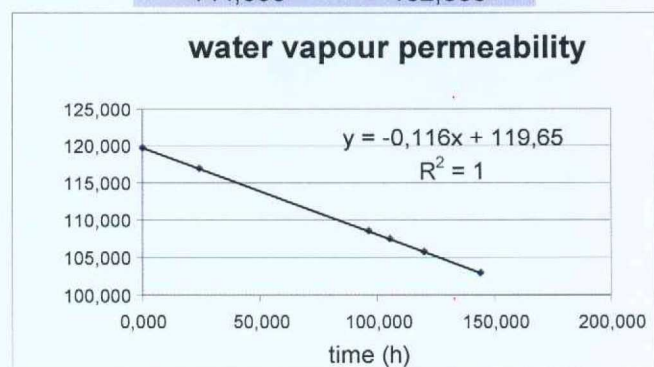
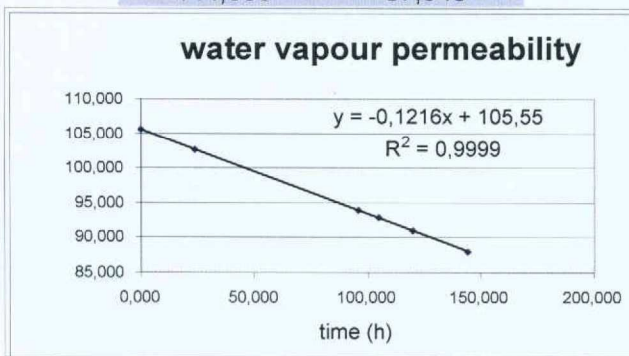
3.3 02080703 – SUNLIFE con latte ed aceto di vino

First series of data

Time (h)	Time (h)
0,000	105,521
24,000	102,616
96,000	93,897
105,000	92,874
120,000	90,962
144,000	87,943

Second series of data

Time (h)	Time (h)
0,000	119,655
24,000	116,864
96,000	108,490
105,000	107,515
120,000	105,729
144,000	102,936



Starting from the resistance of the fiber glass support ($S_d = 0,007$ m) for the product in examination, the following average value of resistance to the transport is obtained:

$$S_d = 0.0008 \text{ m}$$

Uncertainty for $S_d \pm 0.012$ m with factor of $K=3$ (Probability 99,5%).

From the value of the thickness applied, 243 micron, the permeability to the vapour obtained is:

$$\mu = S_d/S = 3.3$$

Starting from the classification reported in the test method it can be concluded that the product has a high permeability to the vapour.

Determination of VOC (volatile organic contents)

Density = 1.52 gr/ml

Parameter	Results	Units
Dipropilenglycol	417	mg/Kg
Organic substances with temperature of boiling T < 250°C	4020	mg/Kg

$$\text{VOC} = 6.74 \text{ gr/lt}$$

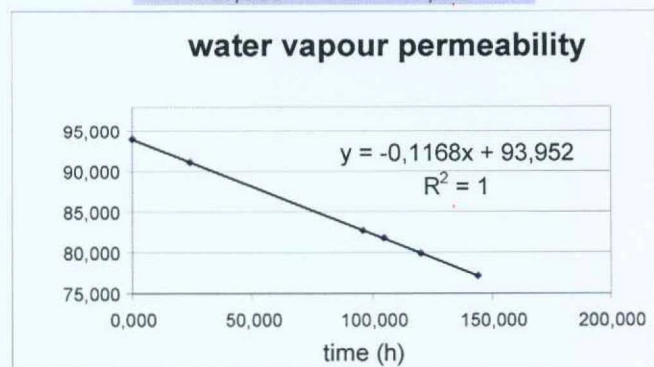
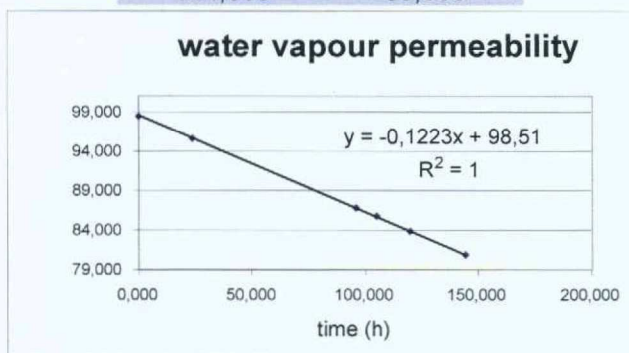
3.4 02080704 – SUNLIFE con latte ed aceto di mele

First series of data

Time (h)	Time (h)
0,000	98,502
24,000	95,573
96,000	86,761
105,000	85,731
120,000	83,814
144,000	80,883

Second series of data

Time (h)	Time (h)
0,000	93,954
24,000	91,150
96,000	82,698
105,000	81,728
120,000	79,917
144,000	77,137



Starting from the resistance of the fiber glass support ($S_d = 0,007 \text{ m}$) for the product in examination, the following average value of resistance to the transport is obtained:

$$S_d = 0.0008 \text{ m}$$

Uncertainty for $S_d \pm 0.012 \text{ m}$ with factor of $K=3$ (Probability 99,5%).

From the value of the thickness applied, 264 micron, the permeability to the vapour obtained is:

$$\mu = S_d/S = 3.0$$

Starting from the classification reported in the test method it can be concluded that the product has a high permeability to the vapour.

Determination of VOC (volatile organic contents)

Density = 1.50 gr/ml

Parameter	Results	Units
Dipropilenglycol	414	mg/Kg
Organic substances with temperature of boiling T < 250°C	3996	mg/Kg

VOC = 6.61 gr/lit

4 Opinions and interpretations not object of SINAL account

The products have given the following results:

Sample	Water Vapour Permeability* UNI EN ISO 7783-2:2001	VOC ISO 11890-2 modified
02080701 – Solaria Universal con latte e aceto di vino	Sd = 0.001 m $\mu = 2.6$	9.09 gr/lit
02080702 – Solaria Universal con latte e aceto di mele	Sd = 0.001 m $\mu = 2.4$	6.26 gr/lit
02080703 – SUNLIFE con latte ed aceto di vino	Sd = 0.0008 m $\mu = 3.3$	6.74 gr/lit
02080704 – SUNLIFE con latte ed aceto di mele	Sd = 0.0008 m $\mu = 3.0$	6.61 gr/lit

* measure obtained with addition of ECOBIOS LED PLUS

All the products have behaviors much similar between them in terms of water vapour permeability and volatile organic contents. The permeability turns out extremely low; that means that all the products examine are transpirant to water vapour. This behavior is comparable with the paints made up of mineral binders.

GFC Chimica s.r.l.

Gli Analisti

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GFC Chimica s.r.l.

Il Responsabile di Laboratorio

Dr. Arlen Ferrari

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