AGING TEST REPORT

Customer: MUROS SINTÉTICOS DECORATIVOS, S.L.

Addres: Polígono Industrial Lentiscares
C/ Carralaverde, parcela 57
26370 Navarrete (La Rioja)

Sample tested: Decorative wall panel imitating concrete M3

Reception date: 30.04.09

Testing date: From 30.04.09 to 15.10.09

Note: Obtained results are only valuable for this tested material

Zamudio, 16th October 2009

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MATERIAL

A decorative wall plate imitating stone has been received from MSD which has been referenced internally as follows:

Their reference: Hormigón / Concrete Panel M3
Our reference: P-09-10776/2-A-2

TEST

Observe the pictures of the material before being subjected to aging:

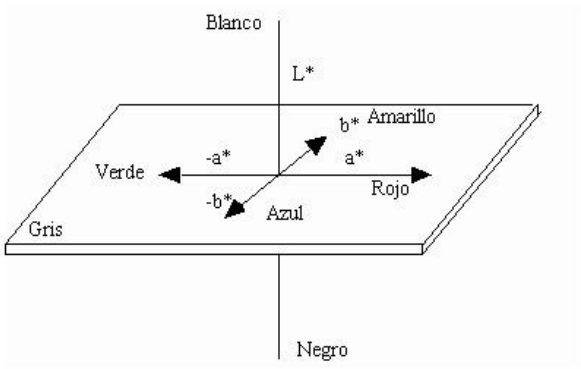
Picture 1: Hormigón / Concrete Panel

The study includes an aging test to ultraviolet light according to UNE EN ISO 4892-3 chamber QUV for a period of 500 hours; after the analysis it was extended to a total of 1000 hours.

The cycles have been:
- 23 hours to UV radiation at a temperature of 70 º C and
- 1 hour of condensation of water at a temperature of 50 º C

At 500 hours color changes have been appeared accordingly to UNE 48-073-94

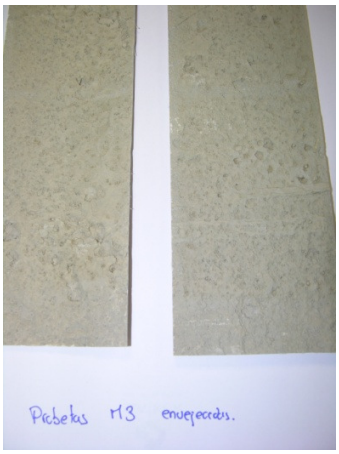
using coordinates LAB CIE L *, a *, b *.
The coordinate L * is called Clarity and can take values between 0 and 100.
The colorimetric coordinates a * b * form a plane perpendicular to the Clarity.
The coordinate a * defines the deviation from the achromatic for Clarity, towards the red if a *> 0, towards the green if a * <0. Similarly the coordinate b * defines the turning to yellow if b *> 0, towards the blue if b * <0, as shown bellow



The following table shows the results of the change in color after exposure of 500 hours and 1000 hours,ΔE:

$\Delta E=((\Delta L^*)^2+(\Delta a^*)^2+(\Delta b^*)^2)^{1/2}$

Look at the photos after the first cycle 500h:



In that case it is manifested in yellowing resulting in the parameters analyzed:

Placa imitación hormigón M3	P-09-10776/3-A-2										
1	CAMBIO DE COLOR TRAS 500 HORAS DE EXPOSICIÓN EN QUV										26/05/2009
MEDIDAS SOBRE SUPERFICIE EXPUESTA				MEDIDAS SOBRE SUPERFICIE REFERENCIA				INCREMENTOS			
MEDIDAS	L*	a*	b*	MEDIDAS	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
1	59,7	2,97	15,32	1	64,84	2,78	12,55	-5,14	0,19	2,77	5,84
2	60,68	2,94	15,29	2	64,27	2,74	12,27	-3,59	0,2	3,02	4,70
3	61,31	3,03	15,51	3	65,4	2,61	12,34	-4,09	0,42	3,17	5,19
MEDIA	60,56	2,98	15,37	MEDIA	64,84	2,71	12,39	-4,27	0,27	2,99	5,22

Table 1. Changes in color parameters after 500 hours aging cycle.

After have completing the 1000 hours of exposure it was not observed any discoloration occurred at higher than the initial phase of 500 hours.

Placa imitación hormigón M3	P-09-10776/3-A-2										
1	CAMBIO DE COLOR TRAS 1000 HORAS DE EXPOSICIÓN EN QUV										05/10/2009
MEDIDAS SOBRE SUPERFICIE EXPUESTA				MEDIDAS SOBRE SUPERFICIE REFERENCIA				INCREMENTOS			
MEDIDAS	L*	a*	b*	MEDIDAS	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
1	61,47	3,09	15,48	1	64,84	2,78	12,55	-3,37	0,31	2,93	4,48
2	61,49	3,04	15,63	2	64,27	2,74	12,27	-2,78	0,3	3,36	4,37
3	61,68	3,02	15,95	3	65,4	2,61	12,34	-3,72	0,41	3,61	5,20
MEDIA	61,55	3,05	15,69	MEDIA	64,84	2,71	12,39	-3,29	0,34	3,30	4,67

Table 2. Changes in color parameters after 1000 h aging cycle.

Effect of flexural property cycle after 1000 hours aging

Test	Results		
		Hormigón M3 / Concrete Panel	
Flexion Resistance (MPa)		108	
Flexion module (MPa)		6810	

Table 3. Table of results according to UNE EN ISO 178

Aged samples under the conditions:

- 23 h of UV radiation at a temperature of 70 º C and
- 1 h of condensation of water at a temperature of 50 º C

Test	Results		
		Hormigón M3 / Concrete Panel	
Flexion Resistance (MPa)		86.76	
Flexion module (MPa)		6462,00	

Table 4. Table of results according to UNE EN ISO 178

Due to the irregularity of the specimens tested, in terms of varying the thickness, surface finish and lack of flatness for good support in the test points, results are highly variable, but can be seen that aging applied does not affect the mechanical performance of material. The flexural modulus remains practically unchanged, and changes in the value of resistance may be to contribute to the aspects discussed above.