

TNO Industrial Technology

Nederlandse Organisatie voor
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for Applied Scientific Research



TNO report

43/02.005584/sec

**Weather resistance of four samples high pressure
laminate**

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1 Introduction

By order of Arpa Industriale SPA, TNO Industrial Technology determined the weather resistance of four samples of high-pressure laminate. The artificial weathering test was performed in accordance with **ISO 105-A04**, parts 1 and 2. After exposure times of 0, 1000, 2000 and 3000 hours the color contrast was assessed using grey scales in accordance with **ISO 105-A01** and **ISO 105-A03**, and the loss of gloss was measured.

The investigation was carried out in accordance with the conditions mentioned in the letter 33/02.002602./sec.

2 Experimental

2.1 Samples received

The samples supplied by the client were received on July 10, 2002 and registered by TNO under the sample code number 02.0394 and a sub-code ranging from 1 to 4. In table 2.1 the sub code and description of the samples are given.

Table 2.1 Description of the received samples

description	sub code
4145 Betulla Svedese	1
1826 Rovere Naturale	2
4247 Teak Sonda	3
4329 Red Bambu	4

2.2 Weathering test

The artificial weathering test was carried out in a Weather-Ometer Ci 4000 apparatus in accordance with ISO 4892, parts 1 and 2. In table 2.2 the weathering conditions are given.

Table 2.2 Conditions in the Weather-Ometer Ci 4000.

Apparatus	Weather-Ometer Ci 4000 (Atlas Electric Devices Company)
Light source	6500 Watt cooled Xenon Arc Lamp
Filter combinations	Inner and outer filter glass type "S" Borosilicate
Replacement schedule lamps and filters	As recommended by the manufacturer
Light intensity (controlled)	0.50 W/m ² at 340 nm
Test chamber temperature (controlled)	40 °C
Black standard temperature (controlled)	65 °C
Relative air humidity (controlled)	50 %
Spray cycle	Duration of spraying 18 minutes, dry interval between spraying 102 minutes
Mounting of test specimens	Specimen holder type SL-3T or WQPTC-3T, with metal backing
Carrier	Continuous exposure to light

From each sample, four specimens were prepared. One specimen was used as a reference. The other three specimens were exposed for 1000, 2000 and 3000 hours, respectively.

Prior to the evaluation the specimens were conditioned for a period of at least 24 hours at a temperature of 23 ± 2 °C and a relative air humidity of 50 ± 5 %.

2.3 Colour fastness

The colour fastness of the samples was assessed by comparing the colour contrast between an exposed specimen and the corresponding reference specimen to one of the nine steps of the grey scales in accordance with ISO 105 A03 and ISO A02, respectively.

The colour difference between two consecutive steps of the grey scale A02 is less than the colour difference between two consecutive steps of the grey scale A03. This means that at the same colour contrast between an exposed and unexposed specimen the assessed contrast rating with the A02 scale is lower than the assessment based on the A03 scale.

2.4 Gloss

The gloss was measured in accordance with DIN 67530 using a micro TRI gloss device (Byke Gardner). All measurements were carried out using an incident light angle and measuring angle of 85 °.

3 Results

In table 3.1 the colour contrast after 1000, 2000 and 3000 hours of the samples is given.

Table 3.1 Colour contrast according to ISO 105 A03 and ISO 105 A02 of the samples after exposure times of 1000, 2000 and 3000 hours.

sub code	in accordance with ISO 105 A03			in accordance with ISO 105 A02		
	1000	2000	3000	1000	2000	3000
1	2-3 (1)	2 (1)	2 (1)	1-2 (1)	1 (1)	1 (1)
2	4 (1)	3-4 (1)	3 (1)	3-4 (1)	2-3 (1)	2 (1)
3	4 (1)	3-4 (1)	3-4 (1)	3-4 (1)	2-3 (1)	2-3 (1)
4	4-5	4-5	4-5 (1)	4	4 (1)	4 (1)

1 colour becomes lighter.

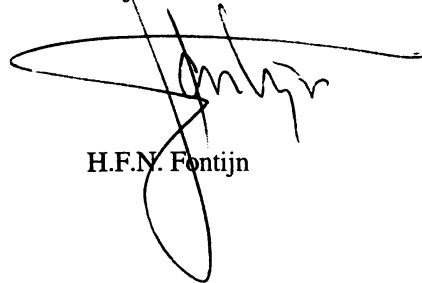
In table 3.2 the gloss after exposure times 0, 1000, 2000 and 3000 hours of the samples is given.

Table 3.2 Gloss of the samples after exposure times of 0, 1000, 2000 and 3000 hours.

sub code	0	1000	2000	3000
1	17.8	19.5	20.3	20.7
2	18.8	22.8	21.7	23.2
3	21.2	20.7	21.2	23.8
4	16.9	19.9	20.4	20.4

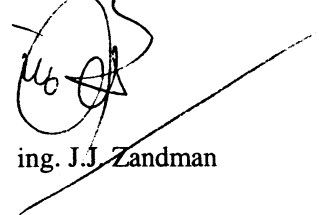
None of the 1000, 2000 and 3000 hours exposed specimens of the samples showed signs of blistering and delamination.

Project leader



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