

Test report no.: 67431/05

Customer: Haogenplast Ltd.
Plastic Industries
42880 Kibbutz Haogen
ISRAEL

Order: Testing of colour fastness after artificial weathering
of window profiles made of PVC-U, laminated with foil.

Artificial weathering according to EN 513, procedure 1
(simulation of a moderate climatic zone M) up to an
irradiation dose of up to 8 GJ/m².

E-mail dated: 2005-07-07 **by:** Mrs. Nurit Naveh

Test samples received on: 2005-06-06

Test period: 2005-07-05 to 2005-12-30

This test report comprises 5 pages.

Würzburg, 2006-01-09
Mü/ste

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1. Order

By E-mail of July 07, 2005 the company Haogenplast Ltd., Plastic Industries, 42880 Kibbutz Haogen, ISRAEL, instructed SKZ - TeConA GmbH to test the colour fastness after artificial weathering of window profiles made of PVC-U, laminated with foil. Artificial weathering according to DIN EN 513, procedure 1 (simulation of a moderate climatic zone M) up to an irradiation dose of up to 8 GJ/m².

2. Test material

On June 6, 2005 SKZ - TeConA GmbH received following test material:

6 x 1 m pieces of window profiles laminated with two different foils

Manufacturer of basic profile: profine Kömmerling, Pirmasens, GERMANY
 Designation of basic profile: Sash 82 mm, Art. no.: 2411
 Colour of basic profile: white

Designation of the tested foils:

Sample no.	Printing design	Basic foil	colour code	Serial no.
1	Mahagoni	K042	5149	32.3099
2	Golden Oak	K042	5151	32.1641

3. Test procedure

Following tests were carried following the quality and test specifications "Plastic windows, quality assurance, RAL-GZ 716/1, section I, plastic window profiles", test methods and requirements, part 7, window profiles made of PVC-U, laminated with foils.

The stated requirements were borrowed from the mentioned quality and test specification.

Unless otherwise noted testing was performed at a standard atmosphere of 23/50-2 in accordance with DIN EN ISO 291.

Usually our reports are based on accredited standards. The list of all accredited standards is shown on the homepage at www.skz.de.

3.1 Testing of weathering fastness

The procedure of artificial weathering is based on the requirements according to DIN EN 513, procedure 1, simulation of a moderate climate zone (M). Laminated outside surface was irradiated.

Weathering instrument according to DIN EN ISO 4892-2

Type:	Xenon test device 1200 CPS
Radiation source:	Xenon arc radiation
Filter system:	outdoor sun light simulation
Black standard temp.:	60 ± 3 °C
White standard temp.:	40 - 45 °C
Relative humidity:	65 ± 5 %
Spray cycle:	18 min. water spray, 102 min. dry period
Irradiation energy E_{UV} (300 - 400) nm:	60 ± 2 W/m ²
Irradiation dose (300 - 800) nm:	8 GJ/m ²
Exposure period:	4123 h
Start:	2005-07-06
End:	2005-12-30

3.1.1 Visual assessment

Visual evaluation was carried out according to ISO 105-A03 by using the grey scale for assessing staining.

Requirement:

Upon termination of artificial weathering, the colour change must not be greater than allowed by grade 4 of the grey scale according to ISO 105-A03. Changes must not bring about stains, bubbles, streaks or cracks. There must be no cracks and no flake-off in the polyacrylate protective layer. A peel-off of the coating, or, formation of bubbles, respectively, (between the polyacrylate protective layer and the base foil as well as between the base foil and the PVC-U-profile) must not occur.

In addition the visual assessment was carried out by using the grey scale for assessing change in colour according to ISO 105-A02.

Requirement (according to RAL-GZ 716/1 section I, part 7, 9. draft, April 2005):

Upon termination of artificial weathering, the colour change must not be greater than allowed by grade 3 of the grey scale according to ISO 105-A03.

3.1.2 Colourimetric assessment

The sample colour was measured by means of a spectrophotometer of a wave length area of 380 - 720 nm, standard light type D65, gloss inclusion, 10° normal inspection. It was determined the colour distance ΔE^*_{ab} according to ISO 7724-3.

Each sample was measured before and after artificial weathering at the same measuring position on the sample, upon identical sample placement. Due to that, also in case of the not single-coloured foils with surface texture, a guide value for colour change can be determined in terms of colourimetry.

Requirements: none

4. Test results

4.1 Weathering fastness

4.1.1 Visual assessment

Sample no.	Printing design	Colour code	Fastness grade acc. to ISO 105 A03	Fastness grade acc. to ISO 105 A02
1	Mahagoni	5149	4-5	4-5
2	Golden Oak	5151	4	4

No stains, bubbles or streaks were found on any sample surface.

No crack formation or flake off was found on the polyacrylate protective layer of any sample. A peel-off of the base foil from PVC-U-profile did not occur.

4.1.2 Colourimetric assessment

Sample no.	Colour, design	Colour code	Colour distance			
			ΔL^*	Δa^*	Δb^*	ΔE^*_{ab}
1	Mahagoni	5149	0.5	0.8	0.4	1.0
2	Golden Oak	5151	1.3	-1.2	1.6	2.4

5. Assessment of test results

Concerning the weathering fastness after artificial weathering both tested foils have met the requirements which e.g. are specified in the quality and testing specifications RAL-GZ 716/1 section I, part 7 for laminated plastic window profiles.