Das Kunststoff-Zentrum

SKZ

SKZ - Testing GmbH · Friedrich-Bergius-Ring 22 · 97076 Würzburg

HANWHA L&C
Mr. Lee kwang Jon
8F, Mirae Asset Center 1
26, Eulji-Ro 5-Gil, Jung-Gu
04539 SEOUL
KOREA

Wolfgang Ries
Tel.: +49 931 4104-126
Fax: +49 931 4104-271
w.ries@skz.de

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Test order no. 129632/18 (Continuation of order no. 122577/16)

Final results of the weathering fastness test (colour fastness) according to Technical appendix "Section II" to RAL-GZ 716, part II-a-3, issue December 2013 on window profiles made of PVC-U laminated with foil

Dear Mr. Lee,

Please find below the following results of the final assessment of the weathering fastness after the artificial weathering of approx. **15,278** hours:

Irradiation energy: **30** GJ/m²

Artificial weathering according to (DIN) EN 513: 1999-10, procedure **1** (simulation of a **moderate** climate zone **M**) up to an irradiation dose of **30 GJ/m²** in the wave length range between 300 nm and 800 nm.

1. Colourimetric assessment:

The sample colour was measured by means of a spectrophotometer of a wave length area of 360 - 750 nm, standard light type D65, gloss inclusion, 10° normal inspection. The colour distance ΔE^*_{ab} was determined according to DIN EN ISO 11664-4: 2012-06. Prior to and after artificial weathering, colour was measured at the same position on the sample to obtain reproducible results despite the structured surface.

Please note that the colourimetric assessment of the structured foils can only be taken as a guide value.

Sample 1: HH1G01

Time of exposure	Dose of irradiation	Colour coordinates			Total colour distance
		Δ L*	Δ a*	Δ b*	Δ E^*_{ab}
1000 h	2 GJ/m²	-0.1	-0.2	-0.3	0.4
2000 h	4 GJ/m²	-0.2	-0.2	0.3	0.4
3000 h	6 GJ/m²	-0.5	0.0	1.0	1.1
4000 h	8 GJ/m²	-0.5	-0.1	1.0	1.1
5000 h	10 GJ/m²	-0.3	-0.2	0.6	0.7
6000 h	12 GJ/m²	-0.4	-0.2	0.9	1.0
7000 h	14 GJ/m²	-0.4	-0.2	1.1	1.2
8000 h	16 GJ/m²	-0.3	-0.2	1.1	1.2
9000 h	18 GJ/m²	-0.2	-0.3	1.0	1.1
10185 h	20 GJ/m²	0.0	-0.3	0.9	1.0
11000 h	22 GJ/m²	0.0	-0.3	1.0	1.0
12000 h	24 GJ/m²	0.0	-0.4	1.0	1.1
13000 h	26 GJ/m²	0.2	-0.6	0.6	0.9
14000 h	28 GJ/m²	0.1	-0.4	1.2	1.3
15278 h	30 GJ/m²	0.2	-0.5	1.0	1.1

Sample 2: HH3N0

Time of exposure	Dose of irradiation	Colour coordinates			Total colour distance
		Δ L*	Δ a*	Δ b*	Δ E^*_{ab}
1000 h	2 GJ/m²	-0.2	-0.2	-0.3	0.4
2000 h	4 GJ/m²	-0.1	-0.4	0.0	0.4
3000 h	6 GJ/m²	-0.2	-0.4	0.3	0.5
4000 h	8 GJ/m²	-0.1	-0.4	0.3	0.5
5000 h	10 GJ/m²	-0.2	-0.5	0.2	0.6
6000 h	12 GJ/m²	0.0	-0.6	0.3	0.7
7000 h	14 GJ/m²	-0.1	-0.7	0.2	0.7
8000 h	16 GJ/m²	0.0	-0.7	0.3	0.8
9000 h	18 GJ/m²	0.2	-0.8	0.3	0.9
10185 h	20 GJ/m²	0.1	-0.8	0.3	0.9
11000 h	22 GJ/m²	0.2	-0.9	0.3	1.0
12000 h	24 GJ/m²	0.3	-0.9	0.3	1.0
13000 h	26 GJ/m²	0.4	-0.9	0.1	1.0
14000 h	28 GJ/m²	0.4	-0.9	0.4	1.1
15000 h	30 GJ/m²	Removed from xenon device			

2. Visual assessment

Visual assessment was performed according to DIN EN 20105-A03 and DIN EN 20105-A02 with the grey scale.

Sample 1: HH1G01

Time of exposure	Dose of irradiation	Grey scale value		Remark
		A02	A03	
1000 h	2 GJ/m²	4 - 5	4 - 5	more yellow
2000 h	4 GJ/m²	4 - 5	4 - 5	more yellow, darker
3000 h	6 GJ/m²	4 - 5	4 - 5	more yellow, darker
4000 h	8 GJ/m²	4 - 5	4 - 5	more yellow, darker
5000 h	10 GJ/m²	4 - 5	4 - 5	more yellow, darker
6000 h	12 GJ/m²	4 - 5	4 - 5	more yellow, darker
7000 h	14 GJ/m²	4 - 5	4 - 5	more yellow, darker
8000 h	16 GJ/m²	4 - 5	4 - 5	more yellow, darker
9000 h	18 GJ/m²	4 - 5	4 - 5	more yellow, darker
10185 h	20 GJ/m²	4 - 5	4 - 5	more yellow, more gloss
11000 h	22 GJ/m²	4 - 5	4 - 5	more yellow
12000 h	24 GJ/m²	4 - 5	4 - 5	more yellow
13000 h	26 GJ/m²	4 - 5	4 - 5	more yellow
14000 h	28 GJ/m²	4 - 5	4 - 5	more yellow
15278 h	30 GJ/m²	4 - 5	4 - 5	more yellow

Sample 2: HH3N0

Time of exposure	Dose of irradiation	Grey scale value		Remark
		A02	A03	
1000 h	2 GJ/m²	4 - 5	4 - 5	lighter
2000 h	4 GJ/m²	4 - 5	4 - 5	lighter, more yellow
3000 h	6 GJ/m²	4 - 5	4 - 5	lighter, more yellow
4000 h	8 GJ/m²	4 - 5	4 - 5	lighter, more yellow
5000 h	10 GJ/m²	4 - 5	4 - 5	lighter, more yellow
6000 h	12 GJ/m²	4 - 5	4 - 5	lighter, more yellow
7000 h	14 GJ/m²	4 - 5	4 - 5	lighter, more yellow
8000 h	16 GJ/m²	4 - 5	4 - 5	lighter, more yellow
9000 h	18 GJ/m²	4 - 5	4 - 5	lighter, more yellow
10185 h	20 GJ/m²	4 - 5	4 - 5	lighter, more yellow, more gloss
11000 h	22 GJ/m²	4 - 5	4 - 5	lighter, more yellow
12000 h	24 GJ/m²	4 - 5	4 - 5	lighter, more yellow
13000 h	26 GJ/m²	4 - 5	4 - 5	lighter, more yellow
14000 h	28 GJ/m²	4 - 5	4 - 5	lighter, more yellow, **brown spots**, see appendix
15000 h	30 GJ/m²	Removed from xenon device		

Appendix:

Sample 2: HH3N0 after approx. 28 GJ/m²

If you have any questions, don't hesitate to contact me.

Best regards

SKZ - Testing GmbH

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Wolfgang Ries
Deputy Group Manager Testing Profiles and Sealants