Das Kunststoff-Zentrum

TOP 100 Top-Innovator 2018

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20 April 2022 / km

Final results of Fastness to Weathering (colour fastness) after artificial weathering according to Technical appendix "Section D" to RAL-GZ 716, item D.4.6, issue July 2018 on window profiles made of PVC-U laminated with film

Test order no. 218947/21 (Continuation of test order no. 211014/20-II)

Dear Ms. Lee,

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

Irradiation energy: **30 GJ/m²**

Artificial weathering according to DIN EN 513: 2019-03, 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: **"Golden Oak - light"**

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	-0.4	0.4	1.4	1.5
2000 h	4 GJ/m²	-0.4	0.4	1.4	1.5
3000 h	6 GJ/m²	-0.4	0.4	1.4	1.5
4000 h	8 GJ/m²	-0.3	0.4	1.3	1.4
5000 h	10 GJ/m²	-0.3	0.4	1.3	1.4
6000 h	12 GJ/m²	-0.3	0.4	1.4	1.5
7000 h	14 GJ/m²	-0.2	0.4	1.3	1.4
8000 h	16 GJ/m²	-0.4	0.4	1.4	1.5
9000 h	18 GJ/m²	-0.2	0.4	1.3	1.4
10185 h	20 GJ/m²	-0.2	0.3	1.6	1.6
11000 h	22 GJ/m²	-0.1	0.3	1.7	1.7
12000 h	24 GJ/m²	-0.1	0.3	1.7	1.7
13000 h	26 GJ/m²	0.1	0.3	1.7	1.7
14000 h	28 GJ/m²	0.2	0.3	1.8	1.8
15278 h	30 GJ/m²	0.2	0.2	1.9	1.9

Sample 2: **"Golden Oak - dark"**

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	-0.7	0.4	1.1	1.4
2000 h	4 GJ/m²	-0.7	0.4	1.2	1.5
3000 h	6 GJ/m²	-0.6	0.4	1.1	1.3
4000 h	8 GJ/m²	-0.6	0.4	1.1	1.3
5000 h	10 GJ/m²	-0.6	0.4	1.1	1.3
6000 h	12 GJ/m²	-0.6	0.4	1.2	1.4
7000 h	14 GJ/m²	-0.4	0.4	0.9	1.1
8000 h	16 GJ/m²	-0.6	0.4	1.1	1.3
9000 h	18 GJ/m²	-0.6	0.4	1.1	1.3
10185 h	20 GJ/m²	-0.6	0.4	1.1	1.3
11000 h	22 GJ/m²	-0.6	0.3	1.1	1.3
12000 h	24 GJ/m²	-0.6	0.3	1.1	1.3
13000 h	26 GJ/m²	-0.5	0.3	1.2	1.3
14000 h	28 GJ/m²	-0.5	0.3	1.2	1.3
15278 h	30 GJ/m²	-0.4	0.2	1.1	1.2

Visual assessment

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

Sample 1: **"Golden Oak - light"**

Time of exposure	Dose of irradiation	Grey scale value		Remark
		A02	A03	
500 h	1 GJ/m²	4 - 5	-	more yellow
1000 h	2 GJ/m²	4 - 5	-	more yellow, plaque
1500 h	3 GJ/m²	4 - 5	-	more yellow, plaque
2000 h	4 GJ/m²	4 - 5	-	more yellow
2500 h	5 GJ/m²	4 - 5	-	more yellow, plaque
3000 h	6 GJ/m²	4 - 5	-	more yellow, plaque
3500 h	7 GJ/m²	4 - 5	-	more yellow, plaque
4000 h	8 GJ/m²	4 - 5	-	more yellow
4500 h	9 GJ/m²	4 - 5	-	more yellow
5000 h	10 GJ/m²	4 - 5	-	more yellow
5500 h	11 GJ/m²	4 - 5	-	more yellow, plaque
6000 h	12 GJ/m²	4 - 5	-	more yellow, plaque
6500 h	13 GJ/m²	4 - 5	-	more yellow
7000 h	14 GJ/m²	4 - 5	-	more yellow, plaque
7500 h	15 GJ/m²	4 - 5	-	more yellow
8000 h	16 GJ/m²	4 - 5	-	more yellow
8500 h	17 GJ/m²	4 - 5	-	more yellow, plaque
9000 h	18 GJ/m²	4 - 5	-	more yellow, plaque
9500 h	19 GJ/m²	4 - 5	-	more yellow, plaque
10185 h	20 GJ/m²	4 - 5	-	more yellow

Sample 1: **"Golden Oak - light"**

Time of exposure	Dose of irradiation	Grey scale value		Remark
		A02	A03	
10500 h	21 GJ/m²	4 - 5	-	more yellow
11000 h	22 GJ/m²	4 - 5	-	more yellow
11500 h	23 GJ/m²	4 - 5	-	more yellow
12000 h	24 GJ/m²	4 - 5	-	more yellow
12500 h	25 GJ/m²	4 - 5	-	more yellow
13000 h	26 GJ/m²	4 - 5	-	more yellow
13500 h	27 GJ/m²	4 - 5	-	more yellow
14000 h	28 GJ/m²	4 - 5	-	more yellow
14500 h	29 GJ/m²	4 - 5	-	more yellow
15278 h	30 GJ/m²	4 - 5	-	more yellow

Sample 2: **"Golden Oak - dark"**

Time of exposure	Dose of irradiation	Grey scale value		Remark
		A02	A03	
500 h	1 GJ/m²	4 - 5	-	more yellow
1000 h	2 GJ/m²	4 - 5	-	more yellow, plaque
1500 h	3 GJ/m²	4 - 5	-	more yellow, plaque
2000 h	4 GJ/m²	4 - 5	-	darker, more yellow
2500 h	5 GJ/m²	4 - 5	-	darker, more yellow, plaque
3000 h	6 GJ/m²	4 - 5	-	more yellow, plaque
3500 h	7 GJ/m²	4 - 5	-	more yellow, plaque
4000 h	8 GJ/m²	4 - 5	-	more yellow
4500 h	9 GJ/m²	4 - 5	-	more yellow
5000 h	10 GJ/m²	4 - 5	-	more yellow
5500 h	11 GJ/m²	4 - 5	-	more yellow
6000 h	12 GJ/m²	4 - 5	-	more yellow
6500 h	13 GJ/m²	4 - 5	-	more yellow
7000 h	14 GJ/m²	4 - 5	-	more yellow
7500 h	15 GJ/m²	4 - 5	-	more yellow, plaque
8000 h	16 GJ/m²	4 - 5	-	more yellow
8500 h	17 GJ/m²	4 - 5	-	more yellow, plaque
9000 h	18 GJ/m²	4 - 5	-	more yellow, plaque
9500 h	19 GJ/m²	4 - 5	-	more yellow, plaque
10185 h	20 GJ/m²	4 - 5	-	more yellow

Sample 2: **"Golden Oak - dark"**

Time of exposure	Dose of irradiation	Grey scale value		Remark
		A02	A03	
10500 h	21 GJ/m²	4 - 5	-	more yellow
11000 h	22 GJ/m²	4 - 5	-	more yellow
11500 h	23 GJ/m²	4 - 5	-	more yellow
12000 h	24 GJ/m²	4 - 5	-	more yellow
12500 h	25 GJ/m²	4 - 5	-	more yellow
13000 h	26 GJ/m²	4 - 5	-	more yellow
13500 h	27 GJ/m²	4 - 5	-	more yellow
14000 h	28 GJ/m²	4 - 5	-	more yellow
14500 h	29 GJ/m²	4 - 5	-	more yellow
15278 h	30 GJ/m²	4 - 5	-	more yellow

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

Best regards

SKZ - Testing GmbH

i. A.

Dr. Philipp Lang
Group Manager Testing Laboratory
Profiles and Sealants