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Management Service

CERTIFICATE

The Certification Body
of TÜV SÜD Management Service GmbH

certifies that

RENOLIT
Rely on it.

RENOLIT SE
Horchheimer Straße 50
67547 Worms
Germany

has established and applies
a Quality Management System for

Development, production and distribution of films - Market Units: Exterior Solutions, Visual Communication, Interior Surfaces, Protect, Facade, Wind Energy, Maritime and B2C.

An audit was performed, Order No. **70107296**.

Proof has been furnished that the requirements according to

ISO 9001:2015

are fulfilled.

The certificate is valid from **2021-01-18** until **2024-01-17**.

Certificate Registration No.: **12 100 26975 TMS**.

Head of Certification Body
Munich, 2021-01-19

IAF MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT

DAkkS Deutsche Akkreditierungsstelle D-ZM-14143-01-00

MS/01-01/2019

Das Kunststoff-Zentrum

SKZ

Test report no.: **125279/17-III**

Customer:

Renolit SE
Horchheimer Str. 50
67547 Worms
GERMANY

Order:

Testing of weathering fastness after artificial weathering 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 film.

Artificial weathering according to DIN EN 513: 1999-10, procedure 1 (simulation of a moderate climate zone M) up to an irradiation dose equivalent first of 20 GJ/m², continuation following up to an total irradiation dose equivalent of altogether 30 GJ/m² in the wave length range of 300 nm to 800 nm.

Letter of: 2017-04-25
Email of: 2018-09-19
2019-04-02

Ref: Dr Martin Rößle
Ms. Silke Hindorf-Geil

Test samples received: 2017-05-12

Test period: 2017-05-17 to 2019-03-21

This test report comprises 9 pages.

Würzburg, 2019-04-09
Rs/km

i. V. M. Heindl

Dr.-Ing. Marcus Heindl
Head of Department Testing Laboratory

International akkreditiert
SKZ - Testing GmbH

i. A.

Wolfgang Ries
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The original language of the report is German. In case of doubt, the German version is obligatory.

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1. Order

By its letter of 25 April 2017 the company Renolit SE, Horchheimer Str. 50, 67547 Worms, GERMANY, instructed SKZ - Testing GmbH to test the weathering fastness after artificial weathering on window profiles made of PVC-U laminated with film according to Technical appendix "section II" to RAL-GZ 716, part II-a-3 (issue December 2013) and by e-mail of 2 April 2019 to issue the test reports. Artificial weathering was carried out according to DIN EN 513: 1999-10, procedure 1 (simulation of a moderate climate zone M) up to an irradiation dose equivalent first of 20 GJ/m^2, continuation following up to an total irradiation dose equivalent of altogether 30 GJ/m^2 in the wave length range of 300 nm to 800 nm.

2. Test material

On 12 May 2017 the SKZ - Testing GmbH received the following test material:

8 x 0.3 m window profile sections laminated with film.

Base profile: Quality assured profile made of PVC-U

Type:	**RENOLIT** EXOFOL PX	
Sample no.:	**Designation of decor**	**Decor no.**
1	Swamp Oak ST-F	9.3167 304
2	Light Oak	9.2052 390
3	Concrete Grey 7023	02.20.71.000019
4	Black	02.20.01.000002
5	Aluminium Brush Effect	9.1298 302
6	Silver Brush Effect	9.1298 303
7	Bamboo R	2.0051 002
8	Crystal White P 9294	02.12.91.000017

3. Test procedure

Following tests were carried out according to Technical appendix "section II" to RAL-GZ 716, part II-a-3: Films for laminating PVC-U-window profiles (issue December 2013). The tests were performed up to an total irradiation dose equivalent (300 - 800) nm of altogether 30 GJ/m².

Unless otherwise noted testing was performed at a standard atmosphere of 23/50, class 1 in accordance with DIN EN ISO 291: 2008-08.

Usually we carry out tests according to standards for which we have an accreditation. The list of all standards for which we are accredited is shown on the homepage at www.skz.de. In case of non-accredited procedures they are marked with *.

3.1 Weathering fastness

Procedure of artificial weathering is based on the requirements according to DIN EN 513: 1999-10, procedure 1, simulation of a moderate climate zone (M). Laminated outside surface was irradiated.

Parameters of weathering device:

Type:	XENOTEST® BETA LM
Radiation source:	Xenon arc radiation
Filter system:	outdoor sun light simulation
Black standard temperature:	60 ± 3 °C
White standard temperature:	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/m²
Total irradiation dose equivalent in the wave length range (300 - 800) nm:	**30 GJ/m²**
Exposure period:	15279 h
Start (Exposure up to 20 GJ/m²):	2017-05-18
End (Exposure up to 20 GJ/m²):	2018-08-16
Start (Exposure up to 30 GJ/m²):	2018-08-16
End (Exposure up to 30 GJ/m²):	2019-03-21

3.1.1 Visual assessment

Visual evaluation was carried out according to DIN EN 20105-A02: 1994-10 by using the grey scale for assessing change in colour.

Requirement according to RAL-GZ 716, issue December 2013 after 30 GJ/m^2:

Upon termination of artificial weathering after 30 GJ/m^2, the colour change must not be greater than allowed by grade 3 of the grey scale according to DIN EN 20105-A02.

Changes must not bring about stains, bubbles, streaks or cracks.

A peel-off of the coating between the polyacrylate protective layer and the base foil as well as between the base foil and the PVC-U-profile must not occur.

3.1.2 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. It was determined the colour distance ΔE^*_{ab} according to DIN EN ISO 11664-4: 2012-06.

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

Irradiation dose 20 GJ/m^2:

Sample no.	Designation of decor	Decor no.	Grey scale value	
			A02	A03
1	Swamp Oak ST-F	9.3167 304	4 - 5	---
2	Light Oak	9.2052 390	4 - 5	---
3	Concrete Grey 7023	02.20.71.000019	4 - 5	---
4	Black	02.20.01.000002	4 - 5	---
5	Aluminium Brush Effect	9.1298 302	4 - 5	---
6	Silver Brush Effect	9.1298 303	4 - 5	---
7	Bamboo R	2.0051 002	4 - 5	---
8	Crystal White P 9294	02.12.91.000017	4 - 5	---

Total irradiation dose 30 GJ/m^2:

Sample no.	Designation of decor	Decor no.	Grey scale value	
			A02	A03
1	Swamp Oak ST-F	9.3167 304	4 - 5	---
2	Light Oak	9.2052 390	4 - 5	---
3	Concrete Grey 7023	02.20.71.000019	4 - 5	---
4	Black	02.20.01.000002	4 - 5	---
5	Aluminium Brush Effect	9.1298 302	4 - 5	---
6	Silver Brush Effect	9.1298 303	4 - 5	---
7	Bamboo R	2.0051 002	4 - 5	---
8	Crystal White P 9294	02.12.91.000017	4 - 5	---

Neither stains, bubbles, streaks nor cracks were observed on sample surfaces.

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

4.1.2 Colourimetric assessment

Irradiation dose 20 GJ/m^2:

Sample no.	Designation of decor	Decor no.	Colour distance			
			Δ L*	Δ a*	Δ b*	Δ E^*_{ab}
1	Swamp Oak ST-F	9.3167 304	-0.6	0.1	1.0	**1.2**
2	Light Oak	9.2052 390	0.6	-0.7	1.3	**1.6**
3	Concrete Grey 7023	02.20.71.000019	-0.2	-0.1	0.2	**0.3**
4	Black	02.20.01.000002	-0.8	0.0	0.9	**1.2**
5	Aluminium Brush Effect	9.1298 302	0.1	-0.1	0.0	**0.1**
6	Silver Brush Effect	9.1298 303	-0.1	-0.1	0.1	**0.2**
7	Bamboo R	2.0051 002	0.2	0.2	0.9	**0.9**
8	Crystal White P 9294	02.12.91.000017	-0.5	-0.1	1.0	**1.1**

Total irradiation dose 30 GJ/m^2:

Sample no.	Designation of decor	Decor no.	Colour distance			
			Δ L*	Δ a*	Δ b*	Δ E*$_{ab}$
1	Swamp Oak ST-F	9.3167 304	-0.3	0.1	0.8	**0.9**
2	Light Oak	9.2052 390	1.0	-0.9	1.2	**1.8**
3	Concrete Grey 7023	02.20.71.000019	-0.1	0.0	0.2	**0.2**
4	Black	02.20.01.000002	-0.6	0.0	0.8	**1.0**
5	Aluminium Brush Effect	9.1298 302	0.0	-0.1	0.1	**0.1**
6	Silver Brush Effect	9.1298 303	-0.1	0.0	0.1	**0.1**
7	Bamboo R	2.0051 002	0.9	-0.7	0.7	**1.3**
8	Crystal White P 9294	02.12.91.000017	-0.4	-0.2	1.2	**1.3**

5. Assessment of test results on the basis of RAL-GZ 716. issue December 2013

The requirements according to Technical annex „section II" of RAL-GZ 716 Quality and Test Requirements for components and procedures, part II-a-3: Films for the lamination of window profiles made of PVC-U, for climate zone M and an total irradiation dose equivalent of altogether 30 GJ/m² are met from the tested foils. According to item 5.2-2.1.2. table 2 minimum requirement class M20, as well as the higher classification M30 was achieved.

Assessment of test results on the basis of RAL-GZ 716, issue July 2018

The requirements according to Technical Appendix of RAL-GZ 716 Quality and Test Requirements for components and procedures, Section D: Films for the lamination of PVC-U window and door profiles, for climate zone M and an total irradiation dose equivalent of altogether 30 GJ/m² are met from the tested foils. According to item D.4.6, minimum requirement class M20, as well as the higher classification M30 was achieved.