Test report no.: **117063/15**

Customer:
profine GmbH
Kömmerling Kunststoffe
Zweibrücker Straße 200
66954 Pirmasens
GERMANY

Production site:
Profine India Window Technology Pvt Ltd.
PLOT NO. 727
Vadodara - 391775
Gujarat
INDIA

Order: Testing of weathering resistance, classification for climate zone S (severe climate) according to DIN EN 12608: 2003-09 "Unplasticized polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors - classification, requirements and test methods".

Letter of: 2015-10-05 **Ref:** Mr. Manfred Hübler

Test samples received: 2015-10-07

Test period: 2015-10-12 to 2016-07-18

This test report comprises 5 pages.

Würzburg, 2016-07-20
Rs/km

International akkreditiert
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1. Order

By its letter dated 5 October 2015 the company profine GmbH, Kömmerling Kunststoffe, Zweibrücker Straße 200, 66954 Pirmasens, GERMANY instructed SKZ - Testing GmbH to test weathering resistance, classification for climate zone S (severe climate) according to DIN EN 12608: 2003-09 "Unplasticized polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors - classification, requirements and test methods".

2. Test material

On 07 October 2015 SKZ - TeConA GmbH received following test material:

4 x 1 m window profiles made of PVC-U, colour white

Designation of profile	Frame (2060)
Designation of system:	Gold ASEA
Profile marking:	KÖMMERLING PRO 12 2060 HCM 21/07/15 01:11 L2 WLG
Profile manufacturer:	Profine India Window Technology Pvt Ltd. Gujarat, INDIA
Producer of formulation:	Profine India Window Technology Pvt Ltd. Gujarat, INDIA
Designation of formulation:	**4071-654**
Basis of stabilisation:	**CaZn**

3. Test procedure

Following tests were performed according to DIN EN 12608: 2003-09, item 5.8 weathering resistance, climate zone S.

Unless otherwise noted all tests were carried out at standard atmosphere 23/50, class 1 according to 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.

3.1 Weathering resistance

Testing of weathering resistance (Charpy impact strength after artificial weathering and colour fastness) was performed according to DIN EN 513: 1999-10. Procedure of artificial weathering is based on the requirements according to DIN EN 513, procedure 2, simulation of a severe climate zone (S). Surface outside was irradiated. The artificial weathering was carried out up to an irradiation dose of 12 GJ/m² in the wave length range between 300 nm to 800 nm.

Testing according to DIN EN ISO 4892-2

Type of weathering device:	XENOTEST® BETA LM
Light source:	Xenon-arc source
Filter:	Terrestrial daylight simulation
Black standard temperature:	65 ± 3 °C
White standard temperature:	45 - 50 °C
Relative humidity:	65 ± 5 %
Spray cycle:	6 min water spray, 114 min dry cycle
Irradiation energy E_{UV} (300 - 400) nm:	60 ± 2 W/m²
Total irradiation dose equivalent in the wavelength range (300 - 800) nm:	**12 GJ/m²**
Exposure period:	6124 h
Start:	2015-10-14
End:	2016-07-11

3.1.1 Charpy notched impact strength after weathering

Charpy notched impact strength was tested on double notched samples according to DIN EN ISO 179-1/1fA: 2010-11, but with a residual width of (3 ± 0.1) mm on samples of the dimensions 50 x 6 mm x wall thickness. The test was carried out subsequent to artificial weathering on reference samples, which have been stored in the dark, as well as on weathered samples. During this test the weathered surface was subjected to tensile stress.

Requirement:

After artificial weathering Charpy notched impact strength of weathered samples shall not drop more than 40 % compared to the value of the unweathered samples.

3.1.2 Colour fastness

3.1.2.1 Visual assessment

Visual assessment was carried out according to ISO 4582: 2007-08 by using grey scale according to DIN EN 20105-A02: 1994-10.

3.1.2.2 Colorimetric assessment

The colorimetric assessment was carried out by a spectrophotometer in wavelength range from 360 to 750 nm, standard light type D65, gloss inclusion, 10° standard observation. The colour distance ΔE^*_{ab} was determined according to DIN EN ISO 11664-4: 2012-06.

Requirement:

After artificial weathering colour distance ΔE^*_{ab} between unweathered and weathered samples shall not be larger than 5 and colour distance Δb^* shall not be larger than 3.

4. Test results

4.1 Weathering resistance

4.1.1 Charpy notched impact strength after weathering

Charpy notched impact strength in [kJ/m²]

Samples corresponding to DIN EN ISO 179-1/ **1fA** (notch base radius 0.25 mm)				
reference sample (unweathered)		weathered sample		amendment
$\bar{x}$	s	$\bar{x}$	s	%
72.6	0.4	71.5	0.6	**-1.5**
10 x non-break (N)		10 x non-break (N)		

$\bar{x}$ = mean value s = standard deviation

4.1.2 Colour fastness

4.1.2.1 Visual assessment

The sample reached the fastness grade **4 - 5** of the grey scale according to DIN EN 20105-A02.

Neither stains, blisters nor crack formations or anything that significant damages the appearance were observed.

4.1.2.2 Colorimetric assessment

Colour coordinates	Sample as supplied	Sample after weathering	Colour distance
L*	94.9	95.0	0.1
a*	-0.8	-0.7	0.1
b*	1.1	0.7	-0.4
Colour distance ΔE^*_{ab}			**0.4**

5. Assessment of test results

Regarding weathering resistance, classification to climate zone S (severe climate), the requirements were met according to DIN EN 12608: 2003-09.