

Test report no.: 212166/22-I

Customer: ALLCOMP LTD
BohdanKhmelnysky Av, 139
DNIPRO, 49 083
UKRAINE

Order: Testing of the suitability of a thermoplastic material for the use as seal for plastic windows and doors according to Technical Appendix of RAL-GZ 716, Section B, (issue July 2020) for the intended classes: temperature class 5 and application class W

E-mail of: 2020-09-19

Ref.: Ms. Yulia Borysenko

Sample receipt: 2021-04-19
2021-12-03

Test period: 2021-04-22 to 2021-11-25

The test report comprises 11 text pages and 2 annexes.

Würzburg, 20 June 2022
Fs/km

i. V.

Dr.-Ing. Marcus Heindl
Head of Testing Laboratory



i. A.

B. Eng. Simon Fischer
Projectmanager
Profiles and Sealants

Die auszugsweise Wiedergabe, Vervielfältigung und Übersetzung dieses Berichtes bedarf der schriftlichen Genehmigung der SKZ - Testing GmbH. Die Ergebnisse beziehen sich auf die geprüften Produkte. Der Akkreditierungsumfang kann im Internet unter www.skz.de eingesehen werden.

1. Order

The Company ALLCOMP LTD, Bohdan Khmelnytsky Av, 139, DNIPRO, 49 083, UKRAINE, instructed SKZ - Testing GmbH by e-mail of 19 September 2020 the suitability of a thermoplastic material for the use as seal for plastic windows and doors according to Technical Appendix of RAL-GZ 716, Section B, (issue July 2020) for the in-tended classes: temperature class 5 and application class W

2. Test material

The SKZ - Testing GmbH received the following samples of compound for testing on the 19 April 2021:

- Approx. 8 m extruded flat profile stripes 27 mm x 2 mm
- 4.1 kg Granulate

The SKZ - Testing GmbH received the following samples of compound for testing on the 3 December 2021:

- Extruded flat profile stripes 27 mm x 2 mm

2.1 Manufacturer's specification

Material designation	AST19A60.9005
Formulation	SEBS
Colour designation	black
Nominal values of the colour	L* = 27.14
	a* = -0.05
	b* = -0.44
Nominal value of the density	1.18 g/cm ³
Nominal hardness	60 Shore-A
Batch	21020001

3. Test procedure

The tests listed below were carried out according to the Technical Appendix of RAL-GZ 716, Section B, (issue July 2020) for the intended classes: temperature class 5 and application class W.

Unless indicated otherwise, preconditioning and testing was carried out 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 *. In the case that only deviating test conditions of the originally accredited standard are concerned, this is marked with #.

Testing of residual compression set and Shore-A hardness was performed on specimens of an injection molded plate.

Further material properties were tested on test specimens made of the extruded flat profile.

3.1 Identity properties

3.1.1 Deviation from the density (test specification B.12. Part 3.1)

The test of density was carried out according to ISO 1183-1:2013-04, procedure A, on 3 samples.

Requirement:

The maximum deviation permitted compared to the manufacturer's specification is $\pm 0.03 \text{ g/cm}^3$.

3.1.2 Deviation from the nominal hardness (test specification B.12. Part 3.2)

The indentation hardness was determined according to ISO 48-4:2021-02 by means of a durometer (Shore hardness) type A and within a test duration of 15 s.

Requirement:

The deviation from the manufacturer's specification must not exceed ± 5 .

3.1.3 Deviation from the colour (test specification B.12. Part 3.3)

The determination of the coordinates of the $L^*a^*b^*$ colour space and the calculation of the colour distance ΔE^*_{ab} was effected according to DIN EN ISO 11664-4:2012-06.

Requirement:

The colour distance ΔE^*_{ab} must not deviate from the manufacturer's specification by more than 2.5.

3.1.4 Thermogravimetric analysis (test specification B.12. Part 3.4)

The thermogravimetric analysis was conducted in accordance with Item B.12. Part 3.4 of the Technical Appendix of RAL-GZ 716, Section B (Issue July 2020).

3.1.5 Infrared spectroscopic analysis (test specification B.12. Part 3.5)

The infrared spectroscopic analysis was conducted in accordance with Item B.12. Part 3.5 of the Technical Appendix of RAL-GZ 716, Section B (Issue July 2018).

3.2 Tensile properties (test specification B.12. Part 3.6)

The test was conducted in accordance with ISO 37: 2019-11 on 5 test specimens S3, but with a total length of 75 mm. The testing speed was 200 mm/min.

Requirement:

- Tear strength must be at least 5 N/mm².
- Elongation at break must be at least 200 %.

3.3 Residual compression set (test specification B.12. Part 3.6)

The test was carried out in accordance with DIN ISO 815-1:2010-09 and DIN ISO 815-2:2010-09 using the sample shape B. Sandwiched between two talc-dusted steel plates, the samples were compressed by 25 % of the original height and aged for 22 h at a temperature of -25 °C, 23 °C and 70 °C.

At the end of the ageing period, the samples were released and allowed to relax on a wooden plate (30 ± 3 min) at a standard atmosphere, class 1. Afterwards, the thickness of the samples was measured once more. Regarding the test -25 °C, however, recovery and measurement took place at test temperature.

3.4 Behaviour after heat ageing (test specification B.12. Part 4)

Artificial heat ageing was carried out in accordance with DIN 53508:2000-03 in a laboratory oven with forced ventilation at 85 °C for a period of 14 days. Subjected to this test were test specimens used for determining the indentation hardness and S2 tensile bars used for determining the elongation at break and the tensile strength.

After thermal ageing, the test specimens were visually checked for changes (e.g. cracks or sticky surfaces).

3.4.1 Change in hardness (test specification B.12. Part 4.1)

After exposure to heat, the hardness must not have changed from the values prior to exposure to heat in the test according to Section 3.1.2.

Requirement:

The deviation from the value of heat ageing shall not exceed -5 / +10.

3.4.2 Change of tensile properties (test specification B.12. Part 4.2)

The test was conducted in accordance with Section 3.2. The testing speed was 200 mm/min.

Requirement:

- The deviation of tensile stress at 100 % elongation from the value prior to heat ageing must not exceed ± 20 %.
- The deviation of tear strength from the value prior to heat ageing must not exceed ± 25 %.
- Elongation at break after heat ageing must be in the range of 60 % to 110 % of the value prior to heat ageing.

3.4.3 Loss of mass (test specification B.12. Part 4.3)

The test was performed according to Item B.12. Part 4.3 of the Technical Appendix of RAL-GZ 716, Section B (Issue July 2020).

Requirement:

The loss of mass must not exceed 3 %.

3.5 Behaviour after artificial weathering (test specification B.12. Part 5)

The artificial weathering test for the determination of weathering fastness and resistance was carried out in accordance with Technical Appendix of RAL-GZ 716, Section B (Issue July 2020).

The procedure of artificial weathering was carried out according to DIN EN 513: 2019-03, procedure 1, simulation of a moderate climate zone (M).

Parameters of the weathering device:

Type of weathering device:	XENOTEST BETA LM
Light source: 4892-2)	Xenon-arc source (according to DIN EN ISO 4892-2)
Filter system:	Terrestrial daylight simulation
Operation:	Non-alternating mode
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 cycle
Irradiation energy E _{UV} (300 - 400) nm:	60 ± 2 W/m ²
wave length range (300 - 800) nm:	8 GJ/m ²
Exposure period:	4074 h
Start:	2021-12-07
End:	2022-06-06

3.5.1 Weathering fastness

After an artificial weathering with an overall exposure equivalent of 3 GJ/m² and 8 GJ/m² in the wave length range 300 to 800 nm the colour change was determined visually by comparing the non-weathered with the weathered sample, using the grey scales according to DIN EN 20105-A02:1994-10, and colorimetrically.

In addition, the weathered specimen surface was checked for changes (e.g. blistering or crack formation). The samples were evaluated by putting them under a microscope (laying flat), using a tenfold magnification, as well as without visual aids on a flat profile which was kinked by 30°.

Requirement:

After artificial weathering the colour distance ΔE^*_{ab} must not deviate from the manufacturer's specification by more than 4.6.

There must not be any blisters or cracks on the weathered surface.

3.5.2 Weathering resistance

After artificial weathering the test specimens were punched out of the artificially weathered flat profiles and subjected to a tensile test. The test was conducted in accordance with Section 3.2. The testing speed was 200 mm/min.

Requirement:

After artificial weathering the elongation at break must not be lower than the value of 200 %.

4. Test results

Table 1: Identity tests / AST19A60.9005

4.1	Test	Unit	Tolerance requirements regarding nominal value of producer	Result						Change
				Single values					Median	
4.1.1	Density	g/cm ³	1.18 ± 0.03	1.196	1.195	1.196	1.196	1.196	1.20 ¹	+0.02
4.1.2	Hardness	Shore A	60 ± 5	57	56	57	56	57	57	-3
4.1.3	Colour	Δ E* _{ab}	≤ 2.5	(see table 4)						1.4
4.1.4	Thermogravimetric analysis	see annex 1								
4.1.5	Infrared spectroscopic analysis	see annex 2								

¹ Arithmetic mean

Table 2: Tensile properties / residual compression set / AST19A60.9005

	Test	Unit	Requirement Application class w Temperature class 5	Result						Change
				Single values				Median		
4.2	Tensile properties									
4.2.1	Tear strength	N/mm ²	≥ 5.0	10.2	10.2	9.9	10.3	10.3	10.2	---
4.2.2	Tensile strength at 100 % elongation	N/mm ²	---	1.6	1.6	1.6	1.6	1.6	1.6	---
4.2.3	Elongation at break	%	≥ 200	780	780	790	808	793	790	---
4.3	Residual compression set									
4.3.1	-25 °C	%	≤ 90	79	79	78	79	79	79	---
4.3.2	23 °C	%	≤ 35	18	18	19	18	18	18	---
4.3.3	70 °C	%	≤ 60	46	47	46	46	46	46	---

Table 3: Behavior after heat ageing and artificial ageing

4.4	Behaviour after heat ageing									
4.4.1	Hardness	Shore A	Change: -5 / +10 of initial value	61	62	61	61	60	61	+4
4.4.2	Tensile strength at 100 % elongation	N/mm ²	Change: ≤ 20 % of initial value	1.8	1.8	1.8	1.8	1.9	1.8	+ 12.5 %
4.4.3	Tear strength	N/mm ²	Change: ≤ 25 % of initial value	11.3	11.4	11.4	11.2	11.3	11.3	+ 10.8 %
4.4.4	Elongation at break	%	Change: -40 %/+10 % of initial value	786	793	785	785	765	783	+ 0.4 %
4.4.5	Weight	%	Change: ≤ 3 % of initial value	-3.40	-3.40	-3.37	-3.39	-3.39	-3.39	-0.9 %
4.4.6	Visual evaluation	---	---	without any complaint						---
4.5	Behaviour after artificial weathering									
4.5.1	Elongation at break	%	≥ 200	727	772	731	760	761	750	---
4.5.2	Tensile strength at 100 % elongation	N/mm ²	---	2.2	2.0	2.2	2.0	2.1	2.1	---
4.5.3	Tear strength	N/mm ²	---	9.1	9.9	9.3	9.6	9.4	9.5	---

Table 4: Color and Weathering fastness/ AST19A60.9005

Delivery State			Artificial weathering	
	given value	actual value	3 GJ	8 GJ
L *	27.14	27.54	26.38	26.23
a*	-0.05	-0.10	0.01	-0.10
b*	-0.44	-0.73	-0.28	-0.72
Δ L*		0.40	-1.25	-1.41
Δ a*		-0.05	0.10	0.00
Δ b*		-0.29	0.46	0.02
Colour distance Δ E*_{ab}		0.8	1.34	1.41
Grey scale (GM) A02 ¹			4	4
Visual assessment with regard to changes	1-fold		without any complaint	without any complaint
	10-fold		without any complaint	without any complaint

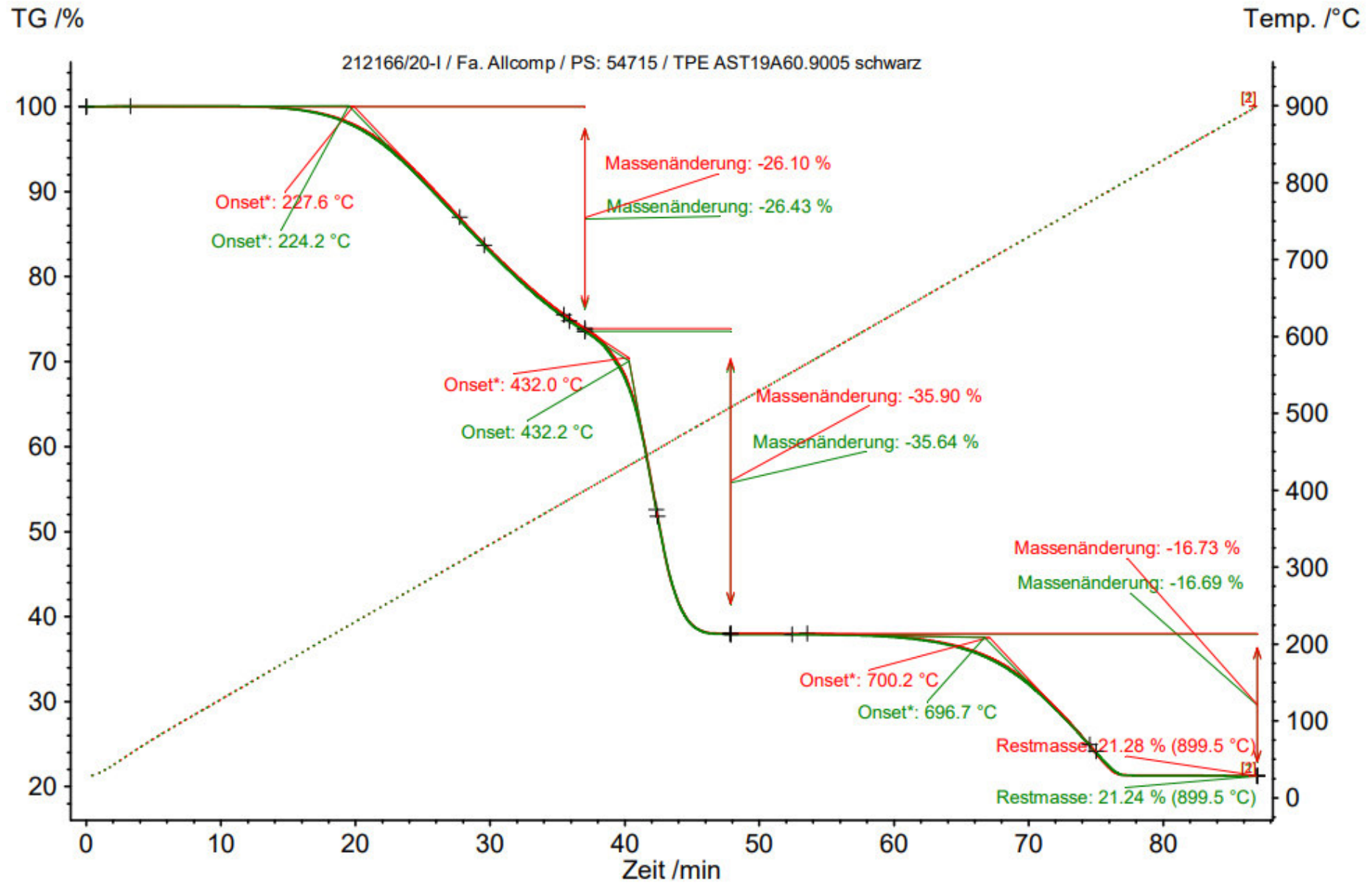
¹ Fastness grade of the grey scale according to ISO 105-A02 or ISO 105-A03 (white)

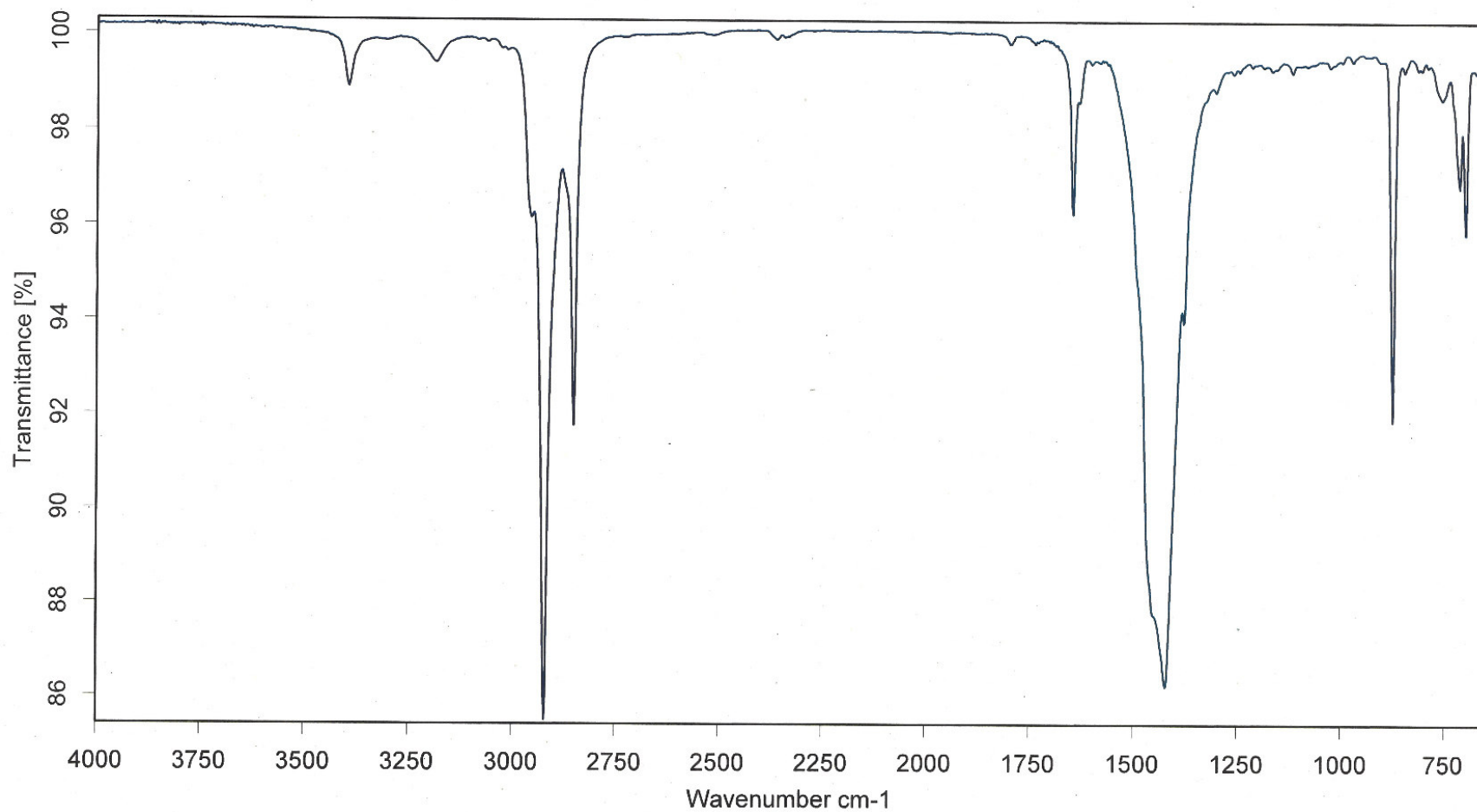
5. Summary

The demands on the sealant in view of the suitability for the use in plastic window and door systems according to RAL-GZ 716 Quality and Test Requirements for Components and Procedures, Section B: Seals for plastic windows and doors (issue July 2020) are met in all points tested.

The proof of suitability applies to the sealing material with the manufacturer's specification:

Material designation	AST19A60.9005
Colour	Black (L* = 27.14; a* = -0.05; b* = -0.44)
Density	1.18 g/cm ³
Hardness	60 Shore A
Temperature class	5
Application class	W





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Hier Text eingeben
SKZ
Testing GmbH

Prüfer: *Schi*

