

**Test report no.:** 94931/11-I-E

**Customer:** Sika Services AG  
Tüffenwies 16  
8048 Zürich  
SWITZERLAND

**Order:** Performance Test of the non sagging one-component sealant **Sikaflex® PRO-3** in accordance with EN 15651-4 Sealants for non-structural use in joints in buildings and pedestrian walkways - Part 4: Sealants for pedestrian walkways

**Verbal order of:** 2011-02-16

**Ref:** Mr Ralf Heinzmann

**Sample receipt:** 2011-02-17 and 2011-02-25

**Test period:** 2011-03-01 to 2011-05-27

The test report comprises 10 pages and 1 annex.

Würzburg, 2013-10-14  
Sc/km

i. V.



Dr. Anton Zahn



i. A.



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## Contents

<b>1.</b>	<b>Order .....</b>	<b>3</b>
<b>2.</b>	<b>Test material .....</b>	<b>3</b>
<b>3.</b>	<b>Test procedure .....</b>	<b>4</b>
3.1.1	Elastic recovery .....	5
3.1.2	Resistance to flow .....	5
3.1.3	Tensile properties (secant tensile modulus).....	5
3.1.4	Tensile properties at maintained extension.....	5
3.1.5	Determination of adhesion/cohesion properties at variable temperatures.....	5
3.1.6	Adhesion and cohesion/properties at maintained extension after immersion in water .....	6
3.1.7	Change in volume .....	6
3.1.8	Tear resistance .....	6
<b>3.2</b>	<b>Additional requirements for outdoor application .....</b>	<b>6</b>
3.2.1	Adhesion and cohesion properties after exposure to artificial irradiation .....	6
3.2.2	Adhesion and cohesion properties at maintained extension after water immersion for 28 days .....	7
3.2.3	Adhesion and cohesion properties at maintained extension after salt water immersion for 28 days.....	7
<b>3.3</b>	<b>Essential characteristics .....</b>	<b>7</b>
3.3.1	Reaction to fire .....	7
3.3.2	Durability .....	8
3.3.3	Release of chemicals dangerous to environment and health.....	8
<b>3.4</b>	<b>Additional requirements for the use in cold climates .....</b>	<b>8</b>
3.4.1	Tensile properties at maintained extension at -30 °C.....	8
<b>3.5</b>	<b>Identification requirements .....</b>	<b>8</b>
3.5.1	Thermogravimetric test .....	8
3.5.2	Specific gravity .....	8
3.5.3	Shore hardness.....	8
<b>4.</b>	<b>Test results - Sikaflex® PRO-3 .....</b>	<b>9</b>
<b>5.</b>	<b>Assessment of the test results.....</b>	<b>10</b>

**1. Order**

Company Sika Services AG, c/o Sika Deutschland GmbH, Stuttgarter Straße 117, 72574 Bad Urach, GERMANY instructed SKZ - TeConA GmbH verbally on 16 February 2011 to test the performance of an one-component sealant **Sikaflex® PRO-3** in accordance with EN 15651-4:2010-03 Sealants for non-structural use in joints in buildings and pedestrian walkways - Part 4: Sealants for pedestrian walkways. On 29 July 2013, the company Sika Services AG instructed SKZ - TeConA GmbH to issue the test report including the assessment according to EN 15651:2012-09.

**2. Test material**

The SKZ - TeConA GmbH received the following samples for testing (description is based on inspection of the samples at SKZ TeConA GmbH and on the manufacturer's data):

20 film bags one-component sealant

Designation:	<b>Sikaflex® PRO-3</b>
Type (chemical family):	i-Cure Polyurethane
Colour:	White
Batch number:	0012786460
Sample receipt:	2011-02-17

100 ml one-component primer for absorbent substrates (concrete)

Designation:	<b>Sika® Primer-3 N</b>
Batch:	0012657006
Sample receipt:	2011-02-25

### 3. Test procedure

The test of the non sagging one-component sealant **Sikaflex® PRO-3** was performed in accordance with EN 15651:2012-09, Part 4: Sealants for pedestrian walkways, class 25 HM.

The testing scope includes a Product Type Determination according to EN 15651-4.

SKZ - TeConA GmbH is a notified body approved according to the Construction Products Regulation for the product standard EN 15651-4 (code no.: NB 1213).

Unless indicated otherwise, preconditioning and test procedure was performed at standard conditioning atmosphere 23/50, class 1 according to DIN EN ISO 291: 2008-08.

#### Production and pre-treatment of test specimens

For the test specimens with the joint dimensions 12 x 12 x 50 mm were produced according to ISO 8340:2005-06.

For the determination of all tensile properties and adhesion/cohesion properties substrate according to the following table was used and prepared:

Substrate according to ISO 13640:1999-12	Primer	Drying time of the primer up to the application of the sealant in the joints
Mortar M1	<b>Sika® Primer-3 N</b>	90 min

Elastic recovery was tested by means of test specimens made of anodic aluminium according to ISO 13640:1999-12, which were cleaned with acetone and subsequently with pure water.

The preconditioning of the test specimens was carried out according to ISO 8340: 2005-06, method B.

Method A: Standard conditioning atmosphere 23/50, class 1 according to DIN EN ISO 291:2008-08

Method B: The test specimens were conditioned according to method A and subsequently, subjected three times to the following storage cycle:

- a) 3 days in the oven at  $(70 \pm 2) ^\circ\text{C}$ ;
- b) 1 day in distilled water at  $(23 \pm 2) ^\circ\text{C}$ ;
- c) 2 days in the oven at  $(70 \pm 2) ^\circ\text{C}$ ;
- d) 1 day in distilled water at  $(23 \pm 2) ^\circ\text{C}$

### 3.1 Performance requirements for non-structural sealants for pedestrian walkways

#### 3.1.1 Elastic recovery

The test was carried out according to DIN EN ISO 7389:2004-04 with test specimens made of aluminium with a 100 % extension, in relation to the initial joint width.

Requirement:

The elastic recovery shall be at least 70 %.

#### 3.1.2 Resistance to flow

The test was carried out according to DIN EN ISO 7390:2004-04.

Requirement:

According to method A and B at 5 °C und 50 °C the slump (flow) of the joint sealant must not exceed 3 mm.

#### 3.1.3 Tensile properties (secant tensile modulus)

The test was carried out according to ISO 8339:2005-06. The secant tensile modulus was determined on test specimens which were extended by 100 % of the original width at temperatures of 23 °C and -20 °C.

Requirement:

Secant tensile modulus at 23 °C: > 0.4 MPa or  
at -20 °C: > 0.6 MPa

#### 3.1.4 Tensile properties at maintained extension

The test was carried out according to ISO 8340:2005-06 with an extension of 100 % at temperatures of 23 °C and -20 °C.

Requirement:

After 24 h neither an adhesive nor a cohesive failure shall occur on the test specimens which are extended by 100 %.

#### 3.1.5 Determination of adhesion/cohesion properties at variable temperatures

The test was carried out according to ISO 9047:2001-12. The amplitude of extension/compression was  $\pm 25$  % of the initial joint width.



Requirement:

The joint sealant must not separate from the contact material nor shall the joint sealant display any signs of crack formation.

3.1.6 Adhesion and cohesion/properties at maintained extension after immersion in water

The test was carried out according to ISO 10590:2005-07 with an extension of 100 %.

Requirement:

After 24 h neither an adhesive nor a cohesive failure shall occur on the test specimens which are extended by 100 %.

3.1.7 Change in volume

The test was carried out according to ISO 10563:2005-07 in a ventilated oven.

Requirement: The change in volume must be  $\leq 10$  %.

3.1.8 Tear resistance

This test was carried out according to EN 15651-4:2010-06, 4.3.2.7 with an extension of 100 %.

Requirement: The crack width must be  $\leq 12$  mm.

3.2 Additional requirements for outdoor application

3.2.1 Adhesion and cohesion properties after exposure to artificial irradiation

This test was carried out according to DIN EN ISO 11431:2003-01, item 8.2.2, automatic weathering cycle. The irradiation was carried out even during raining phase.

**Weathering device according to DIN EN ISO 4892-2:2012-02**

Type of weathering device:	XENOTEST® BETA LM
Light source:	Xenon-arc source
Filter system:	terrestrial daylight simulation
Operation:	non-alternating mode
Black standard temperature:	65 ± 3 °C
White standard temperature:	40 - 45 °C
Test chamber temperature:	38 ± 3 °C
Relative humidity:	65 ± 10 %
Spray cycle:	18 min water spray, 102 min dry cycle
Irradiation energy EUV (300 - 400) nm:	60 ± 2 W/m <sup>2</sup>
Exposure period:	490 h

After the artificial weathering, the specimens were stored for 24 h at standard conditioning atmosphere 23/50, class 1. Subsequently, the adhesion and extension behaviour test was effected with a 100 % adhesion, taking the initial joint width as a basis.

Requirement:

After 24 h neither an adhesive nor a cohesive failure shall occur on the test specimens which are extended by 100 % and the tensile strength after the exposure to artificial weathering shall not be > 20 % compared to untreated test specimen. Additionally the samples were visually checked for changes (e. g. cracks or sticky surfaces).

### 3.2.2 Adhesion and cohesion properties at maintained extension after water immersion for 28 days

The test was carried out according to EN 15651-4:2012-09 and modified DIN EN ISO 10590: 2005-10 with 28 days water immersion instead of 4 days.

Requirement:

After 24 h neither an adhesive nor a cohesive failure shall occur on the test specimens which are extended by 100 %. Change of secant modulus must be  $\leq 50$  %.

### 3.2.3 Adhesion and cohesion properties at maintained extension after salt water immersion for 28 days

The test was carried out according to EN 15651-4:2012-09 and modified DIN EN ISO 10590: 2005-10 with 28 days salt water immersion (10 % NaCl- solution) instead of 4 days water immersion.

Requirement:

After 24 h neither an adhesive nor a cohesive failure shall occur on the test specimens which are extended by 100 %.

## 3.3 Essential characteristics

### 3.3.1 Reaction to fire

The test was performed according to DIN EN ISO 11925-2:2011-02 for classification of the sealant according to DIN EN 13501-1:2010-02. As substrate calcium silicate panels in accordance with EN 13238:2010-02 were used. 6 samples were tested with edge flaming according to EN 15651:2012-09.

The test was not carried out at SKZ - TeConA GmbH, but within the scope of a sub-contract at a testing institute accredited for the test.

Requirement:

Classification in fire behaviour class between A1 and F

### 3.3.2 Durability

No extra test of durability had been carried out.

Requirement:

In accordance to EN 15651-4:2012-09, the durability can be assessed by the properties of ISO 8339:2005-06 or ISO 8340:2005-06 and the properties of ISO 9046:2002-05, ISO 9047:2001-12, ISO 10590:2005-07 or ISO 10591:2005-07.

### 3.3.3 Release of chemicals dangerous to environment and health

No extra test of the release of chemicals dangerous to environment and health had been carried out.

## 3.4 Additional requirements for the use in cold climates

### 3.4.1 Tensile properties at maintained extension at -30 °C

The test was carried out according to ISO 8340:2005-06 with an extension of 100 % at a temperature of -30 °C.

Requirement:

After 24 h neither an adhesive nor a cohesive failure shall occur on the test specimens which are extended by 100 %.

## 3.5 Identification requirements

### 3.5.1 Thermogravimetric test

The test was performed in accordance with EN ISO 11358:1997-04, between 35 °C and 900 °C, temperature slope 10 °C/min, non-oxidative condition (nitrogen).

### 3.5.2 Specific gravity

The test was performed in accordance with DIN EN ISO 1183-1:2011-03 procedure B with a metal pycnometer.

### 3.5.3 Shore hardness

The test was performed in accordance with DIN EN ISO 868:2003-10 after preconditioning at standard climate 23/50, class 1, for 28 days.

The test was conducted using a Shore durometer type A. The test specimens were 6 mm thick and 60 mm in diameter.

Readings were taken 15 seconds after the fixed contact of the pressure foot with the test specimen had been effected.

Three samples were tested and five measurements were taken per sample.



#### 4. Test results - Sikaflex® PRO-3

4.1 Performance requirements for non-structural sealants for facade elements					
	Property	Unit	Requirement	Result	
4.1.1	Elastic recovery (DIN EN ISO 7389)	%	≥ 70	98	
4.1.2	Resistance to flow (DIN EN ISO 7390)	mm	A vertical 5 °C	≤ 3	0
			A vertical 50 °C		0
			B horizontal 5 °C		0
			B horizontal 50 °C		0
4.1.3	Secant tensile modulus (ISO 8339)	MPa	at 23 °C, 100 % extension	> 0.4	0.69
		MPa	at -20 °C, 100 % extension	> 0.6	1.29
4.1.4	Tensile properties at maintained extension (ISO 8340)	---	No failure (NF) at 23 °C and -20 °C	NF <sup>1</sup>	
4.1.5	Adhesion/cohesion properties at variable temperatures (ISO 9047)	---	No failure (NF)	NF <sup>1</sup>	
4.1.6	Adhesion/cohesion properties at maintained extension after immersion in water (ISO 10590)	---	No failure (NF)	NF <sup>1</sup>	
4.1.7	Change in volume (ISO 10563)	%	≤ 10	-0.6	
4.1.8	Tear resistance (EN 15651-4, 4.3.2.7)	mm	No failure (NF)	NF <sup>2</sup>	
4.2 Additional requirements for outdoor application					
	Property	Unit	Requirement	Result	
4.2.1	Adhesion and cohesion properties after exposure to artificial irradiation (DIN EN ISO 11431)	---	No failure (NF)	NF <sup>1</sup>	
4.2.2	Adhesion/cohesion properties at maintained extension after immersion in water for 28 days (EN 15651-4)	---	No failure (NF)	NF <sup>1</sup> change of secant modulus: -29 %	
4.2.3	Adhesion/cohesion properties at maintained extension after immersion in salt water for 28 days (EN 15651-4)	---	No failure (NF)	NF <sup>1</sup>	

<sup>1</sup> Neither adhesive nor cohesive failure occurred.

<sup>2</sup> Crack width ≤ 12 mm

4.3 Essential characteristics						
	Property					Result
4.3.1	Reaction to fire (DIN EN ISO 11925-2)					Class E <sup>3</sup>
4.3.2	Durability (EN 15651-4)					Pass <sup>4</sup>
4.4 Additional performance requirements for the use in cold climates						
	Property	Unit	Requirement			Result
4.4.1	Tensile properties at maintained extension at -30 °C (ISO 8340)	---	No failure (NF)			NF <sup>1</sup>
4.5 Identification requirements						
	Property	Unit	Single values			Result
4.5.1	Ash content (EN ISO 11358)	%	---	---	---	25.8 <sup>5</sup>
4.5.2	Gravity (DIN EN ISO 1183-1)	g/cm <sup>3</sup>	1.36	1.36	1.36	1.36
4.5.3	Shore hardness (DIN EN ISO 868)	Shore A	39	39	40	39

## 5. Assessment of the test results

The non sagging one-component sealant **Sikaflex® PRO-3** in conjunction with the substrate mortar M1 with primer **Sika® Primer-3 N** meets the requirements according to EN 15651-4:2012-09, class 25 HM.

This comprises the additional requirements for outdoor applications and the use in cold climates.

Designation	
Type:	Non-structural sealant type PW (pedestrian walkways)
Intended Use:	EXT-INT (external and internal use)
Further designation:	CC (cold climate)
Substrate:	Mortar M1 with Primer Sika® Primer-3 N
Pre-conditioning	Procedure B (according to ISO 8340)
Class:	25 HM

<sup>3</sup> The test was not carried out at SKZ - TeConA GmbH, but within the scope of a subcontract at a testing institute accredited for the test. The test report and classification report are present at the SKZ - TeConA GmbH.

<sup>4</sup> Durability had been shown by positive results according to EN ISO 8339, EN ISO 8340, EN ISO 9047 and EN ISO 10590.

<sup>5</sup> The results of the thermogravimetric test are indicated in annex 1.

<< TG/DTA >>

Data Name: probe-01

Date: 11/ 4/12 18:22

Sample: Probe 1

Reference: Leertiegel

0

mg

Temperature Program:

[C] [C/min] [min] [sec]

1\* 40 - 900 10 5 0.3

2\* 900 - 900 10 10 0.3

Comments:

Operator Scheifele

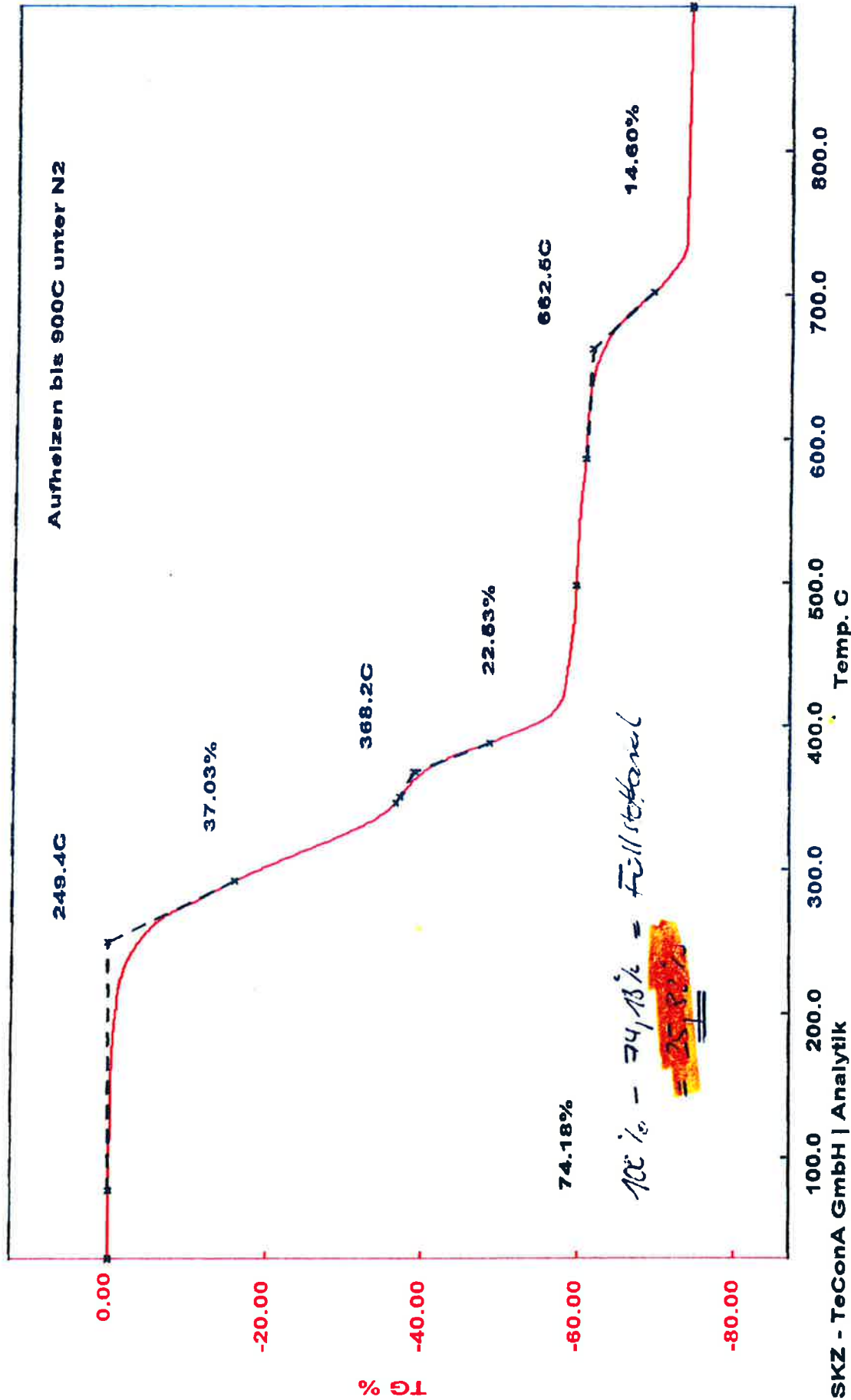
Anlage 30344

Fa. Sika

Sikatflex 11FC+weiss

Annex 1

Test report no. 94931/11-I-E



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