

**Test report no.:** 123831/16

**Customer:** Durante & Vivan s.p.a.  
via G. Garibaldi, 23  
33080 GHIRANO DI PRATA (PN)  
ITALY

**Order:** Testing of the Hydrolysis/Thermolysis and Peel test after cold storage according to Technical appendix "Section II" to RAL-GZ 716 Quality and test requirements for components and procedures (issue December 2013) on window profiles made of PVC-U laminated with films.

**Orally of:** 2016-12-07

**Ref:** Mr Michael Blasius

**Test samples received:** 2016-12-07

**Test period:** 2016-12-15 to 2017-03-16

This test report consists of 13 pages.

Würzburg, 2017-03-24  
Wk/km

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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


The company Durante & Vivan s.p.a., via G. Garibaldi 23, 33080 GHIRANO DI PRATA (PN), ITALY, instructed the SKZ - Testing GmbH orally by 7 December 2016 to test Hydrolysis/Thermolysis and Peel test after cold storage according to Technical appendix "Section II" to RAL-GZ 716 Quality and test requirements for components and procedures (issue December 2013) on window profiles made of PVC-U laminated with films.

## 2. Test material


On 7 December 2016 SKZ - Testing GmbH received following samples for testing (description is based on inspection of the samples at SKZ - Testing GmbH and on the manufacturer`s data):

Each series approx. 2 x 1 m window profile sections made of PVC-U with interrupted lamination (contact barrier) on one side with following designation:


Series I:

Profile manufacturer:	Veka
Colour of basic profile:	Weiß
Marking of the profile:	VEKA 101208 EN 12608 M II A  122 ATG 2731 IIP UNI 285 522 (NF) CSTB 323 861 9 RMa Contains recovered PVC R 0101 86 UL 10/07/2014 17:15
Adhesive manufacturer:	Durante & Vivan
Adhesive:	<b>Duditerm PU 181</b>
Primer:	<b>Primer 1060</b>
Foil manufacturer:	Renolit SE
Colour of foil:	Golden Oak
Lamination side:	Düspohl Maschinenbau GmbH, 33758 Holte-Stukenbrock

Series II:

Profile manufacturer:	Veka
Colour of basic profile:	Weiß
Marking of the profile:	VEKA 101208 EN 12608 M II A  122 ATG 2731 IIP UNI 285 522 (NF) CSTB 323 861 9 RMa Contains recovered PVC R 0101 86 UL 10/07/2014 17:15
Adhesive manufacturer:	Durante & Vivan
Adhesive:	<b>Duditerm PU 182</b>
Primer:	<b>Primer 1050</b>
Foil manufacturer:	Renolit SE
Colour of foil:	Golden Oak
Lamination side:	Düspohl Maschinenbau GmbH, 33758 Holte- Stukenbrock

Series III:

Profile manufacturer:	Veka
Colour of basic profile:	Weiß
Marking of the profile:	VEKA 101208 EN 12608 M II A  122 ATG 2731 IIP UNI 285 522 (NF) CSTB 323 861 9 RMa Contains recovered PVC R 0101 86 UL 10/07/2014 17:15
Adhesive manufacturer:	Durante & Vivan
Adhesive:	<b>Duditerm PU 182</b>
Primer:	<b>Primer 1060</b>
Foil manufacturer:	Renolit SE
Colour of foil:	Golden Oak
Lamination side:	Düspohl Maschinenbau GmbH, 33758 Holte- Stukenbrock

### 3. Test procedure

The tests described in the following have been performed in accordance with the Technical appendix "Section II" to RAL-GZ 716 Quality and test requirements for components and procedures (issue December 2013), Part II-a-4: Adhesives for laminating PVC-U-window profiles, item 5.3-2.2, item 5.3-2.3 and item 5.3-2.4.

The test procedure was carried out according to standard climate 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](http://www.skz.de).

#### 3.1 Peel test at 23 °C

The test was performed in accordance with Part II-a-4, Item 5.3-2.2. For each adhesive system 4 peel strength values were determined.

Conditions:

Test method: Peel test at 23 °C according to Technical Appendix, Section I, 4-A1-2.17.

The testing of adhesion of film was carried out by means of a peel test following the DIN EN 1372: 1999-10 in a vertical position with respect to the profile surface with a withdrawal speed of 10 mm/min.

Requirement:

The peel resistance of any of the 4 samples shall not be less than 3.0 N/mm.

### 3.2 Peel test after cold storage

The test was performed in accordance with Part II-a-4, Item 5.3-2.3. For each adhesive system 4 peel strength values were determined.

Conditions:

Test method: Peel test at 23 °C according to Technical Appendix Section I, 4-A1-2.17.

Cold storage: at -10 °C (+0/-2) for 24 hours

Reconditioning: standard conditioning atmosphere 23 °C / 50 % rel. humidity, class 1 according to DIN EN ISO 291: 2008-08 (approx. 2 h)

The testing of adhesion of film was carried out by means of a peel test following the DIN EN 1372: 1999-10 in a vertical position with respect to the profile surface with a withdrawal speed of 10 mm/min.

Requirement:

After the cold storage, the peel resistance of any of the 4 samples shall not be less than 3.0 N/mm.

### 3.3 Hydrolysis/thermolysis test

The test was performed in accordance with Part II-a-4, Item 5.3-2.4. Each 4 peel strength values were determined prior to and after storage in a climate cabinet.

Conditions:

Test method:	Peel test at 23 °C according to Technical Appendix, Section II, Annex I-5.3
Storage duration:	42 days in the climate cabinet
Climatic conditions:	70 °C and 98 % rel. humidity
Reconditioning:	standard conditioning atmosphere 23 °C / 50 % rel. humidity, class 1 according to DIN EN ISO 291: 2008-08 (approx. 2 h)

The testing of adhesion of film was carried out by means of a peel test following the DIN EN 1372: 1999-10 in a vertical position with respect to the profile surface with a withdrawal speed of 10 mm/min.

Requirement:

Prior to the storage in a climate cabinet the peel resistance of any of the 4 samples shall not be less than 3.0 N/mm.

After the storage in a climate cabinet the peel resistance of any of the 4 samples shall not be less than 1.5 N/mm (or film crack).



#### 4. Test results

##### 4.1 Test results of series I: Duditerm PU 181 + Primer 1060

##### 4.1.1 Peel test at 23 °C

Adhesion of film at 23 °C / prior to cold storage / prior to storage in a climate cabinet

Sample no.	Peel resistance [N/mm]		Ultimate tensile stress [N]	Remark
	avg. peel force sample width	tear force sample width		
1	---	3.9	77.6	stretching and crack of film without peeling off from supporting profile
2	---	3.9	77.1	stretching and crack of film without peeling off from supporting profile
3	---	4.0	80.2	stretching and crack of film without peeling off from supporting profile
4	---	3.9	77.9	stretching and crack of film without peeling off from supporting profile

##### 4.1.2 Peel test after cold storage

Adhesion of film after cold storage

Sample no.	Peel resistance [N/mm]		Ultimate tensile stress [N]	Remark
	avg. peel force sample width	tear force sample width		
1	---	4.3	85.1	stretching and crack of film without peeling off from supporting profile
2	---	4.2	84.4	stretching and crack of film without peeling off from supporting profile
3	---	4.1	81.2	stretching and crack of film without peeling off from supporting profile
4	---	4.0	79.5	stretching and crack of film without peeling off from supporting profile

#### 4.1.3 Hydrolysis/thermolysis test

Adhesion of film after storage in a climate cabinet

Sample no.	Peel resistance [N/mm]		Ultimate tensile stress [N]	Remark
	avg. peel force sample width	tear force sample width		
1	1.8	---	---	approx. 37 mm peeling of film without stretching, subsequently discontinuation of testing
2	1.7	---	---	approx. 38 mm peeling of film without stretching, subsequently discontinuation of testing
3	1.7	---	---	approx. 37 mm peeling of film without stretching, subsequently crack of film
4	1.6	---	---	approx. 39 mm peeling of film without stretching, subsequently crack of film



## 4.2 Test results of series II: Duditerm PU 182 + Primer 1050

### 4.2.1 Peel test at 23 °C

Adhesion of film at 23 °C / prior to cold storage / prior to storage in a climate cabinet

Sample no.	Peel resistance [N/mm]		Ultimate tensile stress [N]	Remark
	avg. peel force sample width	tear force sample width		
1	---	3.5	69.5	crack of film without stretching and peeling off from supporting profile
2	---	3.6	72.3	stretching and crack of film without peeling off from supporting profile
3	---	3.5	69.4	stretching and crack of film without peeling off from supporting profile
4	---	3.8	76.4	stretching and crack of film without peeling off from supporting profile

### 4.2.2 Peel test after cold storage

Adhesion of film after cold storage

Sample no.	Peel resistance [N/mm]		Ultimate tensile stress [N]	Remark
	avg. peel force sample width	tear force sample width		
1	---	4.0	79.8	stretching and crack of film without peeling off from supporting profile
2	---	3.7	73.4	crack of film without stretching and peeling off from supporting profile
3	---	3.5	69.4	crack of film without stretching and peeling off from supporting profile
4	---	3.7	74.3	stretching and crack of film without peeling off from supporting profile

#### 4.2.3 Hydrolysis/thermolysis test

Adhesion of film after storage in a climate cabinet

Sample no.	Peel resistance [N/mm]		Ultimate tensile stress [N]	Remark
	avg. peel force sample width	tear force sample width		
1	2.0	---	---	approx. 36 mm peeling of film without stretching, subsequently discontinuation of testing
2	2.1	---	---	approx. 36 mm peeling of film without stretching, subsequently discontinuation of testing
3	2.1	---	---	approx. 35 mm peeling of film without stretching, subsequently discontinuation of testing
4	1.8	---	---	approx. 40 mm peeling of film without stretching, subsequently discontinuation of testing

### 4.3 Test results of series III: Duditerm PU 182 + Primer 1060

#### 4.3.1 Peel test at 23 °C

Adhesion of film at 23 °C / prior to cold storage / prior to storage in a climate cabinet

Sample no.	Peel resistance [N/mm]		Ultimate tensile stress [N]	Remark
	avg. peel force sample width	tear force sample width		
1	---	3.5	69.2	stretching and crack of film without peeling off from supporting profile
2	---	3.5	70.8	stretching and crack of film without peeling off from supporting profile
3	---	3.8	75.0	stretching and crack of film without peeling off from supporting profile
4	---	3.8	76.4	stretching and crack of film without peeling off from supporting profile

#### 4.3.2 Peel test after cold storage

Adhesion of film after cold storage

Sample no.	Peel resistance [N/mm]		Ultimate tensile stress [N]	Remark
	avg. peel force sample width	tear force sample width		
1	---	3.7	73.4	stretching and crack of film without peeling off from supporting profile
2	---	3.7	73.9	stretching and crack of film without peeling off from supporting profile
3	---	3.8	75.7	stretching and crack of film without peeling off from supporting profile
4	---	4.2	83.0	stretching and crack of film without peeling off from supporting profile

#### 4.3.3 Hydrolysis/thermolysis test

Adhesion of film after storage in a climate cabinet

Sample no.	Peel resistance [N/mm]		Ultimate tensile stress [N]	Remark
	avg. peel force sample width	tear force sample width		
1	1.9	---	---	approx. 35 mm peeling of film without stretching, subsequently discontinuation of testing
2	1.9	---	---	approx. 36 mm peeling of film without stretching, subsequently discontinuation of testing
3	2.0	---	---	approx. 35 mm peeling of film without stretching, subsequently discontinuation of testing
4	1.7	---	---	approx. 47 mm peeling of film without stretching, subsequently discontinuation of testing

**5. Assessment of the test results**

The requirements of the Technical Appendix „Section II“ to RAL-GZ 716 Quality and test requirements for components and procedures (issue December 2013) with regard to the peel test at 23 °C, the peel test after cold storage and the hydrolysis/thermolysis test are met.