

## TEST REPORT No. 90-17-0074

### JOB

No.: 90160210  
Client: WINCO Technologies SAS  
ZI des Châtelets  
8, Rue du Boisillon  
22950 TREGUEUX  
France

### OBJECT OF TESTING

Product: Underlay sheet SKYTECH PRO XL  
Joint of the sheets using reinforced aluminium adhesive tape Reflexbond XL  
Manufacturer: Identically from client  
Manufacturing plant: WINTEK  
470, Sari-ri, Daechang-myeon  
Yeongcheon-city, Kyungsangbuk-do  
Republic of Korea

Standards of product: EN 13859-1: 2010 Flexible sheets for waterproofing. Definitions and characteristics of underlays. Part 1: Underlays for discontinuous roofing

### PRODUCT SAMPLES

#### Description of samples:

- Underlay sheet SKYTECH PRO XL - a piece of product of area approx. 5,5 m<sup>2</sup> (production width - 1,0 m, length - 5,5 m)
- Reinforced aluminium adhesive tape Reflexbond XL - one roll of dimensions 75 mm x 25 m

Sampler: Manufacturer

Place and date of delivery: Laboratory branch in Tatranská Štrba on 21<sup>st</sup> October 2016

Designation of sample by lab.: 207/16 - Underlay sheet SKYTECH PRO XL  
208/16 - Reinforced aluminium adhesive tape Reflexbond XL

### Preparation of glued joints

- From sample of Underlay sheet SKYTECH PRO XL were cut out eight pieces along longitudinal edges of sheet of dimensions approx. 800 mm x 300 mm
  - The two twosome pieces were glued using reinforced aluminium adhesive tape Reflexbond XL - so as to be able clamp the ends of test specimens into the jaws of the testing machine and carry out the test peel resistance of joints (see to figure 2, STN EN 12316-2)
  - The two twosome pieces were glued using reinforced aluminium adhesive tape Reflexbond XL - so as to be able clamp the ends of test specimens into the jaws of the testing machine and carry out the test shear resistance of joints
  - The positions of joints were wiped several times with strong pressure of the palm
  - Length of glued joints: 4x approx. 800 mm
  - Subsequently were joints perpendicularly cut into to test specimens 50 mm wide
- Glued joints prepared by: Ing. František Halčín

## TESTS

### Resistance to water penetration - Class W1

**Test procedure:** STN EN 1928: 2001 Flexible sheets for waterproofing. Bitumen, plastic and rubber sheets for roof waterproofing. Determination of watertightness

**Description of test specimens:** 3 pcs. of circular test specimens - of diameter 200 mm

**Test specimens prepared by:** Milan Ševčík

**Test conditions:** Method A  
Test temperature 21,8°C

**Deviations from the standard:** Modifications according to EN 13859-1, clause 5.2.3:

- Water column - 200 mm (2 kPa),
- Using water dyed with 0,05% eosin (instead of a moisture indicating mixture of sugar and methylene blue),
- One layer of laboratory filter paper with a mass per unit area of 80 g/m<sup>2</sup>,
- Test period: 2 h (instead 24 h),

**Date of test:** 17<sup>th</sup> November 2016

**Test personnel:** Milan Ševčík

### Peel resistance of joints

**Test procedure:** STN EN 12316-2: 2013 Flexible sheets for waterproofing. Determination of peel resistance of joints. Part 2: Plastic and rubber sheets for roof waterproofing

**Description of test specimens:** 5 pcs. of rectangular test specimens of width (50 ± 1) mm. Length of test specimens is such that they can be clamped in the jaws distanced 100 mm from each other and testing their perpendicularly to the joints. The test specimens were cut out from the prepared sample, perpendicularly to joint, so that the glued joints were in centre of the test specimens (details for preparation of glued joint - see to above)

**Test specimens prepared by:** Ing. František Halčín

**Test conditions:** Test temperature 21,6°C

**Deviations from the standard:** None

**Date of test:** 15<sup>th</sup> November 2016

**Test personnel:** Milan Ševčík

### Shear resistance of joints

**Test procedure:** STN EN 12317-2: 2011 Flexible sheets for waterproofing. Determination of shear resistance of joints. Part 2: Plastic and rubber sheets for roof waterproofing

**Description of test specimens:** 5 pcs. of rectangular test specimens of width (50 ± 1) mm. Length of test specimens is such that they can be clamped in the jaws distanced 200 mm from each other and testing their perpendicularly to the joints. The test specimens were cut out from the prepared sample, perpendicularly to joint, so that the glued joints were in centre of the test specimens (details for preparation of glued joint - see to above)

**Test specimens prepared by:** Ing. František Halčín

**Test conditions:** Test temperature 21,6°C

**Deviations from the standard:** None

**Date of test:** 15<sup>th</sup> November 2016

**Test personnel:** Milan Ševčík

### Artificial ageing by exposure to the combination of UV irradiation and heat

**Test procedure:** STN EN 1297: 2005 Flexible sheets for waterproofing. Bitumen, plastic and rubber sheets for roof waterproofing. Method of artificial ageing by long term exposure to the combination of UV radiation, elevated temperature and water  
STN EN 1296: 2002 Flexible sheets for waterproofing. Bitumen, plastic and rubber sheets for roof waterproofing. Method for artificial ageing by long term exposure to elevated temperature

**Description of test specimens:** 3 pcs. of circular test specimens - of diameter 200 mm  
2x 5 pcs. of rectangular test specimens of width (50 ± 1). Length of test specimens is such that they can be clamped in the jaws distanced 100 mm, resp 200 mm from each other and testing their perpendicularly to the joints. The test specimens were cut out from the prepared samples, perpendicularly to joints, so that the glued joints were in centre of the test specimens (details for preparation of glued joint - see to above)

**Test specimens prepared by:** Milan Ševčík, Ing. František Halčín

**Deviations from the standard:** Test procedure is specified in annex C, EN 13859-1, (by reference in EN 13859-1, clause 5.2.10 and clause 4.3.8) and another modification, as follows:

- Exposure of test specimens to UV-A irradiation and elevated temperature in accordance with STN EN 1297, continuously - not using water spraying:
    - Laboratory light source: fluorescent UV-A lamps (type I - 340 nm),
    - A Black Standard Temperature (BST) of  $(50 \pm 3/0)^{\circ}\text{C}$ ,
    - Duration of exposure: 336 h
  - Following to finish UV irradiation - exposure of test specimens to heat in accordance with STN EN 1296:
    - Duration of exposure: 90 days at  $(70 \pm 2)^{\circ}\text{C}$
- After finish of exposure to artificial ageing were performed tests:
- Resistance to water penetration in accordance with STN EN 1928 and modifications noted-up.
  - Peel resistance of joints in accordance with STN EN 12316-2 and modifications noted-up,
  - Shear resistance of joints in accordance with STN EN 12317-2 and modifications noted-up,
- Test date:** Exposure to artificial ageing: from 17<sup>th</sup> November 2016 to 1<sup>st</sup> March 2017  
 Resistance to water penetration - Class W1: 6<sup>th</sup> March 2017  
 Peel resistance of joints: 26<sup>th</sup> March 2017  
 Shear resistance of joints: 26<sup>th</sup> March 2017
- Test personnel:** Milan Ševčík

### Applied instrumentation:

ID	Name	Range	Unit	Division
M900011	Stopwatch	(0 - 1800)	s	0,1
M900029	Measure tape	(0 - 5000)	mm	1
M900031	Digital calliper	(0 - 150,00)	mm	0,01
M900041	Universal testing machine	(0 - 100)	N	0,01
		(0 - 1400)	mm	0,001
M900044	Automatic recorder of temperature and humidity 460	((-25) - 45)	$^{\circ}\text{C}$	0,1
		(15 - 95)	%	1,0
M900045	Automatic recorder of temperature and humidity 461	((-25) - 45)	$^{\circ}\text{C}$	0,1
		(15 - 95)	%	1,0
Z900002	Apparatus for artificial ageing Q-U-V tester			
Z900007	Laboratory ventilated oven 400 l			
Z900017	Apparatus for testing of water tightness			

## TEST RESULTS

### Resistance to water penetration - Class W1

Test specimen No.	Resistance to water penetration - Class W1 (-)
1	<b>Without penetration of water</b>
2	<b>Without penetration of water</b>
3	<b>Without penetration of water</b>

### Peel resistance of joints

Peel resistance of joints		
Test specimen No.	Maximum tensile force (N/50 mm)	Mode of failure (-)
1	38,41	Peeling of the adhesive tape in joint
2	38,18	
3	42,58	
4	42,55	
5	41,04	
Average	<b>41</b>	
Extended uncertainty	2	

### Shear resistance of joints

Shear resistance of joints		
Test specimen No.	Maximum tensile force (N/50 mm)	Mode of failure (-)
1	131,7	Failure of the adhesive tape in joint
2	128,2	
3	100,5	
4	143,5	
5	140,3	
Average	<b>129</b>	
Extended uncertainty	15	

### Artificial ageing by exposure to the combination of UV irradiation and heat

- Exposure of test specimens to UV-A irradiation and elevated temperature
- Following to finish UV irradiation - exposure of test specimens to heat at 70°C

Testing after exposure:

- Resistance to water penetration - Class W1
- Peel resistance of joints
- Shear resistance of joints

### - Resistance to water penetration - class W1 after artificial ageing by exposure to the combination of UV irradiation and heat

Test specimen No.	Resistance to water penetration - Class W1 after artificial ageing by exposure to the combination of UV irradiation and heat (-)
1	<b>Without penetration of water</b>
2	<b>Without penetration of water</b>
3	<b>Without penetration of water</b>

### - Peel resistance of joints after artificial ageing by exposure to the combination of UV irradiation and heat

Peel resistance of joints after artificial ageing by exposure to the combination of UV irradiation and heat		
Test specimen No.	Maximum tensile force (N/50 mm)	Mode of failure (-)
1	50,71	Peeling of the adhesive tape in joint
2	61,07	
3	51,32	
4	59,82	
5	54,40	
Average	<b>55</b>	
Extended uncertainty	4	

### - Shear resistance of joints after artificial ageing by exposure to the combination of UV irradiation and heat

Shear resistance of joints after artificial ageing by exposure to the combination of UV irradiation and heat		
Test specimen No.	Maximum tensile force (N/50 mm)	Mode of failure (-)
1	144,70	Failure of the adhesive tape in joint
2	145,50	
3	150,50	
4	148,00	
5	143,30	
Average	<b>146</b>	
Extended uncertainty	3	

Date of report: 27<sup>th</sup> March 2017

Prepared by: Ing. František Halčín

Authorized by:   
.....  
Ing. Erika Halčinová  
Head of Laboratory Branch



#### Notes:

- Unless the Test Laboratory makes the sampling, data on the manufacturer, its manufacturing plant and about the sampling are presented according to information provided by the client
- Testing was carried out according to the Operational Procedure No. PP-037 of the Test laboratory in compliance with the listed test procedure
- The given extended uncertainty U is based on the standard uncertainty multiplied by the coverage factor k = 2, that in case of the normal distribution provides the reliability in the order of 95%
- Presented results are relevant to the product sample only
- This report shall not be reproduced except in full without written approval of the Test Laboratory.

————— **End of test report** —————