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Accredited Test Laboratory  
D-PL-17774-01-00 and notified  
Product Certification Body 1368 in  
accordance with the CPR

## Test report 03 / 2018

**Test of the resistance to wind uplift according to ETAG 006, the Guideline for European technical approval of systems of mechanically fastened flexible roof waterproofing membranes, chapter 5.1.4.1 (Edition November 2012)**

**Client:** Koelner Rawlplug IP Sp. z o.o.  
Kwidzynska 6  
51-416 Wroclaw  
Poland

Tests in accordance with  
ETAG Nr. 006

**Note**

This test report consists of 5 pages. It shall only be copied and published unabbreviated

**Contents**

1. General Conditions
2. Construction of test specimen
  - 2.1 Tested System
  - 2.2 Assembly of the test specimen
3. Applied load cycles
4. Load spectrum ETAG Nr.006
5. Test results
6. Note
7. Analysis
  - 7.1 Drawing of test specimen
  - 7.2 Pictures of test specimen

Aachen, 22.02.2018

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## 1. General conditions

The indicated test data are valid under test conditions only. A successful application under other than the reported test conditions is not proven with this test report. This report is the intellectual property of I.F.I. Institut für Industrieaerodynamik GmbH and must be copied as a whole only. It is only allowed to be published with I.F.I. written permission

## 2. Construction of the test specimen

### 2.1 Tested System

#### Profiled metal sheeting

Type: E 106  
Thickness: 0.75 mm

#### Thermal insulation

Type: Hardrock 040  
Thickness: 100 mm  
Manufacturer: DEUTSCHE ROCKWOOL  
GmbH & Co. OHG  
Rockwool Straße 37-41  
45966 Gladbeck  
Germany

#### Roof membrane

Type: Plastfoil ECO  
Thickness: 1.5 mm  
Sheet width: 2100 mm  
Overlap: 120 mm  
Joining technology: heat-welded

Manufacturer: Penoplex Spb Limited  
191014 Saint Petersburg  
Russia

#### Type of fastening

Type: Plate: GOK-085-Ø 50 mm  
Screw: WX – 4.8 T060

Manufacturer: Koelner Rawlplug IP Sp. z o.o.  
Kwidzynska 6  
51-416 Wroclaw  
Poland

Distance between fasteners: a: 1980 mm  
Distance between fasteners: b: 250 mm  
Area of influence  $A_i$ : 0.50 m<sup>2</sup>  
Fastener density  $A^{-1}$ : 2.02 fastener / m<sup>2</sup>

### 2.2 Assembly of the test specimen

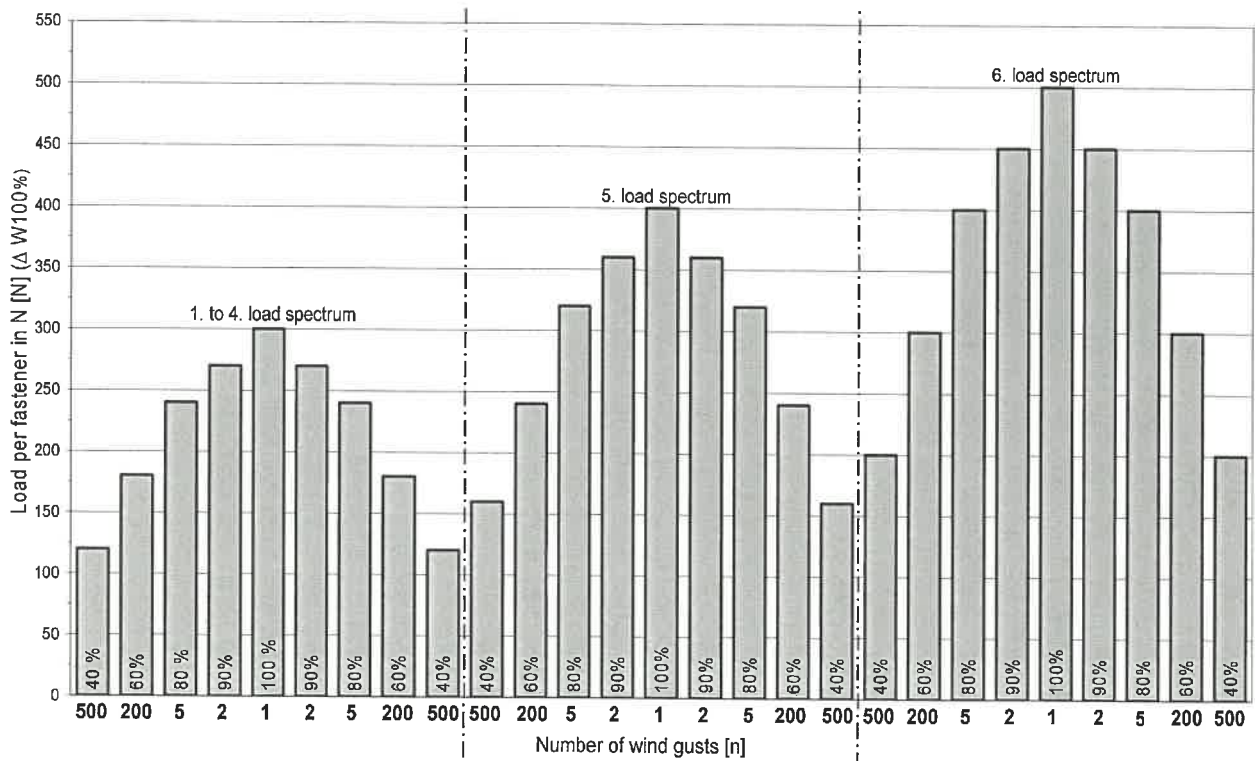
On the profile metal sheets of type with dimensions  $B = 1400 \text{ mm} \times L = 6000 \text{ mm}$ , the thermal insulation of the type Hardrock 040 was applied to the upper flanges of the profile metal sheets and mechanically fastened. The roof membrane was attached to the 100 mm thick mineral wool. The roof membrane was installed perpendicular to the upper flanges of the profile sheets with an overlap of 120 mm and in each upper flange mechanically attached. The overlaps were heat-welded.

### 3. Applied load cycles

Number of Cycles	Load per fastener in N ( $\Delta W_{100\%}$ )
4	300
1	400
1	500
1	600
1	700
1	800
1	900
1	1000
1	1100
1	1200

Number of Cycles	Load per fastener in N ( $\Delta W_{100\%}$ )
1	1300
1	1400
1	1500
1	1600
1	1700
1	1800
1	1900
1	2000
1	2100
1	2200
1	2300

### 4. Load spectrum ETAG Nr.006



## 5. Test results

For the calculation of the test result based on the following values:

$W_{\text{test}} = 2300 \text{ N / fastener}$	applied test pressure of the specimen
$C_a = 0.51$	geometric correction factor
$C_d = 0.90$	statistical correction factor
$\gamma_m = 1.5$	coefficient of safety

Failure of test specimen:

The failure of the specimen occurred at the load cycle  $\Delta w_{100\%} = 2400 \text{ N / fastener}$ .

The maximum load before failure is:

$$W_{\text{test}} = 2300 \text{ N / fastener}$$

Failure probability:

corrected in accordance with the statistical probability of failure  $C_d$  and the dimensions of the test facility  $C_a$ , maximum load:

$$\begin{aligned}W_{\text{corr}} &= W_{\text{test}} \cdot C_a \cdot C_d \\W_{\text{corr}} &= 2300 \text{ N / fastener} \cdot 0.51 \cdot 0.90 \\W_{\text{corr}} &= 1056 \text{ N / fastener}\end{aligned}$$

Admissible load per fastener not considering the temperature influence:

$$\begin{aligned}W_{\text{adm}} &= W_{\text{corr}} / \gamma_m \\W_{\text{adm}} &= 1056 \text{ N / fastener} / 1.5 \\W_{\text{adm}} &= \mathbf{704 \text{ N / fastener}}\end{aligned}$$

## 6. Note

The test has been carried out at an ambient temperature of 19 °C. The distance between fasteners and the edge of the roof membrane was 10 mm. The test was started ten days after the installation of the test specimen.

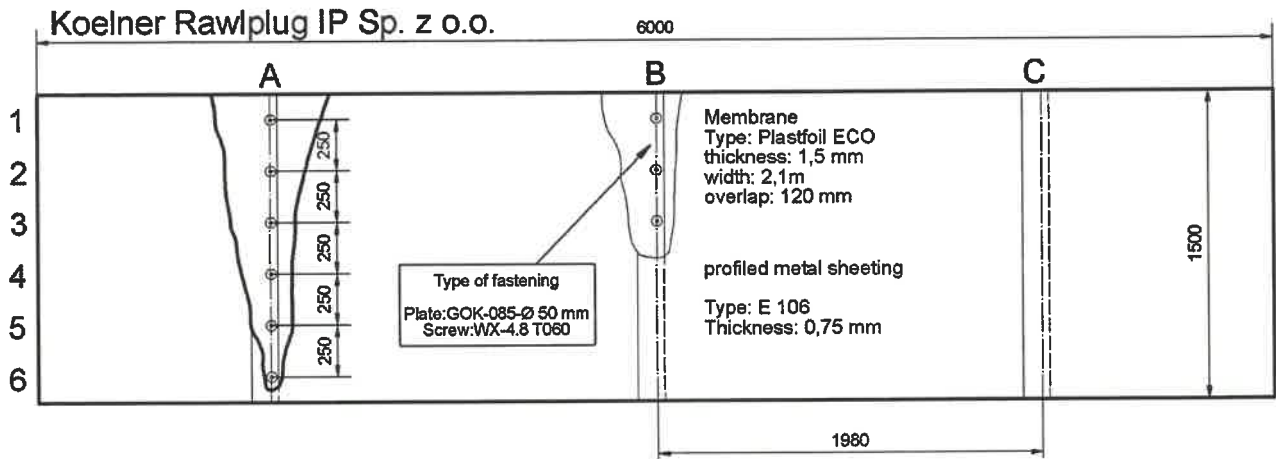
## 7. Analysis

The failure of the specimen occurred at the load cycle  $\Delta w_{100\%} = 2400 \text{ N / fastener}$ .

Damage observed:

- The fasteners B2, B3, and B4 have been pulled out of the high flute of the sheet metal deck. (c. f. figures 1 and 2)

7.1 Drawing of test specimen



7.2 Pictures of test specimen



Fig.1



Fig.2