

## Report

### Fatrafol 810/V / Guardian R(P) 45

Order number: 0334-L-08/1

Ref.: ARH/GZ

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**Subject** : resistance to dynamic wind forces  
according to ETAG 006

**Order date** : 2008.09.30

**Report date** : 2008.11.24

**Rapporteur** : A.R. Hameete

**Authorisation** : prof. ir N.A. Hendriks

**Initials** : 



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## 1 Introduction

By order of Fatra A.S., BDA Keuringsinstituut B.V. has determined the resistance to wind load of a mechanically fastened roof waterproofing system with a Fatrafol 810/V roofing sheet in combination with a Guardian R(P)45/Guardian PS-48080 fastening system.

On 4 November, 2008 the fastening system has been set at disposal by Mr R. van Doren of Afast B.V.

On 4 November, 2008 the roof waterproofing sheet has been set at disposal by Mr R.E.M. van Hijfte and Mr J.P. Leemrijse of Aabo Trading Company B.V.



## 2 Investigation

The investigation on the resistance to dynamical wind forces has been performed according to the European directive ETAG 006: Guideline for European Technical Approval of Systems of mechanically fastened flexible roof waterproofing membranes (2000-03, amended 2007-04).

The test has been performed in week 45, 2008.

See annex C for the test schedule.

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### 3

## Construction of the test specimen

On 3 November, 2008 the build-up of the substructure and the application of the insulation have been performed by Mr W.C. Wiersma of BDA Keuringsinstituut B.V.

On 4 November, 2008 the roof waterproofing sheet has been applied by Mr J.P. Leemrijse of Aabo Trading Company B.V.

On 4 November, 2008 the fastening system has been applied by Mr R. van Doren of Afast B.V.

The test specimen has been built up in the presence of Mr R.E.M. van Hijfte of Aabo Trading B.V. and Mr A.R. Hameete of BDA Keuringsinstituut B.V.

The specimen has the test dimensions of 6,00 m × 2,00 m and has been built up according to the prescribed data of the principal from below upwards:

### Substructure

- \* profiled steel deck, "106 profile", thickness 0,75 mm.

### Thermal insulation

- \* Rockwool Taurox, dimensions 2000 mm × 600 mm, thickness 100 mm, mechanically fastened with 2 fasteners for each board.

### Roofing sheet:

- \* Fatrafol 810/V roofing sheet, production code 06-05-2008.  
The spacing between the individual fasteners has been set at 250 mm.  
The spacing between the rows of fasteners has been set at 1880 mm.  
The joint has been welded with hot air.



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**Fastening system:**

- \* roofing screw : Guardian PS-48080
- washer : Guardian R(P)45

The fixation at the perimeter has been realized using wooden planks, with dimensions of 120 mm × 18 mm, whereby the roofing sheet has been welded around the planks (see annex D).  
The mutual spacing between the fasteners at the perimeter fixation has been set at 250 mm.

For further package data of the applied product, see annex E.

A photo report of the build-up and the failure mode is given in annex B.





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## 4 Results

### Resistance to dynamic wind load

At the 100 % step of the cycle of  $\Delta W_{\max 100 \%} = 1400 \text{ N}$  (theoretical load) per fastener the test model has collapsed by tearing the roofing sheet at the perforations of the fastening system.

According to ETAG 006 the test result is 1300 N (theoretical load) per fastener.

The test result has been interpreted in annex A.

### Remark

It shall be emphasised that this investigation is only an indication at a given moment of the properties of the investigated material and it does not provide information on the scope of the variations over the course of time.

These results shall be interpreted:

- either in the framework of a certain project, applying for the tested batch;
- or in the framework of an admission procedure for certification for a general indication in which the quality management of the manufacturer is involved.

Gorinchem, 2008.11.2

The laboratory

A.R. Hameete



BDA Keuringsinstituut B.V.

prof. ir N.A. Hendriks



## Admissible (design) load according to ETAG 006

The test result of the wind uplift test has been interpreted according to ETAG 006: "Guideline for the European Technical Approval of systems of mechanically fastened flexible roof waterproofing membranes" (2000-03, amended 2007-04).

The admissible (design) load for the wind uplift resistance has been specified in the next formula:

$$W_{adm} = \frac{W_{test} \cdot C_a \cdot C_d}{\gamma_m}$$

Wherein:

$W_{adm}$  = admissible (design) load for the wind uplift resistance (N per fastener);

$W_{test}$  = test result (N per fastener);

$C_a$  = geometric correction factor;

$C_d$  = statistical correction factor;

$\gamma_m$  = material correction factor.

System	$W_{test}$	$C_a$	$C_d$	$\gamma_m$	$W_{adm}$
Fatrafol 810/V roofing sheet mechanically fastened with Guardian R(P)45 / PS-48080 fastening system.	1300	0,82	1,0	1,5	711



**Photo 1**

The insulation has been fixed on the profiled steel.



**Photo 2**

The roof waterproofing sheet is fastened.



**Photo 3**

Detail of the fastening system.

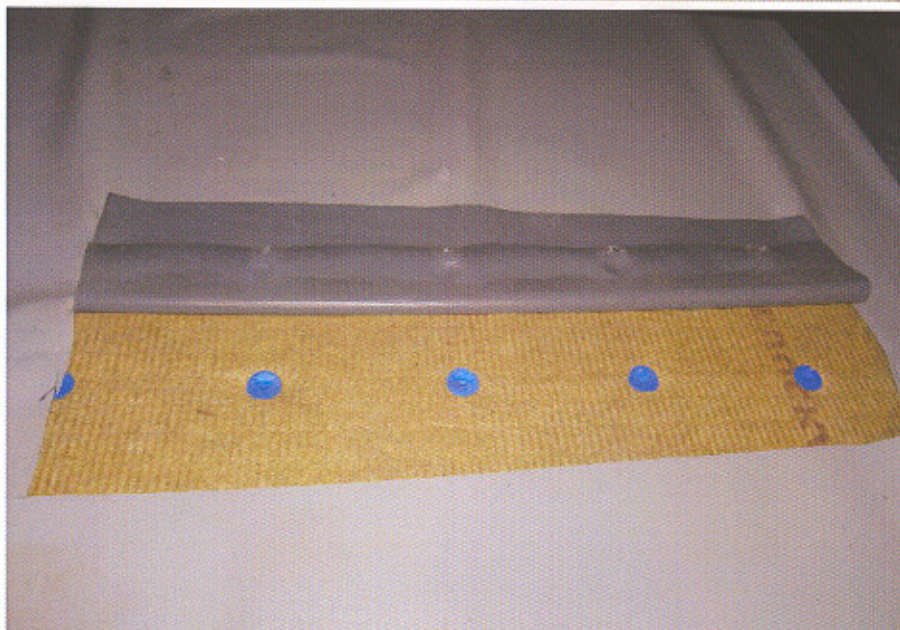




**Photo 4**  
The model is ready for testing.



**Photo 5**  
Failure mode.

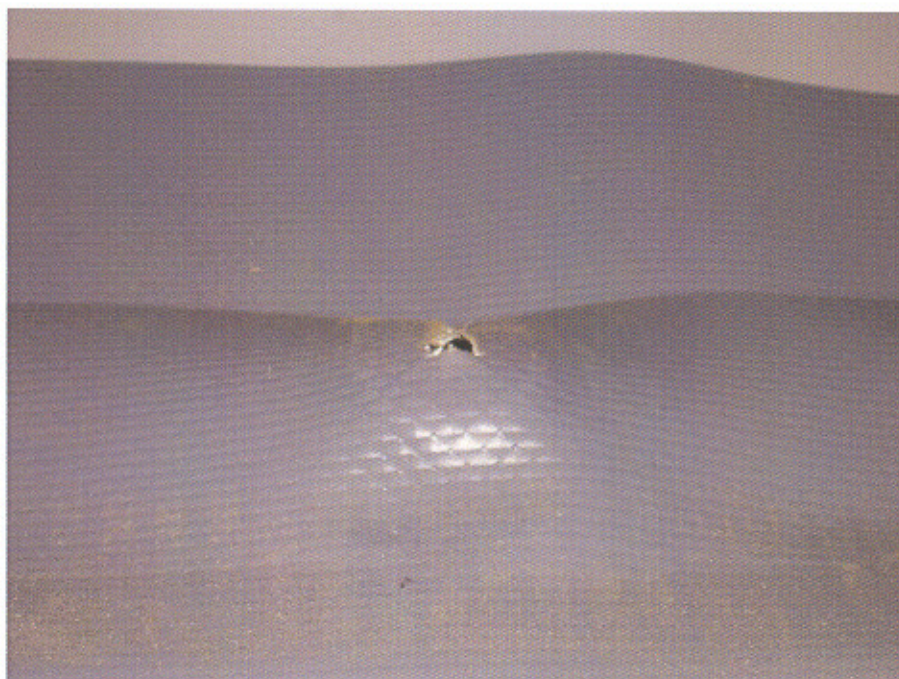


**Photo 6**  
Detail of the failure mode.





**Photo 7**  
Detail of the failure mode.

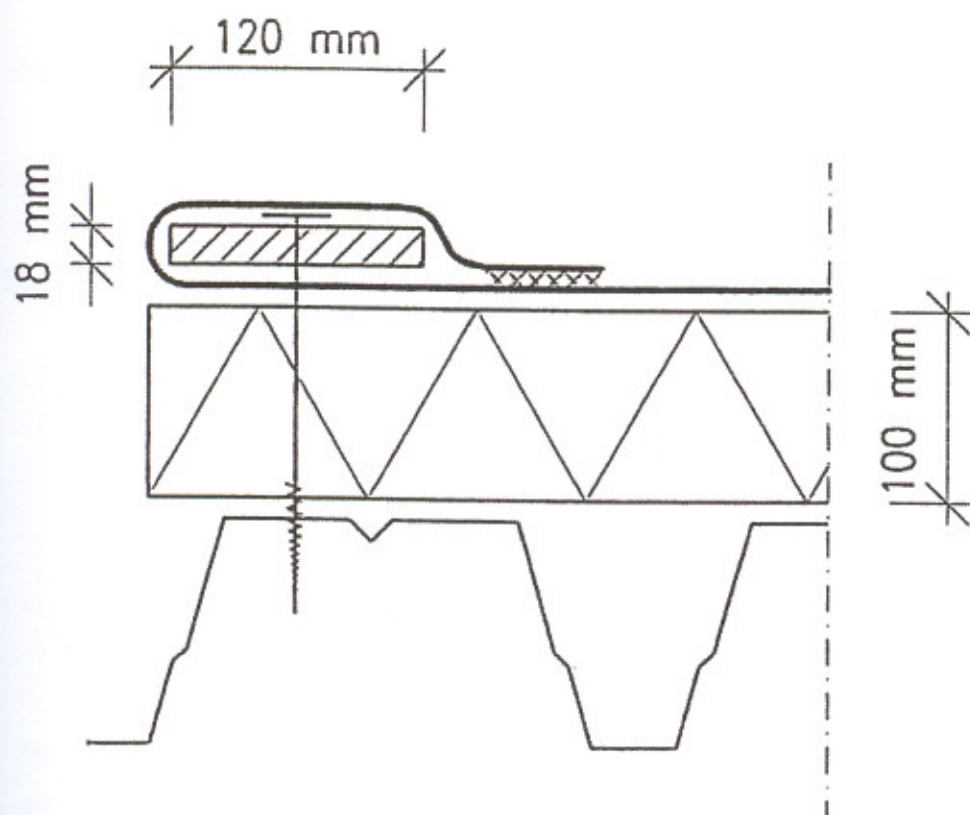


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WIND TEST									
Order number					0334-L-08				
Start of test:					4-11-2008				
End of test:					6-11-2008				
Perator(s):					W.C. Wiersma en J. Delgado				
System:					eenlaags mechanisch bevestigd				
Dimensions test area					longer side 6,00 m x shorter side (m) 2,00 m				
					a/b = 7,52 m/b = 8,00				
Distance between rows (a):					1,88 m				
Distance between fasteners (b):					0,25 m				
Number of fasteners per m²:					2,13				
Number of spaces between the rows (α)					3				
Number of spaces between te fasteners (β)					7				
					percentage peak pressure				
					number of gusts				
					peak force/fastener				
					suction pressure				



Figure 1





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## Package data of the applied product

### Substructure

**van Delft**  
Bouw- en Woningbouw

ordernummer 84 533 pakketnr. 2/5

**BIJLBOUW B.V.**

EN 14782 2008

uw referentie : 27340 - Gorinchem





CE

produkt : Warmdakplaten  
type : VD 106R/750  
dikte : 0,75 mm  
uitvoering A : Sendzimir verzinkt  
uitvoering B : Sendzimir verzinkt  
brandklasse : klasse A1

gewicht : 1.001,0 kg hoeveelheid : 102,00 m<sup>2</sup>

aantal	lengte	aantal	lengte
40	3400		

### Thermal insulation

DIKTE EPAISSEUR DICKE THICKNESS				LENGTE LONGUEUR LANGE LENGTH		BREEDTE LARGEUR BREITE WIDTH		INHOUD CONTENU INHALT CONTENTS		R declared $\lambda$ declared	
100 MM				200 CM		60 CM		28.8 M <sup>2</sup>		2.50 m <sup>2</sup> K/W 0.040 W/mK	
 <b>INTRON</b> CERTIFICATE				 04-0749				BC1-511-0003-0085-R268 ROERMOND NL A1 EUROCLASS MW-EN 13162-T4-DS(TH)- CS(10)50-TR15-PL(5)500-WS			
 <b>CTG 459</b> 001											
<b>ROCKWOOL</b> Lapinus Productie BV				22487 4ROE6LINE				 8 7 1 1 6 9 8 7 3 0 8 1 1			





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# Roofing sheet

CE	
1390	
FATRA, a.s. tř. T. Bál 1541, 763 61 Napajedla, Czech Republic	
08	
1390-CPD-0033/06/Z	
EN 13956	
Střešní fólie z PVC-P vyztužená polyesterovou mřížkou PVC-P roofing membrane with polyester scrim reinforcement	
Název výrobku Trade name	F 810/V
Rozměr Size	2000 mm x 1,20 mm
Množství Quantity	25,00 m - 50,00 m
Barva - Colour	2791 - světlá šedá - light grey
Dezén - Embossing	340V
Použití: Mechanicky kotvená hydroizolační vrstva Exposed application: Mechanically fastened waterproofing	
Reakce na oheň - Reaction to fire: B	
Chování při vnějším požáru - External fire performance: B <sub>s,d,e</sub> (f1)	
Pevnost v tahu - Tensile strength: $\geq 900$ N/50 mm, Tažnost - Elongation: $\leq 15\%$	
Odolnost proti statickému zatížení - Resistance to static loading: $\geq 20$ kg	
Vodotěsnost - Watertightness: 10 kPa (50 kPa)	
Odolnost proti nárazu - Resistance to impact: $\geq 10$ mm ( $-10^{\circ}\text{C}$ , $h=300$ mm)	
Odolnost proti potrhávání - Tear resistance: $\geq 160$ N	
Odolnost proti odlepování ve spoji - Joint peel resistance: $\geq 250$ N/50 mm	
Smyková odolnost ve spoji - Joint shear resistance: $\geq 810$ N/50 mm	
Ohebnost za nízkých teplot - Foldability at low temperature: $\leq -35^{\circ}\text{C}$	
Vystavení UV záření, zvýšené teplotě a vodě: - výhovuje, třída 0 - Exposure to UV radiation, elevated temperature and water: - pass, grade 0 -	
Datum výroby Date of Production	- 6 - 05 - 2008
Pracovník Supervisor	PŠENČÍK LEOS

## Fastening system

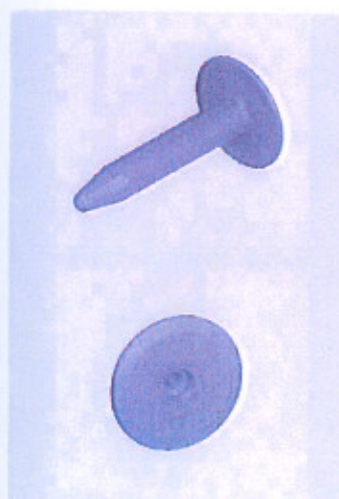
# RP 45 Plus

GUARDIAN KUNSTSTOF TELESKOOP TULE VOOR  
BEVESTIGING VAN DAKBANEN IN DE OVERLAP:

- Plus-Serie
- Gemodificeerd PP
- Afmeting rond Ø 45mm
- Gatdiameter 5,2mm
- NBI-Approval

DE KUNSTSTOF TULES UIT DE RP-SERIE ZIJN TE COMBINEREN  
MET DE VOLGENDE BEVESTIGERS UIT DE GUARDIAN-RANGE:

- PS/BS-4,8
- TS-5,2



O MM x L MM	ARTIKELCODE	VERPAKKING
45 X 20MM	RP45-020	1000
45 X 40MM	RP45-040	500
45 X 60MM	RP45-060	500
45 X 80MM	RP45-080	500
45 X 90MM	RP45-090	500
45 X 100MM	RP45-100	500
45 X 120MM	RP45-120	500
45 X 150MM	RP45-150	500
45 X 180MM	RP45-180	500
45 X 210MM	RP45-210	500
45 X 240MM	RP45-240	500
45 X 270MM	RP45-270	250
45 X 300MM	RP45-300	250
45 X 330MM	RP45-330	250

DE PLUS-SERIE IS SPECIAAL ONTWERPEN VOOR VOORMONTAGE VAN DE SCHROEVEN,  
ZODAT DEZE COMBINATIE MET HULPGEREEDSCHAPPEN EN VOLAUTOMATISCHE  
MACHINES ERGONOMISCH VERWERKT KAN WORDEN.





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# PS 4,8

## GUARDIAN PS DAKSCHROEF

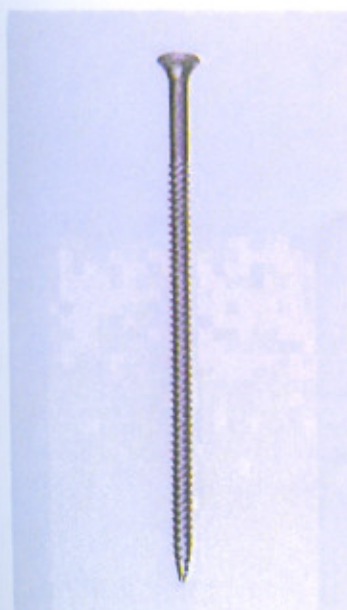
- Torx-25 Kop
- S-Punt (Capaciteit t/m 0,88mm)
- Enduroguard Coating, 15 cycli
- NBI-Approval
- Verpakt in emmers

## TE GEBRUIKEN IN

- Staal dak t/m 0,88mm

## TE VERWERKEN MET

- Ergo-Stick



Ø MM x L MM	ARTIKELCODE	VERPAKKING
4,8 x 40MM	PS-48040	1000
4,8 x 50MM	PS-48050	1000
4,8 x 60MM	PS-48060	1000
4,8 x 70MM	PS-48070	500
4,8 x 80MM	PS-48080	500
4,8 x 90MM	PS-48090	500
4,8 x 100MM	PS-48100	500
4,8 x 110MM	PS-48110	500
4,8 x 120MM	PS-48120	500
4,8 x 130MM	PS-48130	500
4,8 x 140MM	PS-48140	500
4,8 x 150MM	PS-48150	500
4,8 x 160MM	PS-48160	500
4,8 x 170MM	PS-48170	500
4,8 x 180MM	PS-48180	500
4,8 x 200MM	PS-48200	500
4,8 x 220MM	PS-48220	500
4,8 x 240MM	PS-48240	500
4,8 x 260MM	PS-48260	500
4,8 x 280MM	PS-48280	500
4,8 x 300MM	PS-48300	500

ONDERGROND	UITTREKWAARDE	BENODIGDE LENGTE: OPBOUW +
STAALDAK 0,75MM	1.600 N	20MM
STAALDAK 0,88MM	1.800 N	20MM



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Secures your roof