



PAVUS, a.s.

AUTHORIZED BODY AO 216
NOTIFIED BODY 1391
EGOLF MEMBER



L 1026

Order No: 1 07 527
(Z210070222)

FIRE TESTING LABORATORY VESELI NAD LUZNICI
Accredited Test Laboratory - accreditation issued by the Czech Institute for Accreditation, o.p.s.
Registered under Identification No. 1026

ROOF'S EXTERNAL FIRE EXPOSURE TEST REPORT

No. Pr-07-2.137

Issued on 2007-10-02

for the membrane-clad roof

Hydro-insulating Foil

FATRAFOL 810

Sponsor: **FATRA, a.s.**
Tr. Tomase Bati 1541,
763 61 Napajedla

Test method:

CSN P ENV 1187

**»Test methods for external fire exposure to roofs. Test 3: Method
with burning brands, wind,
and supplementary radiant heat «**

The Report contains: 9 page
(6 text pages + 2 annexes)

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1 INTRODUCTION

The tests for the roofs exposed to external fire, covered with FATRAFOL 810 hydro-insulating foil, thick 1.5 mm, had been performed in the Testing Laboratory of PAVUS, a.s., Veseli nad Luznici, following the order of the company of FATRA, a.s.

The tests have been prepared, performed and evaluated on the following background papers:

- [1] CSN P ENV 1187: 2002 Test methods for external fire exposure to roofs. Test 3: Method with burning brands, wind, and supplementary radiant heat.
- [2] Specimen-related Technical Documents (supplied by the Sponsor)

2 TEST SUBJECT

Two specimens were taken as the test subject, fabricated as per cl. 6.4.3.2 designated as Specimen I and Specimen II. The test specimens' size was 1200 x 3000 mm, their composition from the top layer was as follows:

- **Hydro-insulating foil FATRAFOL 810, thick 1,5 mm**
- **thermal insulation of mineral fibres, thick 60 mm**
- **steam-proof foil FATRAPAR E, thick 0,15 mm**
- **baseboard of chipboard panels**

and in the fabrication according to the pertinent technological process.

The baseboard as per [1] cl. 6.4.2.2 b) made of the panels of wood chipboards having width of 250 mm and thickness of 16 mm with straight edges and in parallel to the eaves. The gaps between chipboard panels were 5 mm.

The FATRAFOL 810 hydro-insulating foil (thick 1,5 mm), thermal insulation of mineral fibres (thick 60 mm) and FATRAPAR E steam-proof foil (thick 0,15 mm) were anchored to the baseboards of wood chipboards using the bolts and oval washers.

The FATRAFOL 810 hydro-insulating foil is a PVC-P based roof sheeting reinforced with polyester grid, it resists to UV radiation and can be exposed to the direct climatic influences. The FATRAFOL 810 hydro-insulating foil is made by way of rolling and lamination.

The measures to protect specimens' edges [1] (cl. 6.4.5) were not taken.

The test specimens were fabricated as of August 19, 2007.

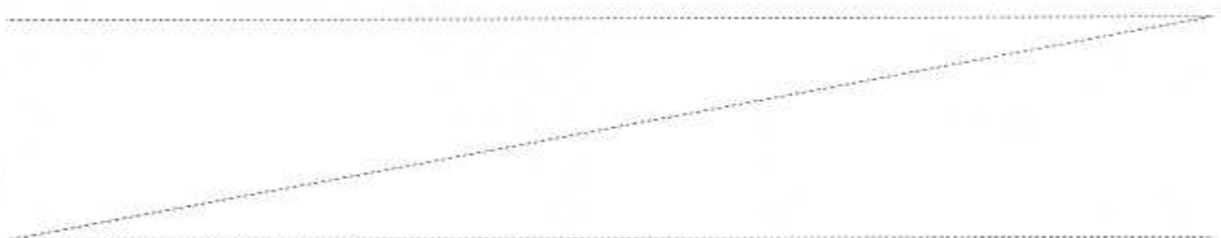
3 TEST PERFORMANCE

3.1 General

The roof external-fire exposition tests were performed as per CSN P ENV 1187.

The tests were conducted as of September 26, 2007. The initial temperature in the vicinity of testing equipment was 18 °C.

The test specimens were exposed to the action of specific external testing stress at a gradient of 5°.



3.2 Test methods

Performance of the roof external-fire exposition test as per CSN P ENV 1187 consists in exposing the specimen to external heat stress at a required gradient while monitoring the specimen behaviour and its condition after the testing.

The external testing heat stress of the membrane is caused by two burning brands made up of fibreboard of 55 x 55 x 32 mm in size - n-heptane saturated prior application [1] (cl. 6.7.1) and the heat radiation of gas-type radiant panel of 600 x 600 mm in size, with heat flow density of 1.25 W.cm^{-2} at a distance of 500 mm, under even air flow of 3 m.s^{-1} .

Two specimens of 1200 x 3000 mm in size, placed longitudinally in the air flow direction, are put under test gradually. The specimens are tested at a gradient of either 5° (roofs up to 10°) or 30° (roofs above 10°).

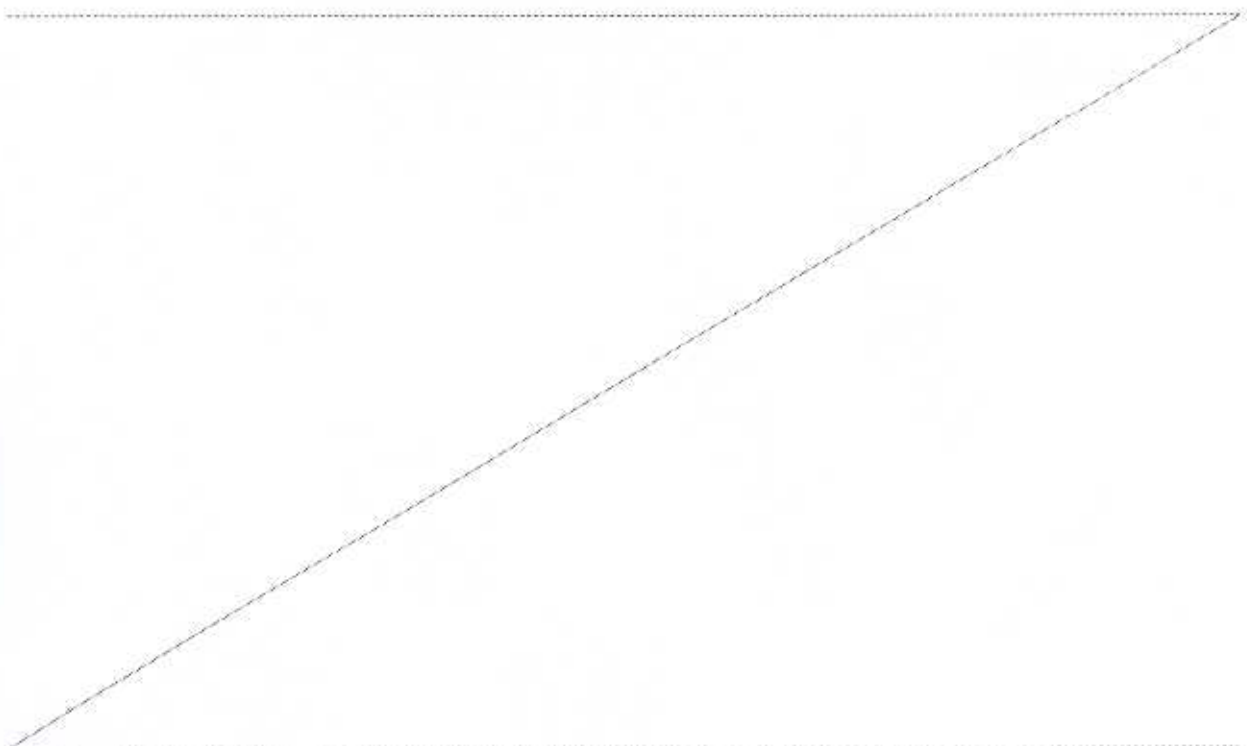
After the air flow rate has stabilized, tests are commenced by placing the test specimen under the radiant panel with stabilized heat flow. At the same time, the specimen surface and the panel's radiant area are parallel, being at a distance of 500 mm from each other. The centre of the right-angle projection of the panel's radiant area lies at the specimen's longitudinal centreline 500 mm from the front edge of the specimen. 2 minutes and 30 seconds after placing the specimen in the test position [1] (cl. 6.7.2) the brands must be ignited simultaneously and, when on fire, after 30 seconds, both brands shall be put on the specimen surface so that their centres are 500 mm from the specimen's front edge and 185 mm on each side from the longitudinal centreline of the specimen.

The test is to be terminated 30 minutes after its commencement or if the fire burns through to propagate along the specimen's bottom side or if there is any danger present for the inspector or the testing equipment.

4 TEST RESULTS

The test specimens' behaviour is described from the observer's point of view, in the flowing air direction. The observations during the test is summarized in tables for each specimen, being substantiated with photographs given in Annex no. 2.

The tables are followed by data describing the specimen condition after the testing, and the evaluation of the tests.



4.1 Test specimen I

Tab. 1 - Behaviour of test specimen I - gradient 5°

Time (min)	Observations
0. - 3.	Specimen put under stress by the heat from radiant panel.
4.	Burning of brands with generation of smoke, the fire propagating along the specimen surface.
8.	After-combustion of foil within the delimited surface.
9.	Formation of small heat-spots in between the brands to be later followed by the foil melting with the generation of smoke.
11.	The brands cease to fire.
31.	Termination of the test.

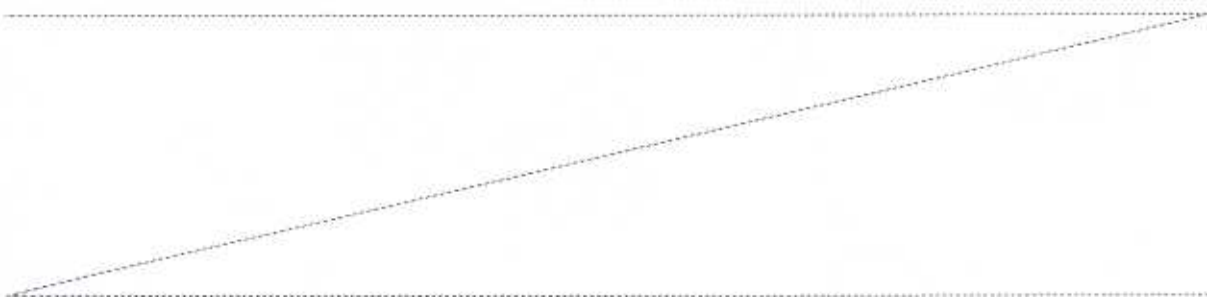
Photograph no. 1 - specimen after the beginning of test
2 - specimen after the termination of test

External propagation of flame

Upward propagation of flame		Downward propagation of flame	
distance (mm)	attainment time (min:s)	distance (mm)	attainment time (min:s)
100	3:15	100	-
300	3:25	300	-
500	3:45	500	-
700	3:55	-	-
900	4:20	-	-
1100	4:45	-	-
1300	5:15	-	-
2000	6:10	-	-

Damage to Specimen

Damage description	Value
Extent of inner damage - upwards (mm)	2020
Extent of inner damage - downwards (mm)	20
Maximum length of burnt material - upwards (mm)	2130
Maximum length of burnt material - downwards (mm)	30
Damaged area (m ²)	0,680



4.2 Test specimen II

Tab. 2 - Behaviour of test specimen II - gradient 5°

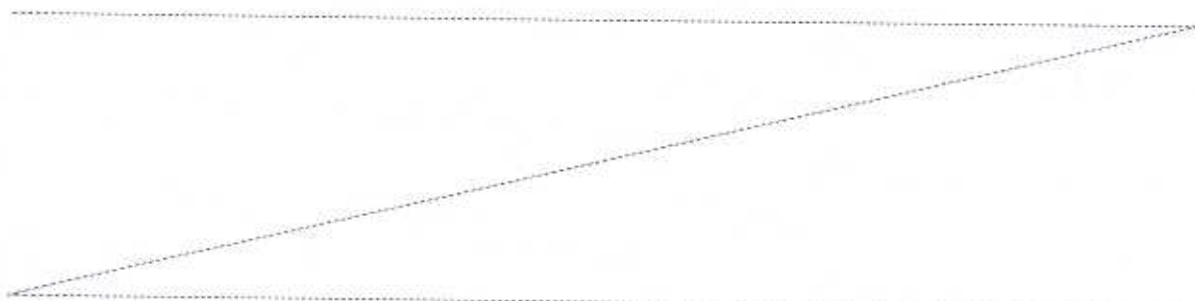
Time (min)	Observations
Time (min)	Observations
Time (min)	Observations
0 - 3.	Specimen put under stress by the heat from radiant panel.
4.	Burning of brands with generation of smoke, the fire propagating along the specimen surface.
8.	After-combustion of foil within the delimited surface.
9.	Formation of small heat-spots in between the brands to be later followed by the foil melting with the generation of smoke.
11.	The brands cease to fire.
Photograph no. 3 - specimen after the beginning of test 4 - specimen after the termination of test	

External propagation of flame

Upward propagation of flame		Downward propagation of flame	
Distance (mm)	attainment time (min:s)	distance (mm)	attainment time (min:s)
100	3:10	100	-
300	3:15	300	-
500	3:25	500	-
700	3:40	-	-
900	3:50	-	-
1100	4:05	-	-
1300	4:25	-	-
2000	6:05	-	-

Damage to Specimen

Damage description	Value
Extent of inner damage - upwards (mm)	2180
Extent of inner damage - downwards (mm)	20
Maximum length of burnt material - upwards (mm)	2310
Maximum length of burnt material - downwards (mm)	40
Damaged area (m ²)	0,730



5 CONCLUSION

All the applicable provisions of CSN P ENV 1187 were used and observed during preparation, execution, and evaluation of the tests.

The test results apply to the tested subject only.

The Report and Annex sheets are valid with the embossed stamp only.



Elaborated by:

A handwritten signature in blue ink, appearing to read 'J. Pribyl'.

Mr. Jiri Pribyl

Fire Testing Laboratory Technician

Approved by:

A handwritten signature in blue ink, appearing to read 'J. Kapl'.

Ing. Jiri Kapl

Head of Fire Testing Laboratory

ANNEX 1: TESTING AND MEASURING EQUIPMENT, MEASUREMENT UNCERTAINTY

Device name	Metrological registration no.	Combined standard measurement uncertainty
testing equipment for the roofs exposed to external fire	Z 4	-
hand digital stop-watch	3 05 02	< 0,04 s
anemometer AMR THERM 2253-2	3 08 01	< 0.5 m.s ⁻¹
winding 5m tape measure SC-50	3 01 05	(10+20.L) *10 ⁻⁶ m
steel ruler 500 mm	3 01 13	0,010 mm
steel ruler 1500 mm	3 01 14	0,010 mm
Radiometer Schmidt - Boelter	3 14 01	3%
Radiometer Schmidt - Boelter	3 14 02	3%
Radiometer Schmidt - Boelter	3 14 03	3%
Radiometer Schmidt - Boelter	3 14 04	3%
Radiometer Schmidt - Boelter	3 14 05	3%

Metrological relationships of the device are specified in the metrological registration card of the device, which is expressly identified by the metrological registration number of the device.

ANNEX 2: PHOTOGRAPHIC DOCUMENTS



Photograph no. 1 - Test specimen I (gradient 5°) after the start of the test



Photograph no. 2 - Test specimen I (gradient 5°) after termination of the test



Photograph no. 3 - Test specimen II (gradient 5°) after the start of the test



Photograph no. 4 - Test specimen II (gradient 5°) after termination of the test