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Efectis Nederland report

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**Determination of the fire resistance according to
NEN 6069:2005 annex A of a steel acoustic
panelsystem ACP100, provided with an air grill**

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1 Subject

A steel acoustic panelsystem ACP100, including an air grill, fabricated by Alara Lukagro. The panelsystem was mounted in an aerated concrete wall.

2 Examination

Determination of the fire resistance according to NEN 6069:2005 annex A.

3 Sponsor

Alara Lukagro B.V.
Postbus 15
2964 ZG Groot-Ammers

4 Place and data regarding the examination

The examination was performed at the laboratory of Efectis Nederland BV in Rijswijk, The Netherlands.

The wall construction was prepared in week 51-2009.

The specimen was assembled on the 23rd of December 2009.

The fire test was performed on the 5th of January 2010.

5 Test specimen

5.1 General¹

The steel acoustic panelsystem ACP100 with air grill was fixed in an aerated concrete wall with a thickness of 150 mm.

5.2 Panelsystem

The panels in which the air grill was mounted were constructed from (seen from the exposed side):

- 1.5 mm thick Zincor steel (16)
- Rockwool 213, 40 kg/m³, thickness 100 mm (14)
- 1 mm thick perforated steel (15)

5.3 Air grill

The air grill consisted of the following components

- 1 mm steel
- Intumescent strip Kerafix Flexpress 100 (12) with dimensions of 50 x 2 mm

5.4 Intumescent materials beside the air grill

- Kerafix Flexpan intumescent strip (6) with dimensions 20 x 2 mm. Two strips are placed between the angle steel and the aerated concrete supporting construction. The distance between the strips was 60 mm

5.5 Fixing materials

- Tapper Ø 6.3 x 25 mm (13), c.t.c. distance 600 mm used to secure the angle steel to the aerated concrete supporting construction;
- Tapper Ø 6.3 x 50 mm (17), c.t.c. distance 400 mm used to secure the air grill to the surrounding panels.

5.6 Angle steel

- 106 x 40 x 2 mm used to connect the panels to the aerated concrete supporting construction.

¹ The numbers between brackets refer to the components in the parts list

6 Sampling and manufacturing of the construction

Alara Lukagro B.V.

Efectis Nederland BV
Centre for Fire Safety

Delivery and mounting of the steel acoustic
panel system ACP100 with the air grill
test frame

7 Mode of testing

7.1 Verification of the specimen

The materials and components used were inspected during assembly on the basis of the supplied drawings and data.

7.2 Conditioning

From the moment of assembly until the fire test the construction was stored in the laboratory of Efectis Nederland BV with the following conditions:

- Ambient temperature: $20 \pm 5^\circ\text{C}$.
- Relative humidity: $50 \pm 10\%$.

7.3 Density and moisture content

Table 1: Density and moisture content

Material	Density [kg/m^3]	Moisture [%]
Aerated concrete	630	4.5

7.4 Fire test

7.4.1 Test conditions

The fire test was carried out according to NEN 6069:2005 annex A. During the fire test, plate thermocouples were used to measure the gas temperatures in the furnace.

7.4.2 Measurements

During the heating the following data was measured and registered:

Furnace conditions

- the temperatures in the furnace using plate thermocouples equally spread over the heated surface;

- the pressure in the furnace (Press-0.5 and Press-2.7).

Specimen

- surface temperature of the steel acoustic panel system ACP 100 with the air grill;
- heat radiation at 1.0 m from the air grill;

Environment

- the air temperature in the laboratory outside the furnace (TAMB).

The positions of the thermocouples were given in the figure B.1.

7.4.3 *Observations during the test*

Time [min]	Observation
0	Start heating
78	End of heating

8 Test results

8.1 Observations during heating

The details of the observations are listed below.

Photographs of details during assembly and the construction before, during and after the test are shown in annex C.

8.2 Graphs of the fire test

The test results are shown as graphs in Annex A and B.

8.3 Uncertainty of measurement

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of the fire resistance, it was not possible to provide a stated degree of accuracy of the result.

9 Summary

The fire resistance was determined of a steel acoustic panel system ACP 100 with an air grill. The examination was performed according to NEN 6069:2005 annex A for the case, “panel with the perforated side in the fire”.

Table 1: Summary of test results

Criterion	Time measured from the start of the test during which the criterion based on NEN 6069:2005 annex A.
a) Integrity (E) <ul style="list-style-type: none">– Cotton pad– Opening gauges– Flames > 10s	78 minutes no failure 78 minutes no failure 78 minutes no failure
b) Thermal insulation (I) <ul style="list-style-type: none">– Average temperature increase– Maximum temperature increase	11 minutes failed 12 minutes failed
c) Radiation (W)	78 minutes no failure

Heating was terminated after 78 minutes at the request of the sponsor.

10 Conclusion according to NEN 6069:2005 annex A

Inner wall

If the steel acoustic panel system ACP 100 with the air grill is placed in an inner wall construction. In the Netherlands it should fulfill the criteria integrity and thermal insulation based on temperature. Based on this the fire resistance, according to NEN 6069:2005 annex A, of the steel acoustic panel system ACP100 with the air grill is:

11 minutes

Outer wall with fire from the inside

If the steel acoustic panel system ACP100 with the air grill is placed in an outer wall construction with fire from the inside. In the Netherlands it should fulfill the criteria integrity and thermal insulation based on radiation. Based on this the fire resistance, according to NEN 6069:2005 annex A, of the steel acoustic panel system ACP100 with the air grill is: **78 minutes**.

11 Field of direct application and conditions

This report details the method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested. Any significant deviation with respect to size, constructional details, load stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method was not covered by this report.

- a) the air grill is mounted in a steel acoustic panelsystem ACP100 as described in this report with maximum dimensions of 1094 x 2600 mm
- b) the maximum dimensions of the air grill are 750 x 750 mm;
- c) the panel shall be mounted in a wall of stone like material with a thickness of at least 150 mm and a density of at least 600 kg/m³.

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12 Parts list

- 6. Kerafix flexpan intumescent strip
- 12. kerafix flexpress 100 intumescent strip
- 13. tapper 6.3 x 25 mm
- 14. Rockwool 213, 40 kg/m³
- 15. 1 mm perforated steel
- 16. 1.5 mm Zincor steel
- 17. tapper 6.3. x 50 mm
- 18. seal

13 Figures

Figure 1: overview of the steel acoustic panel ACP100 with the air grill

Figure 2: detail of the panels in which the air grill is mounted

Figure 3: detail of the connection between the air grill and the panels

Figure 4: detail of the air grill

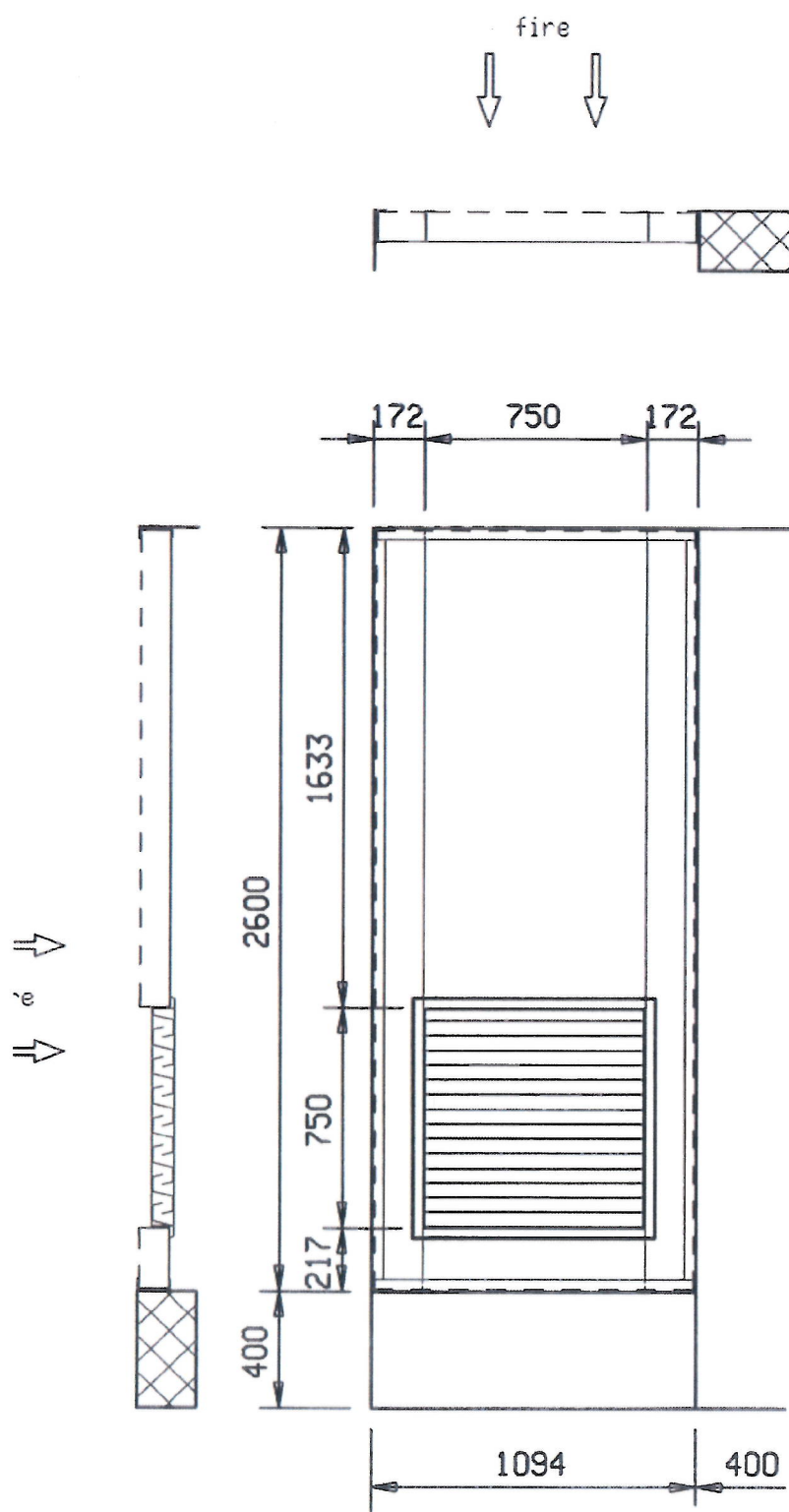


Figure 1: overview of the steel acoustic panel ACP100 with the air grill