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TNO report

2002-CVB-R05880

Fire resistance of a VETROTECH Vetroflam 6
mm EW30 glazing in steel Jansen Economy 50
frame according to NEN 6069:1997 and NEN-EN
1364-1

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Project name Fire resistance
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1 SUBJECT

Window-/frame construction consisting of a Vetrolam 6 mm. EW 30 glazing in a steel Jansen Economy 50 frame.

2 TESTS PERFORMED

Fire resistance according to NEN 6069:1997 in connection with NEN-EN 1364-1.

3 SPONSOR

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4 PLACE AND DATE OF TEST

4.1 Place of the test

The test was performed at the Centre for Fire Research of TNO Building and Construction Research in Rijswijk, The Netherlands.

4.2 Dates regarding the test

The supporting construction was built on July 21st, 2002;
The window-/frame construction was assembled on July 25th, 2002; and
The test was performed on July 25th, 2002.

5 DATE AND NUMBER OF REPORT

September, 2002-CVB-R05880.

6 CONSTRUCTION TESTED

6.1 General

The test was performed on a window-/frame construction, which was mounted in a testing frame with a concrete lining with internal dimensions 4000 x 3000 mm (width x height). In order to accommodate the window frame, the internal dimension of the frame was reduced to 2650 x 1250 mm (h x w) by using 150 mm blocks of cellular concrete, quality class G4.

The window was constructed from

- a steel Jansen Economy 50 frame; and
- a 6 mm thick Vetrolam glazing.

6.2 Materials

General information regarding the materials used in the construction is presented in the next sections. For more information, refer to the figures 1 and 2.

6.2.1 Frame

Steel Jansen Economy 50 frame, outside measurements 2600 x 1200 mm. The gross dimensions of the cross-section of the frame were 40 x 50 mm (h x w), with a rim measuring 20 mm. The steel thickness of the frame construction was 2 mm.

The frame was constructed to hold a pane with dimension 2500 x 1100 mm (h x w). Technical details of the pane is listed in section 6.2.2. For more details, see figure 1.

6.2.2 Glazing

The single glazing was of type Vetroflam, with a total thickness of 6 mm;

Setting blocks, type Flammi, were applied with measurements 80 x 10 mm (length x width). The thickness of the various setting blocks was chosen such to allow for a 5 mm gap around the pane.

Glazing beads: type Jansen 405.120Z dimensions 20 x 20 mm; steel thickness 1 mm see also figure 1.

6.2.3 Fixing materials

The window frame was attached by means of 10 steel screw plugs, 120 mm length, on both horizontal posts and vertical posts. Positions of plugs are shown in Figure 1.

6.2.4 Sealant materials

The rim of the frame and one side of the glazing beads were covered with a ceramic tape, 15 x 5 mm (width x thickness).

6.2.5 Support construction

The construction consisted of cellular concrete;

- Mass density 650 kg/m³
- Thickness 15 cm.
- Moisture content 2.5 %

6.3 Assembly of the window

The assembling of the window was as follows.

- Placement and fixation of the window frame in the test frame. The space between the window frame and the test frame was filled with Rockwool.
- Covering the rim of the frame and the glazing beads with the ceramic fibre liner.
- Setting blocks were placed in the frame.
- Placement of the glass pane in the frame. The pane was adjusted to have equal distance to the rim of the frame on either side.
- Fastening the glazing beads.

7 SAMPLING AND PREPARATION OF TEST SPECIMEN

Centre for Fire Research, TNO Building and Construction Research	Test frame and supporting construction
Vetrotech Saint Gobain	Assembly of test specimen

8 MODE OF TESTING

8.1 Verification of test sample

During the assembly the parts and materials were verified from the supplied drawings.

8.2.1 Conditioning

In the period between assembling and testing the construction was stored in ambient conditions of temperature (20 ± 5 °C) and relative humidity (50 ± 10 %) in the testing laboratory of the Centre for Fire Research.

8.3 Fire test

8.3.1 Conditions

The test was performed under the conditions as specified in NEN-EN 1364-1.

8.3.2 Measurements

During the heating the following data were measured and registered:

- temperatures inside the furnace with 8 plate thermometers, regularly spread over the directly heated surface;
- surface temperatures on the non-directly heated side of the test sample with 11 thermocouples, the positions of the thermocouples are shown in figure 2;
- pressure inside the furnace at 2.7 m height from the floor;
- radiation outside the furnace at 1 m distance from the geometric centre of the test specimen;
- temperature and air velocity outside the furnace.

9 OBSERVATIONS DURING HEATING

After heating of 46 minutes the criterion with respect to the radiation was exceeded, i.e. the total heat flux from the pane at a distance of 1 m. was 15 kW/m^2 .

The test was terminated after a heating period of 53 minutes.

For a more detailed description of the observations please refer to Appendix A.

10 TEST RESULTS OF THE MEASUREMENTS OF THE FIRE TEST

Test results are given in graphs C1 to C3 of Appendix C.

The placement of the thermocouples on the test specimen is shown in the respective figures. The furnace conditions are presented in Appendix B.

11 SUMMARY

Table 1 summarises the most important results of this test.

Table 1: Test results.

	Time from start of heating, during which the criterion just was fulfilled.	
Criterion	NEN 6069:1997	NEN-EN 1364-1
Integrity	52 minutes	52 minutes
Thermal insulation w.r.t. radiation	46 minutes	46 minutes

Heating was terminated after 53 minutes.

12 CONCLUSIONS

The fire resistance of the tested window construction following NEN 6069:1997 with respect to its separation function is **46 minutes**.

A classification following NEN-EN 1364-1 can formally not be given, because the classification system as described in prEN 13501-2 has not yet been finalised.

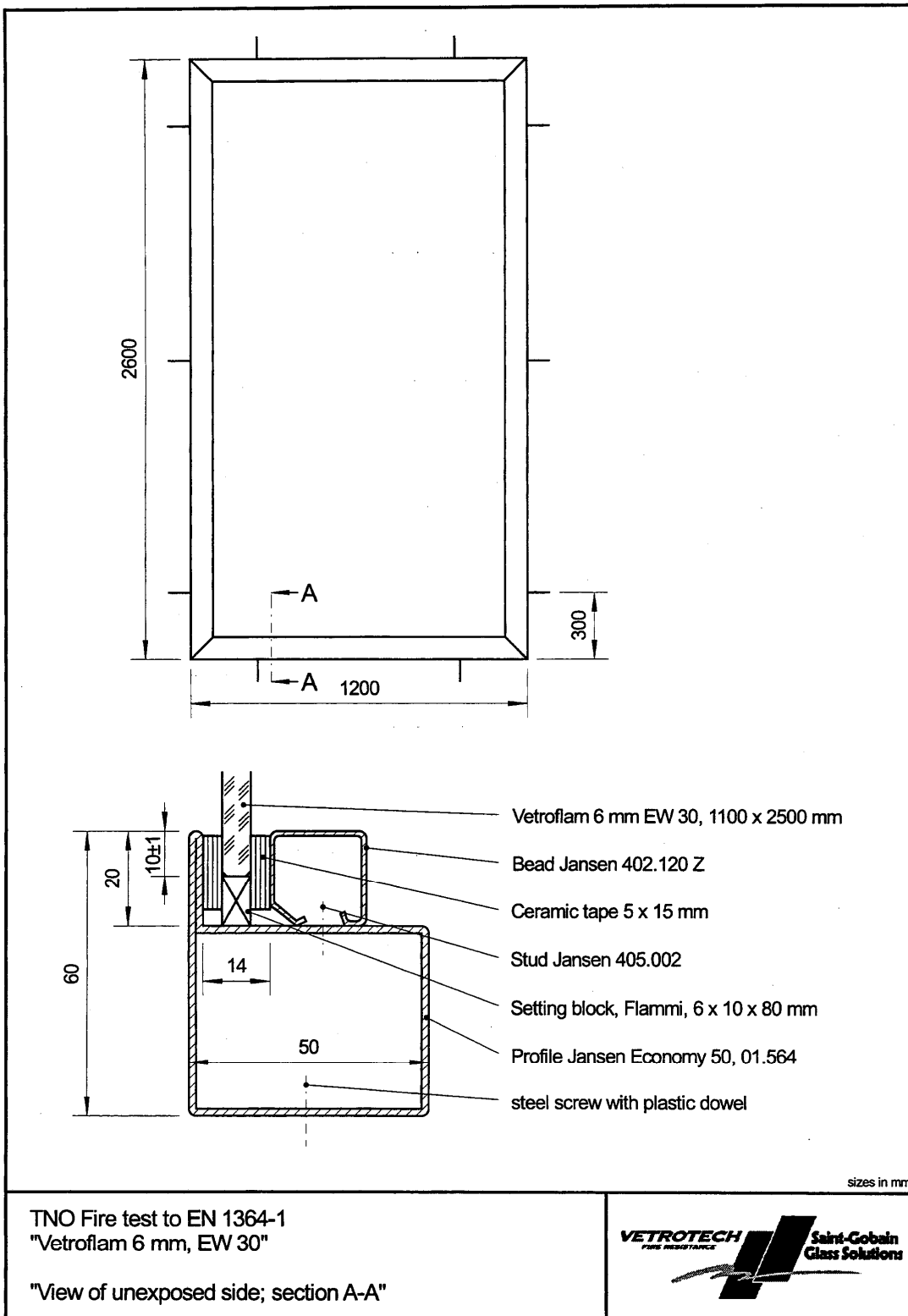
13 FIELD OF APPLICATION AND CONDITIONS

The conclusion applies only to glass/window-frame constructions:

- which are in detail the same as the tested construction, and where the dimensions are not larger than tested;
- fitted in a cellular concrete wall with a thickness of at least 150 mm and a mass per unit volume of $\geq 600 \text{ kg/m}^3$. Other rigid walls of materials like brick or masonry are permitted provide the fire resistance of the wall is not less than that of the window construction tested.

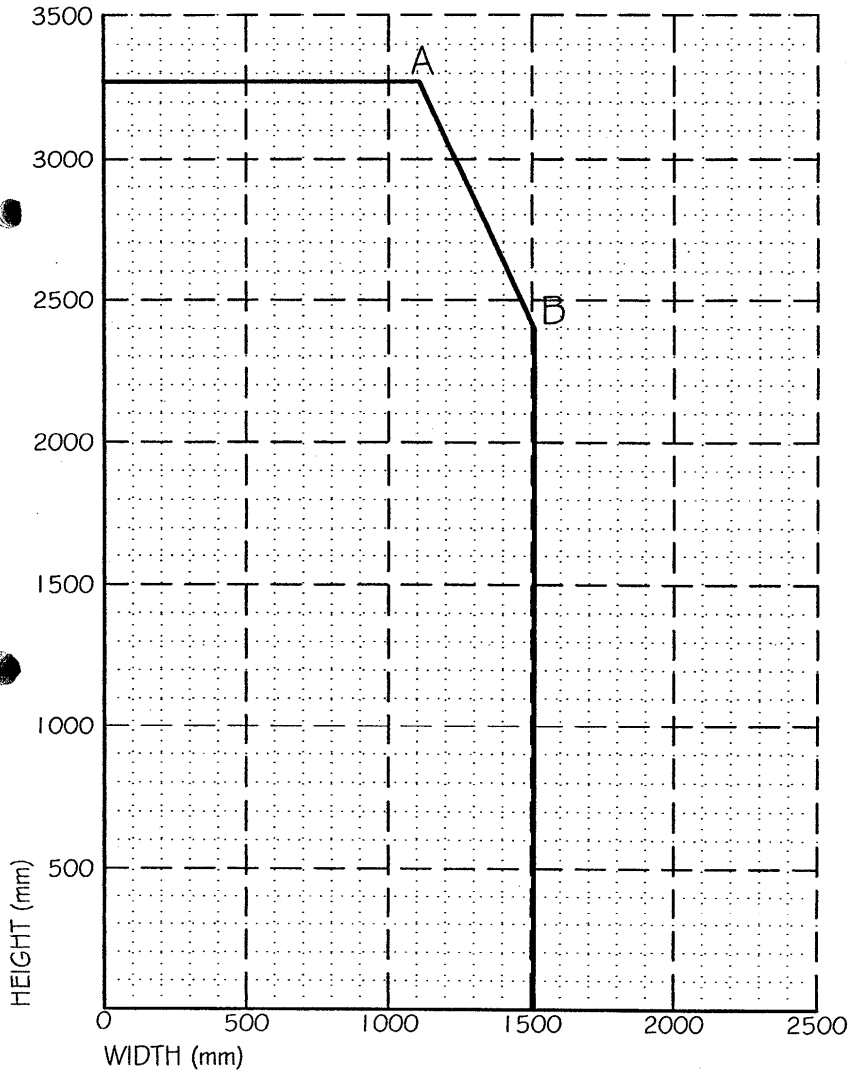
Ing. R.D. Scheepe

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	A	B
WIDTH	1107	1509
HEIGHT	3271	2400

Vetroflam 6mm EW30 Envelope



This drawing is part of International Fire Consultants Ltd Assessment No. IFCA/03113 which contains full details of this Vetroflam 6mm EW30 System

This drawing is Copyright©
Contractors must check all dimensions.
Any discrepancies must be reported before
work proceeds.
Only work to dimensions stated on drawing.

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Assessment IFCA/03113
Vetrotech Saint-Gobain

Envelope of maximum
Approved Pane sizes
Vetroflam 6mm
with Heat Reflecting
Coating in 30 Minute
FR Steel Systems
with Clipped beads

Job number: 5330
Drawn by: CSPK Checked by: HW
Not to Scale June 2003

03113/04