

**TNO report**

**2006-CVB-R0085**

Determination of the fire resistance according to  
NEN-EN 1364-1:2001 of a Vetrotech Saint-  
Gobain window/frame construction with SGG  
Climaplust Vetrolam and SGG Vetrolam 6  
glazing in a Jansen Economy 50 steel frame

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## 1 Subject

Two window/frame constructions, build up from Jansen Economy 50 steel frames, with SGG Climaplus Vetroflam and SGG Vetroflam 6 glazing.

## 2 Investigation

Determination of the fire resistance according to NEN-EN 1364-1:2001.

## 3 Contractor

Vetrotech Saint-Gobain International AG  
Stauffacherstrasse 128  
CH-3000 Bern 22  
SWITZERLAND

## 4 Place and date of the investigation

The investigation took place in the laboratory of the Centre of Fire Research of TNO Built Environment and Geosciences in Rijswijk, The Netherlands.

The specimen was mounted in the frame on the March 14<sup>th</sup> 2005.  
The fire test was performed on the March 14<sup>th</sup> 2005.

## 5 Date and number of the report

February 2006, Report number 2006-CVB-R0085

## 6 Test specimen

### 6.1 General

The left side window/frame construction was assembled from:

- a Jansen Economy 50 steel frame;
- 24 mm thick SGG Climaplus Vetroflam glazing.

The right window/frame construction was assembled from:

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

The frames were screwed into the supporting construction on top and bottom side only, in order to allow deflections on both vertical sides, the so-called “free edges”.

## 6.2 Window/frame construction

General information regarding the materials used in the construction is presented in the next sections. For more information refer to figure 1 to 3.

### 6.2.1 Steel framework

The frame was a construction of Jansen Economy 50 profiles, outer dimensions of the frame 900 x 2400 mm (w x h). The gross dimensions of the cross-section of the frame was 50 x 60 mm (w x h), with a rim measuring 20 mm. The thickness of the steel was 1,5 mm. The rim had a thickness of 3,0 mm.

### 6.2.2 Fixing materials

The window/frame constructions were mounted to the supporting construction by means of steel screw plugs Ø 10 mm, length 100 mm, on both horizontal posts with 2 steel screw plug.

The gap around the window/frame constructions to the supporting construction was filled with compressed Rockwool.

### 6.2.3 Glazing

The left pane was of type SGG Climaplus Vetrolam, dimensions 800 x 2300 mm (w x h), thickness 24 mm.

The right pane was of type SGG Vetrolam 6, dimensions 800 x 2300 mm (w x h), thickness 6 mm.

In order to realize an edge cover of 10 mm of the panes in the framework, setting blocks were used with various thicknesses. Dimensions of the Flammi setting blocks 80 x 24/6 x 10 mm (l x w x t).

The left pane was held into the frame using glazing beads, type Jansen 402.115Z, dimensions 15 x 20 mm (w x h).

The right pane was held into the frame using glazing beads, type Jansen 402.135Z, dimensions 35 x 20 mm (w x h).

The glazing beads were clamped into the frame using steel bolts, type Jansen 450.008. The c.t.c. distance was 200-250 mm.

### 6.2.4 Sealant materials

The rim of the frame and the glazing beads were covered with ceramic tape, type Kerafix Ceramic paper, dimensions 20 x 5 mm (w x t).

## 6.3 Supporting construction

The supporting construction existed of aerated concrete of 150 mm thickness.

Dimensions of both apertures in the wall: 940 x 2440 mm (w x h).

Mass density: 625 kg/m<sup>3</sup>

## 7 Sampling and manufacturing of the construction

TNO Certification	- sampling at glass manufacturing
TNO Centre for Fire Research	- production of supporting construction
Vetrotech Saint-Gobain International	- window/frame constructions and glazing

## 8 Test specimen inspection

### 8.1 General

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

### 8.2 Conditioning

From the moment of installation until the fire test, the specimen was stored in the laboratory of TNO, Centre for Fire Research with the following conditions:

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

### 8.3 Fire test

#### 8.3.1 Conditions

The fire test was carried out according to NEN-EN 1364-1:2001.

The window/frame constructions were heated at one side using the standard fire curve. The targeted overpressure in the furnace was 0 Pa at 0,5 m (20 Pa at 3,0 m) height.

#### 8.3.2 Measurements

During heating the following measurements were made:

Furnace conditions:

- The gas temperatures in the furnace using 6 plate thermocouples (TPL1 up to TPL6);
- The pressure in the furnace.

Window/frame construction:

- The surface temperatures on the unexposed side of both panes using 10 thermocouples (T1 up to T10);
- The surface temperatures on the unexposed side of both frames using 6 thermocouples (T11 up to T16);
- The heat radiation at a distance of 1,0 m from the geometric centre of the panes;

- The horizontal displacement of the window/frame construction, measured half way up the frames on aerated concrete side.

The positions of the thermocouples on the window/frame constructions are specified in appendix C.

## 9 Observations during the heating

### **SGG Climaplus Vetroflam**

Criterion "average temperature" reached after 9 minutes.

Criterion "maximum temperature" reached after 9 minutes

Criterion "integrity" reached after 60 minutes.

After a heating time of 63 minutes the test was ended. Heat radiation was not reached.

### **SGG Vetroflam 6**

Criterion "average temperature" reached after 6 minutes.

Criterion "maximum temperature" reached after 5 minutes

After a heating time of 63 minutes the test was ended. Heat radiation was not reached.

More details can be found in the Appendix A.

## 10 Results

### **10.1 Measurement results**

The measurement results are presented in Appendix B and C.

During the heating the temperature in the laboratory complied to the European standard NEN-EN 1364-1:2001.

### **10.2 Measurements uncertainly**

Due to the nature of fire resistance testing, in which several non-linear effects are present in both the test configuration and the test specimen, which influence each other, it is at this moment not yet possible to give a stated degree of uncertainty of measurement.

## 11 Summary

The fire resistance of two window/frame constructions is determined. The two window/frame constructions are build up from Jansen Economy 50 profiles and SGG Climaplus Vetroflam and SGG Vetroflam 6 glazing.

The fire test was carried out according to NEN-EN 1364-1:2001.  
 The results are summerized in Table 1 and 2.

*Table 1: Summerized results left window, SGG Climaplus Vetroflam*

Criterion	Time measured from the start of the test during which, the criterion was reached.
<b>NEN-EN 1364-1:2001</b>	
1. Integrity	
Cotton pad	Not reached
6 mm caliber	Not reached
25 mm caliber	60 minutes
Sustained flaming	Not reached
2. Thermal insulation	
Average temperature rise	9 minutes
Maximum temperature rise	9 minutes
Radiation	Not reached
After a heating time of 63 minutes the test was ended	

*Table 2: Summerized results right window, SGG Vetroflam 6*

Criterion	Time measured from the start of the test during which, the criterion was reached.
<b>NEN-EN 1364-1:2001</b>	
3. Integrity	
Cotton pad	Not reached
6 mm caliber	Not reached
25 mm caliber	Not reached
Sustained flaming	Not reached
4. Thermal insulation	
Average temperature rise	6 minutes
Maximum temperature rise	5 minutes
Radiation	Not reached
After a heating time of 63 minutes the test was ended	

## 12 Field of application and conditions

The summary formulated in chapter 11 is only valid for window/frame constructions, which are the same in detail to the investigated construction, including materials and means of assembly used. Also the following conditions have to be met:

- a) Type of glass with dimensions,  $w \times h$ , are the same or smaller as investigated;
- b) The frames are the same as described in 6.2 in this report;
- c) Mounted in a supporting construction with a thickness of at least 150 mm and a minimum density of  $625 \text{ kg/m}^3$ .

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