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**INTERNATIONAL FIRE
CONSULTANTS LTD**



COMMERCIAL IN CONFIDENCE

TEST REPORT IFCI/537

**Report of the determination of the fire
resistance in accordance with EN1364-1
of a Jansen Economy 60 glazed screen
with Contraflam Lite glass panes**

Sponsor: Vetrotech Saint-Gobain International AG
Stauffacherstrasse 128
CH-3000 Bern 22
Switzerland

Test Date: 9 February 2006

Ref: X/Report2006/IFCI/537/#7293C

May 2006

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1. SUBJECT

A non-loadbearing glazed screen with “SGG Contraflam Lite 60” fire resistant glass panes in a Jansen Economy 60 steel partition.

2. INVESTIGATION

Determination of the fire resistance of a glazed screen in accordance with EN 1364-1:1999 “Fire resistance tests for non-load bearing elements – Part 1: Walls”.

3. SPONSOR OF THE TEST

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

4. TEST LABORATORY AND TEST DATE

4.1 Laboratory

IFTS International Fire Testing + Services
Bern
Switzerland

4.2 Test Date and IFTS test reference

Test date: 9th February 2006

IFTS Laboratory test reference: A0601003

The glazed screen was installed on 8 February 2006.

4.3 Management and Observation of the test

The test was overseen by Mr J.C.A. van de Weijert from International Fire Consultants Ltd, United Kingdom.

The Fire Test was witnessed by:

Mr M. Sassen	Vetrotech Saint-Gobain Europe b.v.
Mr M. Möllers	Vetrotech Saint-Gobain Europe b.v.
Mr S. Vaessen	Vetrotech Saint-Gobain Europe b.v.
Mr R. Stöckli	IFTS, Switzerland
Mr D. Geissbühler	IFTS, Switzerland

5. CONSTRUCTION TESTED

5.1 General

The test was performed on a glazed screen with overall dimensions 2950mm wide by 3110mm high. The screen contained three apertures; 1a, 1b and 1c. See **Figure IFCI/537/01**.

The glazed screen was constructed from Jansen Economy 60 hollow tubular steel sections. A total of three apertures were glazed with “SGG Contraflam Lite 60” fire resistant glass panes.

5.2 Materials

General information regarding the materials used in the construction is presented in the following sections. For more information, refer to **Figures IFCI/537/01-04**.

5.2.1 Perimeter Framing

The glazed screen was constructed with overall perimeter dimensions 2950mm wide by 3110mm high. The perimeter frame was constructed using the following sections:

Vertical frame sections (See **Figure IFCI/537/04**)

- Jansen Economy 60, steel tubular hollow section 50 x 60 x 1.75mm, Art.Nr. 01.684Z, with a 20mm high steel lip
- steel glazing bead Jansen 20 x 20 x 1.25mm, type clip-on, Art.Nr. 402.120Z for (panes 1a and 1b)
- steel glazing bead Jansen 30 x 20 x 1.25mm, type clip-on, Art.Nr. 402.130Z for (pane 1c)

Horizontal frame sections (See **Figure IFCI/537/02&03**)

- Jansen Economy 60, steel tubular hollow section 50 x 60 x 1.75mm, Art.Nr. 01.684Z, with a 20mm high steel lip
- steel glazing bead Jansen 20 x 20 x 1.25mm, type clip-on, Art.Nr. 402.120Z for (panes 1a and 1b)
- steel glazing bead Jansen 30 x 20 x 1.25mm, type clip-on, Art.Nr. 402.130Z for (pane 1c)

The glazing beads were positioned on the exposed side.

The framing members at the head, at one vertical edge and at the bottom were provided with holes for fixing purposes. The diameter of the holes was 23mm on the inside (facing the glazing pocket) and 11mm on the outside (facing the testing frame).

5.2.2 Transom and mullion

Vertical (See **Figure IFCI/537/04**)

- Jansen Economy 60, steel tubular hollow section 50 x 60 x 1.75mm, Art.Nr. 02.684Z, with two 20mm high steel lips
- steel glazing bead Jansen 20 x 20 x 1.25mm, type clip-on, Art.Nr. 402.120Z for (panes 1a and 1b)
- steel glazing bead Jansen 30 x 20 x 1.25mm, type clip-on, Art.Nr. 402.130Z for (pane 1c)

Horizontal (See **Figure IFCI/537/02&03**)

- Jansen Economy 60, steel tubular hollow section 50 x 60 x 1.75mm, Art.Nr. 02.684Z, with two 20mm high steel lips
- steel glazing bead Jansen 20 x 20 x 1.25mm, type clip-on, Art.Nr. 402.120Z for (panes 1a and 1b)
- steel glazing bead Jansen 30 x 20 x 1.25mm, type clip-on, Art.Nr. 402.130Z for (pane 1c)

The glazing beads were positioned on the exposed side.

5.2.3 Glazing

All panels of the screen were glazed with “SGG Contraflam Lite 60” fire resistant glass panes.

The glass Panes 1a, 1b and 1c were built as follows:

Exposed side

- Toughened glass ESG, thickness 8mm
- Gel layer, thickness 4mm
- Toughened glass ESG, thickness 8mm

Unexposed side

The total thickness of the glass panes was:

- Nominal : 20.0mm
- Average : 20.27mm
- Standard deviation : 0.4878
- No. of measurements: 34

The dimensions of the glass panes were as follows:

Pane 1a
780mm wide x 2000mm high

Pane 1b
780mm wide x 940mm high
Weight; 35.0kg

Pane 1c
2000mm wide x 3000mm high

The glass panes were positioned on calcium silicate setting blocks, type “Flammi”, with dimensions 6 x 20 x 80mm, positioned at 130mm distance from the corners.

The gel layer in the “SGG Contraflam Lite 60” glass panes was sealed around the edges by means of a TPS-sealing strip. The glass pane edges were sealed with a two component poly-sulphite.

A stamp was applied to all glass panes on the bottom right hand side on the exposed side. The stamp contained the following text; “Contraflam Lite, EN12543, EN14449, ID: 26”.

5.2.4 Glass sealing

The glass panes were sealed using ceramic fibre glazing tape, type “Kerafix 2000”, manufactured by Gluske, Germany. The following ceramic tapes were applied:

- 20 x 4mm adhered to the steel lip of the hollow tubular steel sections,
- 20 x 5mm adhered to the glazing beads.

5.2.5 Glass pane fixing

The glazing beads were fixed using steel clip-on screws, type Jansen Art.No. 450.007. The clip-on screws were screwed into the steel tubular sections and were positioned at 70mm from the corners, at 250mm between centres and at the following distances from the front face (exposed face) of the steel sections;

- 18mm for glass panes 1a and 1b,
- 7mm for glass pane 1c.

5.2.6 Intumescent seals

Self adhesive intumescent strips were installed to seal the gap between the glass panes and the steel framing sections. The intumescent strips were of type "Flexpan 200" and were adhered to the steel sections in the glazing pocket. The intumescent strips were applied around the perimeter of the glass panes, interrupted only at the glass setting blocks. The dimensions of the "Flexpan 200" intumescent strips were 1 x 20mm.

5.2.7 Fixing materials

Fixing of the screen perimeter sections at the top and on one vertical side to the concrete test frame at 550 – 650mm between centres:

- Steel screws in plastic plug, type Fischer FUR 10 x 80T, Art.Nr. 88756.

Calcium silicate setting blocks were installed between the bottom steel perimeter section and the light weight concrete block work wall in the test frame. The dimensions of the setting blocks were 50 x 70mm, the thickness varied between 30 and 37mm in order to accommodate the gap width.

5.2.8 Test specimen perimeter void filling

The test specimen was installed into the concrete test frame with a layer of mineral rockfibre, density 39kg/m³, at top, bottom and at one vertical edge. The widths of the gaps were as follows;

- Top; 15mm
- Bottom; 30 – 37mm
- vertical fixed edge; 20mm.

The original thickness of the mineral rockfibre was;

- Top; 30mm
- Bottom; 50mm
- vertical fixed edge; 30mm.

The mineral rock fibre was compressed to fit into the gaps.

The vertical edge on the right hand side was a free edge to allow free movement of the test specimen. At this edge the gap between the screen framing section and the concrete test frame was 20mm wide and was filled with a mineral rockfibre slab, dimensions 300mm by 30mm. The density of this mineral rockfibre was 39kg/m³. The mineral rockfibre was compressed to 20mm in the gap at the position of the screen frame member.

5.2.9 Supporting construction

In order to accommodate the dimensions of the test specimen a light weight concrete block work wall was installed at the bottom of the test frame. The block work wall was 150mm thick and 830mm high.

6. SAMPLING AND TEST SPECIMEN CONSTRUCTION

Vetrotech Saint-Gobain
Weert, The Netherlands

Supply and fixing of the glazing and test specimen construction

I.F.T.S. fire laboratory
Bern, Switzerland

Concrete test frame

7. METHOD OF INVESTIGATION

7.1 Test specimen check

7.1.1 General

During the construction of the test specimen the materials and components used were checked against the supplied drawings and information.

It was found that the construction complied with the supplied drawings from the sponsor.

The glazed partition was fixed to the steel/concrete testing frame at the top and bottom side and at one vertical edge (left hand side). The right hand side of the glazed partition was provided with a free edge in order to allow free movement.

The glazed partition was tested with the glazing beads on the exposed side, i.e. the glazing beads were directly exposed to the fire.

The laboratory I.F.T.S was not involved in the selection of the test specimen.

7.1.2 Before commencement of fire test

General

From the moment of erection of the test specimen construction until the fire test, the test specimen was stored in the I.F.T.S laboratory, with the following conditions:

- Ambient temperature: $20 \pm 5^{\circ}\text{C}$
- Relative humidity: $27 \pm 10\%$

7.1.3 Measurements of density and moisture content

The density and moisture content of the following materials was determined. The moisture content was determined by weighing the sample before and after drying at 105°C for 24h:

Mineral rock fibre, rockwool

Density; 53.3 kg/m³
Moisture content; 20.0 %.

Light weight aerated concrete

Density; 635.9 kg/m³
Moisture content; 19.5 %.

7.2 Fire Test

7.2.1 Conditions

The fire test was conducted according to European standard EN 1364-1: 1999.

The partition was orientated so that the unexposed side was visible in the configuration shown in **Figure IFCI/537/01**.

The target furnace pressure was neutral at the floor level of the test specimen.

7.2.2 Measurements

During heating the following was measured and recorded:

- The gas temperature in the furnace, using 9 plate thermometers (Tc 1 to Tc 9).
- The furnace pressure at 0.4m below the head of the partition.
- The surface temperatures of the unexposed side of the construction. The positions of the 18 thermocouples on the glazed partition are given in **Figure IFCI/537/05**.
- The horizontal displacement at three locations as detailed in **Figure IFCI/537/05**.

The surface temperature of the unexposed face of the test specimen was also monitored with a roving thermocouple.

8. OBSERVATIONS

The test specimen was heated for 132 minutes. At this time the heating was terminated on request of the sponsor. The integrity criteria of the standard were still satisfied. More detailed observations can be found in Appendix B. See also photos in Appendix D.

9. RESULTS

The following measurements are presented in **Figures IFCI/537/C01 – C08** in Appendix C.

- gas temperatures in the furnace in **Figure IFCI/537/C01**
- overpressure in the furnace in **Figure IFCI/537/C02**
- surface temperatures of the unexposed side of the test specimen in **Figures IFCI/537/C03-C05**
- ambient temperature in **Figure IFCI/537/C06**
- heat flux at a distance of 1m from the centre of the specimen in **Figure IFCI/537/07**
- deflection of the partition in **Figure IFCI/537/C08**

During the heating the temperature and air speed in the laboratory complied with the European Standard EN 1364-1: 1999.

9.1 Uncertainty of measurement

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.

10. SUMMARY

A fire resistance test has been performed on a Jansen Economy 60 glazed partition with “SGG Contraflam Lite 60” glass panes. The specimen was fitted in a 160mm thick fire resistant test frame.

The partition was installed with the largest glazing pane on the right hand side when viewed from the unexposed side, as indicated in **Figure IFCI/537/01**.

The fire test was performed in accordance with the European Standard EN 1364-1: 1999. The most important results are given in Table 10.1.

Criterion	The requirements of the standard were satisfied for the following times (in minutes)
	EN 1364-1: 1999
1. Integrity	132*)
2. Thermal insulation with respect to temperature	11**)
3. Thermal insulation with respect to heat radiation	127***)

Table 10.1

*) *The integrity criteria were still satisfied when the heating was terminated.*

**) *The thermocouples applied for maximum temperature rise (Tc 13 – Tc 30)
The maximum allowed temperature rise of 180 °C was exceeded at Tc 20 after a heating time of 11 minutes.*

*The thermocouples applied for average temperature rise (Tc 21 & Tc 30)
The maximum allowed average temperature rise of 140 °C was exceeded after a heating time of 27 minutes.*

***) *Heat flux
The maximum allowed heat flux of 15kW/m² was exceeded after a full heating time of 127 minutes.*

11. CONCLUSION

The Jansen Economy 60 glazed screen incorporating “SGG Contraflam Lite 60” glass panes satisfied the integrity criteria of European Standard EN 1364-1:1999 for 132 minutes.

A classification according to European Standard EN 1364-1:1999 as described in the European standard EN 13501-2:2004 can be made in a separate document.

12. FIELD OF DIRECT APPLICATION OF TEST RESULTS

The conclusion given in Section 11 is only valid for constructions, which are in detail the same, including fixings and applied materials, as the described construction in this report.

The following requirements will have to be satisfied:

- the dimensions, width x height, are equal, smaller or the same as investigated.
- the thickness of the materials used may not be decreased.
- the distance between centres of the fixing materials may not be increased.
- the number of fixings may not be decreased.
- the construction should be installed in a supporting construction with a thickness of at least 150 mm and a specific density of at least 800 kg/m³.
- the number of glazed apertures, and the dimensions of the glass in each pane included within the test specimen, may be decreased but shall not be increased beyond the tested pane size.
- the distance between the edge of the glazing and the perimeter of the glazed partition, or the distance between glazed apertures shall not be reduced from those incorporated in the test specimen. Other positioning within the partition can only be modified if this does not involve the removal or repositioning of structural members.
- changes in hardware are permitted, provided the fire resistance performance of the alternative hardware has been demonstrated in other constructions of similar configuration.

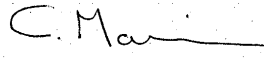
This report details the method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outlined in EN 1364-1. Any significant deviation with respect to size, constructional details, loads stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.

Prepared by:



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Senior Consultant
International Fire Consultants Ltd

Checked by:



Chris Marriner BEng (Hons)
Consultant
International Fire Consultants Ltd

Components List

- 1a) Glass pane "SGG Contraflam Lite 60", 780 x 2000 x 20mm
- 1b) Glass pane "SGG Contraflam Lite 60", 780 x 940 x 20mm
- 1c) Glass pane "SGG Contraflam Lite 60", 2000 x 3000 x 20mm
- 2) Calcium silicate support block, "Promatect", 35 x 50 x 70mm
- 3) Intumescent strip, "Flexpan 200", 20 x 1mm
- 4) Glass setting block, calcium silicate, "Flammi", 6 x 20 x 80mm
- 5) Steel frame section, "Jansen Economy 60", Art Nr: 01.684, 50 x 60 x 1.75mm
- 6a) Steel glazing bead, "Jansen", clip on type, Art No: 402.120Z, 20 x 20 x 1.25mm
- 6b) Steel glazing bead, "Jansen", clip on type, Art No: 402.130Z, 30 x 20 x 1.25mm
- 7) Steel glazing bead screw, "Jansen", clip on type head, used with item 5), Art No: 450.007
- 8) Steel screw, Fischer FUR 10 x 80T, Art. Nr. 88756, with plastic plug, fixings 550-650mm between centres
- 9) Non-combustible mineral rockfibre
- 10) Testing frame
- 11) Glass sealing strip "Kerafix 2000", one side self adhesive, 20 x 4mm on the hollow tubular steel sections and 20 x 5mm on the glazing beads

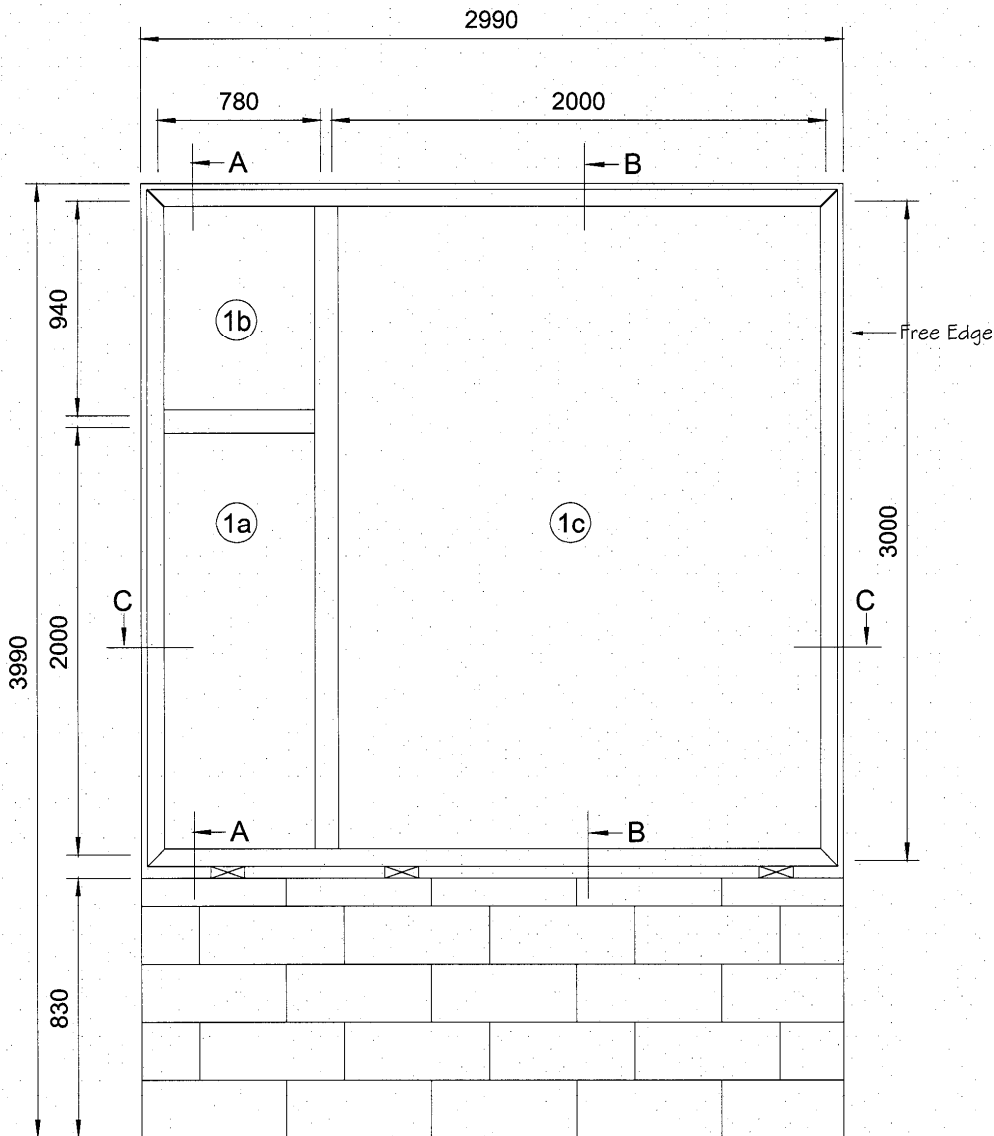
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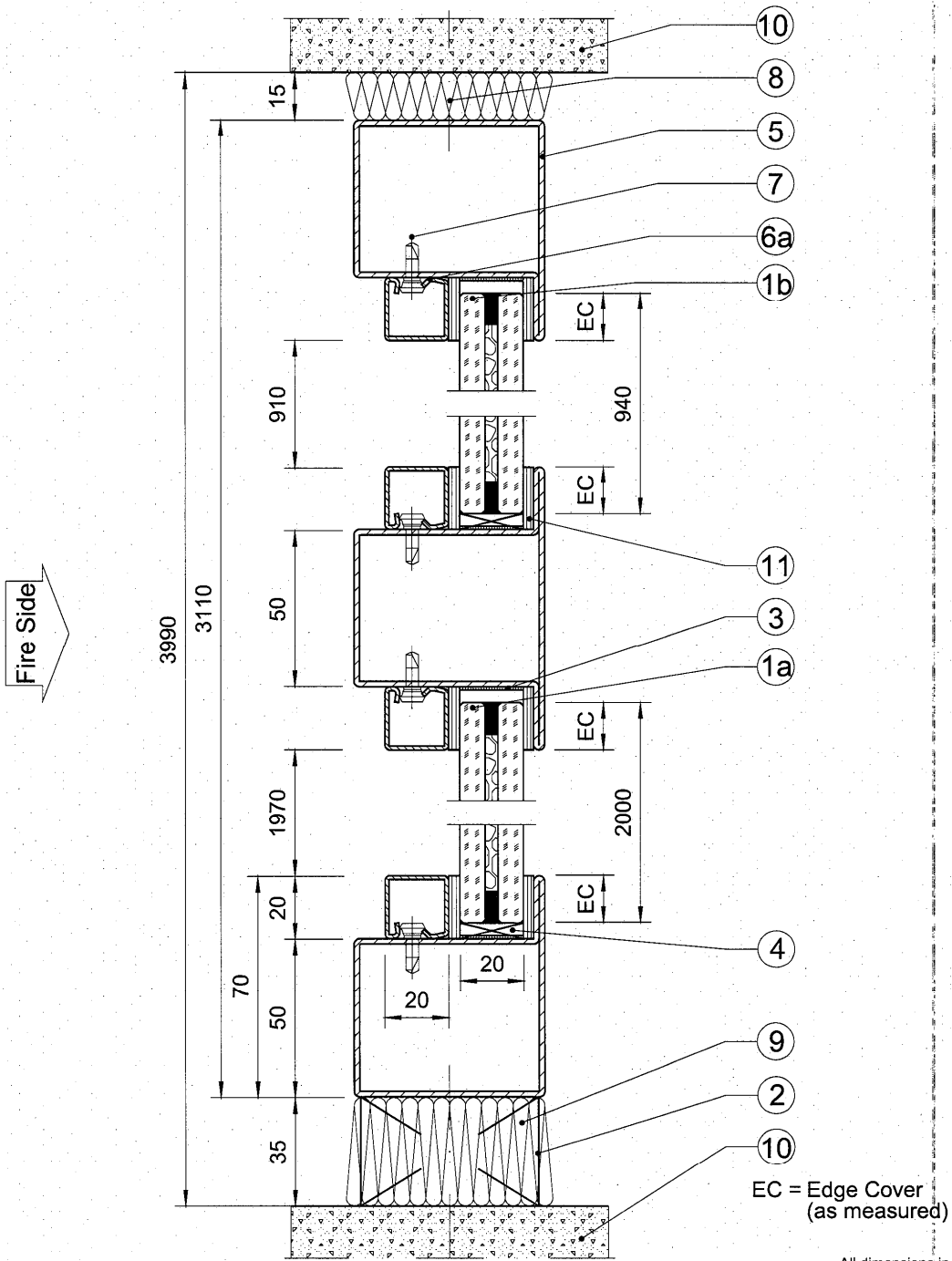
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- ①a SGG CONTRAFLAM LITE 60,
Glass Pane Size: 780 x 2000 x 20 mm
- ①b SGG CONTRAFLAM LITE 60,
Glass Pane Size: 780 x 940 x 20 mm
- ①c SGG CONTRAFLAM LITE 60,
Glass Pane Size: 2000 x 3000 x 20 mm

All dimensions in mm

<p>This drawing is Copyright© Contractors must check all dimensions. Any discrepancies must be reported before work proceeds. Only work to dimensions stated on drawing.</p>	<p>INTERNATIONAL FIRE CONSULTANTS LTD</p> <p>20 Park Street Princes Risborough Buckinghamshire HP27 9AH United Kingdom Tel: +44 (0) 1844 275500 Fax: +44 (0) 1844 274002 Email: ifc@intfire.com Website: http://www.intfire.com</p>	
	<p>Test Report IFCI/537 Vetrotech Saint-Gobain Report of the Determination of the Fire Resistance in Accordance with EN1364-1 of a Jansen Economy 60 Glazed Screen with Contraflam Lite Glass Panes</p>	<p>Unexposed Side of the Test Specimen</p>
		<p>Job number : 7293 Drawn by : C5F Checked by : CM Not To Scale March 2006 IFCI/537/01</p>



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<p>Test Report IFCI/537 Vetrotech Saint-Gobain Report of the Determination of the Fire Resistance in Accordance with EN 1364-1 of a Jansen Economy 60 Glazed Screen with Contraflam Lite Glass Panes</p>	<p style="text-align: center;">Section A-A</p> <table border="1" style="width: 100%;"> <tr> <td colspan="2" style="text-align: center;">Job number : 7293</td> </tr> <tr> <td>Drawn by : CSP</td> <td>Checked by : CM</td> </tr> <tr> <td>Not To Scale</td> <td>March 2006</td> </tr> <tr> <td colspan="2" style="text-align: center; font-size: 1.2em;">IFCI/537/02</td> </tr> </table>	Job number : 7293		Drawn by : CSP	Checked by : CM	Not To Scale	March 2006	IFCI/537/02	
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