

**INTERNATIONAL FIRE
CONSULTANTS LTD**



COMMERCIAL IN CONFIDENCE

TEST REPORT IFCI/570

**Report of the determination of the fire
resistance in accordance with EN1364-1
of a hardwood timber glazed screen
with SGG Vetrolam 30 IGU glass panes**

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

Test Date: 24 April 2007

Ref: X/Report2007/IFCI570/#8260

May 2007

International Fire Consultants Ltd

Head & Registered Office: 20 Park Street, Princes Risborough, Buckinghamshire, England HP27 9AU
Tel: +44(0)1844 275500, Fax: +44(0)1844 274002, e-mail: ifc@intfire.com

Registered No: 2194010 England

An International Fire Consultants Group Company

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1. SUBJECT

A non-loadbearing glazed screen constructed using "SGG Vetroflam 30 IGU" fire resistant double glazed units in a hardwood timber frame.

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
Berne
Switzerland

4.2 Test Date and IFTS test reference

Test date: 24 April 2007

IFTS Laboratory test reference: A0702006

The glazed screen was installed on 23 April 2007.

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 Ch Joss	Vetrotech Saint Gobain International AG
Mr P. Fischer	IFTS, Switzerland
Mr R. Wyss	IFTS, Switzerland
Mr D. Geissbühler	IFTS, Switzerland

5. CONSTRUCTION TESTED

5.1 General

The test was performed on a glazed screen with overall dimensions 2965mm wide by 2950mm high. The screen contained three apertures; 1, 2 and 3. See **Figure IFCI/570/01**.

The glazed screen was constructed from hardwood timber sections. A total of three apertures were glazed with "SGG Vetrolam 30 IGU" fire resistant double glazed units.

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/570/01 to 06**.

5.2.1 Perimeter Framing

The glazed screen was constructed with overall perimeter dimensions 2965mm wide by 2950mm high. The perimeter frame was constructed using the following sections:

Vertical frame sections (See **Figure IFCI/570/03, 04 and 06**)

- Timber, Meranti hardwood section 67 x 102mm, with a 17 x 72mm rebate, Ref. (2)
- Timber, Meranti hardwood glazing bead 17 x 40mm.

Horizontal frame sections (See **Figure IFCI/570/02 and 05**)

- Timber, Meranti hardwood section 67 x 102mm, with a 17 x 72mm rebate and water return groove (top), Ref. (1)
- Timber, Meranti hardwood section 67 x 102mm, with a tapered 17 x 72mm to 30 x 72mm rebate (bottom), Ref. (3)
- Timber, Meranti hardwood glazing bead 17 x 40mm, with a 3 x 3mm rebate (top).
- Timber, Meranti hardwood glazing bead 17 x 53mm, tapered and positioned on rubber setting blocks for ventilation purposes (bottom).

The glazing beads were positioned on the unexposed 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 8mm at 540mm between centres.

5.2.2 Transom and mullion

Vertical (See **Figure IFCI/570/03, 04 and 06**)

- Timber, Meranti hardwood section 67 x 102mm, with two 17 x 72mm rebates, Ref. (5)
- Timber, Meranti hardwood glazing bead 17 x 40mm.

Horizontal (See **Figure IFCI/570/02 and 05**)

- Timber, Meranti hardwood section 67 x 102mm, with a tapered 16 x 72mm to 30 x 72mm rebate and 8 x 32mm rebate to accommodate expansion of the glass pane, Ref. (4)
- Timber, Meranti hardwood glazing bead 17 x 53mm, tapered and positioned on rubber setting blocks for ventilation purposes (bottom).

The glazing beads were positioned on the unexposed side.

5.2.3 Glazing

All panels of the screen were glazed with “SGG Vetroflam 30 IGU” fire resistant double glazed units.

The glass panels were built as follows:

- Planilux 4mm (exposed side)
- PVB-foil 0.76mm
- Planilux 4mm
- Void, filled with air, 10mm wide/steel spacer
- Vetroflam, toughened glass with heat reflecting coating (soft coating), thickness 6mm, heat reflecting coating facing the void (unexposed side).

The total thickness of the glass panes was:

Nominal : 25.0mm

Average : 25.1mm

The dimensions of the glass panes were as follows:

Pane 1

2000mm wide x 789mm high.

Pane 2
804mm wide x 789mm high.

Pane 3
2851mm wide x 2000mm high.

The glass panes were positioned on calcium silicate setting blocks, type “Flammi 12”, with dimensions 7 x 25 x 80mm, positioned at 100mm from the corners. The glass setting blocks on the horizontal sloping profiles were tapered.

The glass panes were provided with a steel separator profile, 10mm wide, around the perimeter. The sheets of glass were adhered to the steel separator profile using butyl adhesive. The glass pane edges were sealed with a silicone.

The beading, setting block and glass pane sizes were designed to provide a nominal 10mm edge cover.

The glass panes were provided with the following stamp at the right hand side bottom corner: “Vetrotech Saint-Gobain Int. AG Vetroflam 30 EN1096 EN14179 ID: 27”.

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:

- 15 x 3mm adhered to the Meranti hardwood sections,
- 15 x 3mm adhered to the Meranti hardwood glazing beads.

5.2.5 Glass pane fixing

The glazing beads were pushed towards the glass to ensure clamping of the glass panes and were then fixed using steel screws, 4 x 40mm at 200 to 250mm between centres. The fixed glazing beads, i.e. the fixed part of the hardwood profiles retaining the glass panes, were also provided with steel screws, 4 x 40mm at 200 to 250mm between centres.

5.2.6 Intumescent seals

Self adhesive intumescent strips were installed to seal the gap between the glass panes and the hardwood framing sections. The intumescent strips were of type Flexpan 200, Art. Nr. 402294, and were adhered to the timber sections in the glazing pocket at the position of the Vetroflam glass panes. The intumescent strips were applied facing the perimeter of the glass panes, interrupted only at the glass setting blocks. The dimensions of the “Flexpan 200” intumescent strips were 16 x 2.0mm.

5.2.7 Fixing materials

The glazing beads were fixed using "Spax-S" steel screws, diameter 4mm x 50mm, but diameter 4mm x 40mm for the transom. The steel screws were installed at 195mm between centres.

The fixed glazing beads were also provided with "Spax-S" steel screws, diameter 4mm x 50mm, but diameter 4mm x 40mm for the transom. The steel screws were installed at 400mm between centres.

Fixing of the screen perimeter sections at the top and bottom side to the concrete test frame was at 490 to 550mm between centres using "Wico" countersunk FN69 steel screws, dimensions 7.5 x 112mm at the top and 7.5 x 152mm at the bottom.

Fixing of the screen perimeter section at one vertical side to the concrete test frame was at 430 to 530mm between centre using "Wico" countersunk FN69 steel screws, dimensions 7.5 x 112mm. The right hand side of the glazed screen was left free.

Calcium silicate setting blocks were installed between the bottom timber perimeter section and the concrete test frame. The dimensions of the setting blocks were 20 x 60 x 70mm. The setting blocks were installed at 100mm distance from the corners.

5.2.8 Test specimen perimeter void filling

The test specimen was installed into the concrete test frame with a 25mm thick layer of mineral rockfibre, density 39kg/m³, at the top, bottom and at one vertical edge. The mineral rockfibre was compressed to 15mm at the top and at the left hand side vertical edge.

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 filled with a mineral rockfibre slab, dimensions 300mm by 50mm. The density of this mineral rockfibre was 39kg/m³. The mineral rockfibre was compressed to 30mm.

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
Berne, 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, bottom 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 gap between the frame member on the right hand side of the glazed partition and the concrete testing frame was 30mm wide and was filled with mineral rockfibre, density 39kg/m³.

The glazed partition was tested with the glazing beads on the unexposed side, i.e. the glazing beads were not 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: 24 ± 2°C
- Relative humidity: 28 ± 10%

The density and moisture of the Meranti hardwood was determined:

Density:	816 kg/m ³
Moisture content:	10.7% ^{*)}

^{*)} Determined by weighing before and after drying at 105°C for 24 hours.

7.1.3 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/570/01**.

7.1.4 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 15 thermocouples on the glazed partition are given in **Figure IFCI/570/07**.

8. OBSERVATIONS

The test specimen was heated for 43 minutes. At this time the glazing beads on the unexposed side ignited, by means of non-piloted auto-ignition due to the radiation from the glass panes. Thereupon the heating was terminated. The integrity criteria and radiation criteria of the standard were satisfied during 43 minutes. More detailed observations can be found in Appendix B. Also see the photos in Appendix D.

9. RESULTS

The following measurements are presented in **Figures IFCI/570/C01 to C08** in Appendix C.

- gas temperatures in the furnace in **Figure IFCI/570/C01**
- overpressure in the furnace in **Figure IFCI/570/C02**
- surface temperatures of the unexposed side of the test specimen in **Figures IFCI/570/C03 to C05**
- ambient temperature in **Figure IFCI/570/C06**
- radiation at a distance of 1m in **Figure IFCI/570/C07**
- deviation in furnace temperature from that specified in **Figure IFCI/570/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

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

10. SUMMARY

A fire resistance test has been performed on a timber Meranti hardwood glazed partition with “SGG Vetroflam 30 IGU” double glazed units. The specimen was fitted in a 160mm thick fire resistant test frame.

The partition was installed as indicated in **Figure IFCI/570/01**.

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	43
2. Thermal insulation with respect to temperature	10 ^{*)}
3. Thermal insulation with respect to heat radiation	43 ^{**)}

Table 10.1

^{*)} The thermocouples applied for maximum temperature rise (Tc 22 – Tc 27)
The maximum allowed temperature rise of 180°C was exceeded at Tc 26 after a heating time of 11 minutes.

The thermocouples applied for average temperature rise (Tc 13 – Tc 21)
The maximum allowed average temperature rise of 140°C was exceeded after a heating time of 10 minutes.

^{**)} Heat flux
The maximum allowed heat flux of 15kW/m² was not exceeded during the full heating period of 43 minutes. The heat flux measured at 1m distance from the centre of the test specimen after 43 minutes was 14.3kW/m².

11. CONCLUSION

The Meranti hardwood timber glazed screen incorporating “SGG Vetroflam 30 IGU” double glazed units satisfied the integrity and radiation criteria of European Standard EN 1364-1:1999 for 43 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

12.1 General

The results of the fire test are directly applicable to similar constructions where one or more of the changes listed below are made and the construction continues to comply with the appropriate design code for its stiffness and stability. Other changes are not permitted without formal review of their influence as part of an extended or project specific determination of the field of application.

- a) The linear dimensions of panes may be decreased.
- b) The aspect ratio of panes may be changed provided that the largest dimension of the pane and its area are not increased.
- c) The distance between mullions and/or transoms may be decreased.
- d) The distance between frame fixing centres may be decreased.
- e) The dimensions of the framing members may be increased.
- f) The allowances for expansion of components shall not be varied from that tested.
- g) The test specimen may be installed up to 10° from the vertical.

12.2 Extension of height

No extension in height is allowed above that tested.

12.3 Extension of width

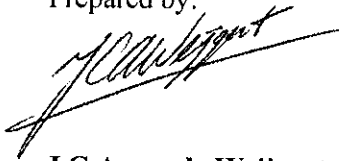
The width of an identical construction may be increased.

12.4 Supporting construction

The construction should be installed in a supporting construction with a thickness of at least 150mm and a density of at least 800kg/m³.

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:



J C A van de Weijert
MSc MIFireE MBEng Eur Ing
Senior Consultant
International Fire Consultants Ltd (IFC)

Checked by:



Chris Marriner
BEng (Hons)
Consultant
International Fire Consultants Ltd (IFC)

APPENDIX A

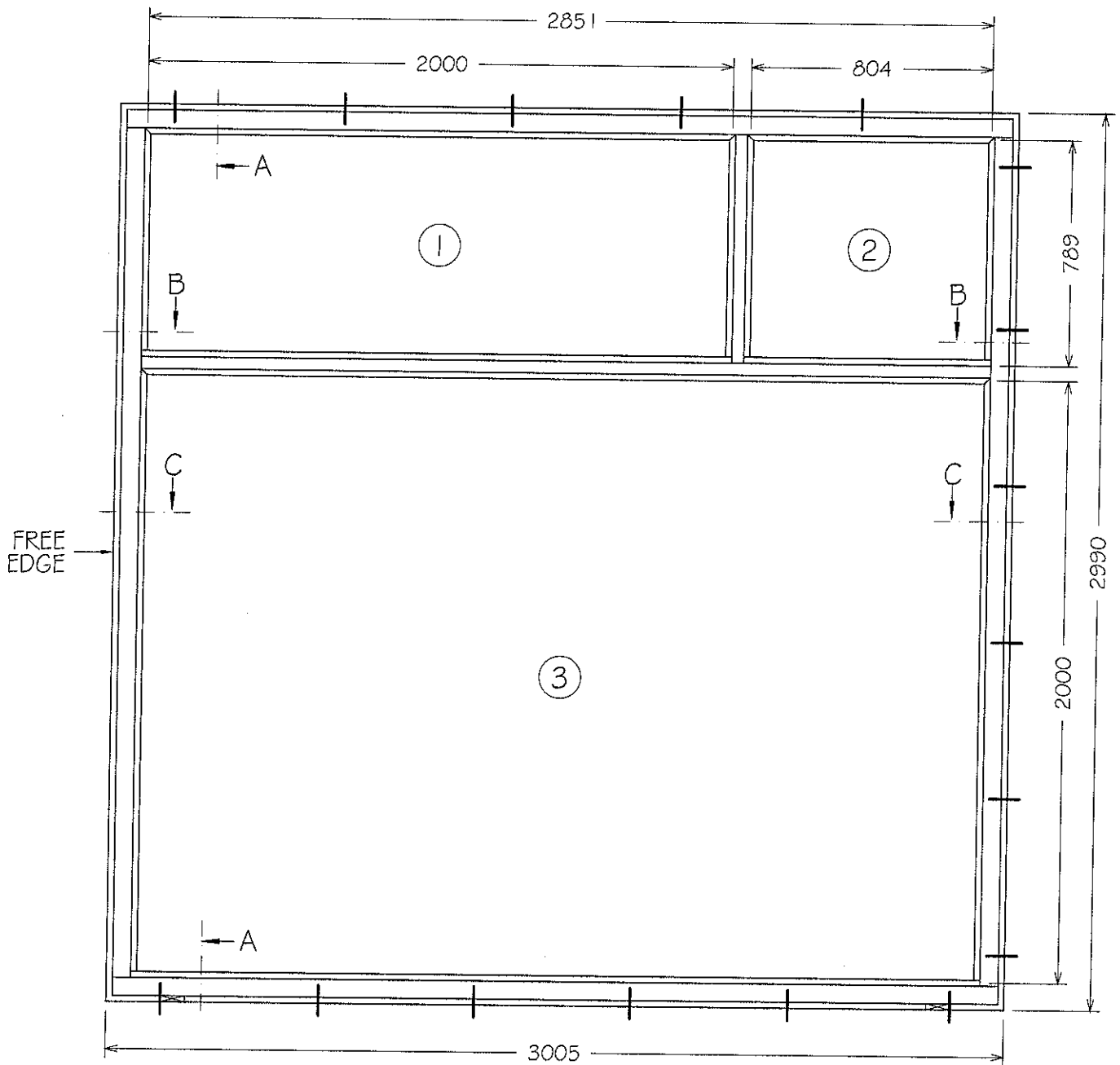
Figures of the test specimen

IFCI/570/01 to 07

*The figures in this Appendix are not included
in the sequential page numbering of this report.*

COMPONENTS LIST

- 1) Glass pane SGG VETROFLAM 30 - IGU, Vetroflam 6 / Spacer 10 / Stadip 44.2; 2000 x 789 x 25 mm
- 2) Glass pane SGG VETROFLAM 30 - IGU, Vetroflam 6 / Spacer 10 / Stadip 44.2; 804 x 789 x 25 mm
- 3) Glass pane SGG VETROFLAM 30 - IGU, Vetroflam 6 / Spacer 10 / Stadip 44.2; 2851 x 2000 x 25 mm
- 4) Glass sealing strips, "Kerafix 2000", one side self adhesive, 3 x 15 mm
- 5) Rubber setting blocks, 35 x 50 x 5 mm
- 6) Timber, Meranti hardwood glazing bead, 17 x 53 mm
- 7) Timber, Meranti hardwood section
- 8) "Wico" countersunk steel screws, 7,5 x 112 mm (top), and 7,5 x 152 mm (bottom), fixings at 540mm between centres maximum
- 9) Calcium silicate setting blocks, type "Flammi", 7 x 25 x 80 mm (tapered)
- 10) Testing frame
- 11) Calcium silicate setting block, 20 x 60 x 70 mm
- 12) Non-combustible mineral rockfibre
- 13) Spax-S steel screws, 4 x 40 mm
- 14) Timber, Meranti hardwood glazing bead, 17 x 40 mm
- 15) Spax-S steel screws, 4 x 50 mm
- 16) Intumescent strip, graphite based "Flexpan 200", 16 x 2 mm



① SGG VETROFLAM 30 - IGU,
VF 6 / SZR 10 / STADIP 44.2; 2000 x 789 x 25

② SGG VETROFLAM 30 - IGU,
VF 6 / SZR 10 / STADIP 44.2; 804 x 789 x 25

③ SGG VETROFLAM 30 - IGU,
VF 6 / SZR 10 / STADIP 44.2; 2851 x 2000 x 25

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Any discrepancies must be reported before
work proceeds.
Only work to dimensions stated on drawing.

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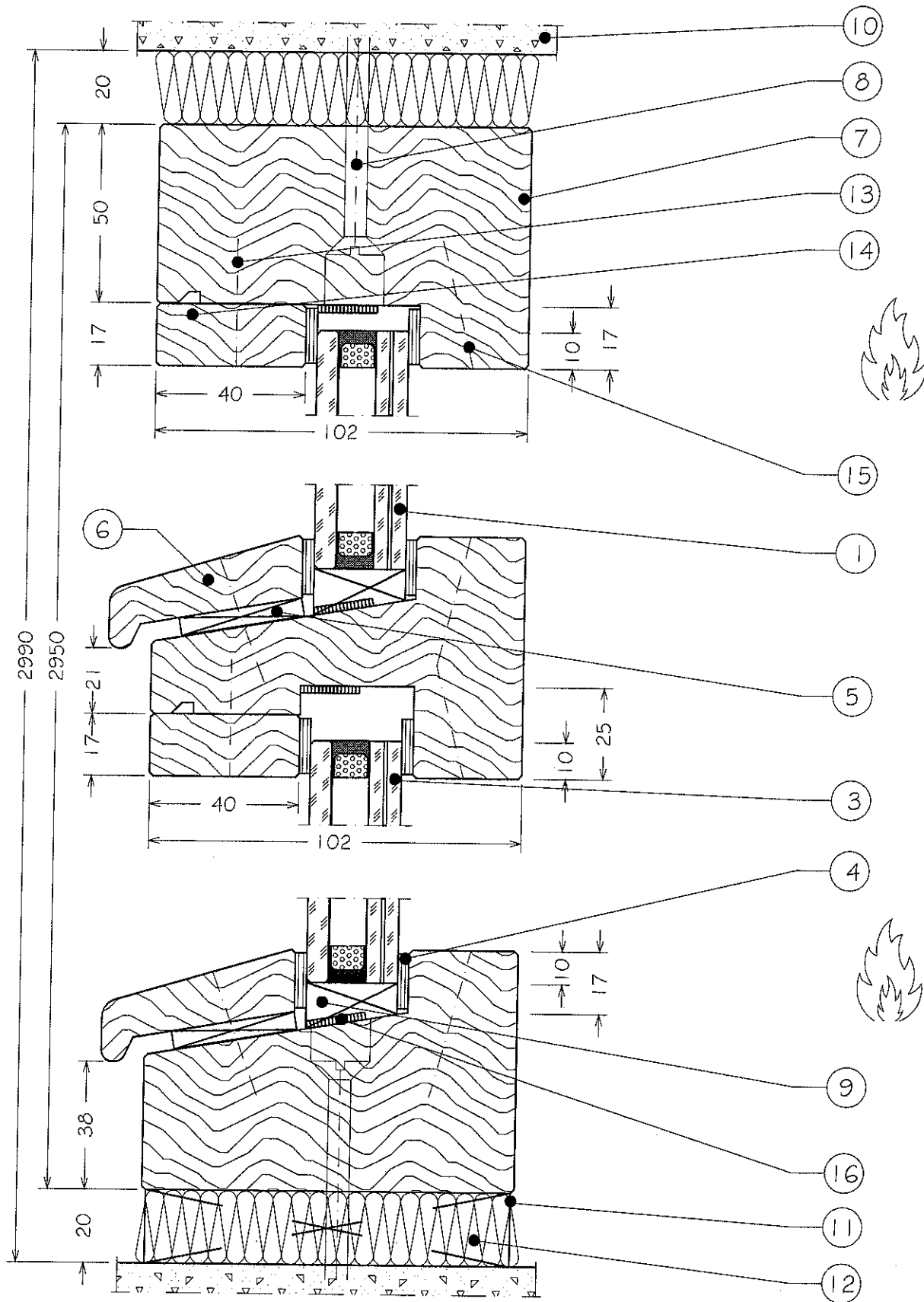
20 Park Street Princes Risborough Buckinghamshire HP27 9AH United Kingdom
Tel: +44 (0) 1844 275500 Fax: +44 (0) 1844 274002 Email: ifc@intfire.com Website: <http://www.intfire.com>

Test Report IFCI/570
Vetrotech Saint-Gobain International AG
Hardwood Timber Glazed Screen
with SGG Vetrolam 30 IGU Glass Panes

Elevation of the Unexposed
Side of the Specimen

Job number : 8260	
Drawn by : CSP	Checked by : CM
Not To Scale	October 2007

IFCI/570/01



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INTERNATIONAL FIRE CONSULTANTS LTD

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

Test Report IFCI/570
Vetrotech Saint-Gobain International AG
Hardwood Timber Glazed Screen
with SGG Vetrolam 30 IGU Glass Panes

Section A-A

Job number : 8260
Drawn by : C5P Checked by : CM
Not To Scale October 2007

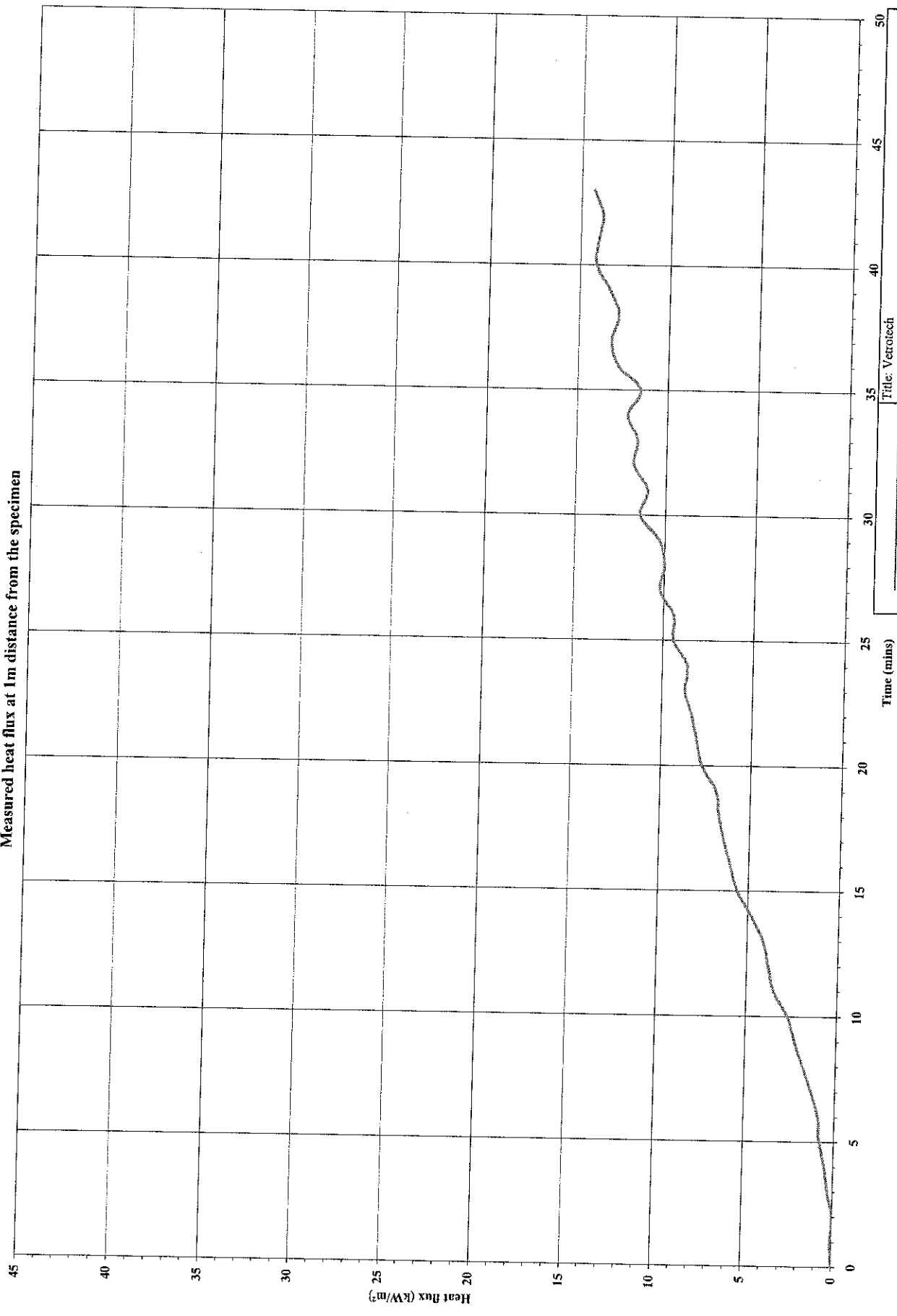
IFCI/570/02

APPENDIX C

Graphs of test results

*The figures in this Appendix are not included
in the sequential page numbering of this report.*

Measured heat flux at 1m distance from the specimen



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Title: Vetrotech	Hardwood timber screen glazed using Vetroflam DGU
Drawing No: IFC/570/C07	
Job No: 8260	Date: May 2007
Drawn By: CM	Checked By: HW