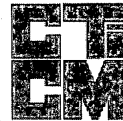


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 Centre
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 de la
 Construction
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TRANSLATION
FIRE RESISTANCE TEST OF BUILDING ELEMENTS
According to NF EN 1364-1
TEST REPORT n° 03 - V - 162

 Test n° :
03 - V - 162

 Carried out on :
 April 24th 2003

Scope :

A glazed partition with wooden framework

Framework : MOABI exotic red wood

 Glazings : CONTRAFLAM LITE EW 60 (V.S.G.I.), 14 mm thick and
 CONTRAFLAM LITE ISO EW 60 (V.S.G.I.), with built-in blind,
 47 mm thick

Overall dimensions of the partition : 3,000 x 3,000 mm (w x h)

Applicant :

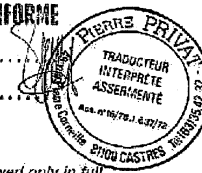
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TRADUCTION CERTIFIÉE CONFORME

No 030502

LE 28 MAI 2003


This test report includes 42 sheets. Copies of this document are allowed only in full.

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1 - SCOPE OF THIS TEST REPORT

Fire resistance test of a glazed partition in conformity with NF EN 1364-1 supplemented according to the "global method" as approved of by the CECMI on March 29th 2000, taking into account the specific provisions of the Decree of the French Home Secretary (*Ministère de l'Intérieur*) dated August 3rd 1999 - Annex III.

The test specimen (dimensions, fire direction, supporting frame, assembly) was supplied by the Applicant on his initiative (in conformity with clause 12 of standard NF EN 1363-1).

2 - MANUFACTURER AND REFERENCE OF THE TEST SPECIMEN

Framework : Moabi exotic red wood - 750 kg/m³
Glazing : Contraflam Lite EW 60 and Contraflame Lite ISO EW 60 (V.S.G.I.) -
Kinon production plant in Aachen (D).

3 - DESCRIPTION OF THE TEST SPECIMEN

3.1 - GENERAL

See Annex 1, Plates 1 to 15 (the drawings from the V.S.G.I. Co. attached to this test report have been checked by the CTICM and found in conformity with the test specimen).

The partition consisted of a framework made of Moabi exotic red wood, defining four openings closed by 14 mm thick Contraflam Lite EW 60 type glazings (V.S.G.I.), and 47 mm thick Contraflam Lite ISO EW 60 glazings with built-in blind (V.S.G.I.).

The glazings were held by wooden glazing beads.

	Theoretical	Measured
Density of the Moabi wood (kg /m ³)	750	700

Dimensions of the partition : 3,000 x 3,000 mm.



3.2 - PARTS LIST

As from the information supplied by the Applicant.
Dimensions are given in mm.

Marking	Description	Reference	Material	Specifications	Manufacturer
1, 2, 5 and 6	Framework		Moabi exotic red wood	50 x 118 30 x 118 d = 750 kg/m ³	-
3 and 4	Glazing beads		Moabi exotic red wood	20 x 49 20 x 42.5 d = 750 kg/m ³	-
7	False tongue		Moabi exotic red wood	20 x 78 d = 750 kg/m ³	-
8	Glazing sealing	Kérafix 2000	Ceramic fibre tapes	15 x 5	GLUSKE
9 and 10	Sealing	DC 615	Silicon sealant		DOW CORNING
		Flexpan 200	Swelling seal	th = 2	GLUSKE
		Kérafix 2000 Brandschutz-Schaum	Expanding foam		GLUSKE
11	Fixing		Nylon Glugs		FISCHER
12 and 13	Glazings	Contraflam Lite EYV 60		th = 14	V.S.G.I.
		Contraflam Lite Iso EYV 60		th = 47	V.S.G.I.
14 and 15	Packing		SUFALUX	5 x 14 x 60 4 x 47 x 60	CAPE FRANCE

th = thickness - d = density

3.3 - DETAILED DESCRIPTION OF THE SPECIMEN

3.3.1. Framework

The whole framework was made of Moabi wood of theoretical density : 750 kg/m³. It consisted of four frames (dimensions : 1,470 x 2,300 mm (w x h), 2,300 x 670 mm (w x h), 1,500 x 1,800 mm (w x h) and 670 x 1500 mm (w x h)), each of them provided with a glazing.
The frames consisted of studs and rails (section : 50 x 118 mm). Only the 1,500 x 1,800 mm (w x h) frame equipped with the built-in blind consisted of 30 x 118 mm sections.
The rails and studs of the frames were assembled together in the corners by mortise and tenon joints.

The whole length of the assembled stud and rail sections was provided with a 10 x 78 mm space to allow for the assembly of 30 x 118 mm false tongues made of Moabi wood. A 2 x 20 mm groove was provided in this space to allow for a 2 x 20 mm Flexpan 200 type swelling seal (GLUSKE).
The frames were fitted on the false tongues to make the partition.

The frames making the partition were assembled on the false tongues by house joints reinforced with Ø 5 x 60 mm screws.



3.3.2 Glazings

The glazings were of the Contraflam Lite EW 60 and Contraflam Lite Iso EW 60 (V.S.G.I.) type, respectively 14 mm and 47 mm thick

The precise composition of the Contraflam Lite EW 60 glazing is kept within the Test Laboratory records.

The Contraflam Lite Iso EW 60 glazing consisted of :

- one 14 mm thick Contraflam Lite EW 60 glass pane
- a 27 mm thick air-space with an aluminium insert and a built-in blind (Screen Line SL 27C New type - SAINT-GOBAIN)
- one 6 mm thick tempered glass pane.

Overall dimensions of the glazings :

Marking	A	B	D	C
Type	Contraflam Lite EW 60			Contraflam Lite Iso EW 60
Width (mm)	1,400	1,400	1,430	1,430
Height (mm)	2,230	600	1,100	1,730

3.3.3 Glazing assembly

Glazings A, B and C were held by single glazing beads made of Moabi exotic red wood (section : 20 x 49 mm), fixed to the frame with steel screws (\varnothing 4 x 45 mm) every 250 mm approximately.

Glazing D was held by double glazing beads made of Moabi exotic red wood (section : 20 x 42,5 mm), fixed to the frame with steel screws (\varnothing 4 x 45 mm) every 250 mm approximately.

The glazing beads were used with 15 x 5 mm KERAFIX 2000 ceramic fibre tapes (GLUSKE) allowing to hold the glazing firmly. The ceramic fibre tapes were sealed on the fire-exposed side and on the unexposed side with DC 815 (DOW CORNING) silicon sealant.

A 2 mm thick FLEXPAN 200 (GLUSKE) type swelling seal, with a width equal to the thickness of the glazing, was placed in the bottom of the filisters.

The glazings were packed in the lower part with two 5 mm thick bars of SUPALUX (CAPE FRANCE).

Filister hold : 15 mm.

3.4 - CHARACTERISATION (According to Decree of August 3rd 1999)

Samples from the same production batches as those used for the test specimen were supplied to the Test Laboratory for a check of the information given in the specifications of the test specimen.



4 - TEST ASSEMBLY

4.1 - SUPPORTING FRAME

The test specimen was assembled within a reinforced concrete supporting frame supplied by the Test Laboratory (*Station d'Essais du CTICM*).

- Date of concrete pouring : January 30th 2003
- Drying time : Over 4 weeks
- Thickness of frame : 200 mm
- Dimensions of opening : 3,000 x 3,000 mm (w x h)

4.3 - ASSEMBLING OF THE TEST SPECIMEN

The specimen (glazings + framework) was delivered to the Test Laboratory on April 17th 2003.

The specimen was assembled by the Applicant during week 17.

Assembling :

The framework was fixed to the concrete supporting frame, on three sides, by means of M8 x 100 mm screws and nylon plugs (FISCHER) every 600 mm approximately. One vertical edge was left free. The peripheral sealing was achieved with KERAFIX 2000 Brandschutzschaum (GLUSKE) expanding foam.

5 - TEST METHOD

5.1 PREVIOUS CONDITIONNING

In conformity with the prescribed procedures stated in § 1, the weight stability of the test specimen was reached on the day of the test.

5.2 - THERMAL PROGRAM

The temperature rise above the ambient temperature inside the furnace was controlled according to the standard thermal program represented by the following function :

$$T - T_0 = 345 \log_{10} (8t+1)$$

where :

t	=	Time [min]
T	=	Temperature inside the furnace at time t [°C]
T_0	=	Ambient temperature at time $t = 0$ min [°C]

5.3 DIRECTION OF FIRE

The test was carried out with the fire on the side opposite the glazing beads for glazings A and B, with the fire on the glazing beads side for glazing D, and with the fire on the tempered glass side for glazing C.



6 - FIRE TEST RESULTS

The locations of the sensors are shown in Annex 1, on plate 16.

The readings are recorded in Annex 1, on the plates mentioned hereafter.

6.1 TEMPERATURE MEASUREMENTS

6.1.1. Ambient temperature in the test room

It was measured according to standard NF EN 1363-1 as follows:

Location	Markings	Plate
Parallel with the fire-exposed side, at 1 metre	36	17

6.1.2. Temperatures inside the furnace

They were measured by 8 plate pyrometers according to standard NF EN 1363-1, located as follows :

Location	Markings	Plate
2 transverse sections at 100 mm from the frame	43 to 48	18

6.1.3. Temperatures of the specimen

They were measured by Nickel-chrome/Nickel alloy thermocouples, with \varnothing 0.5 mm wires protected by insulating sheath ($\rho = 900 \pm 100 \text{ kg/m}^3$), and located as follows :

Location	Markings	Plates
Temperatures on glazing A	1 to 3	21
Temperatures on glazing B	4 to 6	22
Temperatures on glazing C	7 to 9	23
Temperatures on glazing D	10 to 12	24
Temperatures on framework	13 to 20	25

6.1.4. Additional temperatures measurements

They were carried out for information only, as follows :

Location	Markings	Plates
Ambient temperature inside the furnace according to the Decree of August 3 rd 1999	37 to 42	30
Temperatures on framework according to the Decree of August 3 rd 1999	21 to 29	26
Temperatures on the glazing beads according to the Decree of August 3 rd 1999	30 to 35	27

6.2 PRESSURE MEASUREMENTS

The pressure inside the furnace was continuously controlled throughout the whole test. The prescribed value was established at 20 Pa.

Location	Markings	Plate
At 100 mm from the upper rail	53	20

6.3 DISTORTION MEASUREMENTS

During the test, the distortions (deflection, shortening, elongation, bending) were measured and recorded by means of potentiometric sensors as follows:

Location	Markings	Plates
At mid-height of the partition	49 to 51	28
At mid-height of the supporting frame	52	28

6.4 RADIATION MEASUREMENTS

During the test, the radiation through the specimen was measured and recorded by means of a Madtherm radiometer as follows:

Location	Markings	Plates
At the centre of the specimen, at a distance of 1 metre	54	29

7 - OBSERVATIONS

7.1 BEFORE THE TEST

Ambient temperature inside the furnace before the test : 25°C.
Ambient temperature inside the test room before the test : 21°C.
Temperature of the specimen before the test : 23°C.

See Annex 2, photo A.

7.2 DURING THE TEST

TIME [min]	OBSERVATIONS
00	Commencement of test.
2	Slight smoke release from rails/glazing-heads joints.
3	Breaking and falling down of glass panes on fire-exposed side of glazings A, C and D, and falling down of the blind.
4	Breaking and falling down of glass pane on fire-exposed side of glazing B.
5	Opacifying of glazings A, B and D.
6	Breaking and falling down of glass pane on fire-exposed side of glazing C and beginning of opacifying of the glazing.
12	Non uniformity of the opacifying gel at the centre of glazing A. See Annex 2, photo B.
18	Local temperature rise of 180°C recorded by the roving thermocouple on glazing A.
22	Local temperature rise of 180°C recorded by thermocouple 8 on glazing C.
27	Sustained smoke release from rail/stud joint at TC 14.
30	Nothing particular to report.
44	Pilot-flame test negative at smoke release from glazing-bead/stud joint.
45	Nothing particular to report.
60	Nothing particular to report.
55	Blackening of the framework on the periphery of glazing D. See Annex 2, photo C.
59	Pilot-flame test negative at smoke release from glazing-bead/stud joint.
90	Nothing particular to report.
81	Termination of test on request of the Applicant. See Annex 2, photo D.



7.3 AFTER TEST AND COOLING

Since the specimen went on burning after the test, no observation was possible.

8 - CLASSIFICATION CRITERIA ACCORDING TO NF EN 1364-1

According to the classification criteria defined by standard NF EN 1364-1, the behaviour of the specimen may be regarded as follows :

8.1 - FIRE INTEGRITY

8.1.1 - Sustained lighting

Duration : No failure until termination of test

8.1.2 - Gap gauge

Duration : No failure until termination of test

8.1.3 - Cotton-wool pad

Duration : No failure until 18 minutes of test.
Since the specimen did no longer ensure thermal insulation, the cotton-wool pad test was not taken into consideration in conformity with standard prEN 13501-2.

8.2 - THERMAL INSULATION

Duration : EIGHTEEN MINUTES - (18 min)

Cause of limitation : Local temperature rise of 180°C in the specimen

8.3 - RADIATION

	5 kW/m ²	10 kW/m ²	15 kW/m ²	20 kW/m ²	25 kW/m ²
Reached after :	81 min	-	-	-	-

'This report gives details about the construction method, the testing conditions and the test results achieved when the specific building element described was tested according to the procedure outlined in standard NF EN 1363-1 and, where applicable, in standard NF EN 1363-2.

As concerns the dimensions, details, loading, stresses and boundary or end conditions, any significant deviation other than that which is not excluded within the field of direct application in the appropriate test procedure is not covered by this report.

Because of the nature of the fire tests and of the difficulty in quantifying the uncertainty of the fire resistance assessment, it is impossible to establish any level of accuracy of the results.'



9 - CLASSIFICATION CRITERIA ACCORDING TO THE DECREE OF AUGUST 3rd 1999

According to the classification criteria defined by the Decree of August 3rd 1999, the behaviour of the specimen may be regarded as follows:

9.1 - TIGHTNESS TO FLAMES AND TO HOT OR FLAMABLE GASES

Duration : ONE HOUR AND THIRTY MINUTES - (1 hr 30 min)

Cause of limitation : Termination of test on request of the Applicant.

9.2 - THERMAL INSULATION

Duration : EIGHTEEN MINUTES - (18 min)

Cause of limitation : Local temperature rise of 180°C in the specimen.

Maizières-lès-Metz (France), May 15th, 2003

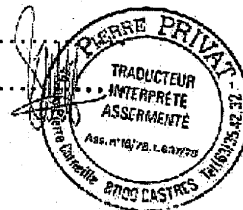
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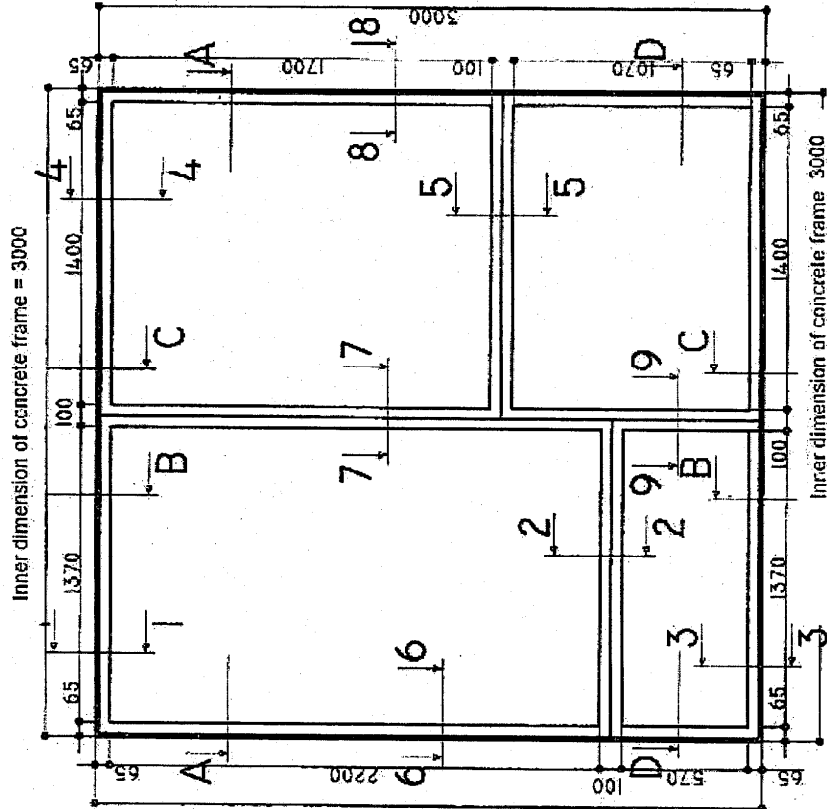
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LE 28 MAI 2003



Annex 1 - Plate 1



Inner dimension of
concrete frame = 3000

TRANSLATION
STATION
0333205

Test 03-V-162

Plate 1

ELEVATION VIEW

Title

STATION
0333205

VETROTECH SAINT GOBAIN

Applicant

CTICM

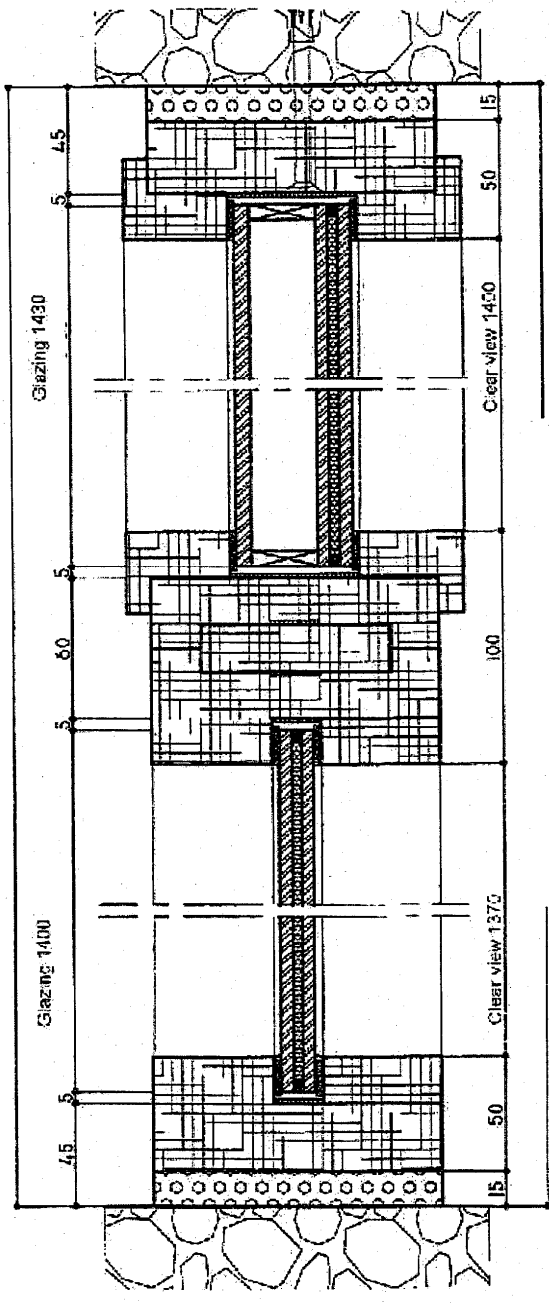
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Annex 1 - Plate 2

Test report n° 03-V-162
(NF EN 1364-1)

FIRE ↓

Inner dimension of concrete frame = 3000



Inner dimension of concrete frame = 3000

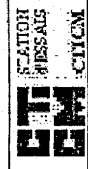
TRANSLATION
STATION
BESSAIS

Test 03-V-162

Plate 2

Title
HORIZONTAL SECTION A-A

Applicant
VETROTECH SAINT GOBAIN



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