REPORT
issued by an Accredited Testing Laboratory

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ISO/IEC 17025

Teknos Norge A/S
Industriveien 28
N-3430 RÖYKEN
Norge

Fire test of a facade cladding

Test method

SP FIRE 105, issue 5, dated 1994-09-09

Product

Teknos FR Facade cladding

Product designation

Spruce facade cladding painted with primer with fire retardant agent and overlaid by a waterborne acrylic industrial system.

Sponsor

Teknos Norge AS
Industriveien 28
N 3430 Røyken
Norway

1 Purpose of the test

The purpose of the test was to determine the fire spread in the façade cladding described in item chapter 2.

2 Test specimen

The materials were selected and delivered by the sponsor. The materials arrive at SP on February 10, 2011. According to the sponsor the wood was treated with fire retardant on September 27-28, 2010.

2.1 Description of the construction

The test specimen consisted of a spruce facade cladding painted with primer with fire retardant agent and overlaid by a waterborne acrylic industrial system, see appendices 1 - 2.

The dimensions of the facade cladding were (width x height) 4000 x 6000 mm.

The facade cladding was constructed of vertical mounted nailing battens with dimensions (thickness x width) 36 x 45 mm with a centre distance of approximately 600 mm. The nailing battens were also placed around the fictitious windows and at the top and the bottom of the facade at the half-width. At the bottom of the facade at the half-width was a cavity vent mounted between the nailing battens. The gap between the cavity vent and the nailing battens was sealed with mineral wool insulation. Against the nailing battens were boards with dimensions (thickness x width) 19 x 148 mm mounted horizontal, without gaps between the boards. The boarding was fixed to the nailing battens with screws designated Spax with a dimension of 6 x 110 mm. At the sides of the fictitious windows were architraves placed with dimensions (thickness x width) 19 x 65 mm. On top and bottom of the fictitious windows and at the bottom of the facade a drip strip mould was mounted with dimensions (thickness x width) 45 x 70 mm.

The wood was treated with 350 g/m^2 ± 10% (wet) primer with fire retarding agent designated Teknosafe 2407. The primer was overlaid by 150 g/m^2 ± 10% (wet) waterborne acrylic industrial system. The wood was industrial painted on September 27-28 2010 by Moelven Langmoen AS. Manufacturer of the fire retarding agent was Teknos Oy Helsingfors Finland.

The cavity vent designated Vented Linear Construction Seals consisted of a wire cloth made of stainless steel designated AISI304, with the mesh size 2 mm and wire diameter 0,56 mm. The wire cloth was shaped into a twin roll barrier with the dimension (diameter x height) Ø36 x 120 mm and a single mounted intumescent seal designated Therm A Flex with the dimensions (thickness x height) 3,4 x 45 mm. Manufacturer of the cavity vent was Securo AS Norway. Manufacturer of Therm A Flex was Intumescent Seals Division of the Dixon International Group Limited, Cambridge.

The test arrangement is shown in appendices 3 - 5.

2.2 Mounting of the test specimen

The façade cladding was mounted against the test rig on February 22, 2011 at SP´s furnace hall by Teknos Norge AS. The nailing battens were fixed to the lightweight concrete with lightweight concrete anchor with the dimension 8 x 60 mm and lightweight concrete screw with a dimension of 8 x 110 mm.

2.3 Conditioning

The wood was stored in SP's furnace hall before the test. The temperature in the furnace hall was in average 17 °C and the relative humidity was in average 58 % during this time.

2.4 Verification

2.4.1 Properties of included materials

Test specimen	*Density (kg/m^3)*	*Moisture ratio 1) (%)*
Nailing batten 36x48 mm	440	8,8
Boarding 19x148 mm/ Architrave 22x145 mm	468	7,5
Drip strip mould	416	13,2

1) Moisture ratio calculated from weight loss after being heated at 105 °C.

The verification was performed on Mars 1, 2011 on samples taken from the same batch of material as the material used for construction of the test specimen.

The purpose of the control is to verify and/or determine material data and dimensions of materials and components included in the test specimen. The extent of performed measurements and applied methodology can deviate from standardized method. The results shall therefore not be considered as formal material data.

3 Test procedure and test results

The test was performed on February 28, 2011. The test lasted approximately 13 minutes.

The climate conditions in the test hall at the start of the test were:

- air temperature: 17 °C
- relative humidity: 26 %

3.1 Witness of test

The test was witnessed by Mr Arve Valsø, Mr Jörgen Hansen and Mr Oscar Strand from Teknos Norge AS and Mr Jan-Olaf Vikan Securo AS

3.2 Temperatures

The temperature at the eave was measured with two thermocouples (C11 – C12).

The placement of the thermocouples at the eave is shown in appendix 4.

The measured temperatures at the eave are shown in appendix 10.

3.2.1 Optional temperatures

The temperature at the cavity vent was measured with ten thermocouples (C1 – C10).

Thermocouples C1, C2, C4 and C5 were placed upon the cavity vent. Thermocouples C3 and C6 were placed on bottom of the cavity vent.

Thermocouples C7 – C10 were placed on the surface of the test rig.

The placement of the thermocouples at the cavity vent is shown in appendix 6.

The measured temperatures at the cavity vent are shown in appendices 7 - 9.

3.3 Heat flux

The total heat flux against the test specimen was measured with one heat flux meter. The heat flux meter was placed at the centre of lower fictitious window. The manufacturer of the heat flux meters was Medtherm.

The measured heat flux at the centre of the lower fictitious window is shown in appendix 11.

3.4 Observations

Photographs taken in connection with the test are shown in appendix 13.

3.4.1 Observations during the test

Time min:s	*Observations*
00:00	The fire source of heptane ignites. The test starts.
00:30	The flames leaves the fire room
00:45	Flames reach the lower edge of the lower fictitious window.
00:55	Flames reach the lower edge of the upper fictitious window.
01:00	Flames reach the upper edge of the upper fictitious window.
01:20	Some flames reach the eave.
03:20	Approximately constant flames to a level of the upper edge of the lower fictitious window.
04:10	Lots of dark smoke is visible above the lower fictitious window.
07:20	Approximately constant flames to a level of the lower edge of the upper fictitious window. Click sounds have sounded from the façade during the whole test.
09:45	Lots of dark smoke is visible above the upper edge of the lower fictitious window.
10:40	The boarding is burning below the lower fictitious window.
11:40	The flames have decrease in height, to a level of the lower edge of the lower fictitious window. Above the flames is dark smoke visible.
12:10	The flames have decrease in height and there are only flames in the fire room.
13:00	The test terminates. The fire source becomes extinct.

3.4.2 Observations after the test

The lower edge of the façade and the area under the lower fictitious window are heavy charred. The drip strip mould along the lower edge and under the lower fictitious window of the test specimen is heavy charred. The area between the fictitious windows is charred. The left side of the drip strip mould above the fictitious window was very little burned. The colour had risen up on the upper drip strip mould on top of the fictitious window and on the architraves on the sides of the fictitious window and been affected by the fire which gave the surface a charred appearance.

The fire damages of the test specimen are shown in appendix 12.

4 Summary

A facade cladding described under chapter 2, has been fire tested according to the accredited methods SP FIRE 105, issue 5, dated 1994-09-09 during 13,00 minutes. The following results were obtained:

The maximum temperature at the eave reaches 241 °C after app. 12,5 minutes (C12)

The maximum heat flux against the centre of the lower fictitious window reach 102 kW/m^2 after 6,9 minutes.

The façade cladding was not charred above the lower edge of the upper fictitious window.

Some flames reach the eave.

The test results relate only to the behaviour of the test specimen during the conditions of the test. At other conditions, for instance another fire condition, the behaviour of the construction may differ from the presented test results.

SP Technical Research Institute of Sweden
Fire Technology - Fire Resistance

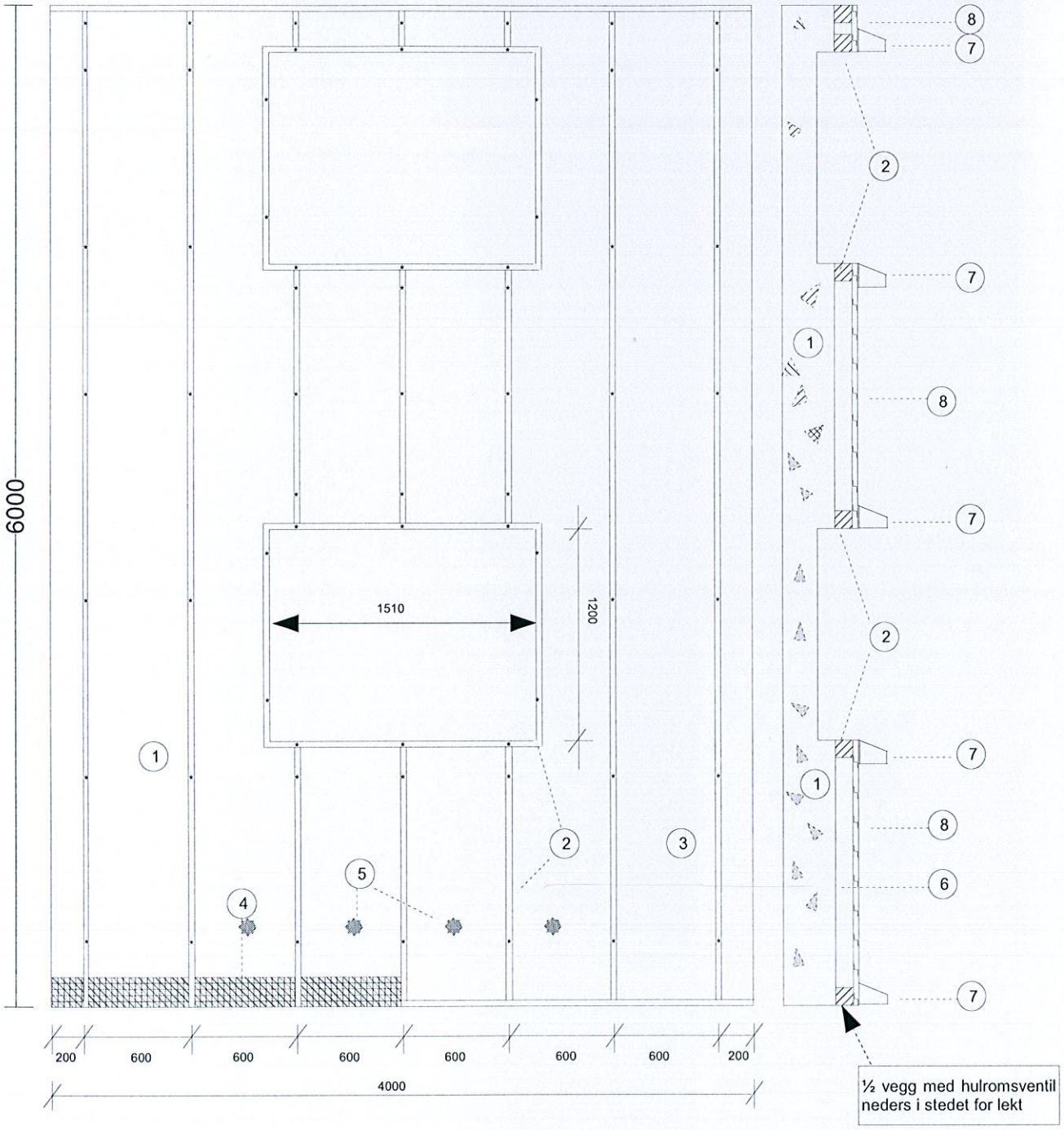
Performed by

Lars Boström

Appendices
1-8 (one page per appendix)

SP FIRE 105

TEKNOS FR FACADE



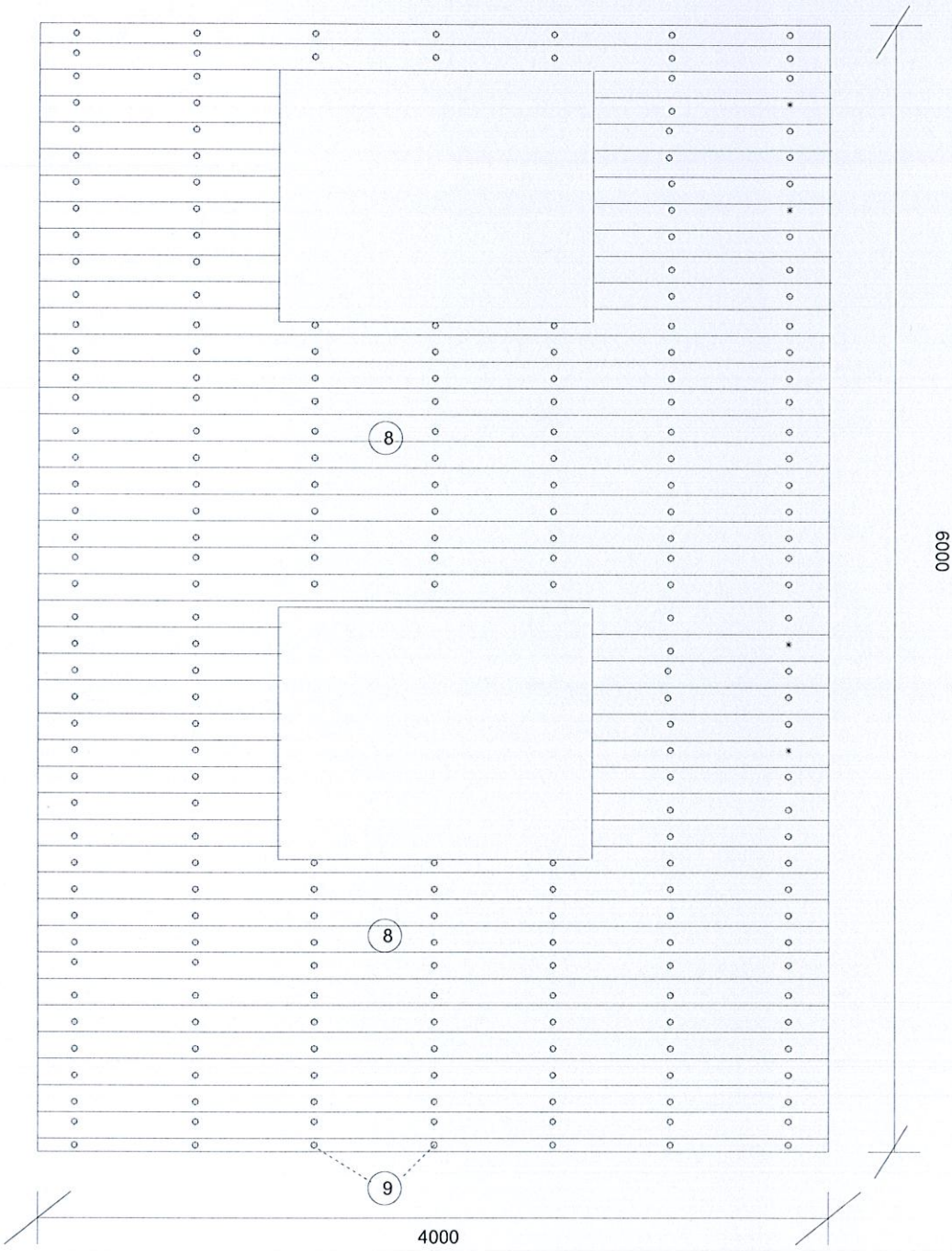
1	Betongelement	
2	Trelekter	36 x 48 mm; cc 600 mm
3	Spikerplugg	8/100; cc 1000 mm
4	Hulromsventil	
5	Termoelement	
6	Luftspalte	
7	Vannbord/dryppnese	45 x 70 mm
8	Trekledning	19 x 148 mm gran dobbelfals

SP APP: 1
REF: PX05884-02
SIGN: OZ

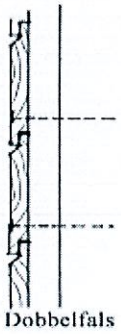
TEKNOS NORGE AS
Industriveien 28
N 3430 Spikkestad

SP FIRE 105

TEKNOS FR FACADE



8	Trekledning	19 x 148 mm gran dobbelfals
9	Spiker eller skruer	2,8 x 75 eller 55 x 3,9



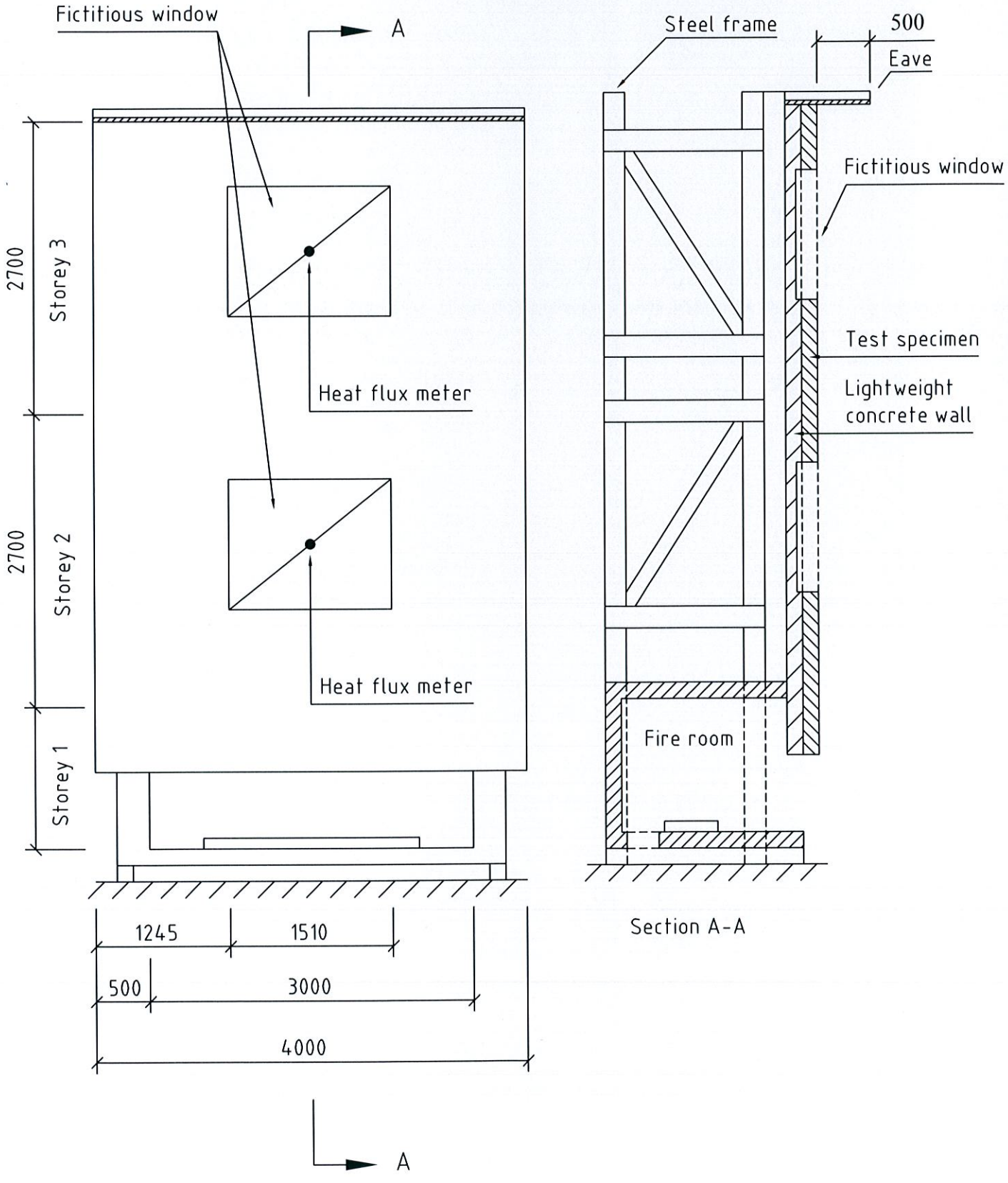
SP APP: 2
REF: PX05884-02
SIGN: Ok

TEKNOS NORGE AS
Industriveien 28
N 3430 Spikkestad

Test arrangement

SP FIRE 105

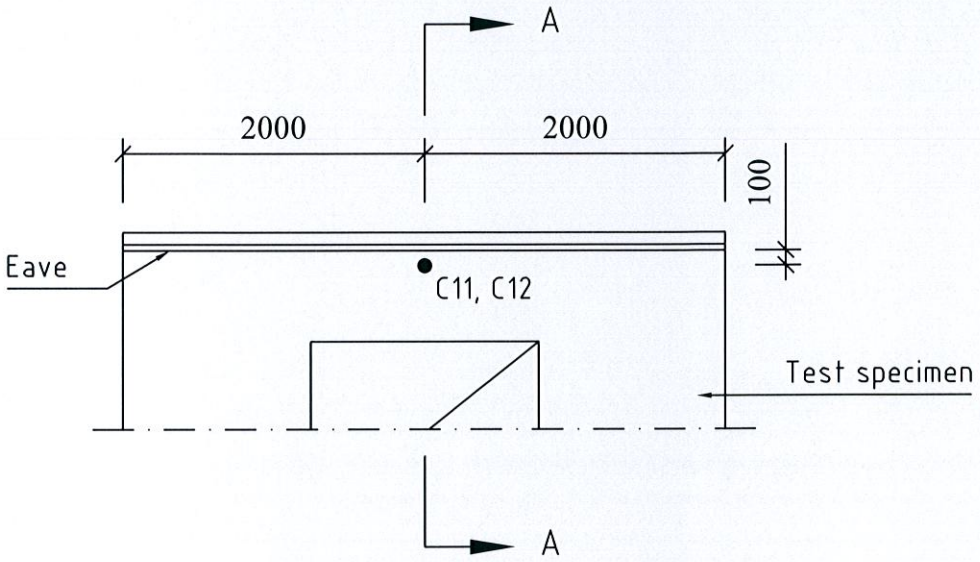
Appendix No: 3	
Report No:	PX05884-02
Date: 2011-02-25	Rev. Date:
Scale: 1:50	Sign: TR

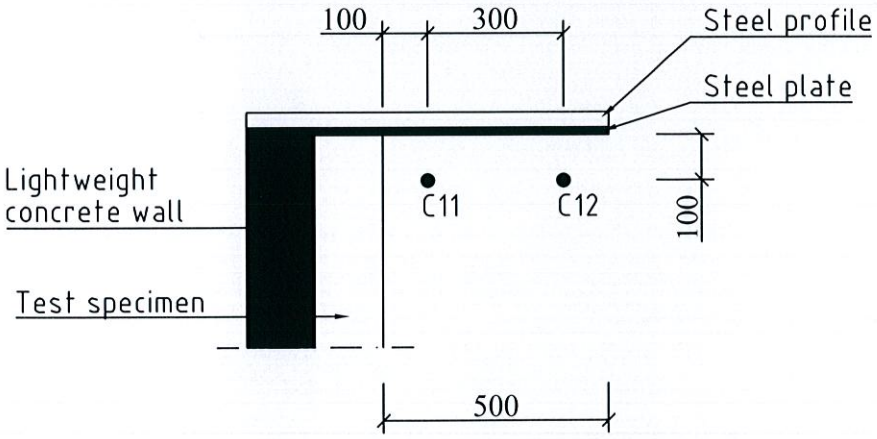


Test arrangement

SP FIRE 105

Appendix No: 4	
Report No: PX05884-02	
Date: 2011-02-25	Rev. Date:
Scale: 1:50	Sign: TR





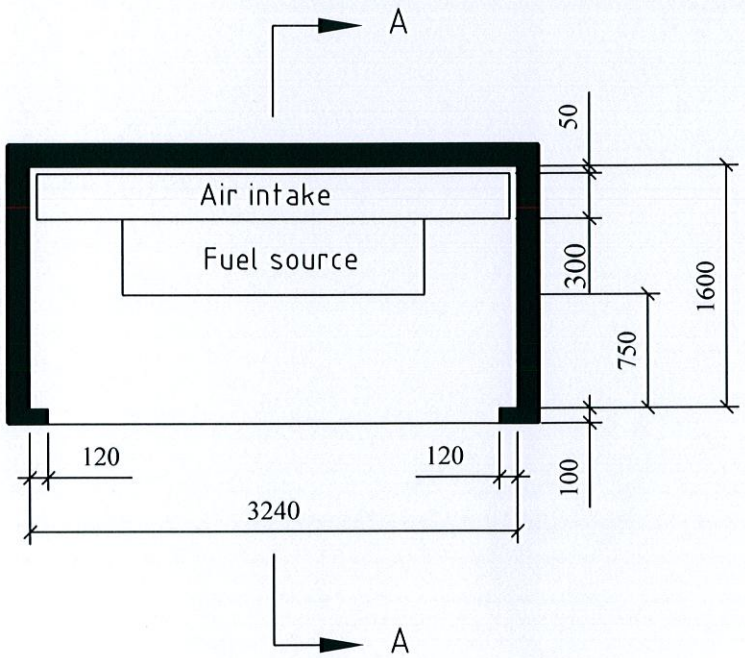
Section A-A

Thermocouple C11-C12

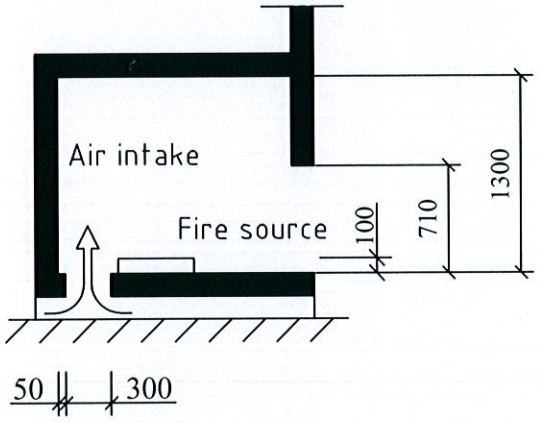
Test arrangement

SP FIRE 105

Appendix No: 5	
Report No:	PX05884-02
Date: 2011-02-25	Rev. Date:
Scale: 1:50	Sign: TR



Planview of fire room

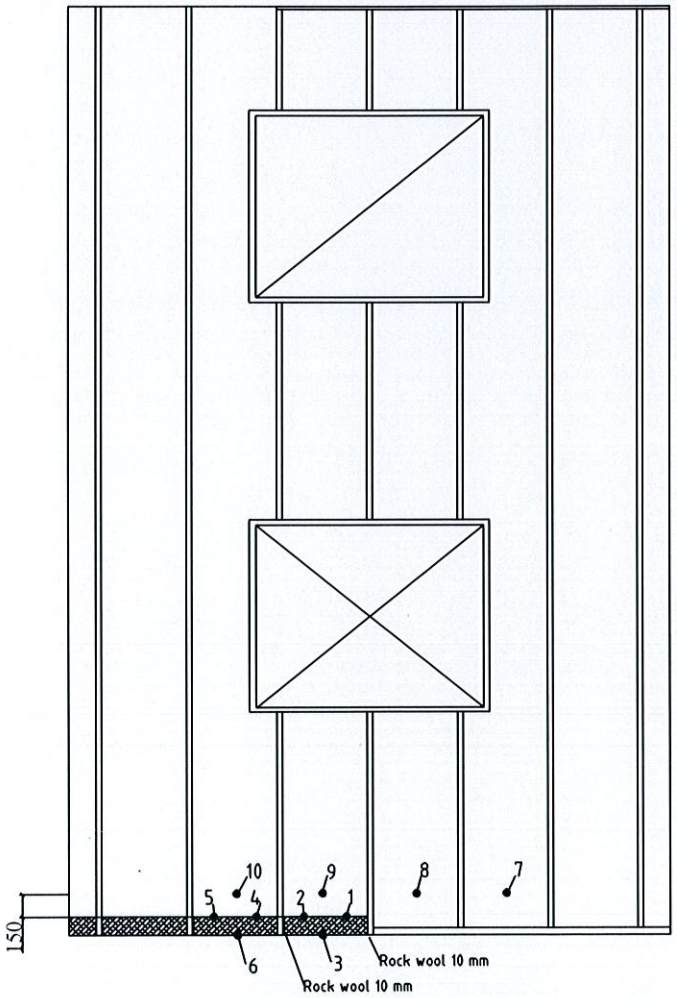


Section A-A

Test arrangement

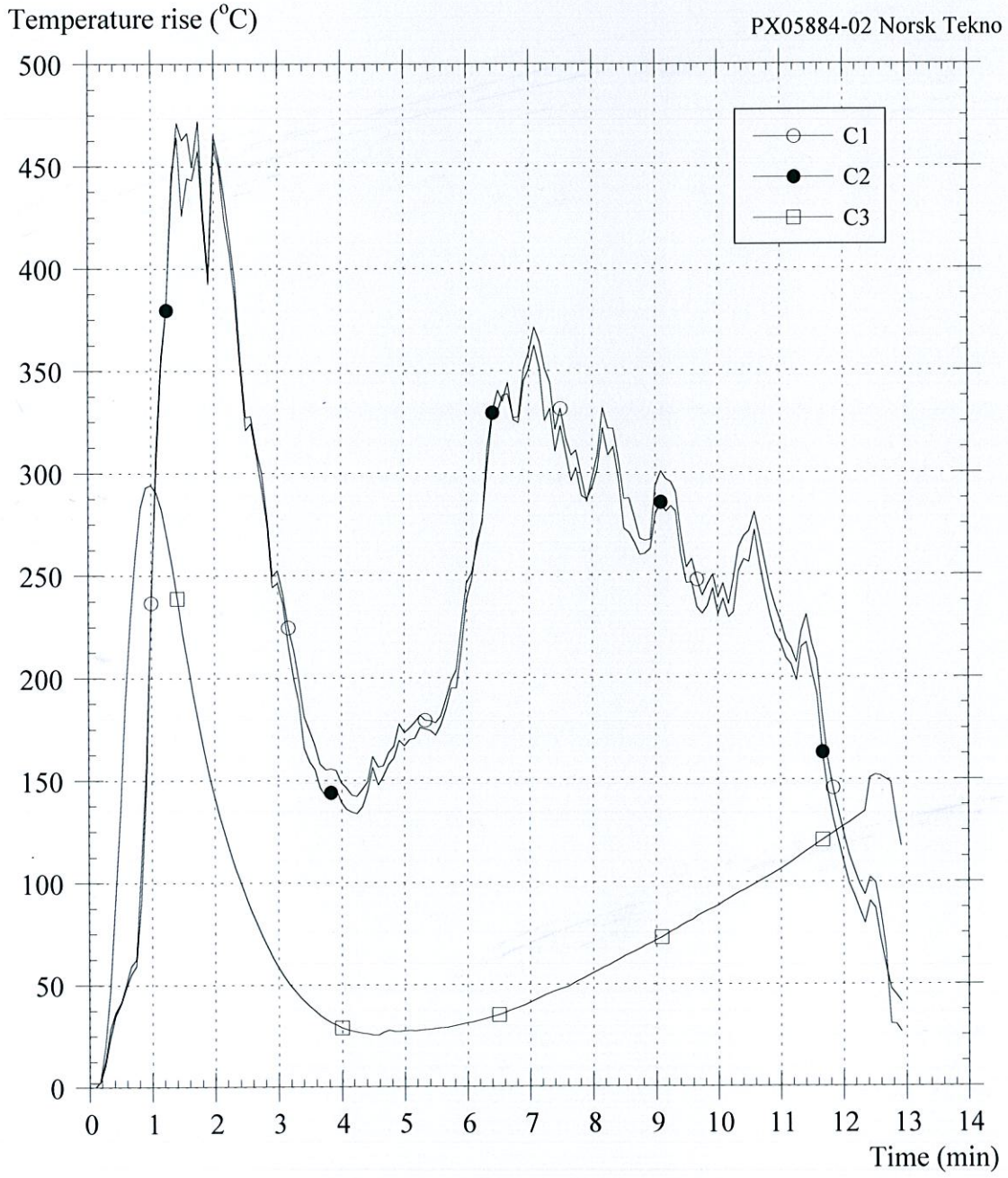
SP FIRE 105

Appendix No: 6	
Report No: PX05884-02	
Date: 2011-02-28	Rev. Date:
Scale: 1:50	Sign: TR

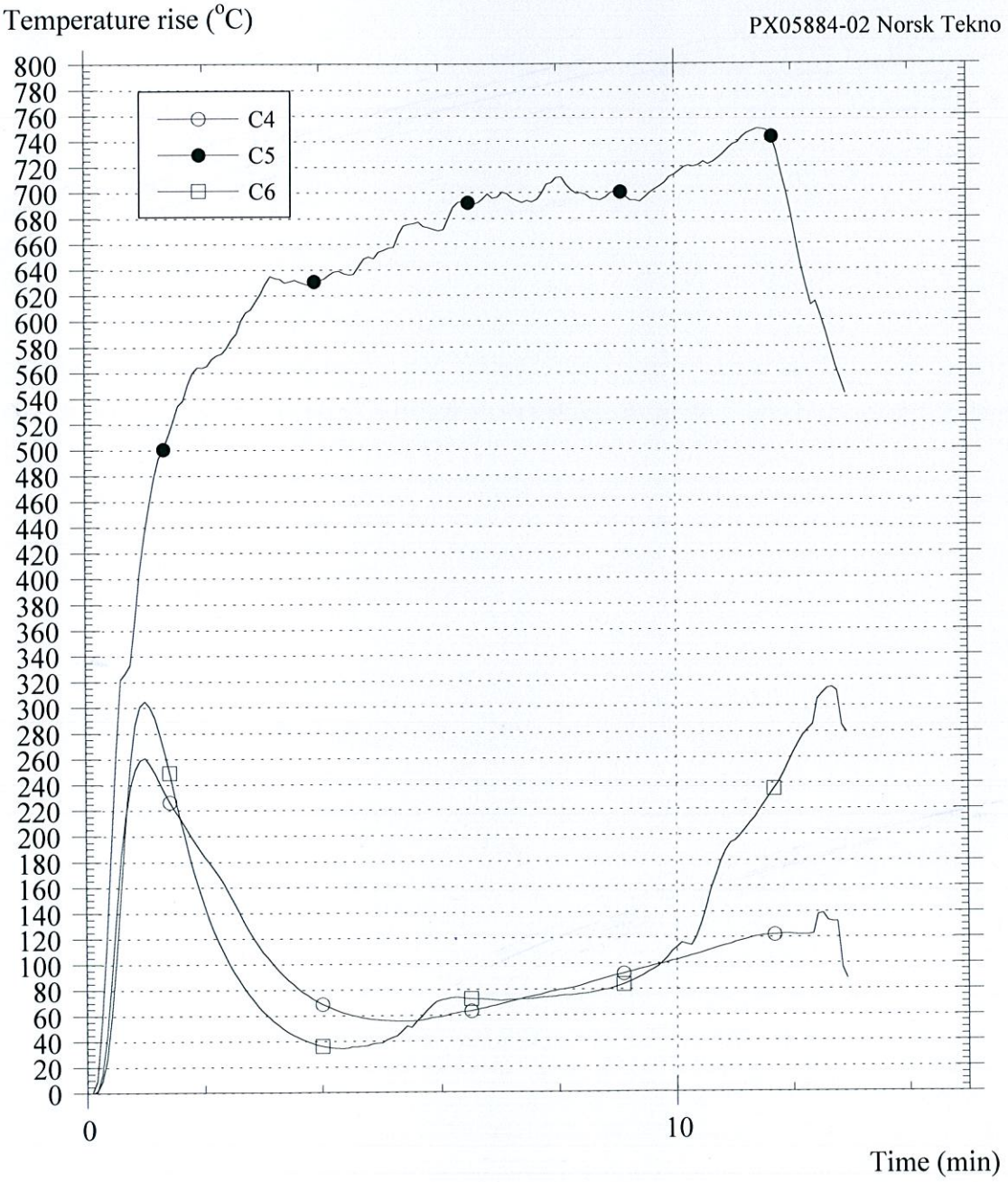


Thermocouples 1 - 10 placed by the sponsor

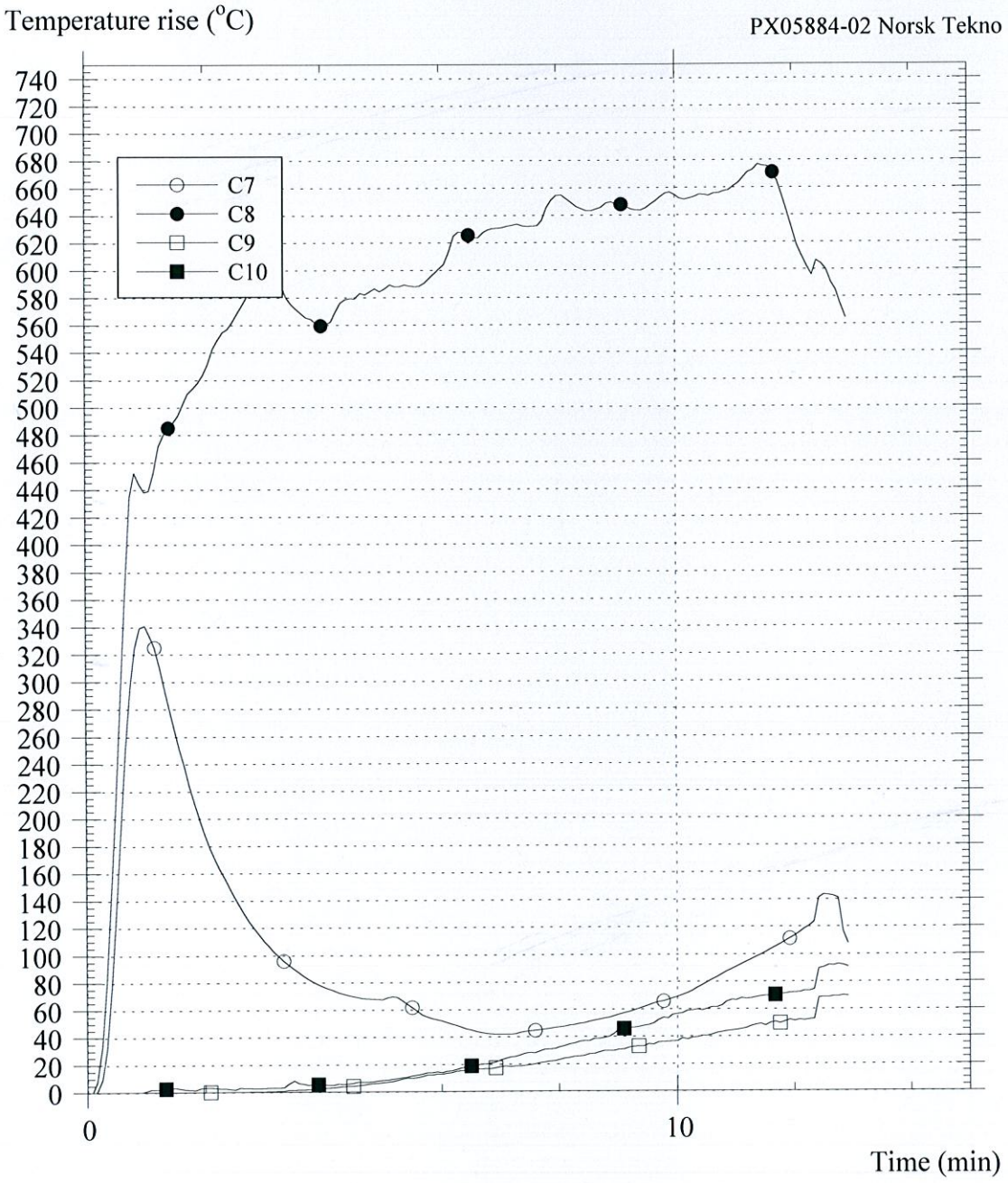
Unexposed face temperature rise



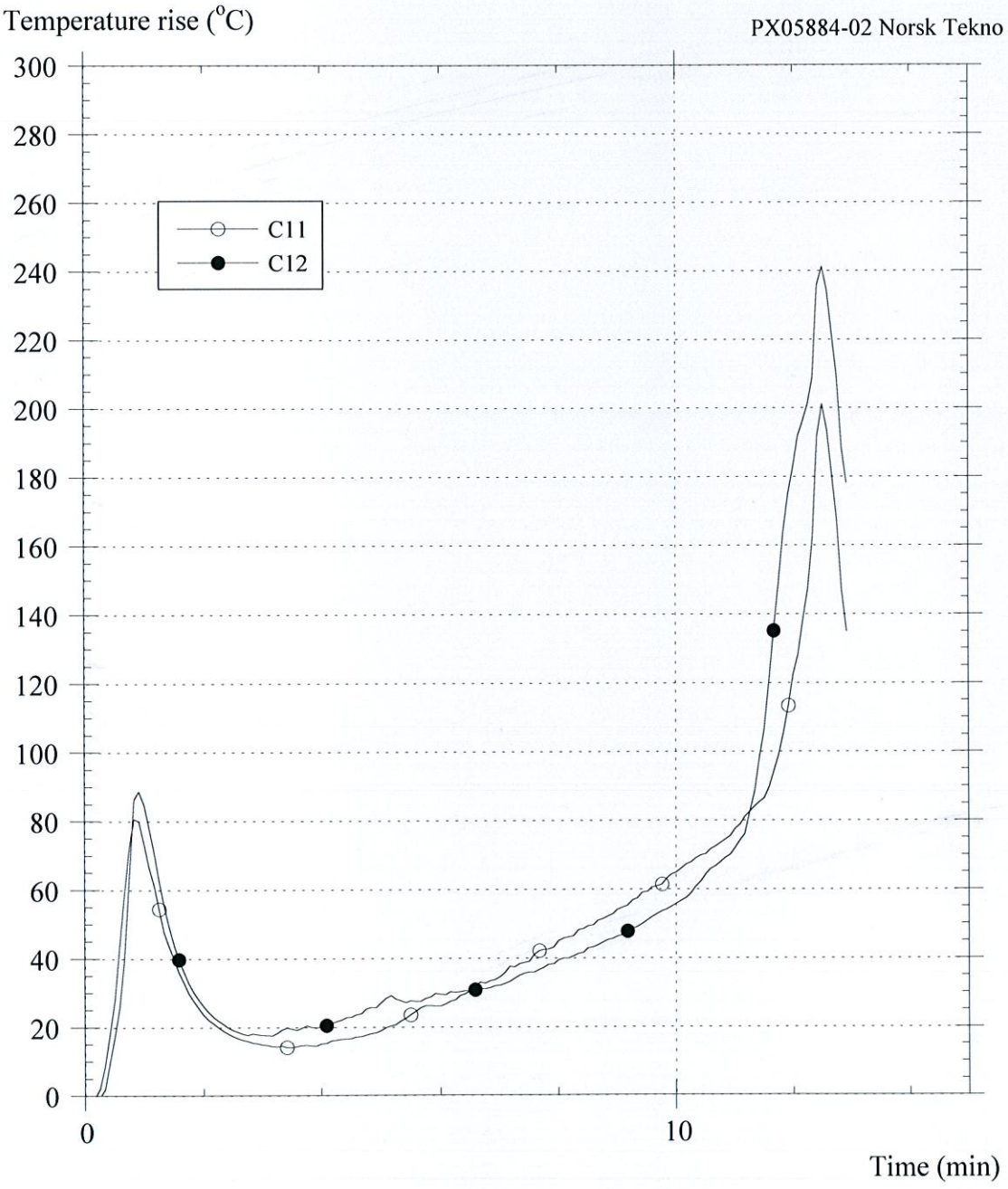
Unexposed face temperature rise



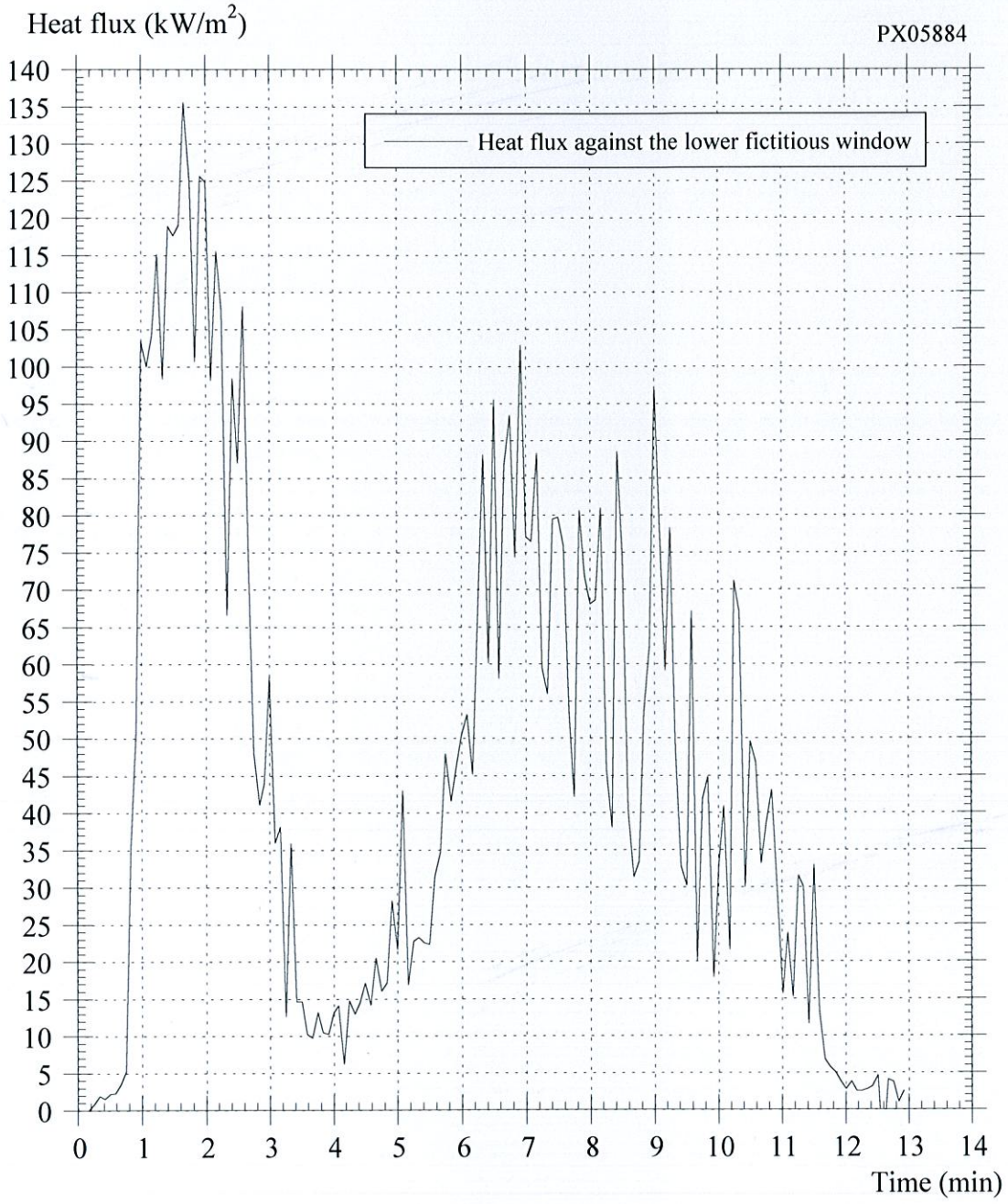
Unexposed face temperature rise



Unexposed face temperature rise

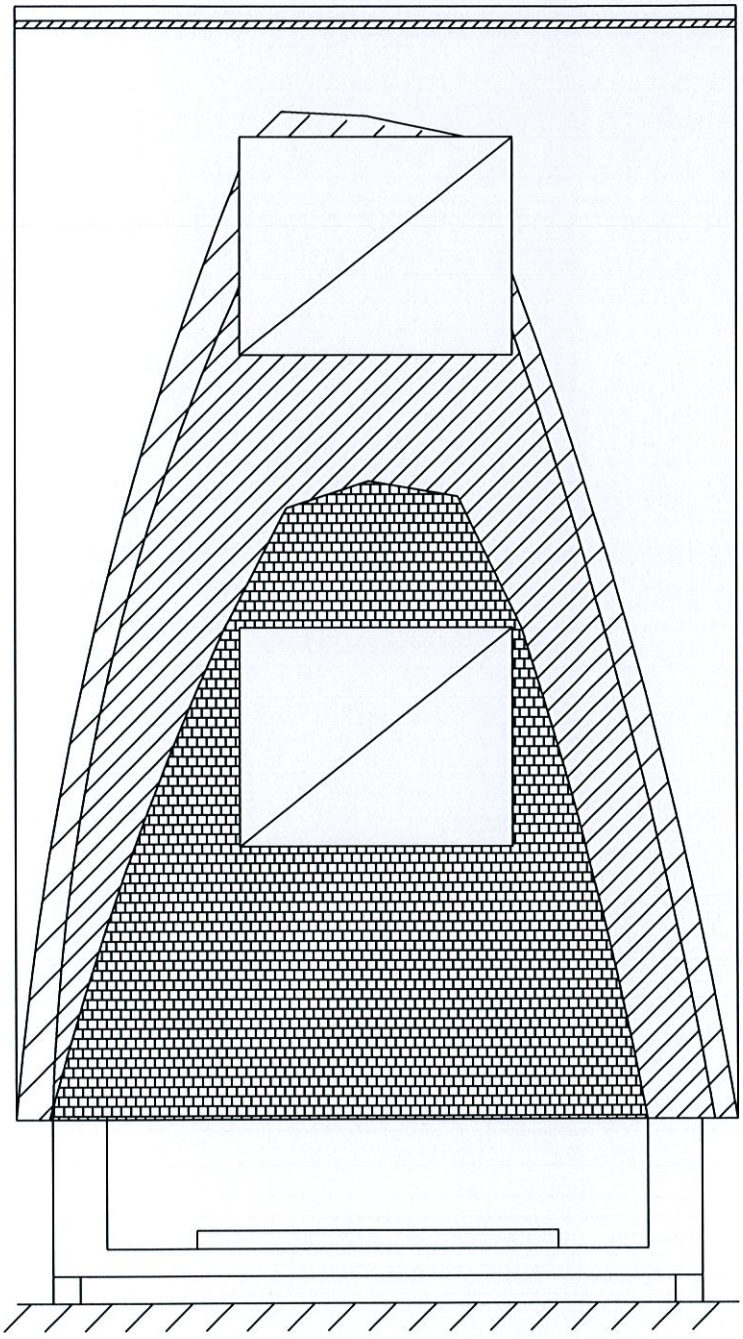


Heat flux


Heat flux (kW/m2)
PX05884
Heat flux against the lower fictitious window
140
135
130
125
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Time (min)

Fire damage

Appendix No: 12	
Report No: PX05884-02	
Date: 2011-03-01	Rev. Date:
Scale: 1:50	Sign: TR



The boarding is uninfluenced

The boarding is discoloured

The boarding is charred

The boarding is heavy charred

Appendix No: 13

Report No: PX05884-02

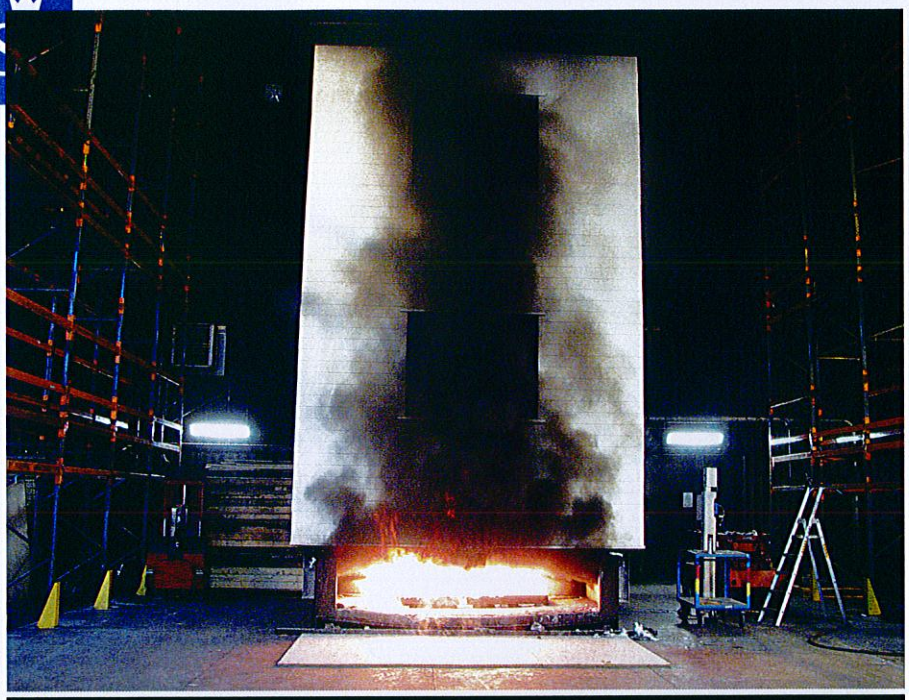


Photo No: 1

The test specimen at the beginning of the test.

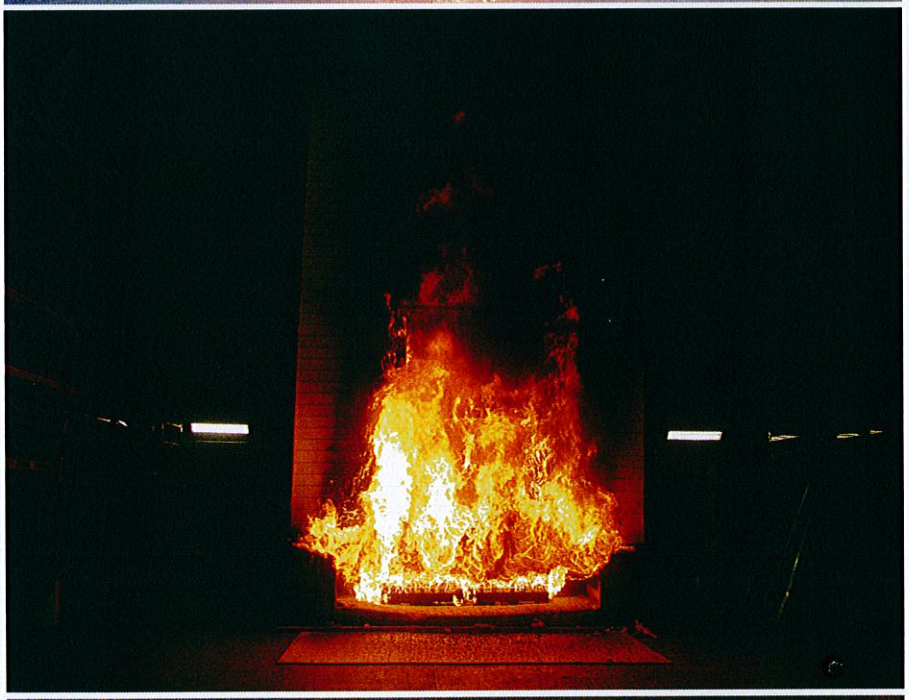


Photo No: 2

The test specimen when the flames reach the lower edge of the upper fictitious window.

Photo No: 3

The fire exposed side after the test.