TEST REPORT FOR FIRE RESISTANCE

Test Sponsor:

AGC Glass Europe
Avenue Jean Monnet, 4
1348 Louvain-la-Neuve
Belgium
T: +32 2 409 30 00 |
F: +32 2 672 44 62
Website: www.agc-pyrobel.com

Test Assembly:

Non-loadbearing Uninsulated, Fully Glazed, BGT Steel Partition Assembly with 16mm thick Pyrobel-T EW-120-16 Glass

Test Standard:

EN 1363-1:2020; Fire resistance tests - Part 1: General requirements

EN 1363-2:1999; Fire resistance tests - Part 2: Alternative and additional procedures

EN 1364-1:2015; Fire resistance tests for non-loadbearing elements - Part 1: Walls

Test Reference No.:	AP089-1B
Test Date:	06-May-26
Issue Date:	09-Jun-26

Thomas Bell-Wright International Consultants (Dubai Branch)
Plot 599 8987, Corner of 46th and 47th Streets, Jebel Ali Industrial Area 1, Dubai, U.A.E
T: +971 4 821 5777 | fire@bell-wright.com | www.bell-wright.com
UAE ● KSA ● Qatar ● UK

Accreditation

ISO/IEC 17025 General requirements for the competence of testing and calibrating laboratories with:

United Kingdom Accreditation Service (UKAS) - Testing Laboratory: **4439**
www.ukas.com

Memberships

Members of European Group of Organization for Fire Testing, Inspection and Certification
www.egolf.org.uk

Member of Association for Specialist Fire Protection
www.asfp.org.uk

Member of Centre for Window and Cladding Technology
www.cwct.co.uk

The work which is the subject of this report falls within the scope of the listed 17025 accreditation above.

TABLE OF CONTENTS

1. INTRODUCTION

Determination of the fire resistance of a non-loadbearing, uninsulated, fully glazed, BGT steel partition assembly with 16mm thick Pyrobel-T EW-120-16 glass according to:

EN 1363-1:2020; *Fire resistance tests - Part 1: General requirements*

EN 1363-2:1999; *Fire resistance tests - Part 2: Alternative and additional procedures*

EN 1364-1:2015; *Fire resistance tests for non-loadbearing elements - Part 1: Walls*

2. SPONSOR

Name: AGC Glass Europe
Address: Avenue Jean Monnet, 4
1348 Louvain-la-Neuve
Belgium
T: +32 2 409 30 00 |
F: +32 2 672 44 62
Website: www.agc-pyrobel.com

3. TESTING LABORATORY

Name: Thomas Bell-Wright International Consultants (TBWIC)
Address: Corner of 46th and 47th streets, Jebel Ali Industrial Area 1
P.O. Box 26385, Dubai, U.A.E.
T: +971 (0) 4 821 5777, F: +971 (0) 4 333 26 93
Website: www.bell-wright.com

4. DATE OF TEST & WITNESSES

The test was conducted on 06-May-26 and has been witnessed by the following parties:

Name	Company	Contact Number
Mr. Kamil Mohammed	Intertek	+971 50 951 4681
Mr. Shibanath Giri	Bin Ghurair Metal Industries	+971 55 123 2910
Mr. Nafees Idrees		+971 56 409 6183
Mr. Binay Ku Mahanta		+971 55 123 2956
Mr. Rami Bou Chakra	AGC Glass	+971 55 104 0755

5. TEST SAMPLES

5.1. General Description of the Assembly

The test specimen consisted of a non-loadbearing, uninsulated, fully glazed steel partition assembly installed within a rigid test frame opening. It incorporated a series of glazing panes installed in square and portrait orientation.

The overall dimensions of the specimen were 3000 x 3000 x 50mm (w x h x thk.), and 3010 x 3030 x 50mm (w x h x thk.) inclusive of the ceramic fiber infill at the fixed vertical edge and horizontal edges.

For full details of the test specimen, refer to Appendix 1 and 2.

5.2. Supporting Construction

The specimen was installed directly in a restraint frame made of steel and dense refractory castable with a density of 2000kg/m³. The overall frame opening was 3050 x 3050 x 300mm (w x h x thk). The sill of the test

frame was raised by 20mm, and width of the frame at fixed vertical edge was reduced by 15mm to achieve the required opening dimension of 3035 x 3030 x 300mm (w x h x thk.)

5.3. Standard Specific Construction Conditions

The fire test was carried out according to EN 1363-1:2020, EN 1363-2:1999, and EN 1364-1:2015.

The specimen was installed near to the unexposed face of the rigid supporting construction and, in accordance with §6.3.4 of EN 1364-1:2015, had an unrestrained edge on one vertical edge between the framing system and the supporting construction. The unrestrained edge had a nominal gap of 25mm, and was filled with 128 kg/m^3 ceramic fiber blanket.

A nominal 10mm gap was maintained between the fixed vertical edge of the framing system and the supporting construction and was placed with metal shims tightly at each anchoring points, and the gap was filled with 128kg/m^3 ceramic fiber blanket. Additionally, 20mm and 10mm gaps were maintained, respectively, at top and bottom horizontal edge between the framing system and supporting construction and was filled with 128kg/m^3 ceramic fiber blanket. The gap between the bottom horizontal edge and supporting construction was placed with metal shims tightly at each anchoring points.

The specimen was non-symmetrical and was tested with the glazing bead on the fire side (exposed face) and flange side of the partition frames facing the non-fire side (unexposed face).

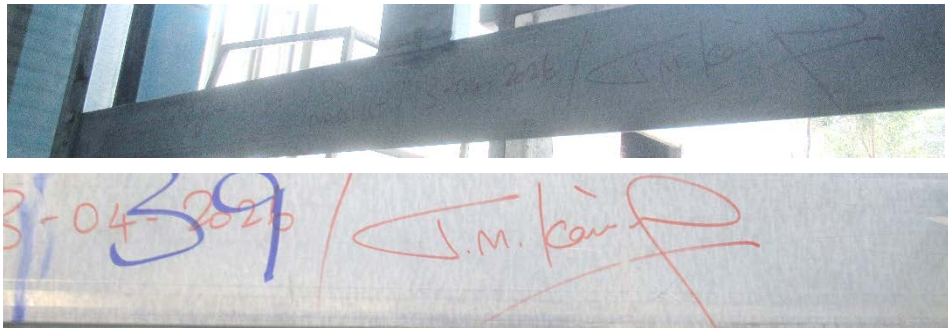
In accordance with §A.2 of EN 1364-1:2015, the specimen was tested with the largest glazing panel adjacent to the free edge of the specimen. Only portrait and square panes were tested and landscape panes were not part of the test or within the scope of this test report.

The specimen was installed such that it incorporated both a 'T' and a '+' joint, as well as a junction between transoms and mullions where the mullions are full height and interrupt the transom. However, the specimen did not include any non-glazed panels, and the inclusion of non-glazed panels in practice are not within the scope of this test report.

6. SPECIMEN DEFINITION & VERIFICATION

6.1. Specimen Definition & Verification of the Test Specimen

TBWIC testing laboratory has not been involved in the selection or design of the specimen. However, the steel partition frame materials were selected, marked, and signed by a representative from Intertek (Certification Body) on 13-Apr-26 as shown below.



There are contexts where information has been provided by the sponsor and verification of information has been done through either technical datasheet or other document submission, or as indicated directly by the sponsor. For this reason, materials have been tested in an as-received condition and TBWIC bears no liability for the legitimacy of the submitted information. Similarly, the results of the test apply only to the samples as received.

6.2. Specimen Installation & Condition

Installation of the specimen: Bin Ghurair Metal Industries L.L.C

The specimen components were delivered on 01-May-26 and 04-May-26. The specimen was installed between 01-May-26 and 04-May-26 and was stored in ambient conditions at temperatures ranging between 27°C and 42°C and 21% to 58% humidity.

7. METHOD OF TEST

7.1. Performance Criteria

Integrity failure of the specimen shall be deemed to have occurred if the specimen collapses, if sustained flaming for more than 10 seconds is observed on the unexposed face, a positive cotton pad test is taken, or permitting the penetration of gap gauges through the specimen, as specified in §11.2 of EN 1363-1:2020.

Insulation failure of the test construction shall be deemed to have occurred if the mean unexposed face temperature exceeds 140˚C above its initial value and maximum unexposed face temperature, if any thermocouple exceeds 180˚C above the initial mean unexposed face temperature, or if integrity failure occurs, as per §11.3 of EN 1363-1:2020.

7.2. Specimen Instrumentation & Measurements

The time-temperature curve has been controlled using nine thermocouples distributed in the furnace, and the thermocouples were placed at 100mm from the exposed face of the specimens.

The pressure in the furnace was controlled at 15Pa at a nominal height of 2500mm above the sill of the specimen, in service of establishing a neutral pressure plane nominally at 500mm above the sill of the specimen but not to exceed 20Pa at the head of the specimen, in accordance with §5.2.1 and §5.2.2 of EN 1363-1:2020. An additional probe, for reference, was located at 1500mm above the sill of the specimen, and readings for both probes are provided in Appendix 3.

Unexposed face temperatures have been measured, as well as radiation at a distance of 1m from the geometric center of the specimen, placed in accordance with §8.3.1.2(a) of EN 1363-2:1999 (see Appendix 3). Deflection has been measured at several locations (see Appendix 4).

Two measurements of radiation have been taken. The primary has been placed in accordance with §8.3.1.2(a) of EN 1363-2:1999, and the secondary immediately next to it for reference and redundancy. For the purposes of this report, the radiation expressed in the results is that of the primary flux meter, as referenced in the graphs in Appendix 3.

8. FIRE TEST

8.1. Ambient Conditions & Test Situation

The ambient conditions at the start of the test are expressed below. The airflow was measured with an anemometer placed at a right angle and within 1m of the test face.

Condition	Value
Ambient Temperature	30°C
Humidity	47.4%
Air Velocity	Less than 0.1 m/s
Initial Unexposed Mean Surface Temperature	29°C

8.2. Pre-Test Observations

The specimen was found satisfactory and fit to be tested.

8.3. Fire Test Observations

Time (mm:ss)	Specimen Observations (All observations have been taken from the unexposed face unless otherwise noted) *(Refer drawing 1 of Appendix 2 for the location of the glazing panels)*
0:00	**The test was started**
01:24	Crack sound was heard from the specimen.
02:00	Inner layer of glass pane GP1 had started to separate.
02:10	Inner layer of glass pane GP4 had started to separate.
02:13	Inner layer of glass pane GP6 had started to separate.
02:38	Inner layer of glass pane GP5 had started to separate.
02:48	Inner layer of glass pane GP2 had started to separate.
02:56	Inner layer of glass pane GP3 had started to separate.
04:43	Inner layer of glass pane GP6 was observed breaking.
04:44	Interlayer of glass pane GP6 was observed reacting.
04:53	Inner layer of glass pane GP1 was observed breaking.
04:55	Interlayer of glass pane GP1 was observed reacting.
06:01	Inner layer of glass pane GP5 was observed breaking.
06:03	Interlayer of glass pane GP5 was observed reacting.
06:21	Inner layer of glass pane GP4 was observed breaking.
06:23	Interlayer of glass pane GP4 was observed reacting.
07:00	Inner layer of glass pane GP3 was observed breaking.
07:03	Interlayer of glass pane GP3 was observed reacting.
07:46	Inner layer of glass pane GP2 was observed breaking.
07:47	Interlayer of glass pane GP2 was observed reacting.
11:25	Smoke was observed issuing at the top left corner of the glazing panel GP1.
11:27	Smoke was observed issuing at the top left corner of the glazing panel GP6.
12:00	**A temperature of 214°C was recorded on Tc-38 (Partition frame), crossing the allowable limit, causing insulation failure of the specimen. (Max Individual = 180°C + Initial Mean = 180°C + 29°C=209°C).**
13:10	Specimen was observed deflecting towards the furnace.
17:40	Intumescent tape of glazing panels GP1 to GP5 had reacted.
17:49	On the exposed face, inner layer of all glazing panes had fallen off and interlayer were observed deteriorating.
18:59	Smoke was observed issuing at the top right corner of glazing panel GP6.
19:46	The intensity of the smoke mentioned at 11:25, 11:27 and 18:59 minutes had increased.
20:00	The specimen was stable.
23:09	Discoloration was observed on the surface of the partition frame.
24:27	Yellow liquid was observed dripping from the top right corner of the glazing panel GP1.
25:00	**A temperature of 215°C was recorded on Tc-26 (Partition glass), crossing the allowable limit, also causing insulation failure of the specimen. (Max Individual = 180°C + Initial Mean = 180°C + 29°C=209°C)**
30:00	The specimen was stable.

32:00	**A mean surface temperature of 170°C was recorded, crossing the allowable limit and, also causing insulation failure of the specimen. (Max Mean = 140°C + Initial Mean = 140°C + 29°C = 169°C)**
36:17	A red spot was observed forming on the specimen.
41:14	Black patches were observed forming on the specimen.
45:00	The specimen was stable.
49:02	On the exposed face, interlayer of all glazing panes was observed deteriorating.
54:12	Inter layer of the glass panes was observed deteriorating.
60:00	Specimen was stable.
68:26	Inter layer of all glass panes was observed deteriorating.
89:32	The specimen had deflected towards furnace.
90:00	The specimen was stable.
120:00	The specimen was stable.
133:19	**The test was stopped, as agreed upon with the sponsor.**

8.4. Post-Test Unexposed Face Observations

The specimen was observed to be intact. The interlayer of the glass panes had deteriorated.

Refer to Picture 9 in Appendix 4.

8.5. Post-Test Exposed Face Observations

Framing profiles were observed to have burnt and deflected. The interlayer of the glass panes had burnt completely.

Refer to Picture 10 in Appendix 4.

9. SUMMARY OF RESULTS

9.1. Test Results

The non-loadbearing, uninsulated, fully glazed, BGT steel partition assembly with 16mm thick Pyrobel-T EW-120-16 glass has been evaluated in accordance with:

EN 1363-1:2020; *Fire resistance tests - Part 1: General requirements*

EN 1363-2:1999; *Fire resistance tests - Part 2: Alternative and additional procedures*

EN 1364-1:2015; *Fire resistance tests for non-loadbearing elements - Part 1: Walls*

The requirements of the standard were satisfied for:

Criterion	Results
Integrity	
Sustained Flaming	133 Minutes[1]
Cotton Pad	133 Minutes[1]
Gap Gauge (6 mm Diameter)	133 Minutes[1]
Gap Gauge (25 mm Diameter)	133 Minutes[1]
Insulation	
Mean Unexposed Thermocouple Temperature	31 Minutes
Maximum Unexposed Thermocouple Temperature – Partition Glass	24 Minutes
Maximum Unexposed Thermocouple Temperature – Partition Frame	11 Minutes
Heat Radiation[2]	
5 kW/m^2	5.5 kW/m^2 at 45 Minutes
10 kW/m^2	10.3 kW/m^2 at 85 Minutes
12.3 kW/m^2	13.1 kW/m^2 at 111 Minutes
Maximum & Last Value Recorded	14.7 kW/m^2 at 133 Minutes

[1]Test was discontinued after 133:10 minutes at the request of the sponsor and no failure was observed under the indicated criteria.
[2]The time values for radiation were taken at the first instance a value was recorded over the given thresholds. Additionally, two measurements of radiation have been taken, for redundancy. For the purposes of this report, the radiation expressed in the results is that of the primary flux meter, as referenced in the graphs in Appendix 3.

10. FIELD OF DIRECT APPLICATION OF TEST RESULTS

The following calculations govern allowances in expanding the dimensions of the tested specimen, and the calculations are taken from the rules prescribed in §A.4 of EN 1364-1:2015, of which relevant parts of are transcribed in Appendix 6 of this report.

Note: These calculations do not provide an E, W, I, or any other classification under EN 13501-2 (year agnostic) or other classification scheme. They provide size variations outlined in the EN 1364-1:2015 standard, and are not part of an external assessment.

10.1. Overall Permitted Size Variations

The specimen achieved an integrity result of 133 minutes satisfying Category B overrun time for specimen with an intended classification period of 120 minutes, as expressed in Table A.1 of EN 1364-1:2015. Additionally, the specimen satisfied the radiation threshold for 110 minutes satisfying Category B overrun time for specimen with an intended classification period of 90 minutes, as expressed in Table A.1 of EN 1364-1:2015.

Therefore, in a context where this specimen is used to satisfy a 90-minute integrity (E) and radiation (W) control requirement, and a 120-minute integrity (E) only requirement, and in accordance with §A.4 of EN 1364-1, the overall dimensions may be increased as follows:

i. The height of the glazed element may be increased by a factor of 1.2, as per A.4.3.2.1 of EN 1364-1:2015.
ii. The width of the glazed element may be extended endlessly through replication, as per §A.4.2.1.3 & A.4.3.2.2 of EN 1364-1:2015.
iii. The height and width of individual rectangular glass panes may be increased by a factor of 1.2, so long as the increase in tested area of individual panes does not exceed a factor of 1.21.
iv. The calculation of aspect ratio, specified in A.4.2.2.2 of EN 1364-1:2015, shall be conducted after any increase in glass dimensions based on overrun time has been established. This calculation dictates that the area of the pane after increasing the height of the largest tested landscape pane and the width of the largest tested portrait pane shall be less than or equal to the average area of the largest tested landscape and portrait panes.

Allowable Dimension Increase		
	Tested Dimensions	**Allowable Max Dimensions**
Glazed Element Height	3000mm	3600mm
Glazed Element Width	3000mm	Unlimited *(See Note 1)*
Glazing Pane Height (GP1)	2890mm	3468mm
Glazing Pane Width (GP1)	1415mm	1698mm *(See Note 2)*
Glazing Pane Area (GP1)	4.09m^2 **($A_{portrait, tested}$)**	4.95m^2 **($A_{portrait, extended}$)**
Glazing Pane Height (GP6)	1415mm	1698mm
Glazing Pane Width (GP6)	1415mm	1698mm
Glazing Pane Area (GP6)	2m^2 **($A_{square, tested}$)**	2.42m^2 **($A_{square, tested}$)**
[1]As per A.4.2.1.3 of EN 1364-1:2015, test results cover rectangular glazed elements of greater width by replication of the tested glazed element in accordance with conditions a, b, and c of A.4.2.1.3. In compliance with achieving category B overrun time, the dimensions of the glazed element itself may be increased to 3600mm, as well as replicated to an unlimited width. *[2]Pane GP1 is only eligible for an increase in width if the height is decreased such that the area of the pane is less than or equal to 3.69m^2 and that the aspect ratio is still that of a portrait pane, in accordance with A.4.2.2 and A.4.3.4 of EN 1364-1 and expressed in the Maximum Allowable Extended Aspect Ratio section of this table.*		
Maximum Allowable Extended Aspect Ratio		
Equation (See point iv above.)	$A \leq ½ \times (A_{portriat, extended} + A_{square, extended}$	
Calculation	$A \leq ½ \times (4.95\ m^2 + 2.42m^2)$	
Allowable area of assessed new pane	3.69m^2	

In addition to the conditions outlined in the table above, the following conditions, allowances, and limitations also apply:

a. The installation angle of the specimen may be sloped to a maximum of ±10° from the vertical plane, in accordance with §A.4.2.1.1 of EN 1364-1:2015.
b. The distance between mullions and/or transoms may be decreased from that tested, the distance between fixing centers may be decreased from that tested, in accordance with §A.4.2.3 of EN 1364-1:2015.
c. The cross-sectional dimensions of the framing profiles may be increased from that tested, in consideration of the limitations outline in §A.4.2.3 of EN 1364-1:2015.
d. In accordance with §A.4.2.2.1 of EN 1364-1:2015, the linear dimensions of panes may be decreased from the dimensions tested. Height and width may be considered independently.
e. The test specimen was tested in a high-density rigid supporting construction, as defined in §7.2.2.1 of EN 1363-1:2020 and A.4.2.4.2 of EN 1364-1:2015, and is not eligible to be installed in low density, flexible, or other supporting construction with a lesser fire resistance or lesser thickness than that tested.

11. LIMITATIONS

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 1364-1:2015, EN 1363-1:2020, and where appropriate EN 1363-2:1999. Any significant deviation with respect to size, construction details, load, stresses, or edge or end conditions other than those allowed under the direct field of application in the relevant test method is not covered by this report.

This report and all records of the test to which it relates may not be retained by TBWIC beyond 5 years from the date of testing.

This test report is respectfully submitted by: Thomas Bell-Wright International Consultants.

Prepared By:

Arun Kumar Murugan
Senior Fire Testing Engineer

Reviewed By:

Kevin A. Zachariah
Projects & Laboratory Operations Manager

Authorized By:

Brett W. Shinn
Fire Testing Manager

P.O.Box: 26385
DUBAI - U.A.E.
Thomas Bell-Wright Int'l Consultants (Dubai Br.)

Report Revision Tracking		
Revision No.	**Issue Date**	**Notes & Amendments**
Rev. 00	09-Jun-26	This is the first issue of the report. No revisions are included.

At the request of the sponsor, this report has been issued as duplicate versions under separate stakeholder names. To maintain continuity of detail, the versions issued and their respective parties are expressed below.

AP089-1A	AP089-1B
Bin Ghurair Metal Industries L.L.C P.O. Box: 55686, Plot 597-400, Al Habab Road, Dubai Investment Park 2, Dubai, United Arab Emirates T: +971 (4) 880 2008 | F: +971 (4) 880 2009 Website: www.bgtdubai.com	AGC Glass Europe Avenue Jean Monnet, 4 1348 Louvain-la-Neuve Belgium T: +32 2 409 30 00 | F: +32 2 672 44 62 Website: www.agc-pyrobel.com

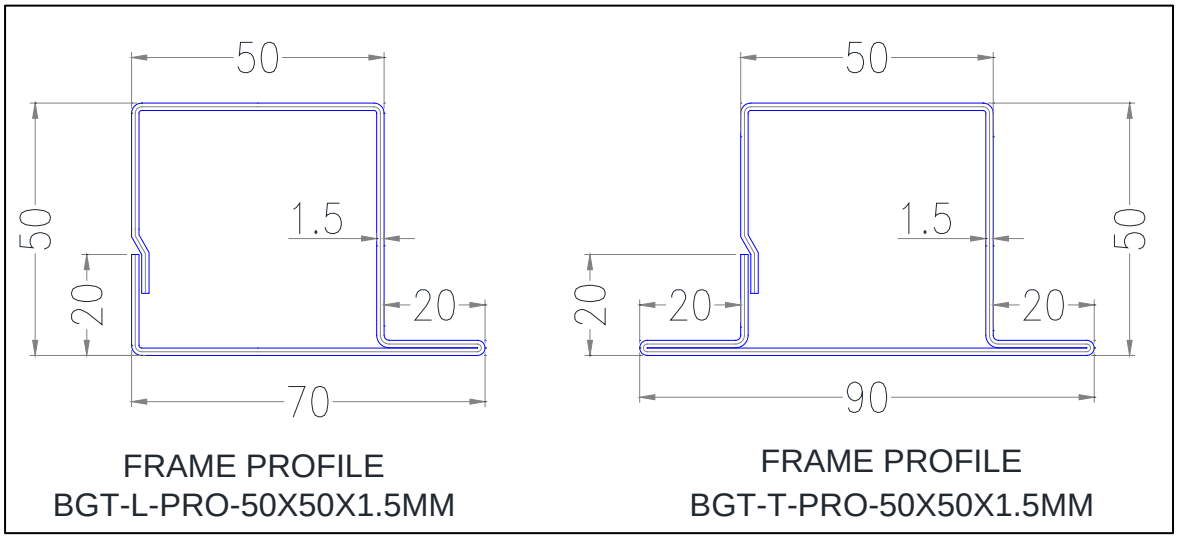
12. APPENDIX 1 – COMPONENT DESCRIPTION

Note: All information provided herein Appendix 1 has been provided either by TBWIC or Test Sponsor. Information marked with a single asterisk indicates information provided by the Test Sponsor which has been checked against the materials used in the test where appropriate, however does not fall under the responsibility of TBWIC. All dimensions are expressed in millimetres (mm), unless otherwise specified.

Overall	
Type	Non-loadbearing, uninsulated, fully glazed, steel partition assembly 16mm thick Pyrobel-T EW-120-16 glass
Dimensions	3000 x 3000 x 50mm (w x h x thk.) 3010 x 3030 x 50mm (w x h x thk.) inclusive of the ceramic fiber infill at the horizontal edges and fixed vertical edge

A. Partition Framing System

Framing Profiles and Accessories

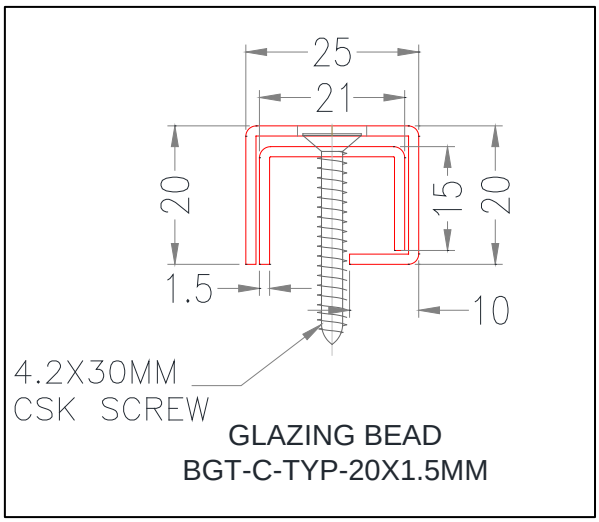


	Perimeter Frame	Intermediate Frame	Fasteners
Material	Galvanized Steel*	Galvanized Steel*	Galvanized Steel*
Manufacturer	Bin Ghurair Metal Industries*	Bin Ghurair Metal Industries*	Retail
Reference	BGT-L-PRO*	BGT-T-PRO*	N/A
Dimension	As shown above | Cut to required length	As shown above | Cut to required length	Ø10 x 92mm
Fixing Method & Application	The framing profiles were welded together at the junction of the top and bottom edges at the factory prior delivery to the lab. The assembled framing system was fixed to the supporting construction at the head, sill and fixed edge of the specimen using Ø10 x 92mm anchor bolts at a spacing indicated in Drawing 2 in Appendix 2. Gap along the horizontal and fixed vertical edges between the framing system and supporting construction was filled with ceramic fibre of density 128kg/m³. The same ceramic fibre was used for a thickness of 25mm order to represent a free edge on the unrestrained vertical edge.		

B. Glazing System

Glazing Panes		
Manufacturer	AGC Europe	
Reference	Pyrobel-T EW 120-16	
Thickness	16mm	
Dimensions	**Glazing Pane Reference**	**Dimensions**
	GP1	1415 x 2890 x 16mm (w x h x thk.)
	GP2, GP3, GP4 and GP5	677.5 x 677.5 x 16mm (w x h x thk.)
	GP6	1415 x 1415 x 16mm (w x h x thk.)
Mechanical Edge Cover	17mm	
Fixing Method & Application	The glazing panes were placed within the framing system using the glazing bead. The glazing panes were initially rested on the setting blocks, and glazing bead installed on the exposed face was used to hold the glass panes.	

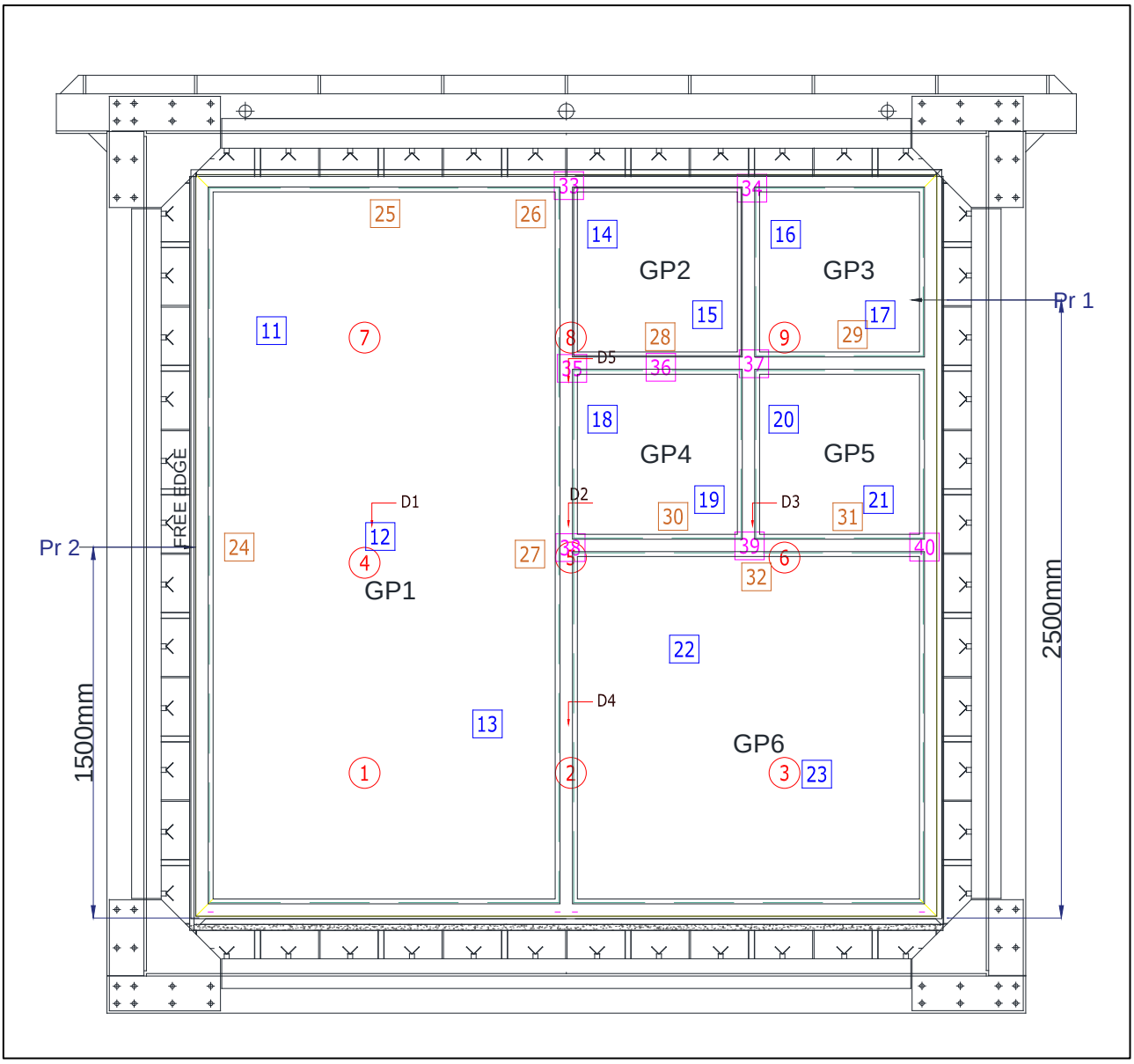
Glazing Bead and Accessories



	Glazing Bead	**Screw**
Material	Galvanized Steel*	Stainless Steel*
Manufacturer	Bin Ghurair Metal Industries*	Retail
Dimensions	As shown above | Cut to required length	Ø4.2 x 30mm
Fixing Method & Application	Two nos of steel channels were joined together to form a glazing bead assembly by spt welding nominally at every 300mm c/c. The glazing beads were installed on the exposed face of the specimen and fixed to the framing profiles using Ø4.2 x 30mm countersunk screws spaced nominally 75mm from the edges and 300mm C/C.	

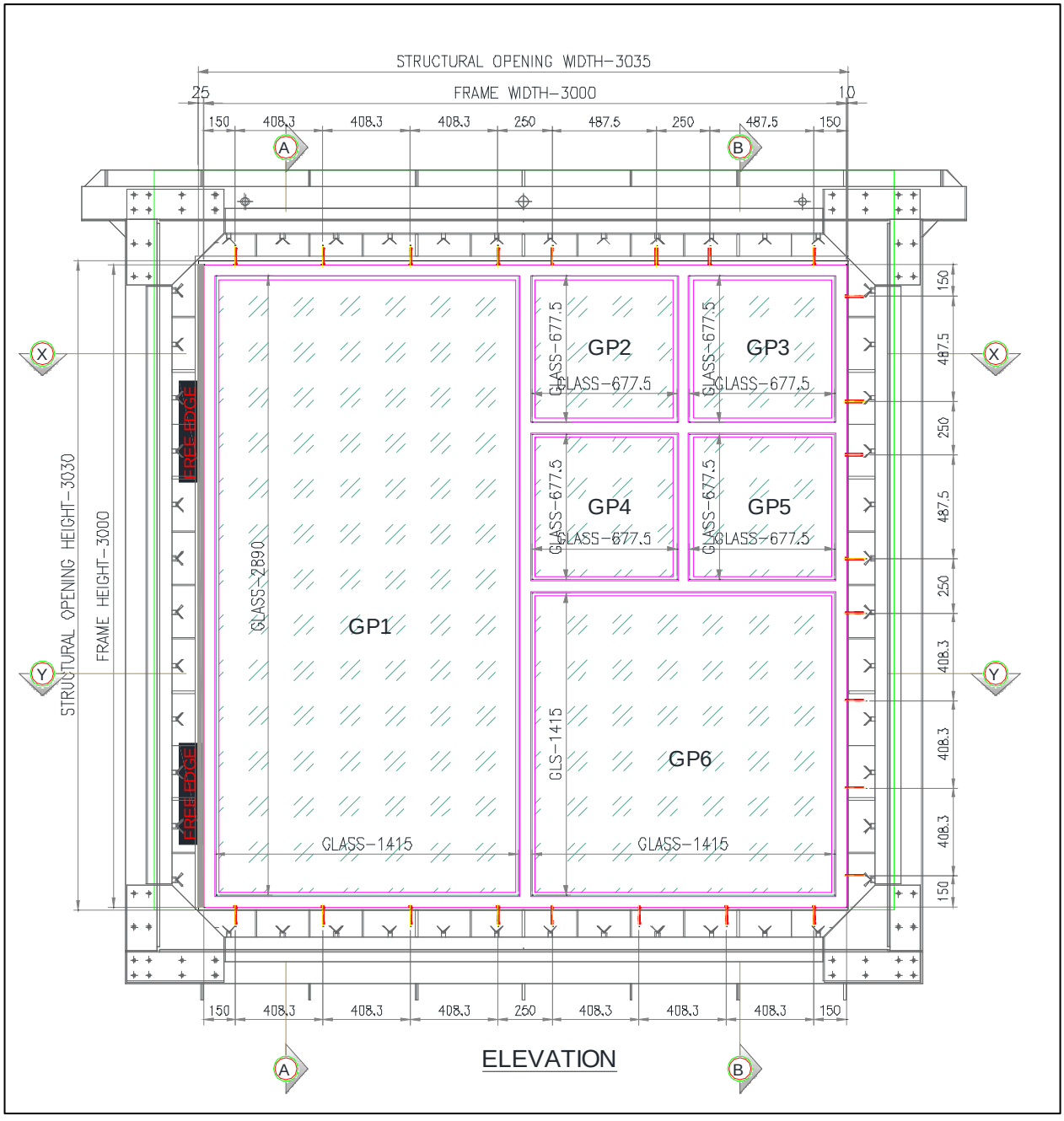
Setting Blocks, Glazing Tape and Intumescent Tape			
	Setting Blocks	**Glazing Tape**	**Intumescent Tape**
Material	Inorganic oxide based*	Calcium magnesium silicate	Intumescent*
Manufacturer	KuhnOdice Germany GmbH*	KuhnOdice Germany GmbH*	Finotech*
Reference	FLAMMI 12	KERAFIX® 2000	FINOTECH® FSET 60*
Dimensions	80 x 20 x 3mm (l x w x thk.)	15 x 3mm (w x thk.)	16 x 1.5mm (w x thk.)
Fixing Method & Application	Two nos of setting blocks were provided on the bottom edge of the horizontal jamb frame for each glazing pane, spaced nominally 100mm from the glass corner. The glazing tapes were self-adhered to the inner perimeter of the flanges on the frame and glazing beads such that to be compressed against the glass panes during installation. Intumescent tape was self-adhered along the perimeter of the glazing panes, as shown in the detail drawings in Appendix 2.		

13. APPENDIX 2 – ASSEMBLY DRAWINGS

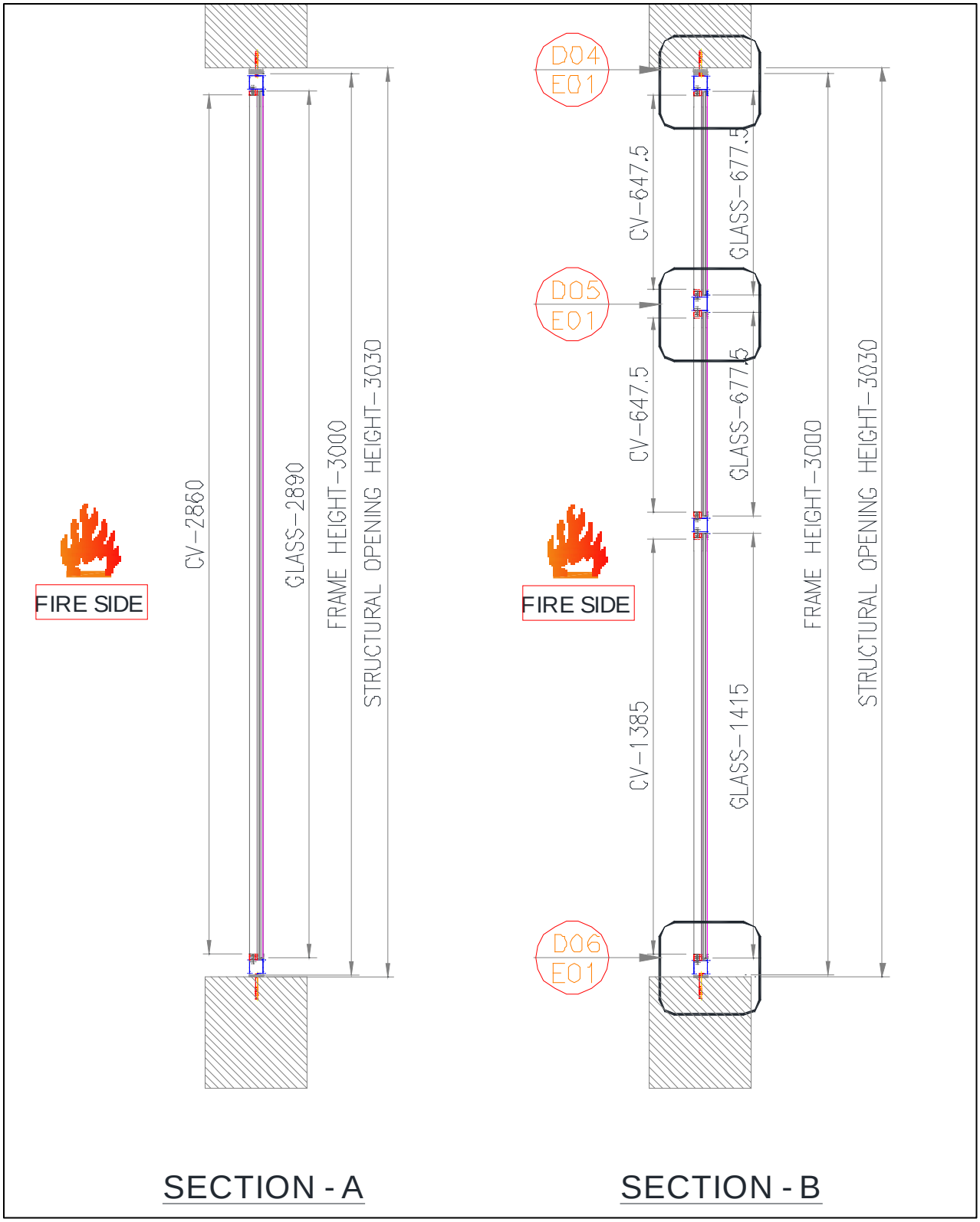


Drawing 1: (Overall Instrumentation)
(Drawing provided by TBWIC)

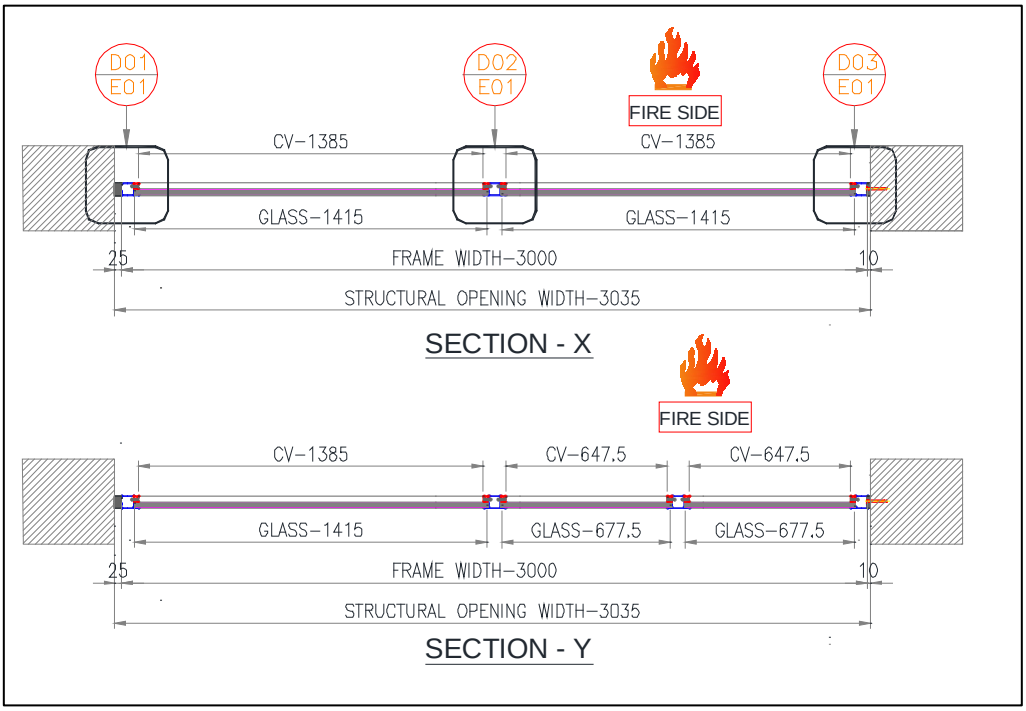
INSTRUMENTATION	
Pr1	Furnace pressure at 2500mm above the sill of the specimen and maintained at 15Pa.
Pr2	Furnace pressure at 1500mm above the sill of the specimen (for reference only).
Tc1 – Tc9	Thermocouples to measure furnace temperature
TC11 – TC23	Thermocouples to measure the mean unexposed surface temperature.
TC24 – TC32	Thermocouples to measure the maximum unexposed surface temperatures of partition glass.
TC33 – TC40	Thermocouples to measure the maximum unexposed surface temperatures of partition frame
D1 – D5	Deflection measurement points



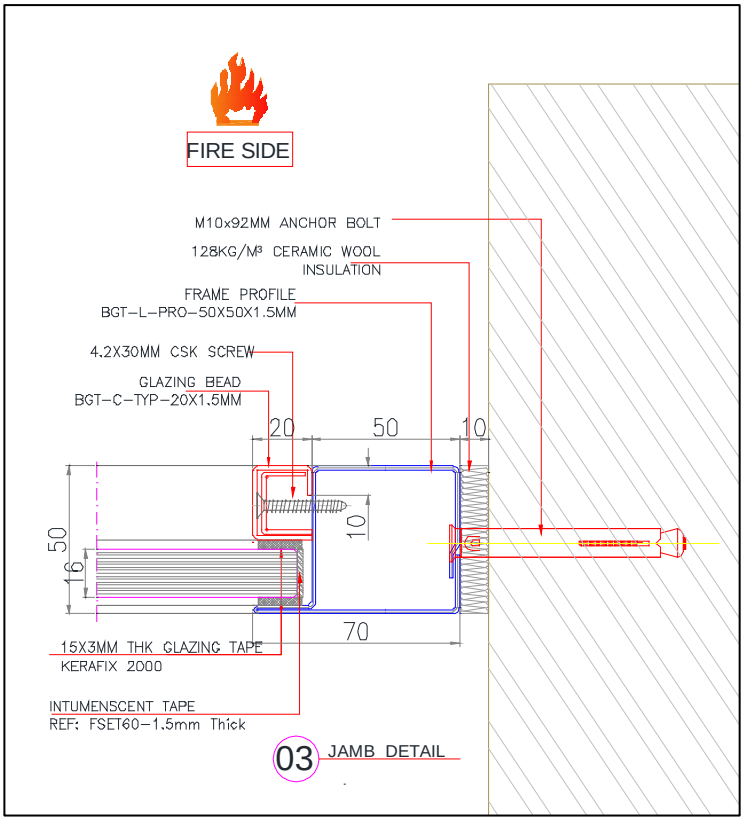
Drawing 2: Elevation view of the test specimen
(Drawing provided by sponsor)



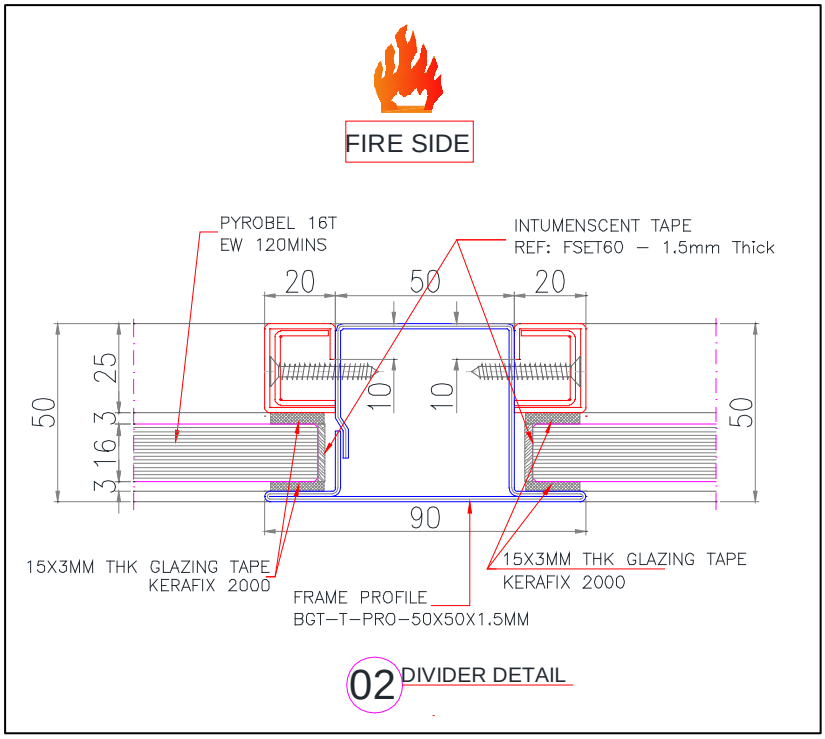
Drawing 3: Vertical section views of the test specimen
(Drawing provided by sponsor)



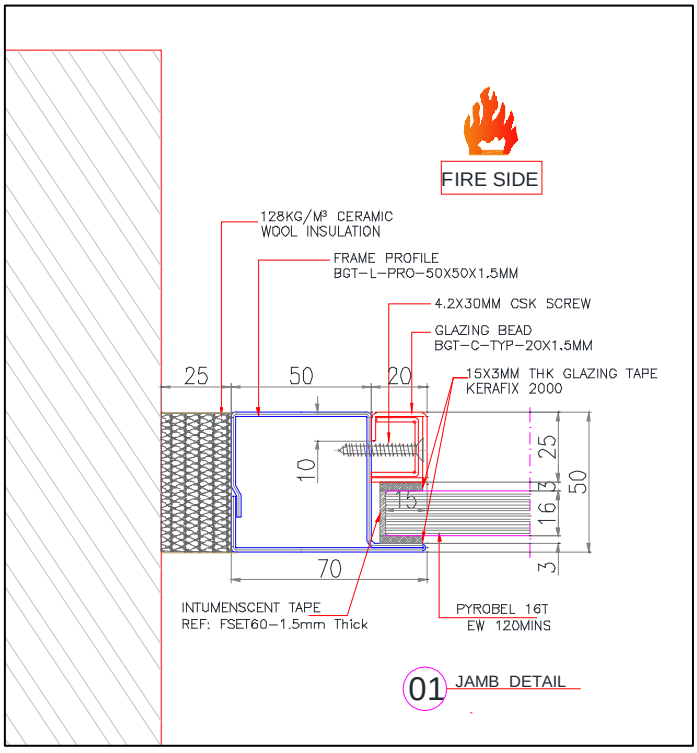
Drawing 4: Plan section views of the test specimen
(Drawing provided by sponsor)



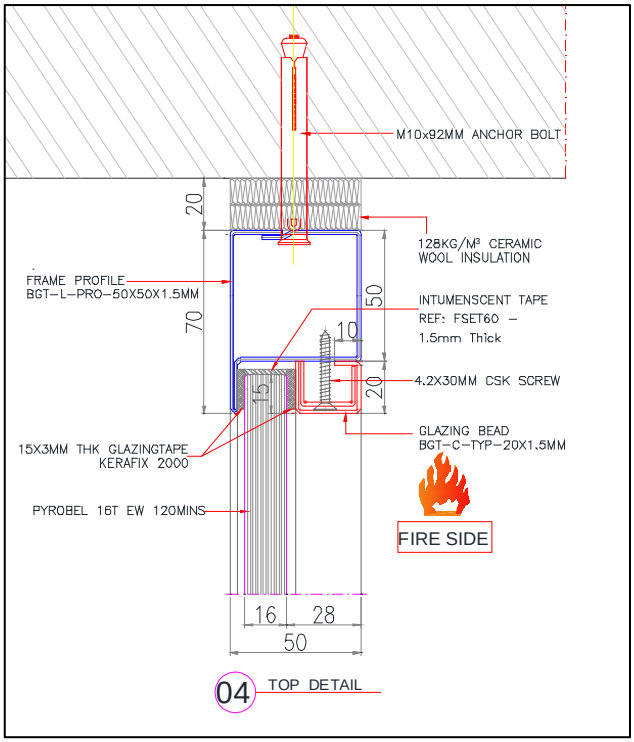
Drawing 5: Fixed edge detail of the test specimen
(Drawing provided by sponsor)



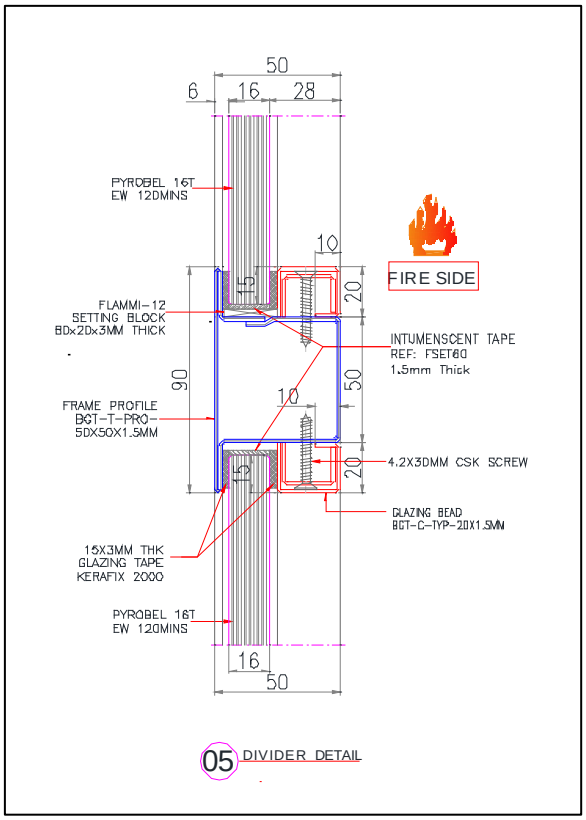
Drawing 6: Panel joint detail of the test specimen
(Drawing provided by sponsor)



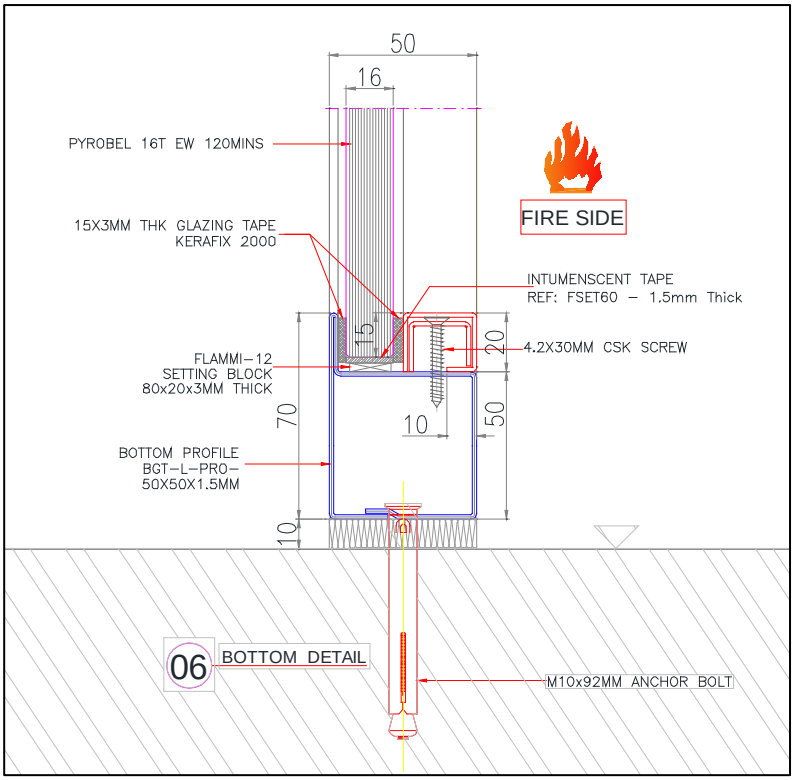
Drawing 7: Free edge detail of the test specimen
(Drawing provided by sponsor)



Drawing 8: Head detail of the test specimen
(Drawing provided by sponsor)

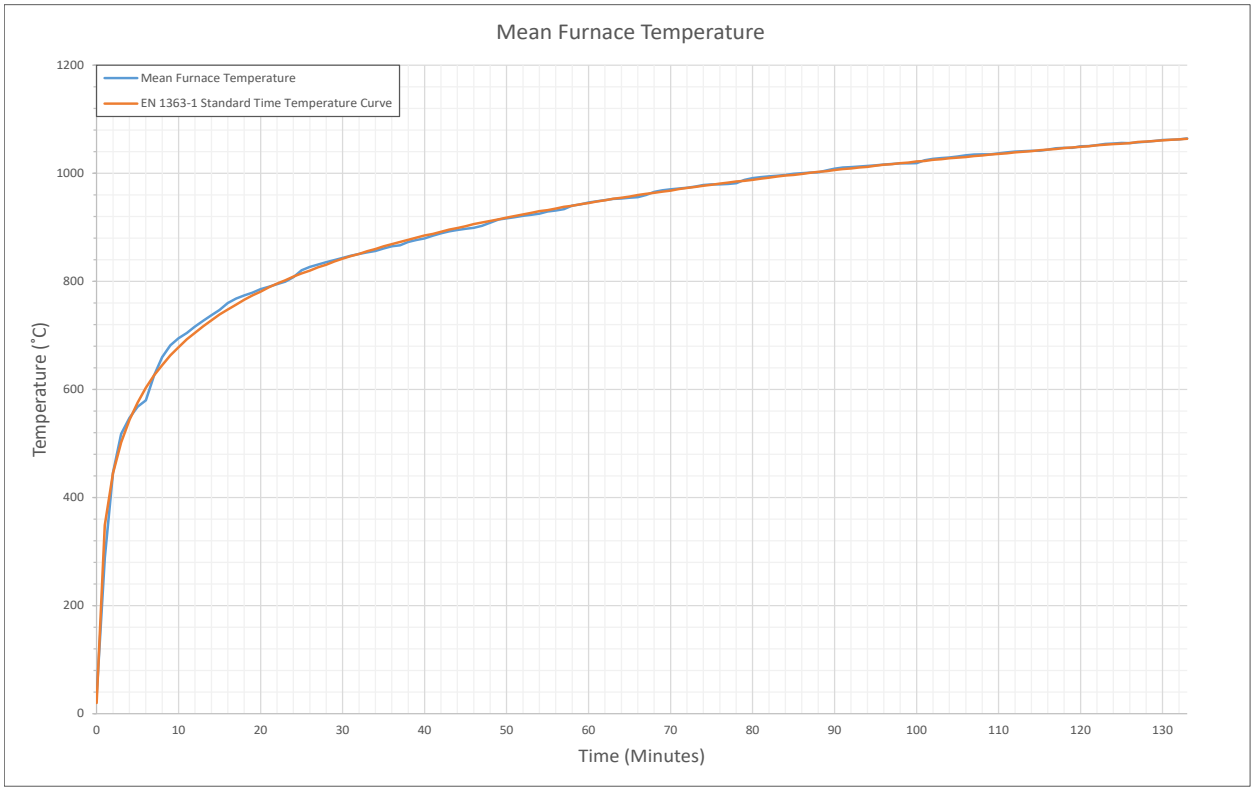


Drawing 9: Horizontal joint detail of the test specimen
(Drawing provided by sponsor)

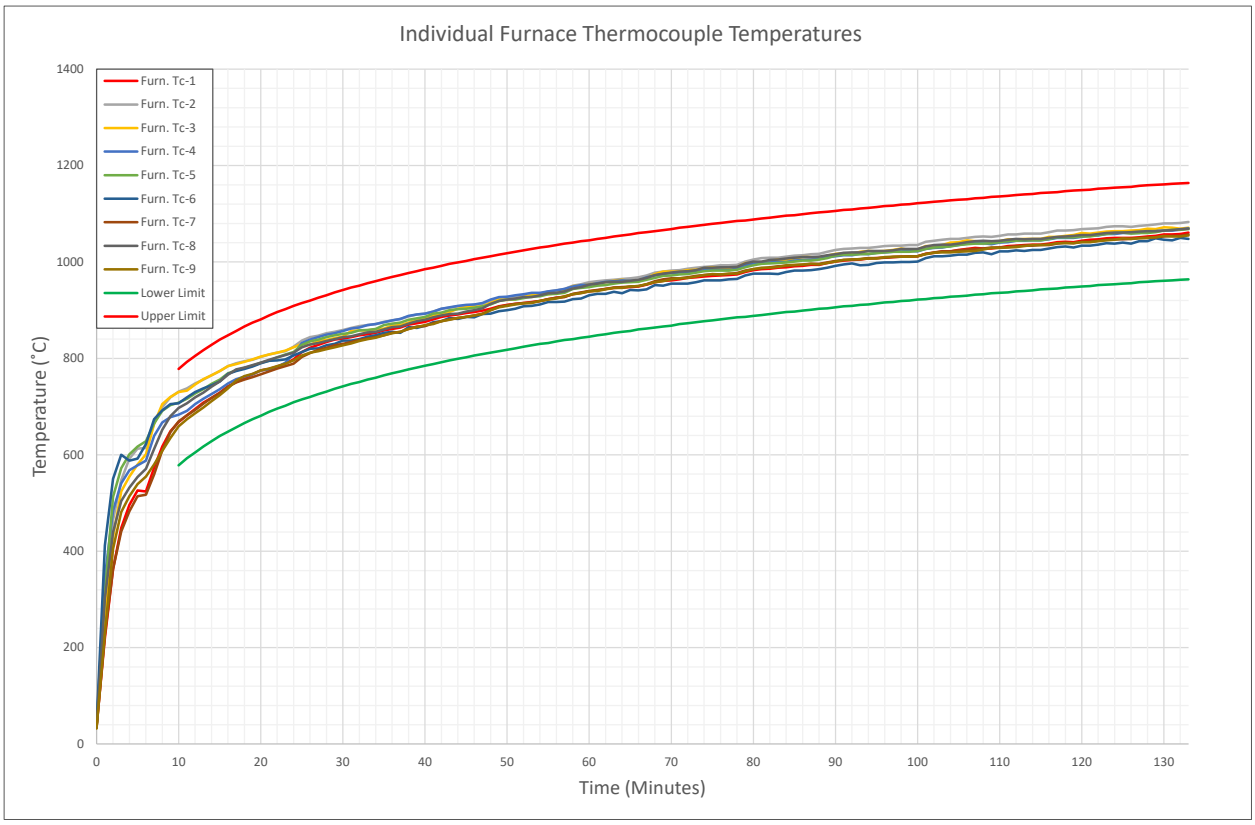


Drawing 10: Sill detail of the test specimen
(Drawing provided by sponsor)

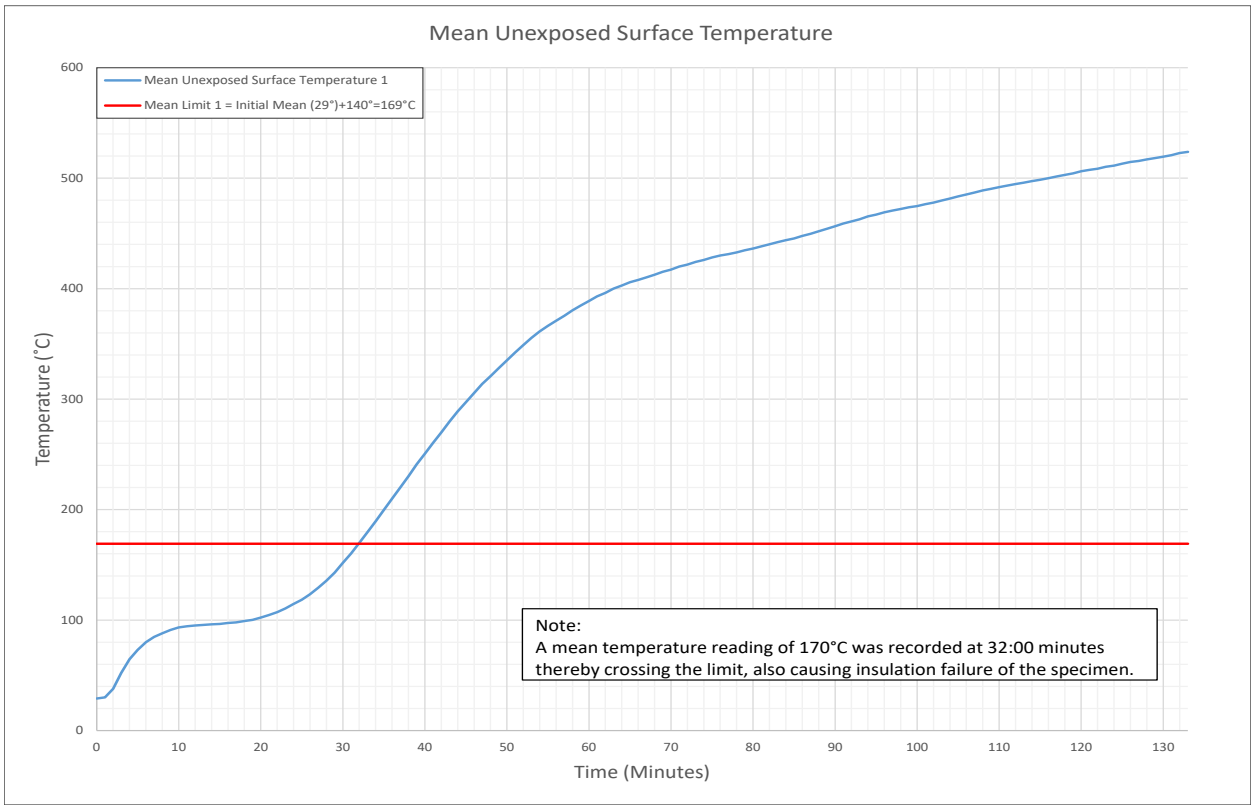
14. APPENDIX 3 – GRAPHS & MEASUREMENTS



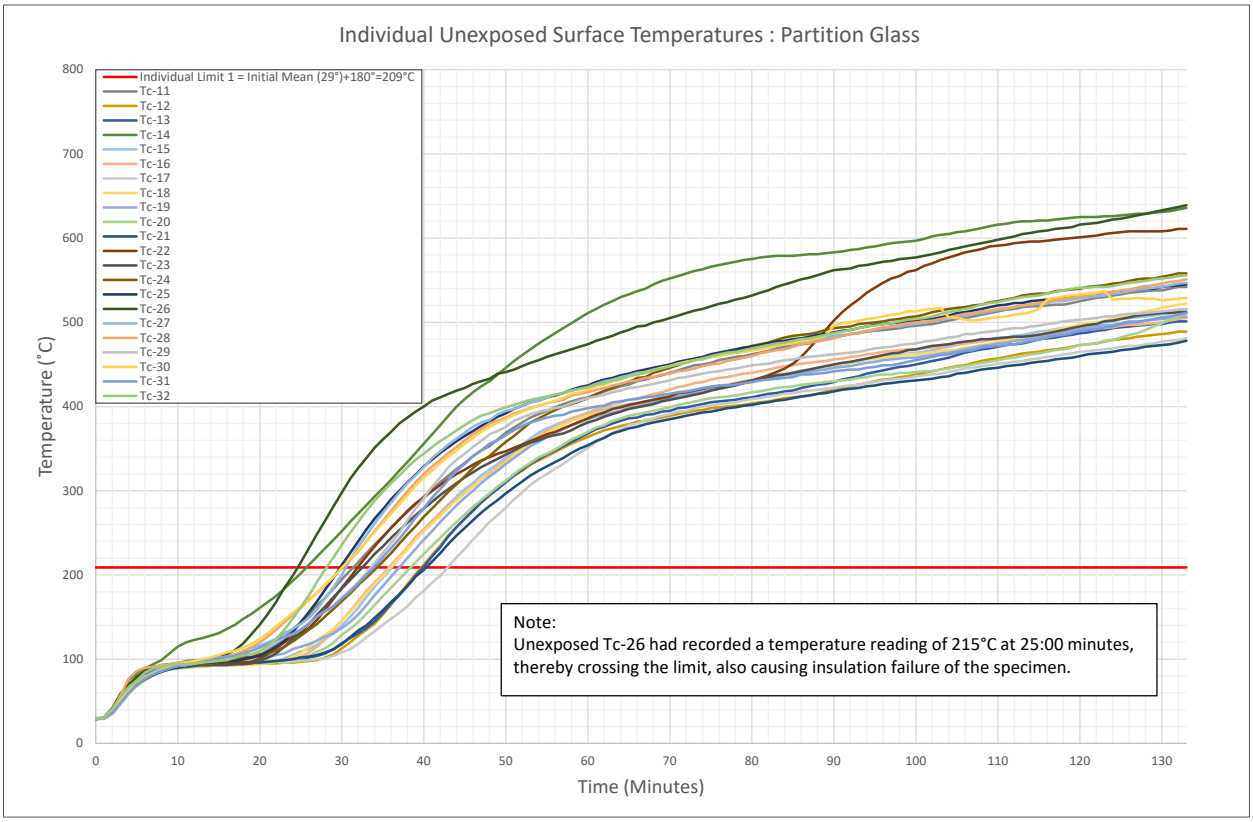
Graph 1: Mean Furnace Thermocouple Temperature



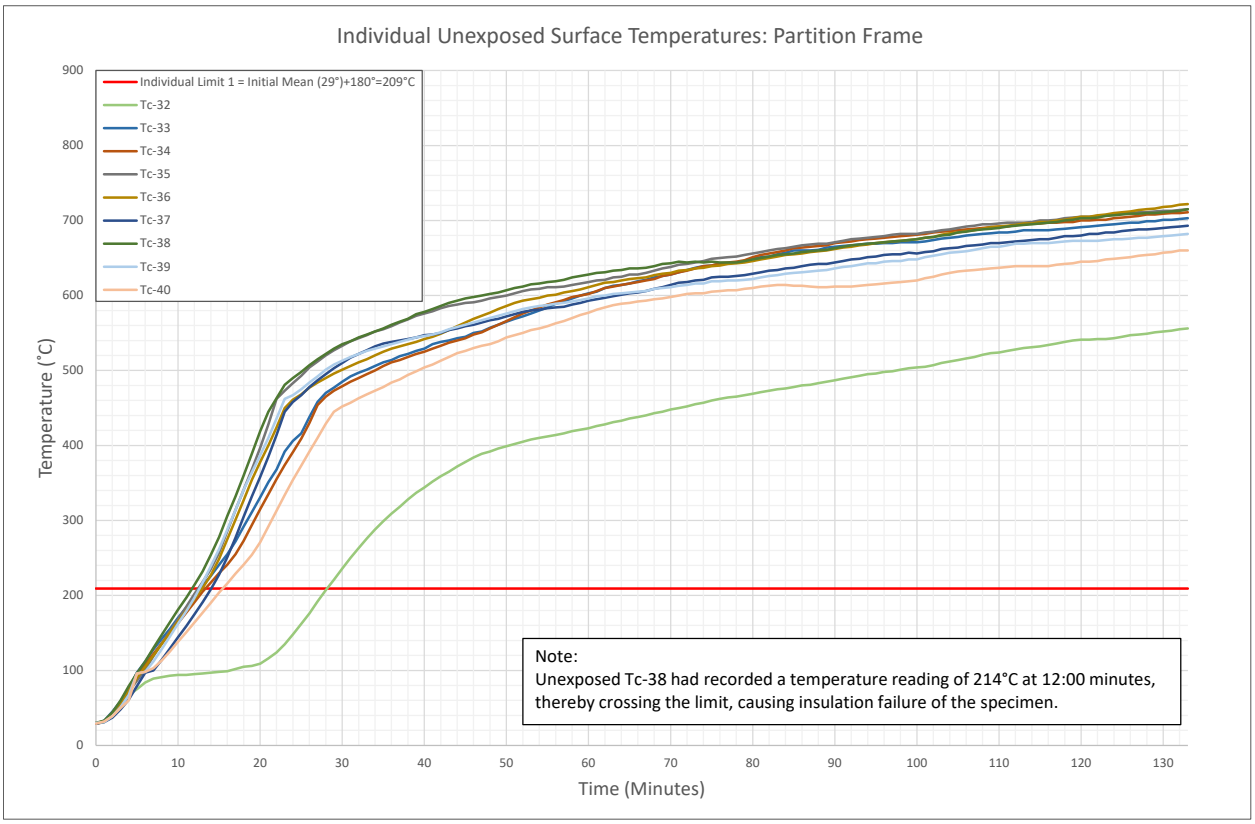
Graph 2: Individual Furnace Thermocouple Temperature



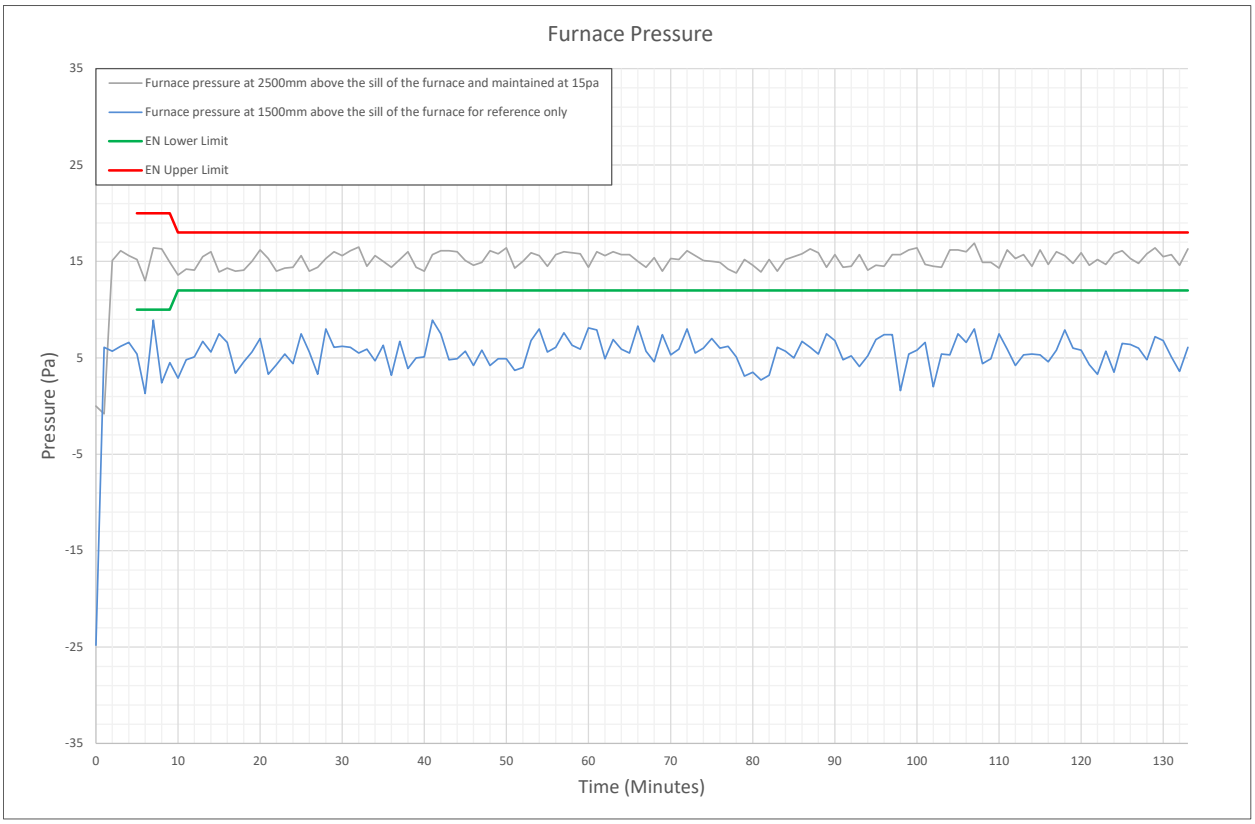
Graph 3: Mean Unexposed Surface Temperature



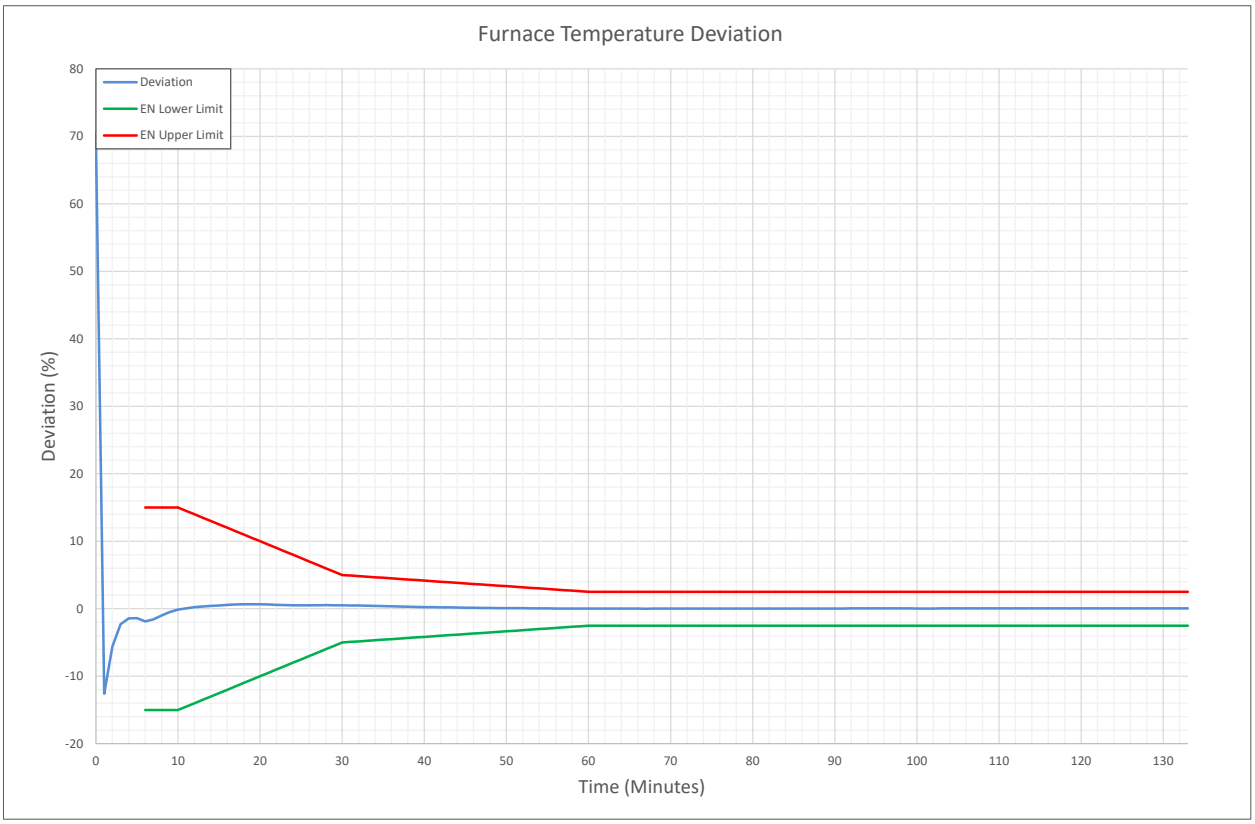
Graph 4: Individual Unexposed Surface Thermocouple Temperatures – Partition Glass



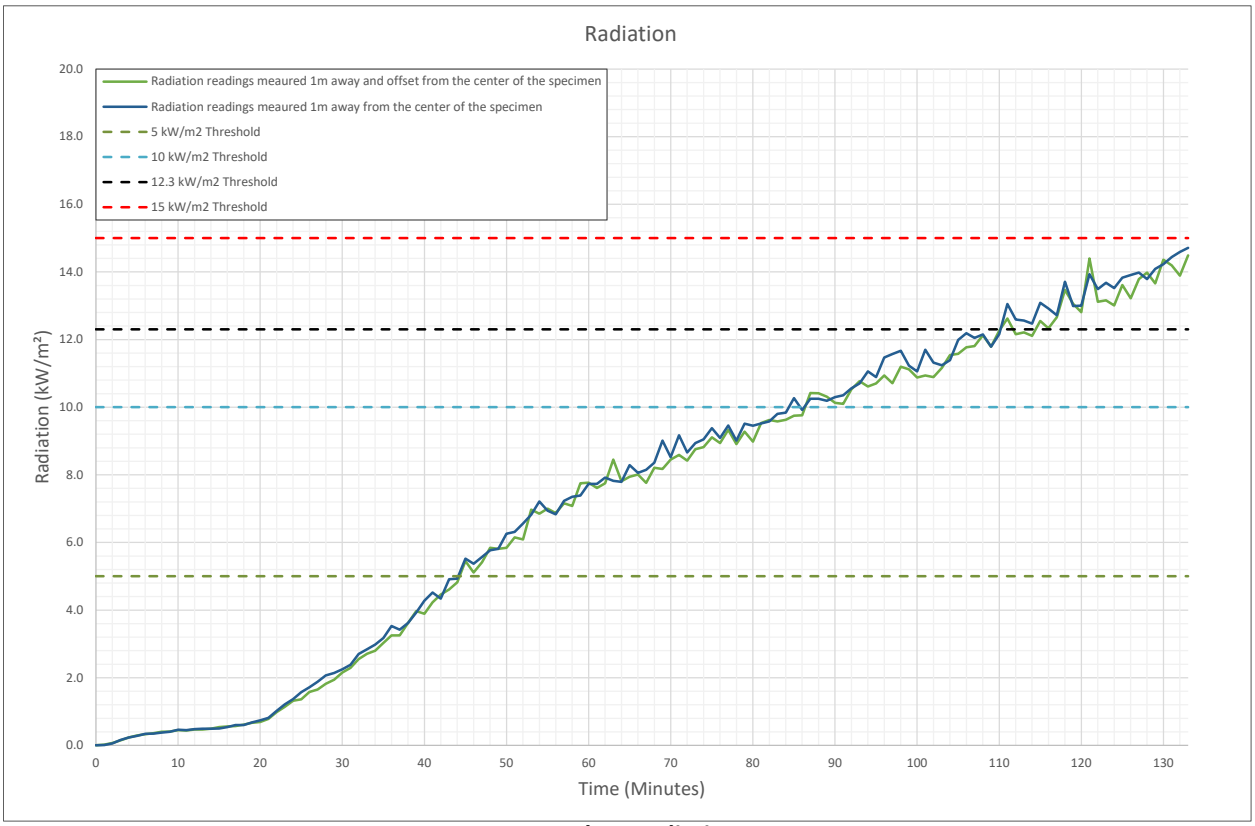
Graph 5: Individual Unexposed Surface Thermocouple Temperatures – Partition Frame



Graph 6: Furnace Pressure



Graph 7: Furnace Temperature Deviation



Graph 8: Radiation

14.1. DEFLECTION

The following table shows the deflection measurements in mm, recorded during the test.

(+) are for measurements going into the furnace.

(-) are for measurements coming out of the furnace.

Time In mins.	Deflection Points				
	D1	D2	D3	D4	D5
0:00	0	0	0	0	0
20:00	69	114	77	77	88
40:00	79	75	85	89	101
60:00	83	130	85	86	101
80:00	87	131	87	86	103
100:00	85	139	87	86	102
110:00	83	139	90	74	103
120:00	85	132	87	86	103
130:00	85	136	86	84	104

15. APPENDIX 4 – TEST PHOTOGRAPHS

Picture 1: Exposed face of the specimen prior to the commencement of the test.

Picture 2: Unexposed face of the specimen prior to the commencement of the test.

Picture 3: Unexposed face of the specimen after the commencement of the test.

Picture 4: Unexposed face of the specimen after 20:00 minutes

Picture 5: Unexposed face of the specimen after 45:00 minutes

Picture 6: Unexposed face of the specimen after 60:00 minutes

Picture 7: Unexposed face of the specimen after 90:00 minutes

Picture 8: Unexposed face of the specimen after 120:00 minutes

Picture 9: Unexposed face of the specimen at the end of the fire endurance test.

Picture 10: Exposed face of the specimen at the end of fire endurance test.

16. APPENDIX 5 – FIELD OF DIRECT APPLICATION OF TEST RESULT

The text in this section has been quoted directly from EN 1364-1:2015 between sections A.4 and A.4.3.5 either in whole or in part. Omissions to the text in the standard have only been made if the text is erroneous to the specimen tested.

16.1. General

The test results are applicable to similar constructions where one or more of the changes in §A.4 of EN 1364-1:2015 are made and the construction continues to comply with the appropriate design code for its stiffness and stability. Other changes are not permitted.

The result of a test on a specimen with mixtures of different type of construction (e.g. different type of glass or different types of framing, etc…) is only applicable to that testes.

16.2. Field of Direct Application Rules Not Requiring Overrun Time

16.2.1. GLAZED ELEMENT

16.2.1.1. Installation Angle

Test results on vertical glazed elements sloped to a maximum angle of ±10°C from the vertical plane, provided the height of the glazed element is not larger than the maximum height tested.

16.2.1.2. Height of the Glazed Element

Test results cover rectangular glazed elements with a height increase of 10% subject to a maximum increase of 0.3 m, above the height tested, provided that:

a) The maximum deflection (see figure A.7.2) of the test specimen did not exceed 100 mm;
b) The allowances for thermal expansion of the construction are increased pro-rata.

In case of element intended to be classified for EW, the following additional provisions apply:

- The average temperature of the unexposed face of the glazed element as well as the average temperature of the unexposed face of the non-glazed area of the test specimen (see figured A.7.1 or A.7.2) remained below 300°C, or
- The heat radiation measured from the test specimen did not exceed 12.3 kW/m^2.

16.2.1.3. Width of the Glazed Element

Test results cover rectangular glazed elements of greater width by replication of the tested glazed element or parts thereof, provided:

a) The framing system is identical to the one tested;
b) The width of the specimen in the test was 2.8 m or greater with one vertical edge unrestrained;
c) The mullions within and/or connection joints between glazed elements have been tested.

In case of element intended to be classified for EW, the following additional provisions apply:

- The average temperature of the unexposed face of the glazed element as well as the average temperature of the unexposed face of the non-glazed area of the test specimen (see figure A.7.1 or A.7.2) remained below 300°C, or
- The heat radiation measured from the complete and fully glazed test specimen with minimum size of 2.8 x 2.8 m did not exceed 12.3 kW/m^2.

16.2.2. GLAZING SYSTEM (SEE FIGURE A.7.3)

16.2.2.1. Linear Dimensions

The linear dimensions of panes may be decreased from the dimensions tested. Height and width may be considered independently.

16.2.3. FRAMING SYSTEM (SEE FIGURE A.7.3)

The distance between the mullions and/or transoms may be decreased from that tested.

The distance between fixing centers may be decreased from that tested.

The cross sectional dimensions of the frame profiles may be increased from the dimensions tested, under the following restrictions:

- For combustible framing intended to be used for E and/or EW classification, the depth of the frame profiles on the unexposed side is as tested.
- For framing systems intended to be used for EI classification, no increase in width is allowed in case no temperature measurements on the unexposed side of the profiles were made during the test.

16.2.4. SUPPORTING CONSTRUCTIONS

16.2.4.1. GENERAL

For specimens tested in the test frame without any supporting construction, the result is applicable to high density rigid supporting constructions with at least the same fire resistance as the test specimen.

16.3. Field of Direct Application Rules Requiring Overrun Time

16.3.1. GENERAL

For some rules to be applicable, an overrun time in the fire test result compared to the intended classification period is required. The overrun time is shown in Table 1.

Intended Classification Period (min)	**Overrun Time A (min)**	**Overrun Time B (min)**
≤ 20	N/A	≥ 3
30, 45, and 60	3 ≤ t < 6	≥ 6
≥ 90	≥ 5% and < 10% of the intended classification period	≥ 10% of the intended classification period.
Note: The rules given in 18.3 may be used in addition to the rules in 18.2		

16.3.2. DIMENSIONS OF THE GLAZED ELEMENT

16.3.2.1. HEIGHT

The test result of the glazed element covers the height up to a maximum of the tested height multiplied by a factor of 1.1 provided overrun time A is achieved. This is irrespective of the measured deflections.

The test results of the glazed element covers the height up to a maximum of the tested height multiplied by a factor of 1.2 provided overrun time B is achieved. This is irrespective of the measured deflections.

In case of elements intended to be classified as EW, the following additional provisions apply:

- The average temperature of the unexposed face of the glazed element as well as the average temperature of the unexposed face of the non-glazed area of the test specimen (Figure A.7.1 or A.7.2) remained below 300˚C, or
- The heat radiation measured from the complete and fully glazed element did not exceed 12.3kw/m^2.

16.3.2.2. WIDTH

For glazed elements tested with a width smaller than 2. Meters, the following rules apply.

The test result of the glazed element covers the width up to a maximum of the tested width multiplied by a factor of 1.1 provided overrun time A is achieved. This is irrespective of the measured deflections.

The test result of the glazed element covers the width up to a maximum of the tested width multiplied by a factor of 1.2 provided overrun time B is achieved. This is irrespective of the measured deflections.

In case of elements intended to be classified for EW, the following additional provisions apply.

- The average temperature of the unexposed face of the glazed element as well as the average temperature of the unexposed face of the non-glazed area of the test specimen (Figure A.7.1 or A.7.2) remained below 300˚C, or
- The heat radiation measured from the complete and fully glazed element did not exceed 12.3kw/m^2.

16.3.3. DIMENSIONS AND AREA OF INDIVIDUAL RECTANGULAR GLASS PANES

The test result of a pane covers dimensions up to a maximum of the tested dimensions multiplied by a factor of 1.1 in width and/or height, provided overrun time A is achieved and the maximum tested area multiplied by a factor of 1.1 is not exceeded.

The test result of a pane covers dimensions up to a maximum of the tested dimensions multiplied by a factor of 1.2 in width and/or height, provided overrun time B is achieved and the maximum tested area multiplied by a factor of 1.21 is not exceeded.

In case elements to be classified for EW, the following additional provisions apply:

- The average temperature of the unexposed face f the glazed element as well as the average temperature of the unexposed face of the non-glazed area of the test specimen (Figure A.7.1 or A.7.2) remained below 300˚C or
- The heat radiation measured from the complete and fully glazed element did not exceed 12.3kw/m^3.

In order to accommodate the increase in glass dimensions, it is permitted to increase the distance between mullions and/or transoms.

16.3.4. AREA OF INDIVIDUAL CIRCULAR, TRIANGULAR, AND FOUR SIDED NON RECTANGULAR GLASS PANES.

The test result from individual circular, triangular, and four sided non-rectangular glass panes covers the area up to a maximum of the tested area multiplied by a factor of 1.1 provided overrun time A is achieved.

The test result from individual circular, triangular, and four sided non-rectangular glass panes covers the area up to a maximum of the tested area multiplied by a factor of 1.2 provided overrun time B is achieved.

The pane shall be of the same orientation and shape (including maintaining internal angles) as the tested pane.

In order to accommodate the increase in glass area, it is permitted to increase the distance between mullions and/or transoms.

17. APPENDIX 6 – SUPPORTING DRAWINGS

Note: The drawings included herein Appendix 7 have been reference directly from EN 1364-1:2015 as supporting documents to §11: Direct Field of Application and Appendix 6 of this test report.

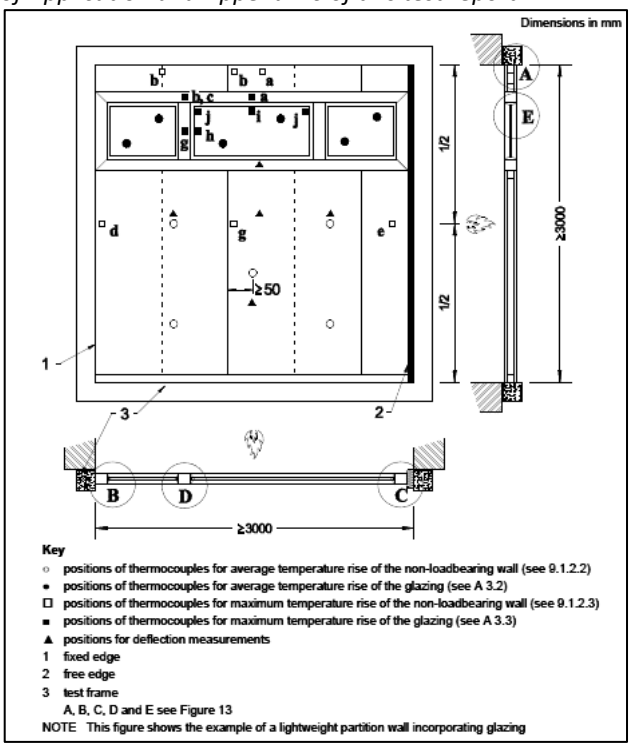


Figure A.7.1: Example of unexposed thermocouple positions and deflection measurement positions for 2 discrete areas; i.e. a non-loadbearing wall with an area of insulated glazing.

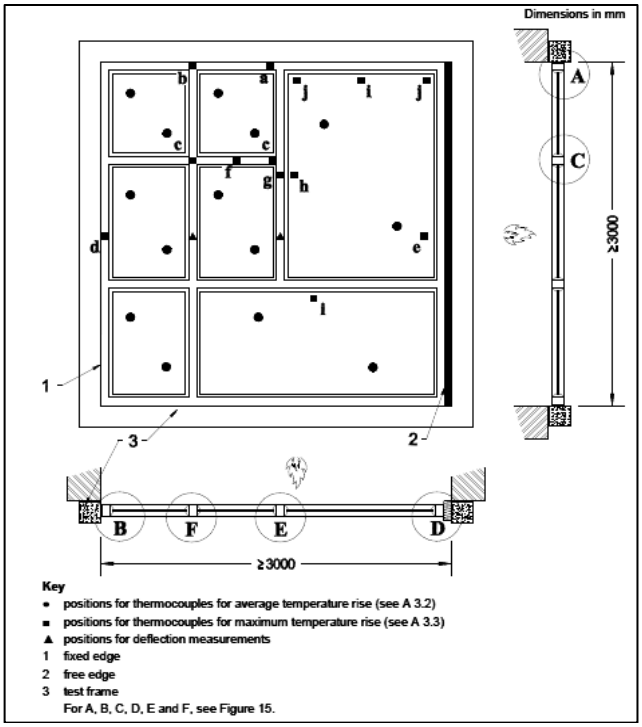


Figure A.7.2: Example of unexposed thermocouple positions and deflection measurement positions for fully glazed walls.

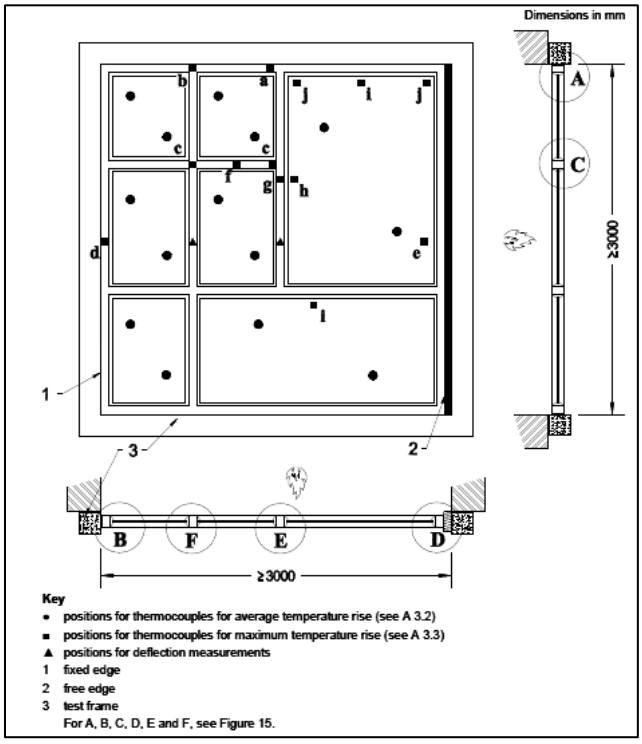


Figure A.7.2: Example of unexposed thermocouple positions and deflection measurement positions for fully glazed walls.

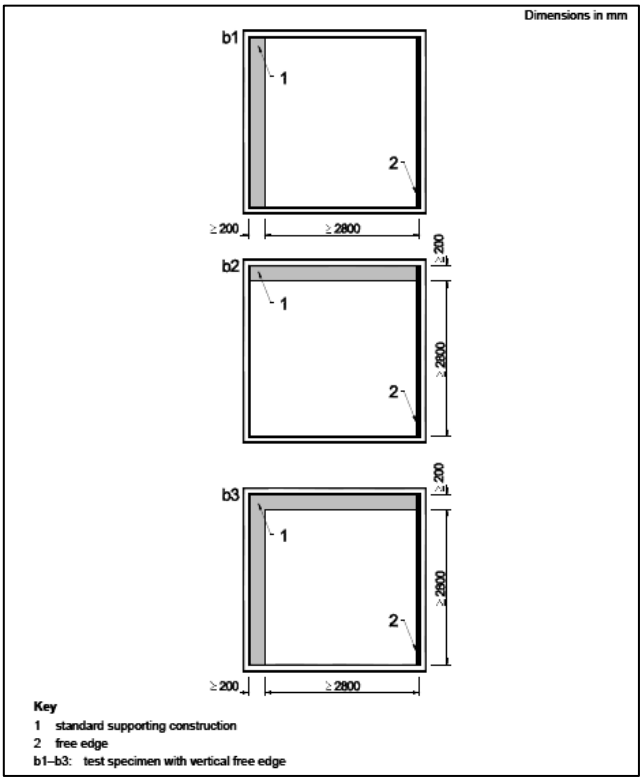


Figure A.7.4: Standard supporting construction and vertical free edge.

----- End Of Test Report -----