

Exova Warringtonfire
Holmesfield Road
Warrington
WA1 2DS
United Kingdom

T : +44 (0) 1925 655 116
F : +44 (0) 1925 655 419
E : warrington@exova.com
W: www.exova.com



Testing. Advising. Assuring.

Title:

A fire resistance test performed on a specimen of a fire retardant aluminium composite panel non load bearing partition wall to ASTM E119-12

Report No:

334186



Prepared for:

Aludecor Lamination Pvt. Ltd.

Suite No. 52
5th Floor
1 RN Mukherjee Road
Kolkata – 700001

Date:

31st October 2013

Notified Body No:

0833



0249

Summary

Objective To evaluate the fire resistance performance of a specimen of non-loadbearing partition when subjected to a test given in ASTM E119-12.

Sponsor **Aludecor Lamination Pvt. Ltd.**, Suite No. 52, 5th Floor, 1 RN Mukherjee Road, Kolkata – 700001

Summary of the Tested Specimen The partition had overall nominal dimensions of 3035 mm high by 3000 mm wide and comprised a steel stud framework, faced on each side with nominally 15 mm thick plasterboard. The insulated core to the partition comprised a layer of nominally 50 mm thick mineral fibre (to the exposed face) and a layer of 25 mm thick ceramic fibre (to the unexposed face).

6 No. Fire Retardant Aluminium Composite panels, Each of overall dimensions 1500 mm wide by 1000 mm high, were then riveted to the outer face via angle brackets.

Test Results:

Passage of flames and hot gases 120 minutes*

Temperature Rise 120 minutes*

Hose Stream A hose stream test was conducted immediately after the fire test, in accordance with clause 7.6 of ASTM E119-12. The requirements of the hose stream test were satisfied.

* The test duration. The test was discontinued after a period of 120 minutes.

Date of Test 12th October 2013

This report may only be reproduced in full. Extracts or abridgements of reports shall not be published without permission of Exova Warringtonfire.

Signatories



Responsible Officer
I. Kennedy*
Testing Officer



Approved
S. Hankey*
Operations Manager

* For and on behalf of **Exova Warringtonfire**.

Report Issued

Date : 30th October 2013

This copy has been produced from a .pdf format electronic file that has been provided by **Exova Warringtonfire** to the sponsor of the report and must only be reproduced in full. Extracts or abridgements of reports must not be published without permission of **Exova Warringtonfire**. The pdf copy supplied is the sole authentic version of this document. All pdf versions of this report bear authentic signatures of the responsible **Exova Warringtonfire** staff.

CONTENTS	PAGE NO.
SUMMARY	2
SIGNATORIES	3
TEST PROCEDURE	5
INSTRUMENTATION	5
TEST OBSERVATIONS	6
TEST SPECIMEN	8
SCHEDULE OF COMPONENTS	11
TEST PHOTOGRAPHS	13
TEMPERATURE AND DEFLECTION DATA	19
PERFORMANCE CRITERIA AND TEST RESULTS	24
ONGOING IMPLICATIONS	24
CONCLUSIONS	25

Test Procedure

Introduction	<p>The test was carried out to the fire test method in ASTM E119-12 'Standard Test Method for Fire Tests of Building Construction and Materials' to determine the performance of the specimen as defined in that standard.</p> <p>The specimen was assessed against the performance criteria detailed within Clause 8.3 of ASTM E119-12.</p>
Instruction to test	<p>The test was conducted on the 12th October 2013 at the request of Aludecor Lamination Pvt. Ltd, the test sponsor.</p>
Test Specimen Construction	<p>A comprehensive description of the test construction is given in the Schedule of Components. The description is based on a detailed survey of the specimen and information supplied by the sponsor of the test.</p>
Installation	<p>The test construction was mounted within a refractory concrete lined steel test frame by representatives of Exova Warringtonfire during the week commencing 7th October 2013</p>
Sampling	<p>Exova Warringtonfire was not involved in any selection or sampling procedures for the tested specimen.</p>

Instrumentation

General	<p>The instrumentation was provided in accordance with the requirements of the Standard.</p>
Furnace	<p>The furnace was controlled so that its mean temperature complied with the requirements of ASTM E119-12, Clause 7.</p>
Thermocouple Allocation	<p>Thermocouples were provided to monitor the unexposed surface of the specimen. The output of all instrumentation was recorded at no less than 30 second intervals as follows:</p> <p>The locations and reference numbers of the various unexposed surface thermocouples are shown in Figure 1.</p>
Integrity Criteria	<p>Cotton pads were available to evaluate the specimen to withstand the passage of flame and hot gases.</p>
Furnace Pressure	<p>After the first five minutes of testing and for the remainder of the test, the furnace atmospheric pressure was controlled so that the calculated pressure differential relative to the laboratory atmosphere was 20 (+6/-3) Pa at the top of the specimen.</p>

Test Observations

Time		All observations are from the unexposed face unless noted otherwise.
mins	secs	The ambient air temperature in the vicinity of the test construction was 18°C at the start of the test with a maximum variation of -3°C during the test.
00	00	The test commences.
10	00	From the exposed face the joint compound is beginning to burn and drop away.
10	00	Steam/smoke release is beginning to issue from the top of the specimen.
15	00	All of the joint compound has now fallen away, revealing the joints and screw heads.
20	00	No further significant change.
20	00	On the exposed face, both vertical and horizontal joints are now open approximately 10 mm for horizontal and 5 mm for the vertical.
30	00	Exposed Face - Shrinkage of the boards is resulting in the board breaking at the fixings positions down the vertical stud positions.
30	00	No further significant change.
35	00	Deflection of the specimen is evident around the mid-point of the specimen.
40	00	From the exposed face, the horizontal joints now open approximately 20 mm and the vertical joints approximately 10 mm.
40	00	Steam/smoke release continues to issue from the top of the specimen.
50	00	From the exposed face, the horizontal joints are now open approximately 30 mm and the vertical joints 15 mm.
55	00	From the exposed face the left hand side plaster board below is beginning to break away from the top corner approximately 400 mm by 600 mm as collapsed onto the furnace floor.
60	00	No further significant change.
65	00	From the exposed face cracks, approximately 500 mm long have appeared on the top left hand side board.
73	00	From the exposed face more of the left hand side bottom board has broken and fallen away along with the top left hand board as well.
75	00	Cracking is occurring on all the boards now, horizontal joints open approximately 60 mm with the board sagging away.
75	00	Steam/smoke is still issuing from the top of the specimen.

Time

mins secs

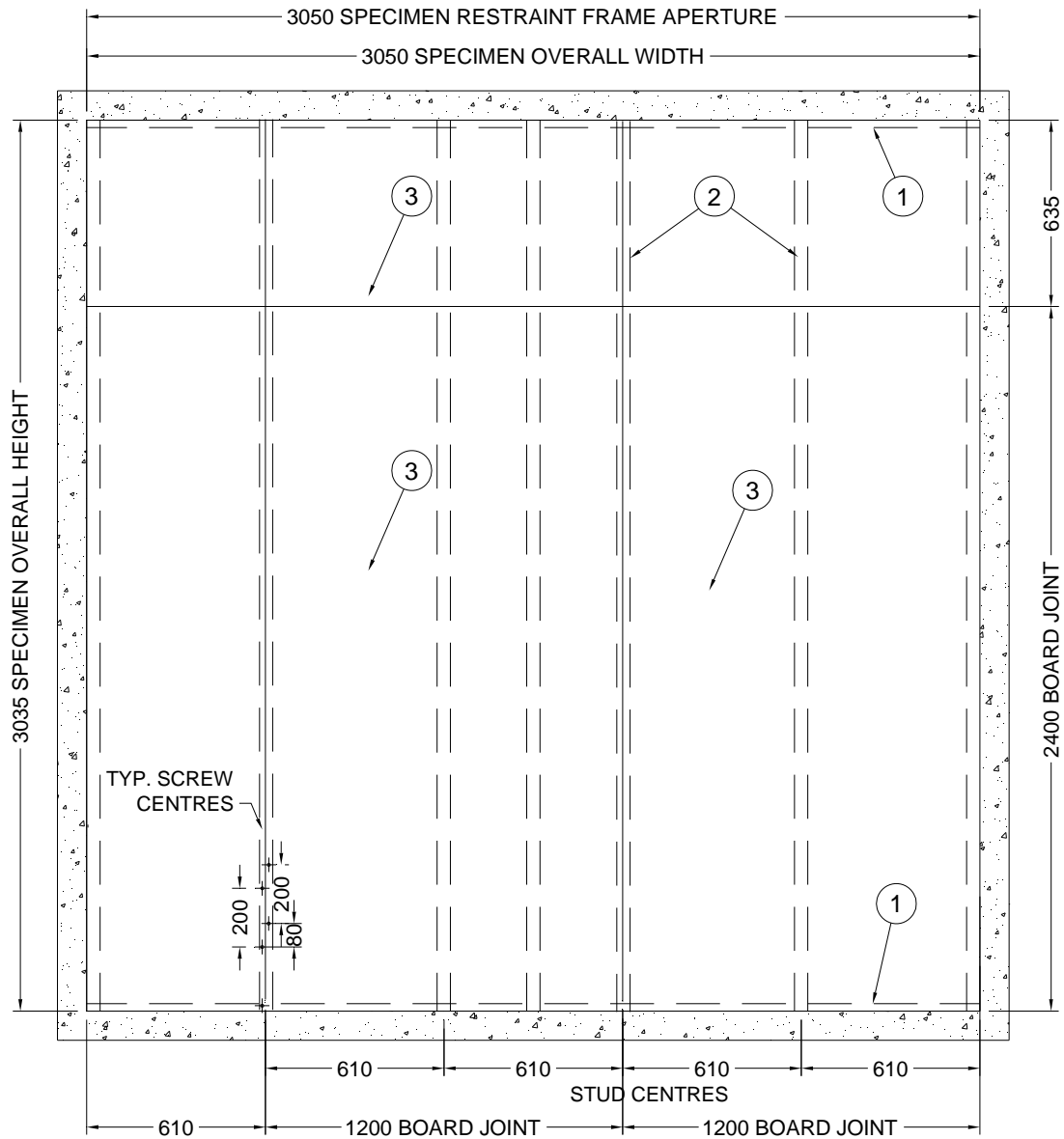
80	00	From the exposed face the bottom left hand side board is continuing to break away and collapse onto the furnace floor.
85	00	The bottom right hand side board is now breaking away and collapsing onto the furnace.
90	00	No further significant change.
95	00	From the exposed face the bottom middle board is beginning to collapse onto the furnace floor.
100	00	From the exposed face all boards are now beginning to break and collapse into the furnace floor.
110	00	No further significant change from the exposed face.
110	00	No further significant change.
115	00	From the exposed face the mineral wool is shrinking and deteriorating.
120	00	The test is discontinued at the request of the sponsor.

HOSE STREAM TEST

00	00	Test started
00	15	Leakage of water from the right hand side top horizontal joint approximately 800 mm from the right edge. The water does not project from the surface of the specimen.
00	45	Leakage of water from the right hand side top horizontal joint approximately 800 mm from the right edge. The water does not project from the surface of the specimen.
01	00	Leakage of water from the left hand side top horizontal joint approximately 700 mm from the left edge. The water does not project from the surface of the specimen.
01	30	Again leakage from the top right hand side horizontal joint. The water does not project from the surface of the specimen.
02	00	Again leakage from the top at the left hand side top horizontal joint. The water does not project from the surface of the specimen.
02	30	Test Terminated.

Test Specimen

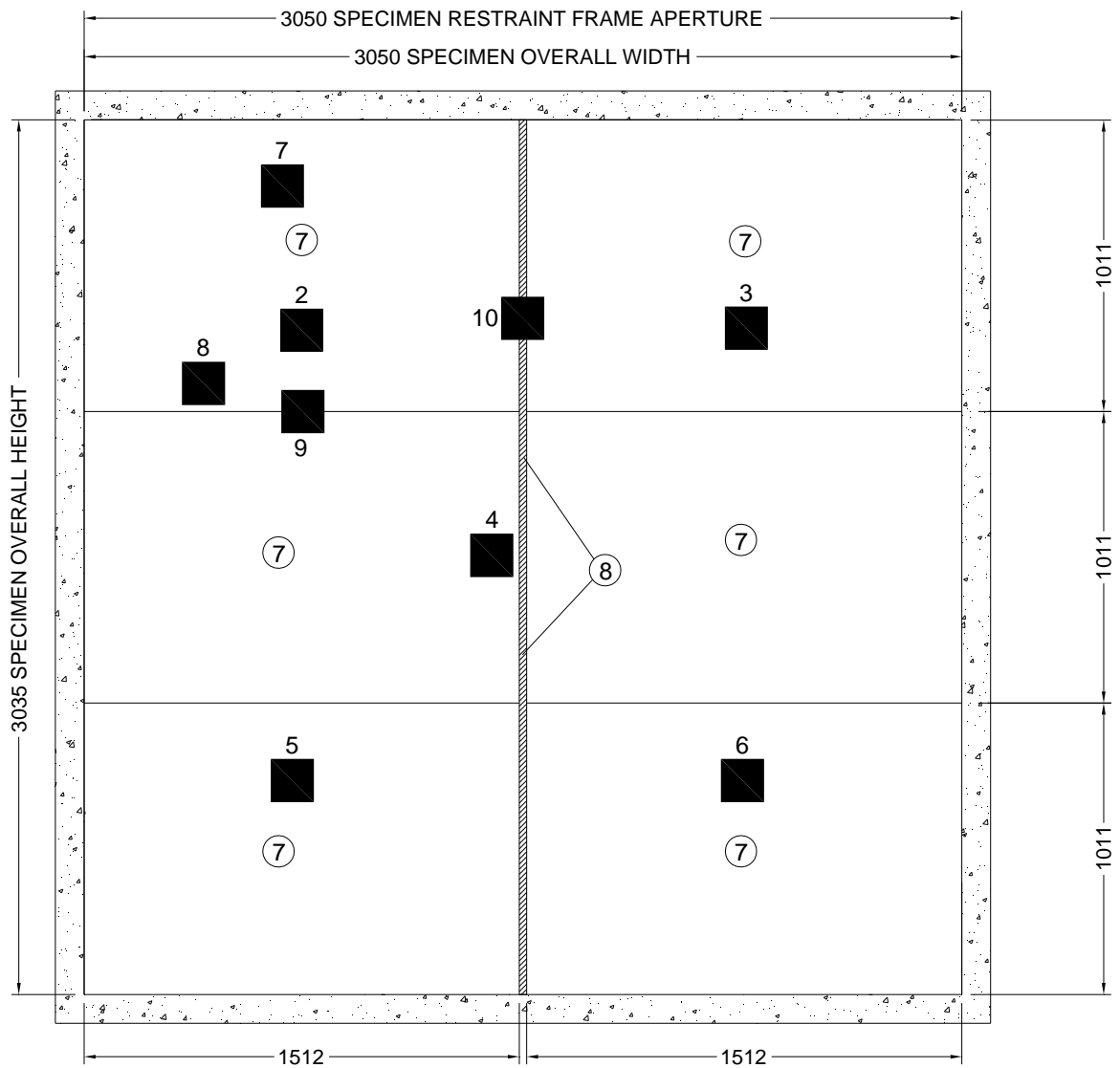
Figure 1- General elevation of test specimen and unexposed face thermocouples



- POSITIONS OF UNEXPOSED FACE THERMOCOUPLES.
- ALUMINUM PANELS AND TC POSITIONS OMITTED FOR CLARITY

Do not scale. All dimensions are in mm

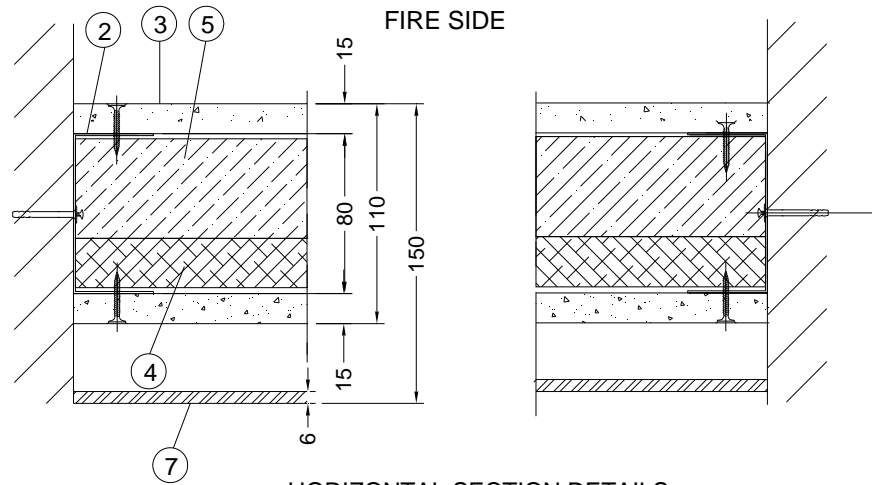
Figure 2 – General elevation of test specimen and unexposed face thermocouples



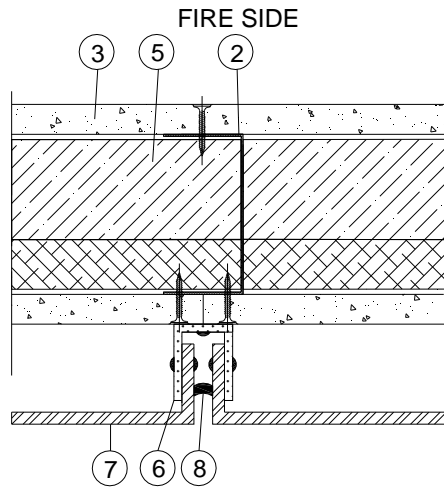
- POSITIONS OF UNEXPOSED FACE THERMOCOUPLES.
- HEAD/BASE CHANNELS, VERTICAL STUDS AND BOARDS

Do not scale. All dimensions are in mm

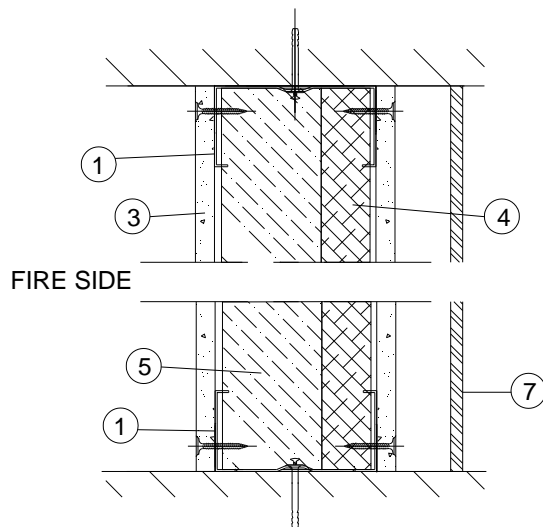
Figure 3 – Typical details of test specimen



HORIZONTAL SECTION DETAILS



HORIZONTAL SECTION AT A PANEL JOINT



VERTICAL SECTION DETAILS

Do not scale. All dimensions are in mm

Schedule of Components

(Refer to Figures 1 and 2)
 (All values are nominal unless stated otherwise)
 (All other details are as stated by the sponsor)

<u>Item</u>	<u>Description</u>
1. Head and Base Channels	
Manufacturer	: Speedline
Reference	: Speedline 80 mm C Stud
Material	: Galvanised mild steel channel
Thickness	: 1.1 mm
Overall section size	: 80 mm x 40 mm
Details of fixings to masonry surround	
i. type	: Ankerbolt M10 X 75
ii. overall size	: 75 mm x 8 mm diameter
iii. spacings	: 300 mm centres
2. Vertical Studs	
Manufacturer	: Speedline
Reference	: Speedline 80mm Track
Material	: Galvanised mild steel channel
Thickness	: 1 mm
Overall section size	: 80 mm web x 40 mm flanges
Expansion allowance at head	: 15 mm
Fixing method	: Studs were spaced at 610 mm centres and friction fitted within the head and base channels. The fixed edge stud was fixed to the frame with Ankerbolt M10 X 75 at 300 mm centres.
3. Facing boards	
Manufacturer	: Gyproc
Reference	: Fire Resistant Gypsum Boards
Material	: Calcium Sulphate based board
Thickness	: 15 mm
Size of boards	: 2400 mm high x 1200 mm wide
Density	: 100 kg/m ³
Fixing method	: Single layer screw fixed to both faces of all framework members. The vertical joints of the unexposed face boards were staggered 200 mm with respect to those on the opposite face
Details of panel fixings	Drywall Screws
i. type	: Hilti drywall screws DS01B
ii. overall size	: 25 mm x 3.5 mm diameter
iii. spacings	: 200 mm centres along all framework members
Details of board joint filler	: Reinforced with joint Tape plus Joint Filler

4. Internal Insulation Packing 1

Manufacturer	:	Thermal Ceramics
Reference	:	Superwool 607
Material	:	Ceramic fibre based insulation
Density	:	96 kg/m ³ , uncompressed
Fitting method	:	Packed into gap along the free edge between lining of restraint frame and left hand edge of the partition as viewed from the unexposed face

5. Internal Insulation Packing 2

Manufacturer	:	Rockwool
Reference	:	Fire Barrier
Material	:	Mineral wool based insulation
Density	:	80 kg/m ³ , uncompressed
Fitting method	:	Packed into gap within the partition itself as part of dual core insulation.

6. Staggered Clip Angle

Reference	:	Staggered Clip Angle
Material	:	Aluminium
Overall Size	:	25.4 mm x 25.4 mm x 4 mm x 100 mm long
Centres	:	400 mm
Fixing Method	:	Angles were staggered down the partition board at 400 mm centres at the vertical joint in the middle of the panels using clip angle screws. The angles were then secured to the aluminium composite panels using 4.8mm pop rivets.

7. Unexposed Panels

Material	:	Fire Retardant Aluminium Composite Panel
Overall Size	:	1500mm x 1000mm x 4mm
Fixing method	:	Panels were fixed to partition using 4.8mm pop rivets which secured the aluminium composite panels to the clip angles the panel where also friction fitted flush one top of the other.

8. Panel Joint Seal

Manufacturer	:	Dow Corning India Private LTD
Reference	:	Structural Glazing Sealant
Overall Size	:	10 mm deep
Application	:	Applied using cartridge gun

Test Photographs

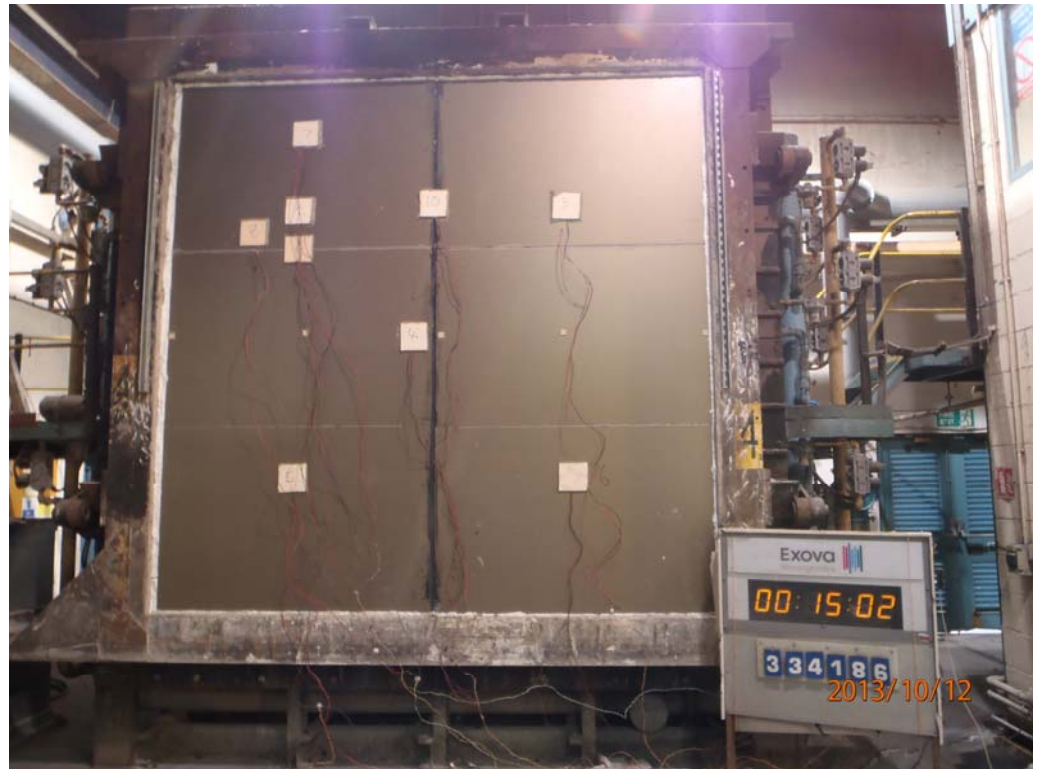
The exposed face of the specimen prior to testing



The unexposed face of the specimen prior to testing



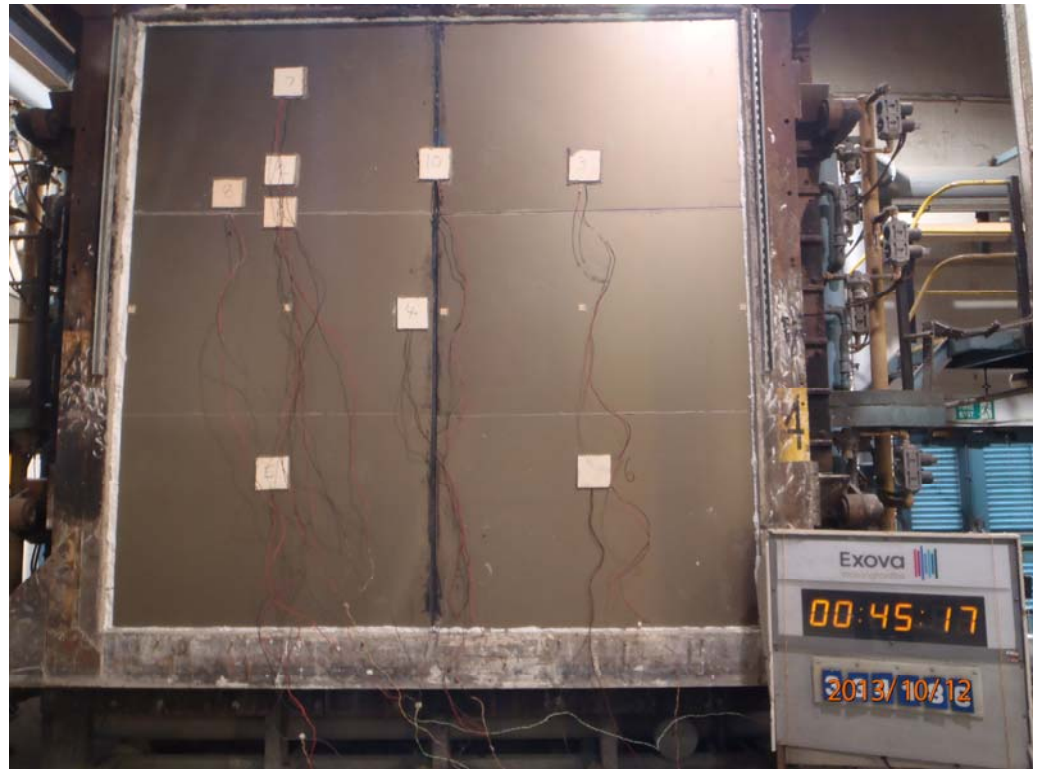
The unexposed face of the specimen after 15 minutes of testing



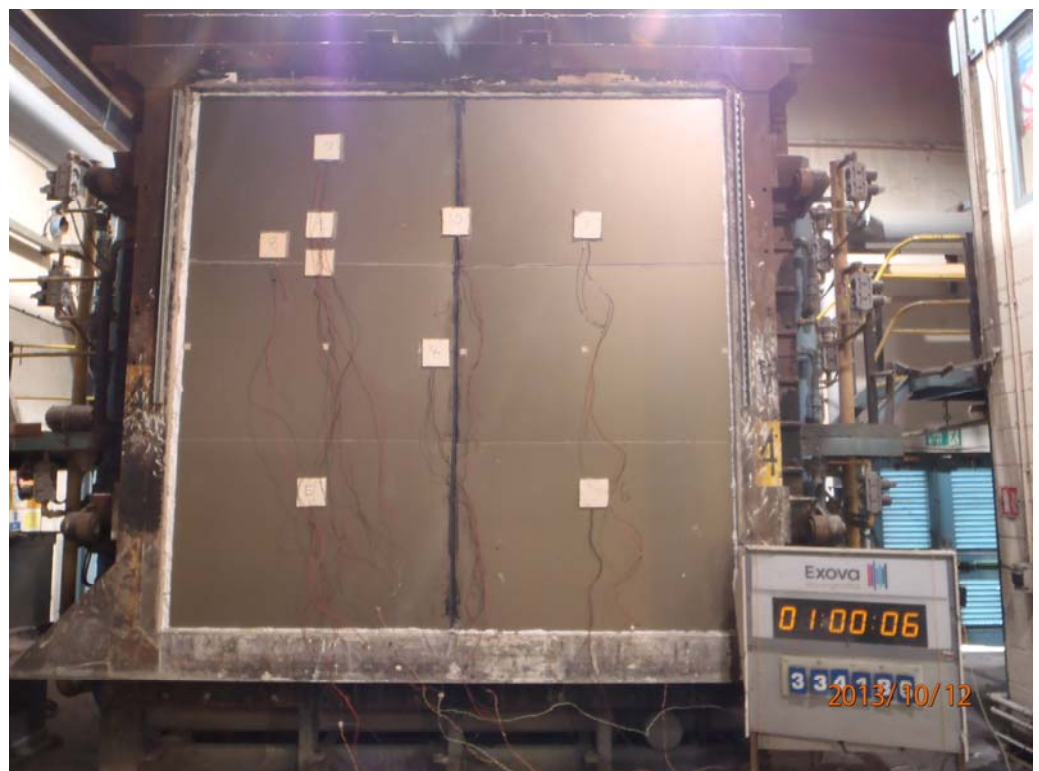
The unexposed face of the specimen after 30 minutes of testing



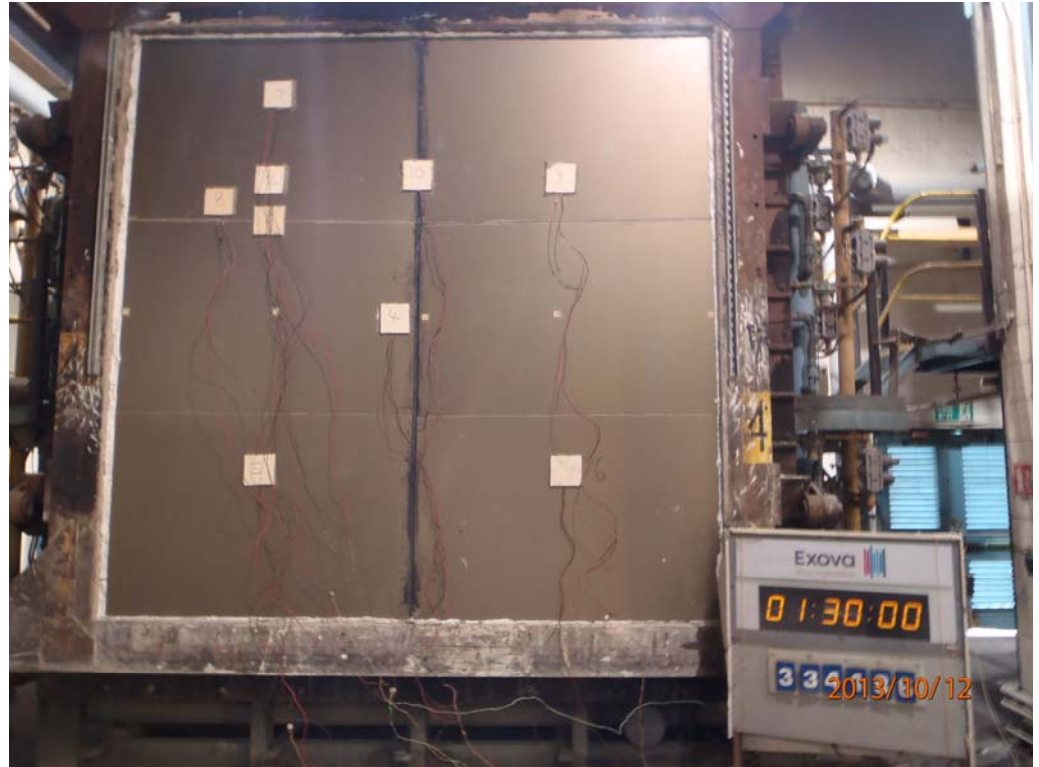
The unexposed face of the specimen after 45 minutes of testing



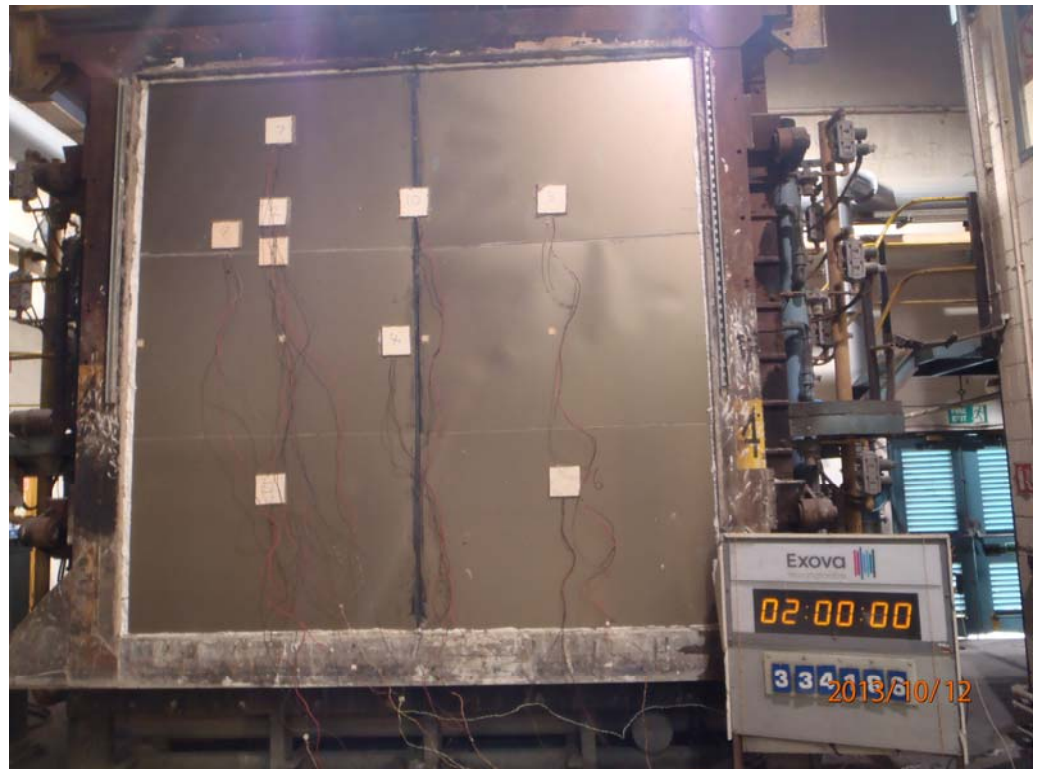
The unexposed face of the specimen after 60 minutes of testing



The unexposed face of the specimen after 90 minutes of testing



The unexposed face of the specimen after 120 minutes of testing



The exposed face of the specimen shortly after the test and just before the hose stream test



The unexposed face of the specimen during the hose stream test



The exposed face
of the specimen
following the hose
stream test



Temperature and Deflection Data

Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In The Standard

Time Mins	Specified Furnace Temperature Deg. C	Actual Furnace Temperature Deg. C
0	20	25
3	383	482
6	588	620
9	686	706
12	729	733
15	760	759
18	784	792
21	800	804
24	816	821
27	830	832
30	843	845
33	855	857
36	866	868
39	876	879
42	884	889
45	892	894
48	899	898
51	906	906
54	913	912
57	919	919
60	926	925
63	932	930
66	938	936
69	944	942
72	949	948
75	955	951
78	960	960
81	965	967
84	969	972
87	974	976
90	978	979
93	982	983
96	986	988
99	990	992
102	994	995
105	997	999
108	1000	1003
111	1003	1007
114	1005	1007
117	1008	1008
120	1010	1012

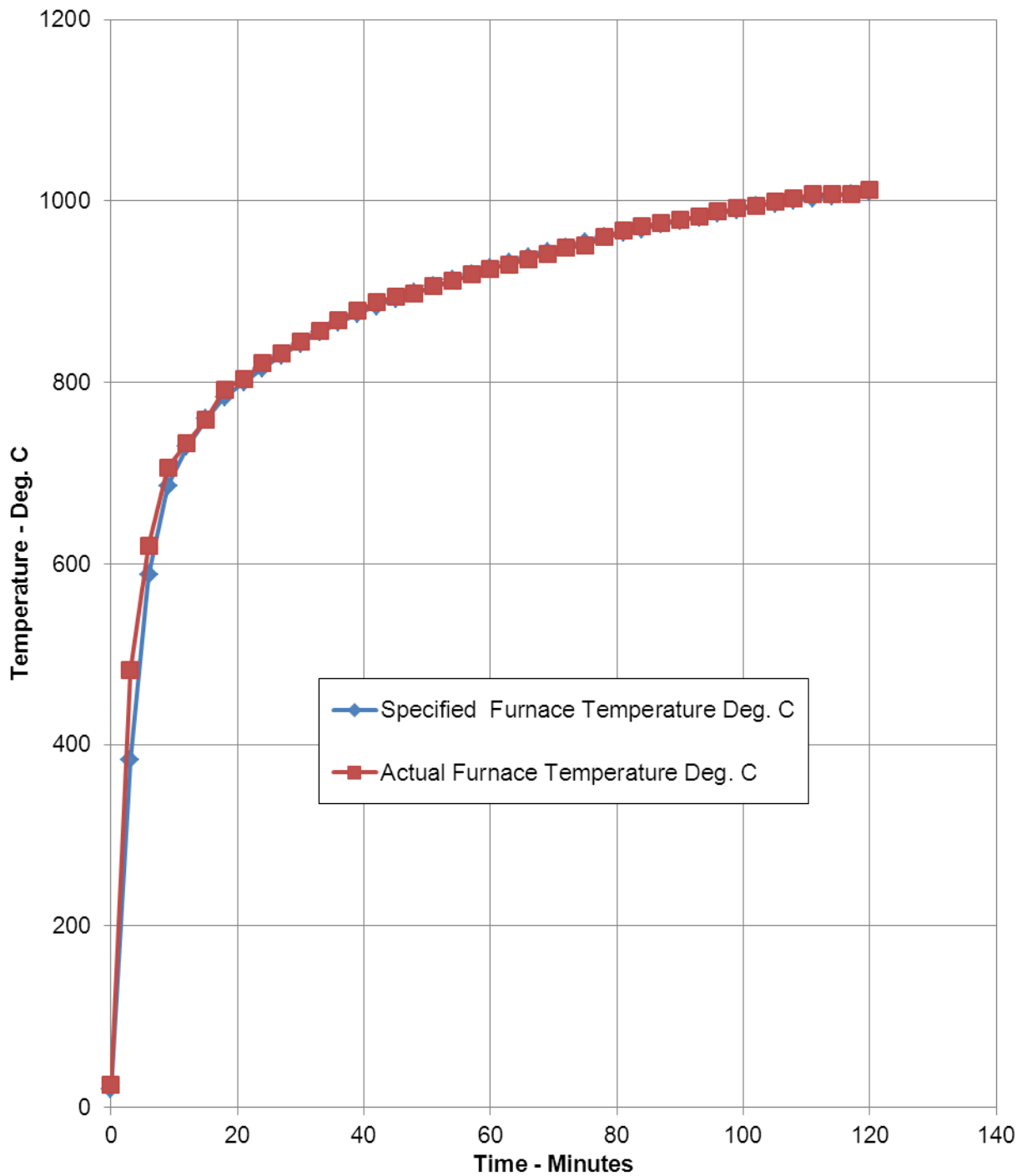
Individual And Mean Temperatures Recorded On The Unexposed Surface Of The Test Specimen

Time Mins	T/C Number 2 Deg. C	T/C Number 3 Deg. C	T/C Number 4 Deg. C	T/C Number 5 Deg. C	T/C Number 6 Deg. C	Mean Temp. Deg. C
0	17	18	18	18	18	18
3	17	18	18	18	18	18
6	17	18	18	18	18	18
9	17	18	18	18	18	18
12	18	18	18	19	18	18
15	19	19	19	20	19	19
18	21	22	21	23	21	22
21	24	25	24	27	24	25
24	27	28	27	30	27	28
27	29	31	30	32	30	30
30	32	33	32	34	32	33
33	33	35	34	35	33	34
36	34	36	35	35	34	35
39	35	37	36	36	35	36
42	37	39	37	37	36	37
45	38	40	38	38	37	38
48	39	42	39	39	38	39
51	41	45	41	41	40	42
54	44	48	43	44	43	44
57	47	52	46	46	46	47
60	51	55	49	49	49	51
63	55	58	52	52	53	54
66	58	61	56	55	56	57
69	61	64	59	58	58	60
72	64	67	61	61	60	63
75	66	69	64	63	62	65
78	68	70	66	65	64	67
81	69	71	68	66	65	68
84	70	72	69	68	67	69
87	71	74	71	69	68	71
90	72	75	72	71	70	72
93	73	76	73	72	71	73
96	74	76	73	73	72	74
99	75	77	74	73	73	74
102	76	78	75	74	74	75
105	76	79	75	75	75	76
108	77	80	76	76	76	77
111	77	81	77	77	77	78
114	78	83	78	78	78	79
117	78	86	79	79	79	80
120	79	91	79	80	79	82

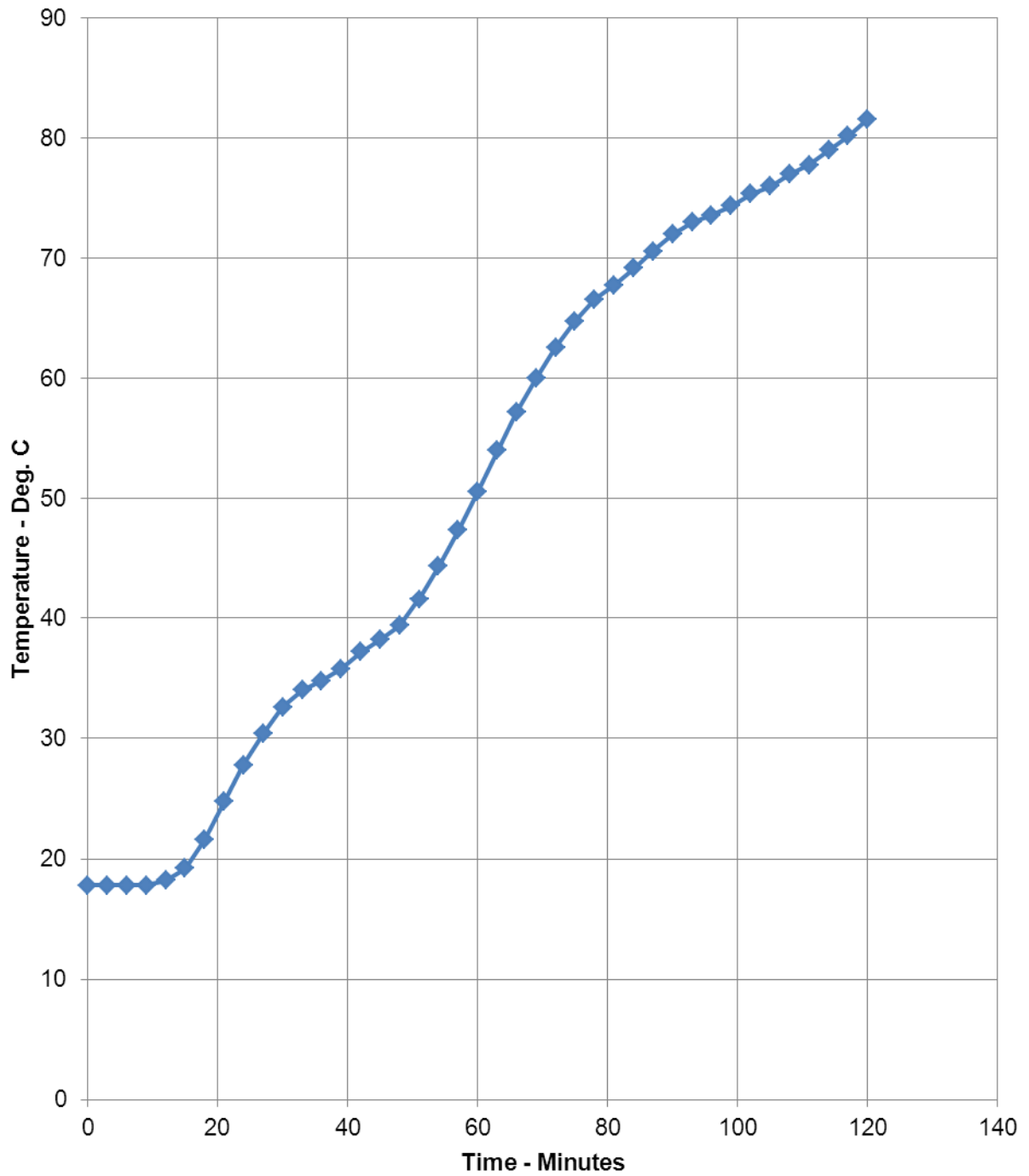
Individual Temperatures Recorded On The Unexposed Surface Of The Test Specimen

Time Mins	T/C Number 7 Deg. C	T/C Number 8 Deg. C	T/C Number 9 Deg. C	T/C Number 10 Deg. C
0	19	20	20	20
3	19	20	20	20
6	19	20	20	20
9	19	20	20	20
12	19	20	20	20
15	20	21	20	21
18	22	22	22	23
21	25	25	24	26
24	30	27	27	30
27	34	30	30	33
30	37	32	32	36
33	39	34	34	38
36	41	36	35	40
39	42	37	36	42
42	43	38	37	43
45	44	40	38	45
48	46	41	40	47
51	48	43	41	50
54	51	46	44	53
57	54	49	46	56
60	58	52	50	60
63	61	56	53	63
66	65	59	56	66
69	67	62	59	69
72	69	65	62	71
75	71	67	64	74
78	72	69	66	75
81	74	71	68	77
84	74	72	69	78
87	75	74	70	79
90	76	75	71	80
93	76	75	72	81
96	77	76	73	83
99	77	77	74	84
102	78	78	75	85
105	78	79	75	87
108	78	80	76	89
111	78	80	77	92
114	79	81	78	94
117	80	82	78	98
120	80	83	79	101

Graph Showing Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In The Standard



Graph Showing Mean Temperature Recorded On The Unexposed Surface Of The Test Specimen



Performance Criteria and Test Results

Passage of flames and hot gases

It is required that the specimen withstands the fire endurance test without passage of flame or gases hot enough to ignite cotton waste. These requirements were satisfied for a period of 120 minutes, at which time the test was discontinued.

Temperature Rise

It is required that the mean temperature rise of the unexposed surface shall not be greater than 139°C and that the maximum temperature rise shall not be greater than 181°C (i.e. 30% greater than the mean temperature rise criteria). These requirements were satisfied for the test duration of 120 minutes.

Hose Stream

Immediately following the fire test, the specimen was subjected to a hose stream test conducted in accordance with the principles given in E119-12, Clause 7.6 for a period of 2 ½ minutes.

During the application of the hose stream. No opening developed in the test assembly permitting the projection of water beyond the unexposed surface. Therefore the specimen was judged to have satisfied the requirements of this test.

Ongoing Implications

Limitations

The results relate only to the behaviour of the specimen of the element of construction under the particular conditions of test. They are not intended to be the sole criteria for assessing the potential fire performance of the element in use, nor do they reflect the actual behaviour in fires.

Review

The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over five years old should be considered by the user. The laboratory that issued the report will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report.

Conclusions

Evaluation Against Objective To evaluate the fire resistance performance of a specimen of non-loadbearing partition when subjected to a test given in ASTM E119-12.

The specimen non-loadbearing partition achieved the following results:

Test Results:

Passage of flames and hot gases 120 minutes*

Temperature Rise 120 minutes*

Hose Stream A hose stream test was conducted immediately after the fire test, in accordance with clause 7.6 of ASTM E119-12. The requirements of the hose stream test were satisfied.

* The test duration. The test was discontinued after a period of 120 minutes.