

Test Report

No. AJHG1512012147FB

Date: JAN.13, 2016

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PERMAFORM AUSTRALIA LTD

219-18# XINFENG (S) ROAD SHANGHAI CHINA

The following sample(s) was / were submitted and identified on behalf of the client as:

Sample Description:

PERMAFORM PVC WALL - Extruded rigid polyvinyl chloride (PVC)-based, hollow type rib reinforced plastic material comprising of two PVC panel facings with internal reinforced PVC ribs, used as permanent formwork for concrete walls; 150mm in thickness overall. The nominal thickness of the PVC on the face panels are 2.8mm up to 5mm at the anchor points.

Test Requested:

AS 1530.4-2014 Method for fire tests on building materials, components and structures Part 4:

Fire-resistance test of elements of construction

Test Results: -- See attached sheet --

Test Period:

Sample Receiving Date : DEC.29, 2015

Test Performing Date : DEC.29, 2015 TO DEC.30, 2015

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Signed for and on behalf of
SGS-CSTC Co., Ltd. Anji Branch



Allen Zou
Technical Manager



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1. Introduction

Determine the fire resistance of the non-load bearing vertical separating elements in accordance with section 3 of AS 1530.4-2014: Method for fire tests on building materials, components and structures part 4: Fire-resistance test of elements of construction.

The sample with 3000 mm width by 2750mm height by 150 mm thickness was symmetrical separating element, and one side was exposed to a time-temperature curve as dictated by the Clause 2.10 of AS 1530.4 for a period of 95 minutes under Non-loaded conditions.

2. Test Specimen

2.1 The direction of specimen tested was a random surface

Because of the specimen is a vertical symmetrical separating element

2.2 Description of specimen :

Total nominal installation dimensions of the specimen are 2750 mm height by 3000 mm width by 150 mm thickness.

The tested specimen was assembled by two panels with normal size 1550 mm width by 2750 height and another 1450 mm width by 2750 height. Installation detail, see Figure 1. The tested specimen was symmetrical and the specimen was mounted one side of specimen towards to the heating conditions of the test.

The specimen was installed into a prepared masonry wall with an opening size 3050mm width by 2800mm height and fixed by expansible bolt. Between all around of the sample and between two panels were filled with rock wool by laboratory. Installation was conducted by a representative of Lab on 29 DEC, 2015.

To be continued....



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Unit: mm

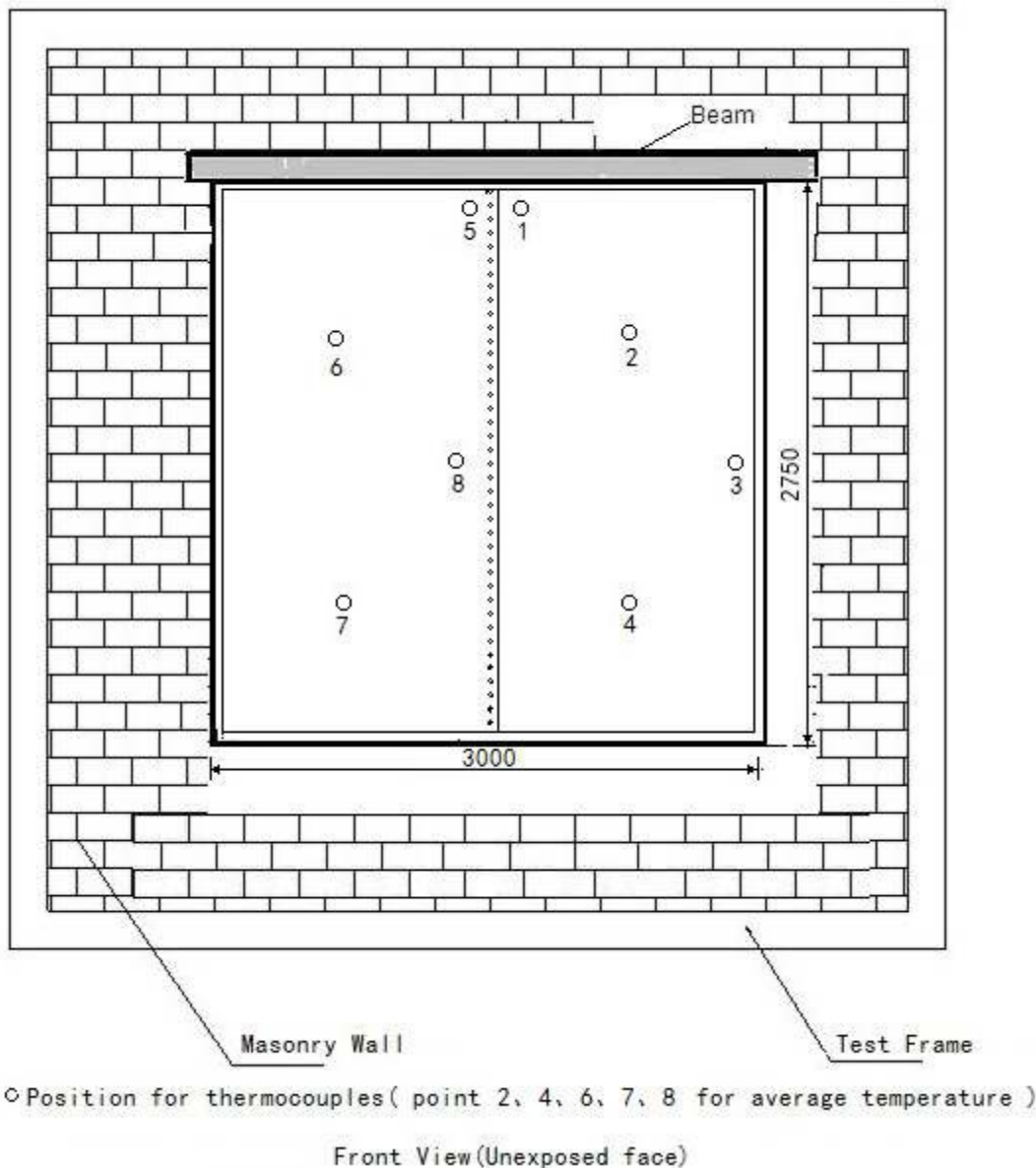


Figure 1 - The drawing of installation

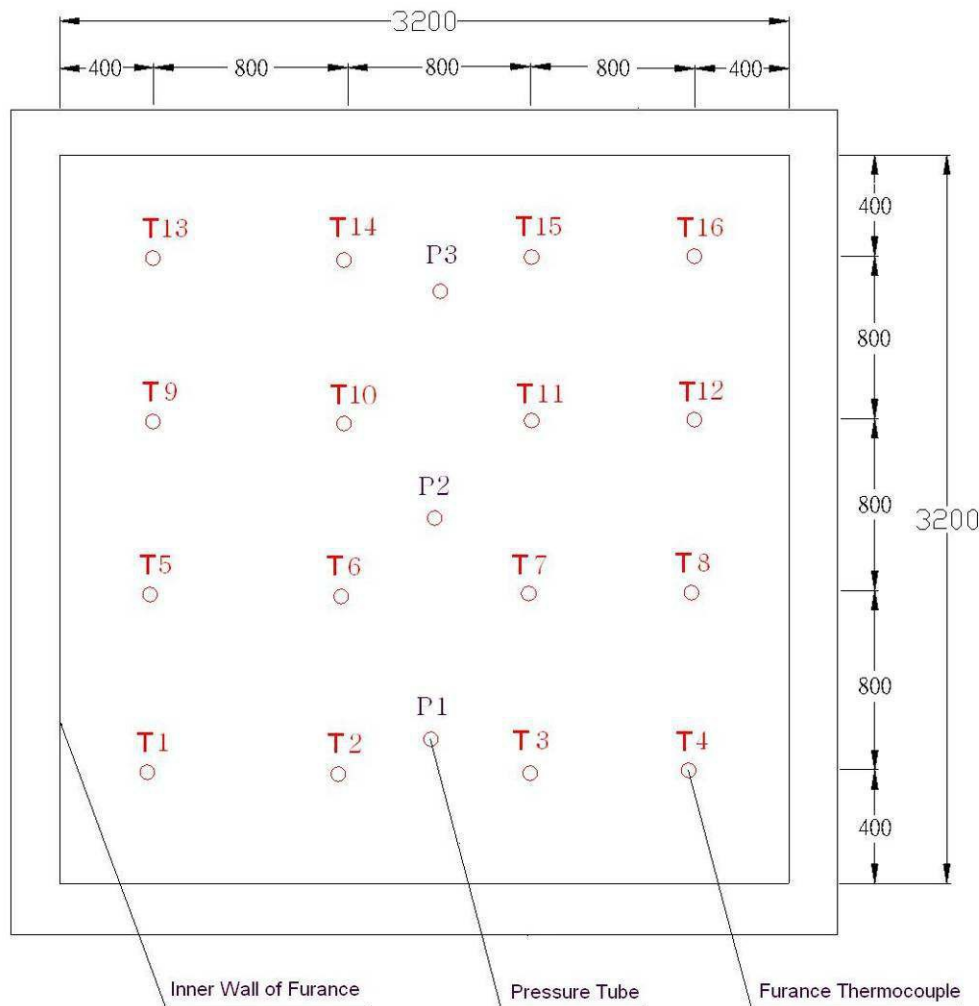
To be continued....

3. Equipment

Sixteen mineral insulated thermocouples were kept at 100 mm away from the surface of the specimen, and were provided to monitor the temperature of the furnace. The locations and reference numbers of the furnace thermocouples are shown in Figure 2.

A pressure sensor was provided to monitor the furnace pressure.

Cotton pads and gap gauges were available to evaluate the impermeability of the specimen to hot gases.



All dimensions are in mm

Figure 2 - Elevation of Furnace Thermocouples

To be continued....

4. Test procedure

The test was conducted in accordance with the procedure specified in AS 1530.4-2014, section 3.

The ambient temperature of test area was 15°C at commencement of test with variation of 0°C during the test.

The furnace was controlled so that the mean furnace temperature, deviation from the mean furnace temperature and uniformity of temperature distribution complied with the requirement of AS 1530.4-2014.

Sixteen furnace thermocouples were used to determine the mean furnace temperature.

The furnace pressure was controlled to comply with the requirements of AS 1530.4-2014, Clause 2.10.3.

The furnace pressure shall be monitored and controlled. 5 min after the commencement of the test the furnace pressure shall be 0 ± 5 Pa of the nominal pressure specified for the particular element under test; from 10 min onwards it shall be 0 ± 3 Pa of the nominal pressure specified for the particular element under test at a height of approximately 500 mm above the notional floor level.

Cotton pads and gap gauges were used to determine the integrity. The sustained flaming on the unexposed surface was also checked to determine the integrity. The thermocouples specified in clause 2.2.3.1 were used to determine the insulation of specimen.

5. Test Results

The following data were recorded during the test:

- The actual mean furnace temperature/ time curve and the standard furnace temperature/ time curve, which were shown in Figure 3.
- The furnace pressures relative to laboratory atmosphere, at a height of approximately 500 mm above the notional floor level, which were shown in Figure 4.
- The mean and maximum temperature raises of the unexposed surface of were shown in Figure 5. The individual temperatures recorded on the unexposed surface of the specimen were shown in Table 1.

A summary of the observations made on the general behaviour of the specimen was given in Table 2.

To be continued....

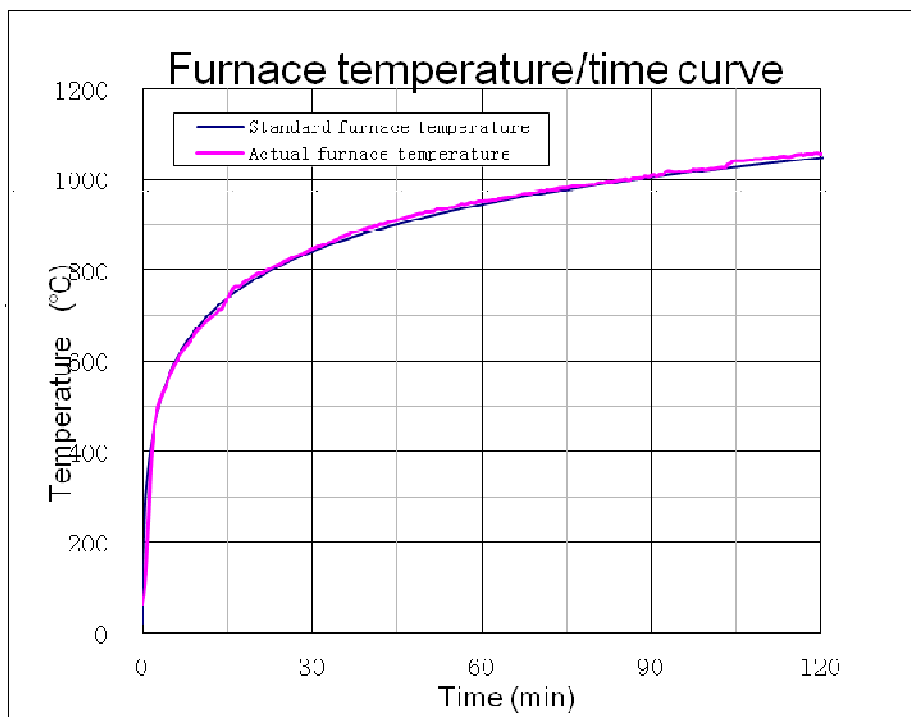


Figure 3 - Actual Mean and Standard Furnace Temperature/Time Curve

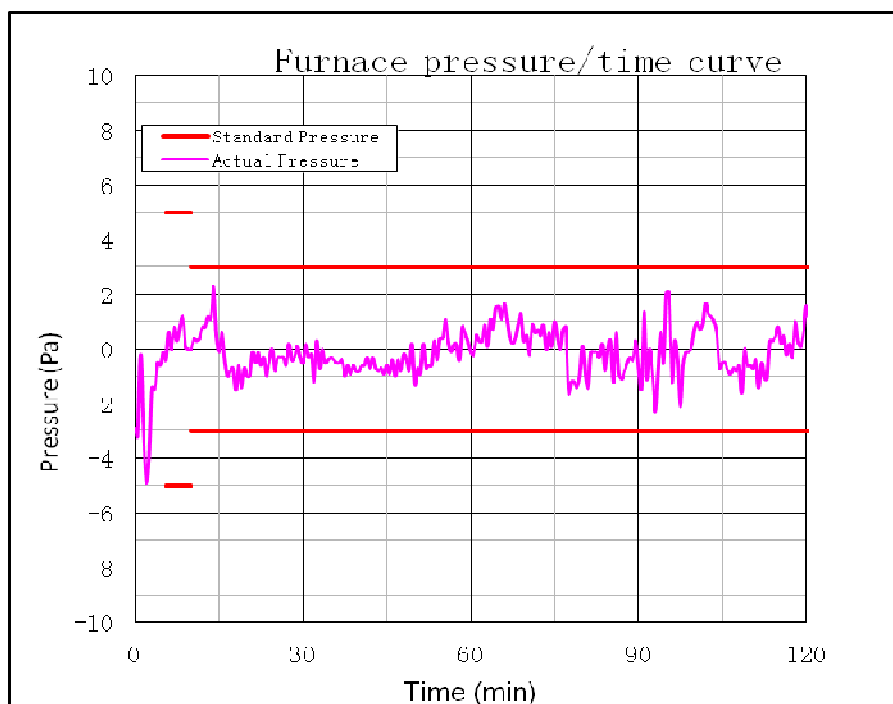


Figure 4 - Furnace Pressures Relative to Laboratory Atmosphere
(500 mm above the notional floor level)

To be continued....

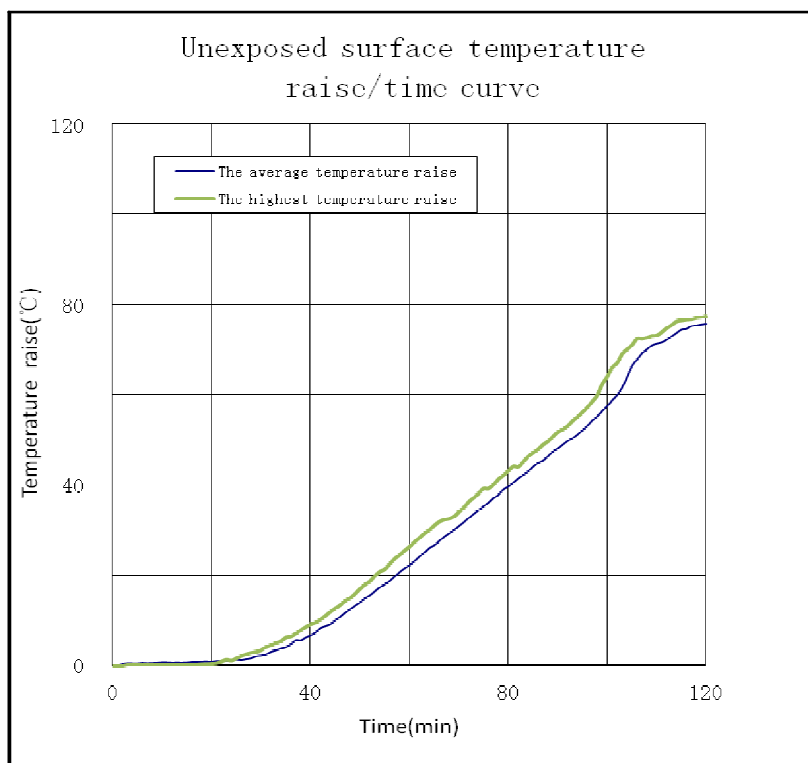


Figure 5 - Temperature raise/time curve

Table 1 Individual Temperatures Recorded on the Unexposed Surface of the Specimen (unit:°C)

Time (min)	Position of Thermocouples							
	1	2	3	4	5	6	7	8
0	15	14	15	14	14	14	14	15
1	15	14	15	14	14	14	14	15
2	15	15	15	14	14	15	14	15
3	15	15	15	14	14	15	14	15
4	15	15	15	14	14	15	14	15
5	15	15	15	14	14	15	14	15
6	15	15	15	14	14	15	14	15
7	15	15	15	14	14	15	14	15
8	15	15	15	14	14	15	14	15
9	15	15	15	14	14	15	14	15
10	15	15	15	14	14	15	14	15
11	15	15	15	14	14	15	14	15

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Time (min)	Position of Thermocouples							
	1	2	3	4	5	6	7	8
12	15	15	15	14	14	15	14	15
13	15	15	15	14	14	15	14	15
14	15	15	15	14	14	15	14	15
15	15	15	15	14	14	15	14	15
16	15	15	15	15	14	15	15	15
17	15	15	15	15	14	15	15	15
18	15	15	15	15	14	15	15	15
19	15	15	15	15	14	15	15	15
20	15	15	15	15	15	15	15	15
21	16	15	16	15	15	15	15	15
22	16	15	16	15	15	15	15	16
23	16	15	16	15	15	15	15	16
24	16	15	16	15	15	15	15	16
25	17	15	17	16	15	15	16	16
26	17	15	17	16	16	15	16	16
27	18	15	18	16	16	15	16	16
28	18	15	18	16	17	15	16	16
29	18	15	18	17	17	15	16	16
30	18	16	18	17	17	16	17	17
31	19	16	19	17	18	16	17	17
32	20	16	20	18	18	17	17	17
33	20	17	20	18	18	17	18	18
34	20	17	20	18	19	18	18	18
35	21	18	21	19	19	18	19	18
36	21	19	21	19	20	19	19	19
37	22	19	22	20	20	19	20	21
38	23	20	23	20	21	19	20	19
39	24	20	24	21	22	20	20	20
40	24	21	24	21	22	20	21	20
41	25	21	25	22	23	21	22	21
42	25	22	25	22	24	22	22	23
43	26	23	26	23	24	23	23	23
44	27	23	27	23	25	23	24	23
45	28	24	28	24	26	24	24	24
46	28	25	28	25	27	24	25	25
47	29	25	29	26	28	25	26	26

To be continued....



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Time (min)	Position of Thermocouples							
	1	2	3	4	5	6	7	8
48	30	26	30	27	28	26	27	27
49	31	27	31	27	29	27	27	28
50	32	28	32	28	30	28	28	29
51	33	29	33	29	31	29	29	30
52	34	29	34	29	32	30	30	30
53	35	30	35	31	33	30	31	31
54	36	31	36	32	34	31	32	32
55	36	32	36	32	34	31	32	33
56	38	32	38	33	36	32	33	33
57	39	34	39	34	36	33	34	34
58	40	34	40	35	37	34	35	35
59	41	35	41	36	38	35	36	35
60	41	36	41	37	39	35	37	36
61	42	37	42	38	40	36	38	37
62	43	38	43	39	41	37	39	38
63	44	39	44	40	42	38	40	39
64	45	40	45	41	42	39	40	40
65	46	41	46	42	44	40	42	40
66	47	42	47	42	44	41	42	41
67	47	42	47	43	45	42	43	42
68	48	43	48	44	45	43	44	43
69	48	44	48	45	46	43	45	44
70	49	45	49	46	47	44	46	45
71	50	46	50	47	48	46	47	45
72	51	47	51	47	49	47	47	46
73	52	48	51	48	50	47	48	47
74	53	49	53	49	50	48	49	47
75	54	49	54	50	51	49	50	48
76	54	50	54	51	52	50	51	49
77	55	51	55	52	53	51	52	50
78	56	52	56	53	54	52	53	51
79	57	53	57	54	54	53	54	52
80	58	53	57	54	56	54	54	52
81	59	55	59	55	56	55	55	53
82	59	55	59	56	57	55	56	54
83	60	56	60	57	58	56	57	55

To be continued....



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Time (min)	Position of Thermocouples							
	1	2	3	4	5	6	7	8
84	61	57	61	58	59	57	58	56
85	62	58	62	59	60	58	59	57
86	63	59	63	59	61	59	59	58
87	64	60	64	60	62	59	60	58
88	65	60	65	61	63	60	61	59
89	66	62	66	62	64	62	62	60
90	67	62	67	63	65	62	63	61
91	67	64	67	63	66	64	63	61
92	68	64	68	64	67	64	64	62
93	69	65	69	64	68	65	65	63
94	70	66	70	65	70	65	66	64
95	71	67	71	66	71	67	66	65
96	72	68	72	67	72	68	67	66
97	73	69	73	68	74	69	69	66
98	74	70	74	69	75	70	70	67
99	75	71	75	70	77	71	72	68
100	76	73	76	71	79	73	73	69
101	77	74	77	72	81	74	74	71
102	79	75	79	73	82	75	75	71
103	80	78	80	75	84	77	76	72
104	81	81	82	77	85	81	77	74
105	82	83	83	80	86	84	78	77
106	83	85	84	81	87	86	79	78
107	84	87	85	83	87	87	80	79
108	85	88	86	85	88	88	80	80
109	85	88	87	86	88	88	81	82
110	86	88	88	86	88	88	81	83
111	86	89	88	86	88	89	81	83
112	87	90	89	87	89	90	82	83
113	87	90	89	88	89	90	82	84
114	87	91	90	88	89	91	83	85
115	88	91	90	89	89	91	84	86
116	87	92	90	89	90	92	85	86
117	88	92	91	90	90	92	85	87
118	88	92	91	90	90	92	85	87
119	88	92	91	90	90	92	85	88
120	89	92	92	91	91	92	86	88

To be continued....



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Table 2 Observations during the Test

Time (min:sec)	Observations
00:00	Furnace fired.
01:00	Smoke start to release from between panels .
120:00	Slight deformation towards the furnace. The sample keeps fire-resistance performance end test as client's requirement.

6. Performance Criteria (AS 1530.4-2014, Clause 2.12.2 and 2.12.3)

6.1 Integrity

Failure in relation to integrity shall be deemed to have occurred when evaluated as follows:

6.1.1 Cotton pad

The cotton pad in its frame shall be applied against the surface of the test specimen over the crack, fissure or flaming under examination, until ignition of the cotton pad (defined as glowing or flaming) or for a maximum of 30s.

6.1.2 Gap gauges

Gap gauges are used to evaluate the size of any opening in the surface of the test specimen at time intervals that will be determined by the apparent rate of the specimen deterioration.

- a) a 6 mm gap gauge can be passed through the specimen so that the gap gauge projects into the furnace and the gauge can be moved a distance of 150 mm along the gap; or
- b) a 25 mm gap gauge can be passed through the specimen so that the gap gauge projects into the furnace.

6.1.3 Flaming

Sustained flaming on the surface of the unexposed surface for 10s or longer constitutes integrity failure.

6.2 Insulation

Failure in relation to insulation shall be deemed to have occurred when measured by thermocouples on the unexposed surface, the specimen is deemed to have failed when---

- a) the mean temperature of the unexposed surface of the test specimen exceeds the initial temperature by more than 140 °C; or
- b) the temperature at any location on the unexposed surface of the test specimen exceeds the initial temperature by more than 180 °C

To be continued....

7. Conclusion

The tested specimen has been subjected to a fire resistance test in accordance with AS 1530.4-2014.

The fire resistance of the specimen was judged against the criteria for insulation and integrity as specified clause 6 of this report, and the specimen satisfied the performance requirements for the following period:

Insulation	Integrity
≥120 mins	≥120 mins

The test was terminated after a period of 121minutes.

None of the above criteria was observed or times exceeded in determination of periods of installation and integrity in excess of 120 minutes.

No surface spalling was detected.

STATEMENT:

The results of these fire tests may be used to directly assess fire hazard, but it should be recognized that a single test method will not provide a full assessment of fire hazard under all fire conditions.

This report details methods of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outlined in this standard. Any significant variation with respect to size, constructional details, loads, stresses, edge or end conditions, other than those allowed under the field of direct application in the relevant test method, is not covered by this report.

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

Based on test performance of the full scale fire resistance test it is the opinion of the testing laboratory that temperature endured by a concrete filled Permaform wall would not burn or melt away the polymer webs to create holes under fire conditions.

Therefore the presence of web diaphragms will not affect the FRI capacity and smoke generation for the Permaform product tested in accordance with AS 1530.4-2014

To be continued....



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Appendix A Test photographs:



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End of report