

## Test Report

No. AJHG1501000530FB

Date: FEB.17, 2015

Page 1 of 13

### ZHEJIANG TERASUN AIR DUCT CO., LTD

MAREN VILLAGE, CHONGREN INDUSTRIAL ZONE, CHONGREN TOWN, SHENGZHOU CITY,  
ZHEJIANG PROVINCE, CHINA

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

**Sample Description:** TERASUN MAGNESIUM BOARD / TSM

**SGS Ref No.:** HZIN1501000081ML

**Manufacturer:** ZHEJIANG TERASUN AIR DUCT CO., LTD

### Test Requested:

Fire Resistance Test of the Non-loadbearing vertical partitions element sample acc. to BS 476-20:1987 *Incorporating Amendment No. 1* Fire tests on building materials and structures — Part 20: Method for determination of the fire resistance of elements of construction (general principles) and BS 476-22:1987 Fire tests on building materials and structures — Part 22: Methods for determination of the fire resistance of non-loadbearing elements of construction

**Test Results:** -- See attached sheet --

### Test Period:

Sample Receiving Date : JAN.20, 2015

Test Performing Date : JAN.20, 2015 TO FEB.15, 2015

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 performance of the non-loadbearing vertical partitions element sample in accordance with BS 476-20: 1987 Incorporating Amendment No. 1. Fire tests on building materials and structures — Part 20: Method for determination of the fire resistance of elements of construction (general principles) and BS 476-22:1987 Fire tests on building materials and structures — Part 22: Methods for determination of the fire resistance of non-loadbearing elements of construction.

The sample was a vertical construction. The test was therefore conducted in accordance with Clause 5 of BS 476: Part 22: 1987 Determination of the fire resistance of partitions. This test report should be in conjunction with that Standard and with BS 476: Part 20: 1987.

The sample was asymmetrical separating element, but only required to resist fire from one side which was exposed to elevated temperatures as dictated by the BS 476-20 time-temperature curve for a period of 21 minutes under Non-loaded condition. According to Clause 4.5 of BS 476-20, a sample, with 3000mm length by 3000mm width by 102mm thickness sample was exposed to the heating conditions in the furnace.

The test was conducted on FEB.15, 2015.

**2. Summary**

The performance of the specimen was judged against the criteria for insulation and integrity as specified in Clause 5 of BS 476: Part 22:1987, for vertical construction, and indicate in clause 6 of this report, and the results obtained were as follows:

Integrity	Insulation
120 min	98 min

The test was terminated after a period of 121 minutes by client's requirement.

To be continued...



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### 3. Test Specimen

The nominal installation dimensions of the specimen are 3000 mm length by 3000 mm width by 102mm thickness.

The product specification as follows:

Exposed face: two 2400\*1200\*12mm panels + two 2400\*600\*12mm panels + 600\*600\*12mm panels, with density about 900kg/m<sup>3</sup>.

Interlayer: C75 Lightgauge Steel Joists + mineral wool (about 100kg/m<sup>3</sup>).

Unexposed face: two 2400\*1200\*12mm panels + two 2400\*600\*12mm panels + 600\*600\*12mm panels, with density about 900kg/m<sup>3</sup>.

Specimen was installed into a prepared masonry wall with the opening size 3010mm width by 3010mm height .C75 Lightgauge Steel Joists were fixed to masonry wall by expansion bolts. The exposed and unexposed face testing panels were fixed to C75 Lightgauge Steel Joists by self-tapping screw (space about 10mm).Gaps between sample panels as well as gaps around of the specimen and masonry wall were covered by fire resistance belting and glue (provided by client) . Installation was conducted by a representative of Lab on 10 Feb 2015.The detail is show in figure 1.

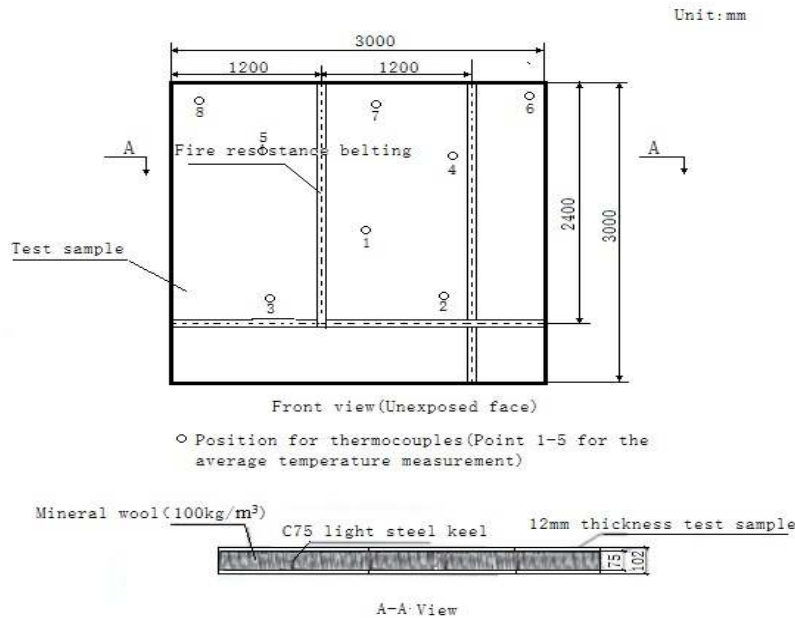


Figure 1 - Installation of the Specimen

To be continued....

### 4. Equipment

Sixteen mineral insulated thermocouples, which were kept at 100 mm away from the surface of the specimen, 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.

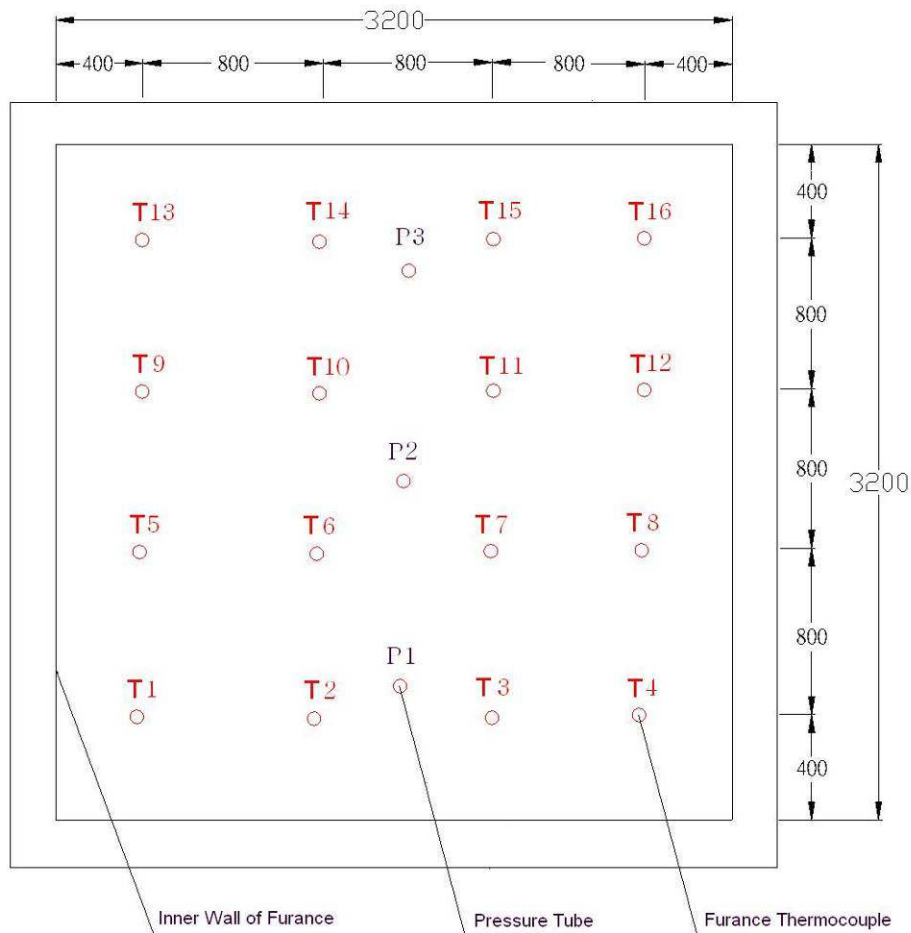


Figure 2 - Plan of Furnace Thermocouples

To be continued...

### 5. Test procedure

The test was conducted in accordance with the procedure specified in BS 476-22:1987, Clause 5.

The ambient temperature of test area was measured at commencement of 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 BS 476-20:1987.

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

After the first 5 minutes of the test and for the remainder of its duration, the furnace pressure was controlled to comply with the requirements of BS 476: Part 20: 1987, Clause 3.2.2. The furnace pressure was maintained at  $0 \pm 2$  Pa relative to laboratory atmosphere, at a height of approximately 1 000 mm above the notional floor level.

Cotton pads and gap gauges were used, if considered appropriate, to determine compliance with the integrity criterion. The occurrence of sustained flaming on the unexposed surface was also checked to determine compliance with the integrity criterion.

### 6. Test Results

The following data were recorded during the test:

- a) The actual mean furnace temperature/ time curve as well as the standard furnace temperature/ time curve, which were shown in Figure 3.
- b) The furnace pressures relative to laboratory atmosphere, at a height of approximately 1 000 mm above the notional floor level, which were shown in Figure 4.
- c) 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.

The ambient air temperature in the vicinity of the test construction was 18°C at the start of the test with variation of 0°C during the test.

To be continued....



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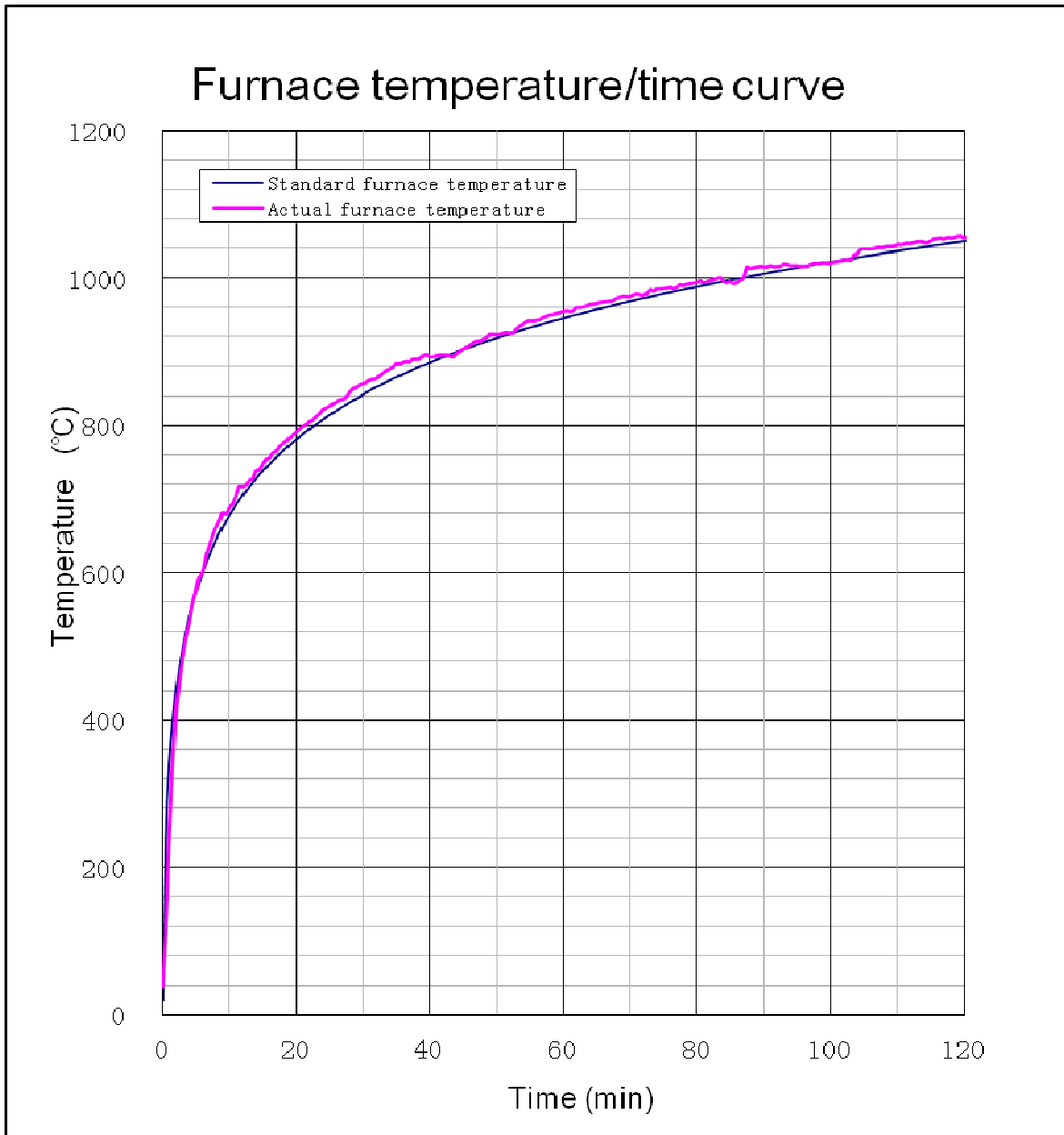


Figure 3 - Actual Mean Furnace Temperature/Time Curve and Standard Furnace Temperature/Time Curve

To be continued....



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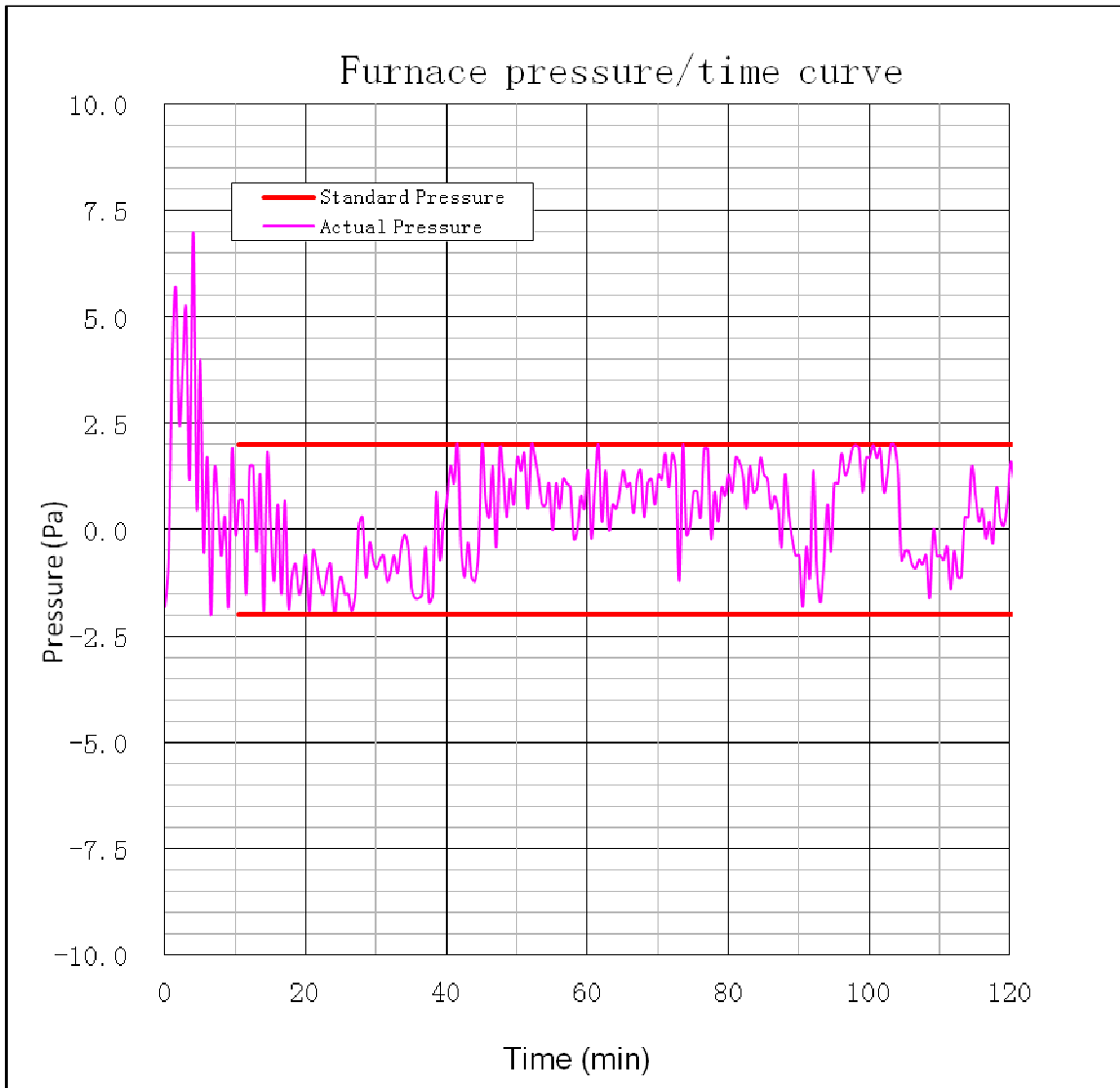


Figure 4 - Furnace Pressures Relative to Laboratory Atmosphere  
( 1 mm above the notional floor level)

To be continued....



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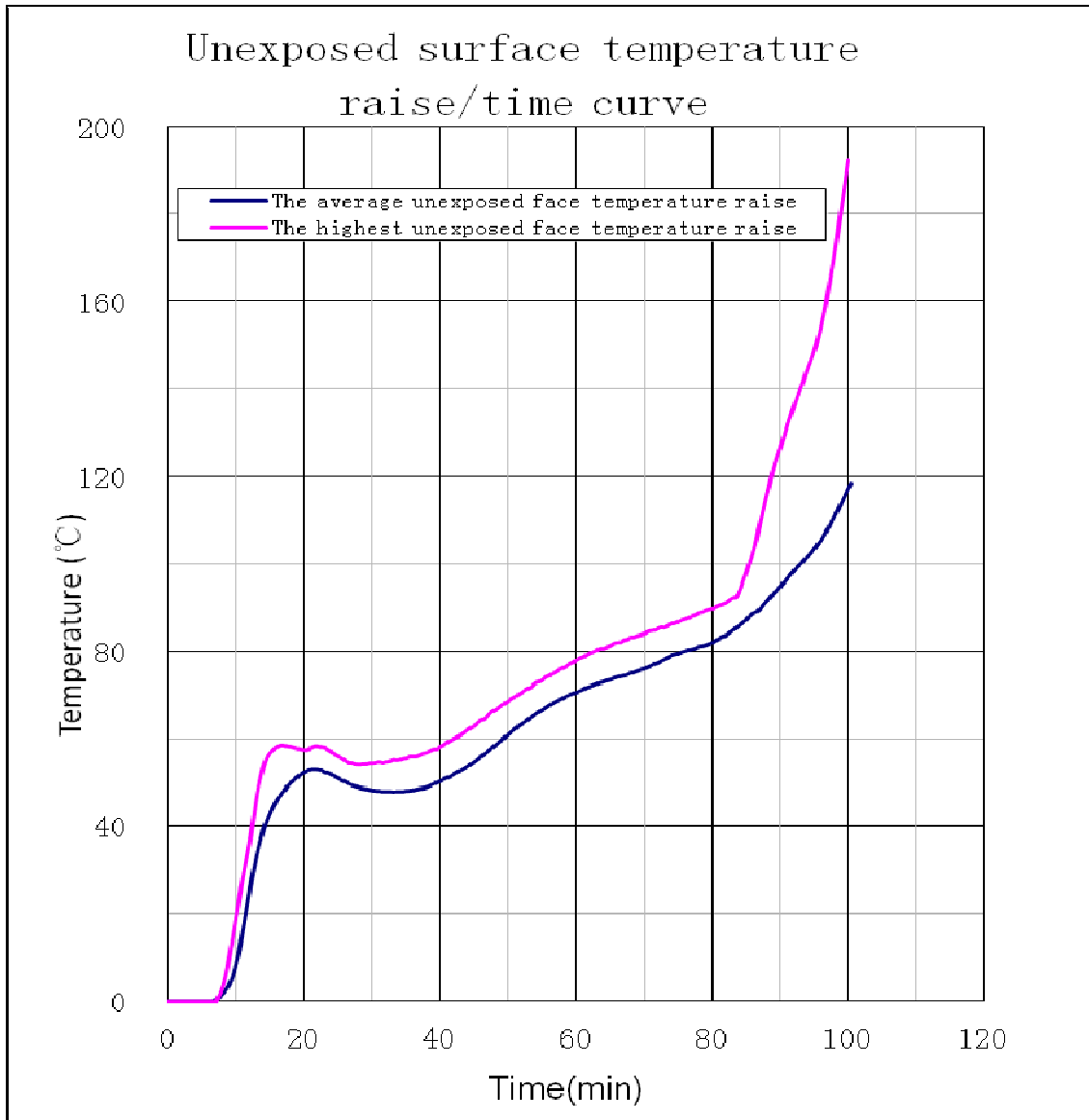


Figure 5 - Temperature raise/time curve

To be continued....



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

Time (min)	1	2	3	4	5	6	7	8
0	18	19	17	19	17	17	18	17
5	18	19	17	19	17	17	19	17
10	23	27	22	32	27	20	28	39
15	53	61	64	49	77	48	61	69
20	67	77	73	57	78	65	73	73
25	70	76	69	56	73	69	75	70
30	69	72	66	56	68	67	74	67
35	71	73	66	56	65	69	76	68
40	74	75	69	58	65	72	78	71
45	81	79	73	63	68	78	83	77
50	87	85	79	68	75	85	89	82
55	93	90	84	74	82	91	93	86
60	97	94	87	77	88	94	98	88
65	99	97	90	81	90	98	101	92
70	101	99	94	84	92	101	104	97
75	102	101	98	87	99	102	107	103
80	103	103	100	91	103	103	110	105
85	106	105	102	95	118	104	114	108
90	111	108	105	93	147	109	119	117
95	119	113	110	96	169	118	127	131
96	121	114	111	96	174	119	130	133
97	122	115	112	98	182	121	132	136
98	124	117	112	99	191	121	135	138
99	126	118	113	100	<b>202</b>	122	138	141
100	128	120	114	101	212	123	140	143

To be continued....



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Table 2 Observations Made during the Test

Time (min:sec)	Observations
00:00	Furnace fired.
30:00	Slight deformation occurs.
60:00	No significance change.
90:00	The deformation has been lager.
121:00	The sample keeps the integrity, end test by client.

**7. Performance Criteria (BS 476 Part 20:1987, Clause 10 & BS 476 Part 22:1987, Clause 5)**

The performance of the specimen was assessed against the criteria for integrity and insulation in accordance with BS 476: Part 22: 1987, Clause 5. The performance criteria for failure were given as follows.

Integrity: Failure is deem to occur:

- a) When collapse occurs; or
- b) When sustained flaming for not less than 10s on the unexposed surface occurs; or
- c) For situations where the cotton pad is suitable, when flames and/or hot gases cause flaming or glowing of the cotton fibre pad; or
- d) For situations where the cotton pad is not suitable, when either:
  - i) the 6 mm diameter gap gauge can penetrate a through gap such that the end of the gauge projects into the furnace and the gauge can be moved in the gap for a distance of at least 150 mm; or
  - ii) the 25 mm diameter gap gauge can penetrate a through gap such that the end of the gauge projects into the furnace.

Insulation: Failure is deem to occur:

- a) When the mean unexposed surface temperature rise more than 140 K; or
- b) When the temperature rise recorded at any position on the unexposed surface, ether by a fixed thermocouple or by the roving thermocouple is in excess of 180 K; or
- c) When integrity failure occurs.

To be continued....



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**8. Conclusion**

The tested specimen has been subjected to a fire resistance test in accordance with BS 476-20 and BS 476-22,

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

Insulation	Integrity
98 min	120 min

The test was terminated after a period of 121 minutes.

**9. Limitation**

The results only relate to the behaviour of the specimen of the element of construction under the particular conditions of the 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.

The test results relate only to the specimen tested. The fire resistance performance of specimen of this design may change if different dimensions, different gaps, incorporating different components, or mounted within different wall construction.

The specimen was asymmetrical and was tested such that the specified surface towards the heating conditions of the test. The test result may not be appropriate to situation other side towards the heating conditions.

To be continued....

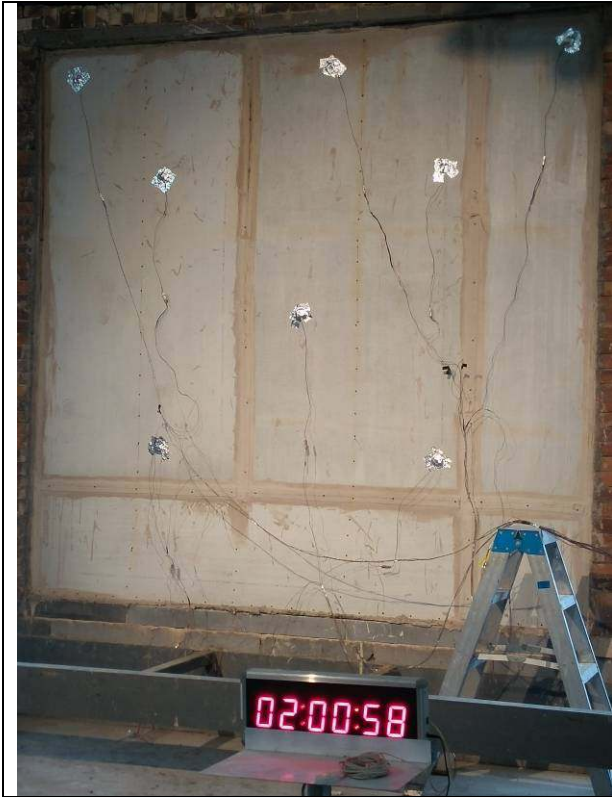


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### Appendix A Test photographs



To be continued....



120min



Exposed face after the test



Installation 1



Installation 2

SGS authenticate the photo on original report only

\*\*\*End of report\*\*\*

