TEST REPORT

YUYAO CHINSUN BUILDING MATERIAL FACTORY
JIATANG ,SIMEN TOWN,YUYAO CITY,ZHEJIANG PROVINCE P.R.CHINA

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

Sample Name	:	Magnesium Oxide Board
Sample Number	:	SC130520514
Product Specification	:	Thickness:12mm
Manufacturer	:	YUYAO CHINSUN BUILDING MATERIAL FACTORY
Buyer	:	China Direct Industries, Inc.
Test Required	:	Please see next pages
Test Method	:	Please see next pages
Date of Receipt	:	May.18, 2013
Test Period	:	May.18, 2013 to Jul.22,2013
Test Result(s)	:	Please see next pages

******** To be continued********

Signed for SGS-CSTC Standards
Technical Services Co., Ltd

Sally Xie

Sally Xie
Authorized signatory

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Test Required:

1. ASTM E84-08 Standard Test Method for Surface Burning Characteristics of Building Materials
2. DIN 4102-1:1998 Fire behaviour of building materials and elements Part 1: Classification of building materials, Requirements and testing
3. This test was conducted accordance with a SGS In-house test method – Evaluate the high temperature performance and confirmed by the applicant.
4. GB/T 9978.8-2008 Fire-resistance tests-Elements of Building construction –Part 8: Specific requirements for non-loadbearing vertical separating elements.

Test Result:

Please see next pages for detail result of each test.

Conclusion:

1. To be test under ASTM E84-08. The results rated Class A according to The National Fire Protection Association Life Safety Code 101, "Interior Wall and Ceiling Finish Classification".
2. According to the test results, the submitted sample meets the Class A1 defined in DIN 4102-1:1998.
3. With a SGS In-house test method, the submitted sample shows Flame Resistant to Combustion at 800℃ for 2.5 hours and Remains Flameless at 1200℃ lasting 1.5hours.
4. To be test under GB/T 9978.8-2008, the submitted sample Magnesium Oxide Board with its thickness 12 mm, its fire resistance integrity and fire resistance insulation are 150 min.

******** To be continued********

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1. Test result of ASTM E84-08

I. Sample Details:

Materials / Color	Magnesium Oxide Board / White
Size of sample	Length: 2440mm Width: 610mm Thickness: 12mm 3PCS

	Temperature (℃)	Humidity (%)	Duration (day)
Precondition	23±2.8	50±5	18

Remark: Test specimens shall be conditioned before testing, until constant mass is achieved.

II. Test Conducted: ASTM E84-08 Standard Test Method for Surface Burning Characteristics of Building Materials

Time Elapsed (min)	Window Number	Smoke % Light Absorbed	Air Stream Temp(F)
0.0	0	0	105
0.5	0	5	105
1.0	1	10	248
1.5	0	5	300
2.0	0	5	311
2.5	0	5	312
3.0	0	5	318
3.5	0	3	320
4.0	0	3	321
4.5	0	3	320
5.0	0	3	321
5.5	0	3	321
6.0	0	3	323
6.5	0	3	325
7.0	0	3	323
7.5	0	3	325
8.0	0	3	325
8.5	0	3	325
9.0	0	3	325
9.5	0	3	326
10.0	0	3	325

FSI= 4.7 SD= 27

******** To be continued********

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RATING:

The National Fire Protection Association Life Safety Code 101, "Interior Wall and Ceiling Finish Classification", has a means of classifying materials with respect to Flame Spread and Smoke Developed when tested in accordance with NFPA 255, (ASTM E84) "Method of Test of Surface Burning Characteristics of Building Materials".

The classifications are as follows:

Class A Interior Wall & Ceiling Finish:	Flame Spread	0-25
	Smoke Developed	0-450
Class B Interior Wall & Ceiling Finish:	Flame Spread	26-75
	Smoke Developed	0-450
Class C Interior Wall & Ceiling Finish:	Flame Spread	76-200
	Smoke Developed	0-450

******** To be continued********

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GRAPHICAL RESULTS:

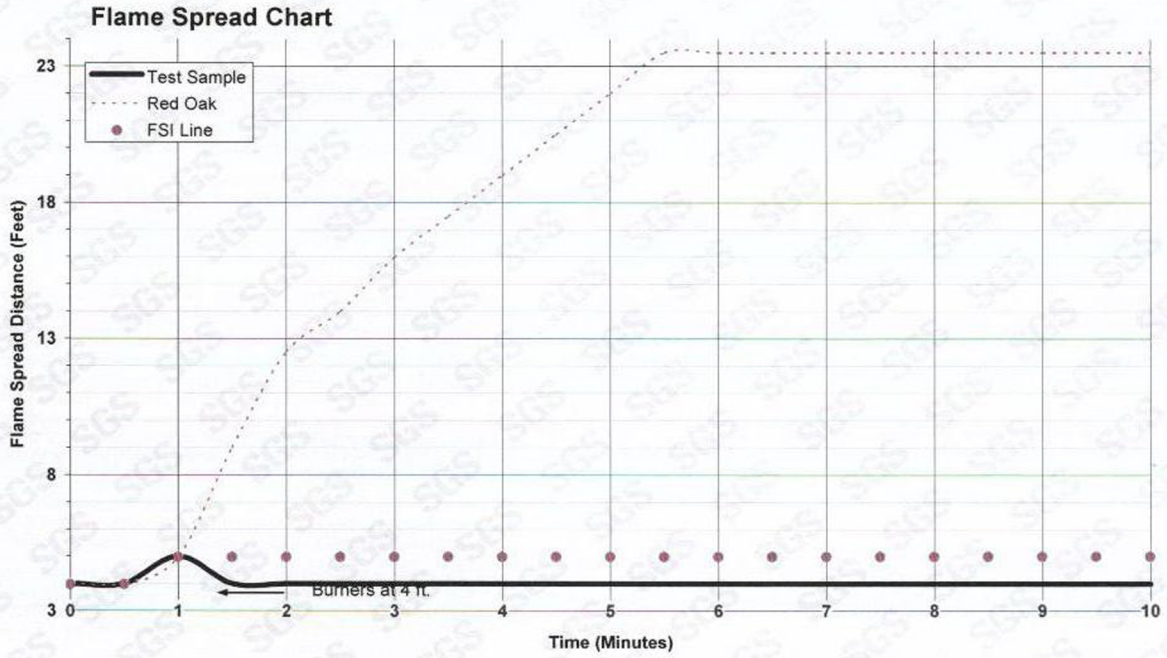

Figure 1. Flame Spread Chart

******** To be continued********

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Smoke Developed Chart

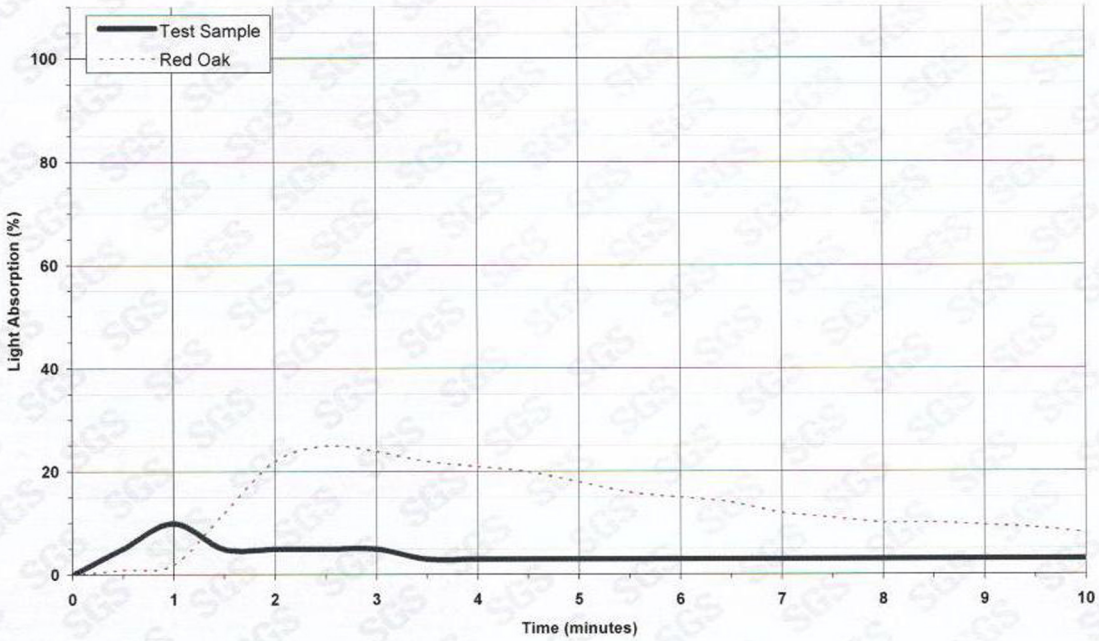

Figure 2. Smoke Developed Chart

Photo Appendix 1:

******** To be continued********

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2. Test result of DIN 4102-1:1998

I. Test Conducted

DIN 4102-1: 1998 Fire behaviour of building materials and elements Part 1: Classification of building materials, Requirements and testing

II. Sample details

Material / Color / Density	Magnesium Oxide Board / White / 0.8g/cm^3
Specimen size (mm)	40mm×40mm×47mm, 5pcs

	Temperature (℃)	Humidity (%)	Duration (h)
Precondition	105	—	6

III. Test results

Items	1	2	3	4	5	AVG
Tm (max) in furnace(℃)	764	766	765	763	763	
T_f (final) in furnace(℃)	758	758	757	755	756	
△T in furnace(℃)	6	8	8	8	7	7
Specimen mass before tested (g)	61	62	61	61	62	
Specimen mass after tested (g)	33	34	33	33	34	
Mass loss (%)	46	45	46	46	45	
Whether flaming occurs or not	NO	NO	NO	NO	NO	NO
Observations	--					

Requirements:-

1) No flaming occurs;

2) None of the specimens releases enough heat to cause the temperature in the furnace to rise by more than 50 °C above the initial temperature.

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Sub-Conclusion:

According to the test results, the submitted sample meets the Class A1 defined in DIN 4102-1:1998 Fire behaviour of building materials and elements Part 1: Classification of building materials, Requirements and testing.

Photo Appendix 2:

3. SGS In-house test method – Evaluate the high temperature performance

I. Test conducted

This test was conducted accordance with a SGS In-house test method – Evaluate the high temperature performance and confirmed by the applicant.

II. Introduction

Pre-heated the furnace to (800±5) ℃. This temperature is to remain constant to within ±2℃ for at least 10 minutes before test. Then the specimen is fixed in the centre of the furnace and starts the timer. Record the observations up to 2.5 hours. Retain the specimen in the furnace and heat the furnace to (1200±5) ℃ within 30 minutes and maintain 1.5 hours in this temperature and record the observation during the test duration.

******** To be continued********

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III. Sample description

Sample Name: Magnesium Oxide Board

Product specification: thickness 12mm

Specimen size: 120 mm×100mm×12mm, Weight :223g

Precondition details:

	Temperature (℃)	Humidity (%)	Duration
Precondition	23±2	50±5	10 days

IV. Test results & critical observations

The following observations were made during the test:

0 min:

Test start, the mass of the specimen is 223 g

0~2.5 hours: (800±2) ℃

No any flame and generate some smoke.

2.5~4.0 hours: (1200±5) ℃

No any flame

4.0 hours:

Test end, then cooled the specimen in a sealed container.

After test:

Weight of the sample: 105 g

Percent of sample's mass loss $= \frac{223-105}{223} \times 100\% = 52.9\%$

The strength of the specimen becomes very low and crumbly and there are some micro-cracks in the surface of the specimen.

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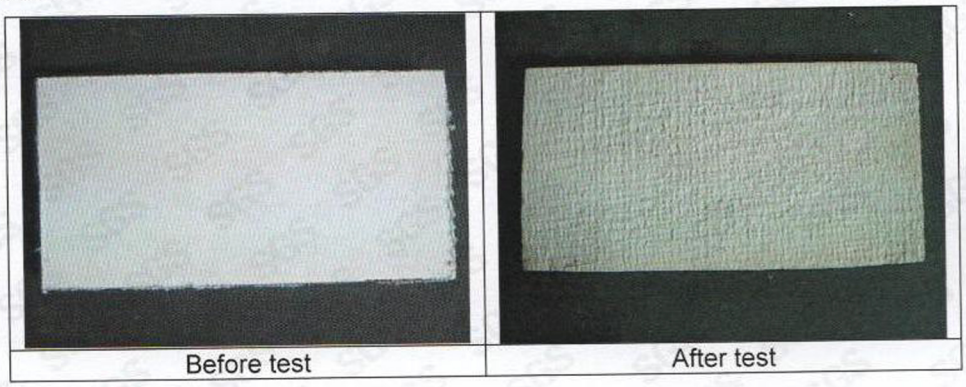
Photo Appendix 3:



Before test	After test

Statement: The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

4. Test result of GB 9978.8-2008

I. Test conducted:

GB/T 9978.8-2008 Fire-resistance tests-Elements of Building construction –Part 8: Specific requirements for non-loadbearing vertical separating elements.

II. Sample description

The structure sketch and size of the sample see Figure 3, Photo Appendix 4, and Figure 4 is the sketch of location of the specified thermocouples. The curing time after mounting is 48h.

******** To be continued********

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III. Test results

Test item		Test Results		Conclusion
Fire resistance	Lose Integrity	Cotton pad is ignited	No	150 min, Not Lose Integrity and Not Lose Heat Insulation
		Sustained flaming on the unexposed surface is more than of 10 s duration	No	
		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.	No	
		The 25 mm diameter gap gauge can penetrate a through gap such that the end of the gauge projects into the furnace	No	
	Lose Heat Insulation	The mean unexposed face temperature increases by more than 140 °C above its initial value.	The mean temperature rise of the unexposed face of the specimen at the test terminated (150min) is 81℃	
		The temperature recorded at any position on the unexposed face is in excess of 180 °C above the initial mean unexposed face temperature	The maximum temperature rise of the unexposed face of the specimen at the test terminated (150min) is 151℃	

Description of the specimen after test:

a. The exposed face collapsed. The unexposed face bulged, and there are some vertical cracks on the joints.

b. The maximum deformation of the geometrical center of the specimen during the test is 65mm

c. Generate some smoke on the unexposed face of the specimen.

Remark: Specimen photos before and after the test, see Photo Appendix 5

IV.Sub-Conclusion

According to the test results, the submitted sample Magnesium Oxide Board with its thickness 12 mm, its fire resistance integrity and fire resistance insulation are 150 min.

******** To be continued********

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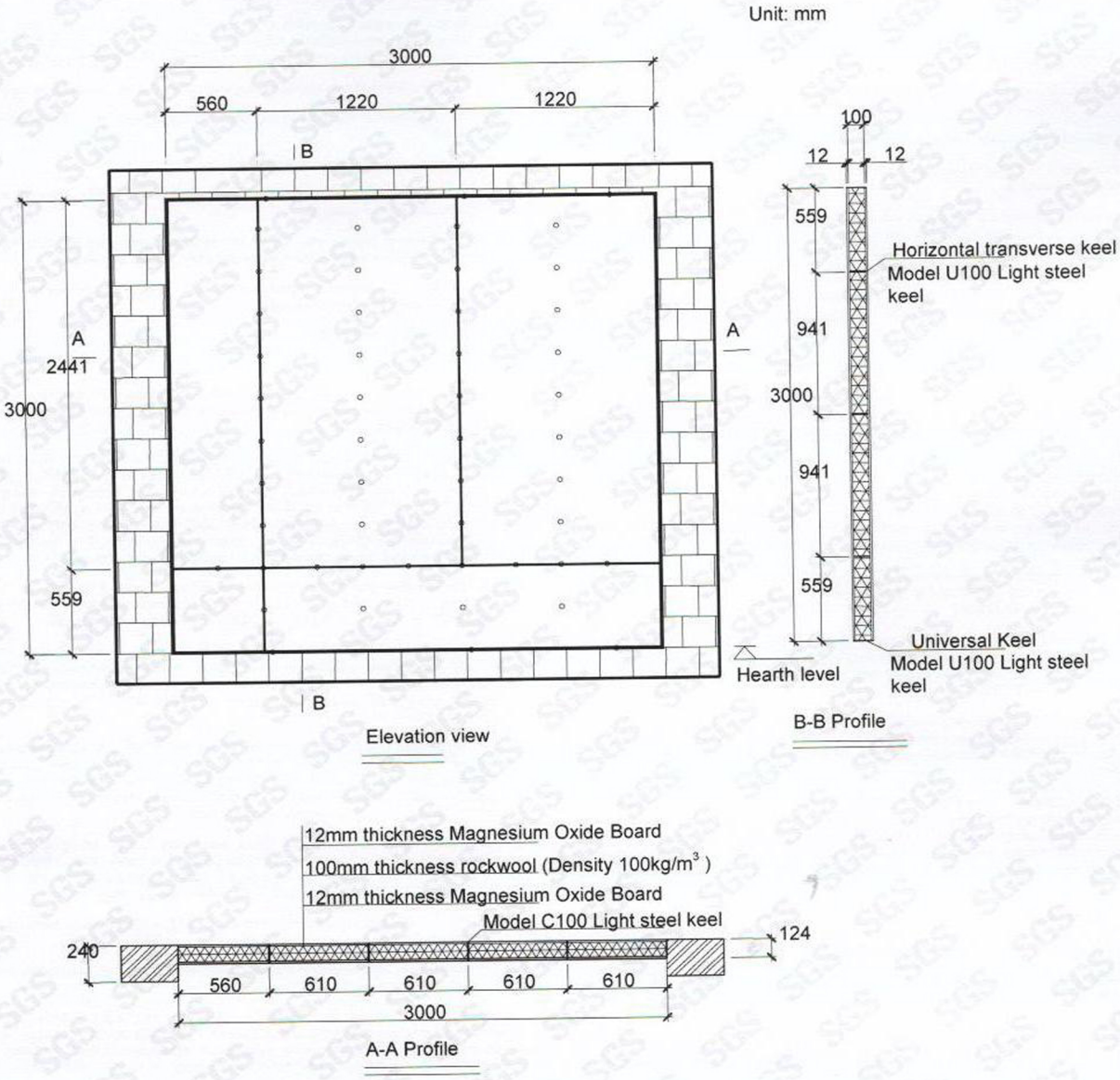

Figure 3. Specimen Structure Sketch

******** To be continued********

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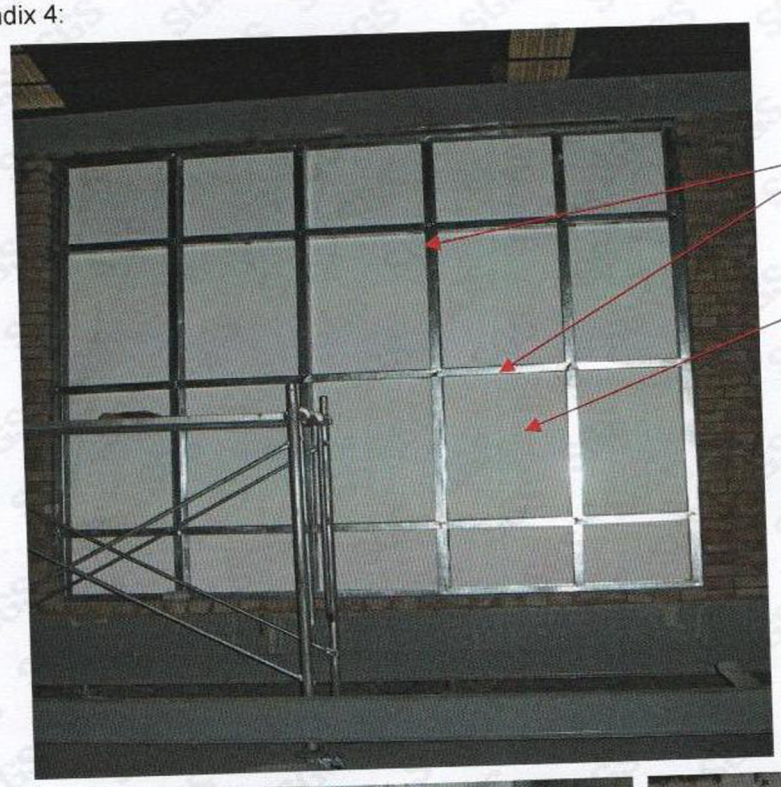
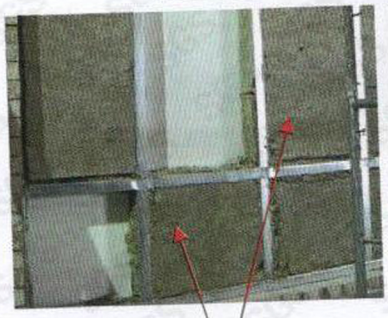
Photo Appendix 4:





******** To be continued********

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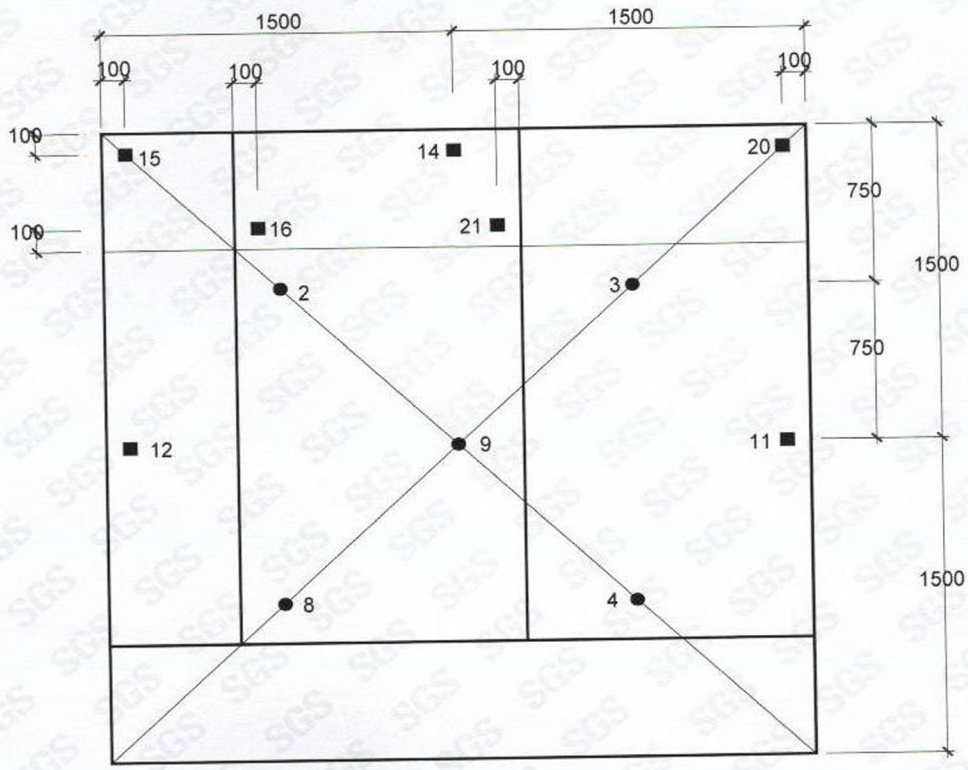
Unit: mm



Elevation view

Figure 4. Location of the specified thermocouples.

Remark:

Point 2, 3, 4, 8, 9 is for the mean temperature rise of the unexposed face of the specimen measurements.

Point 2, 3, 4, 8, 9, 11, 12, 14, 15, 16, 20, 21 is for the maximum temperature rise of the unexposed face of the specimen measurements.

******** To be continued********

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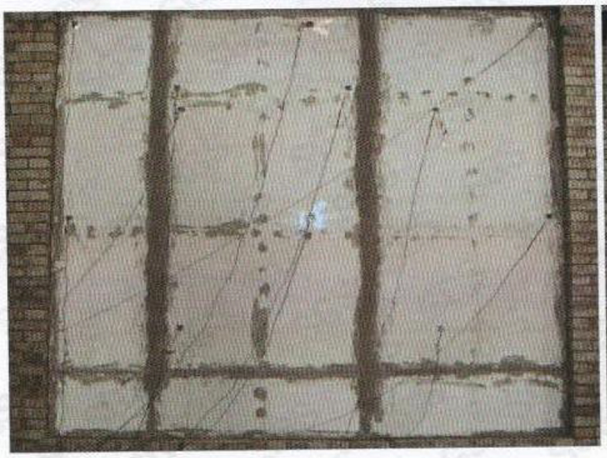
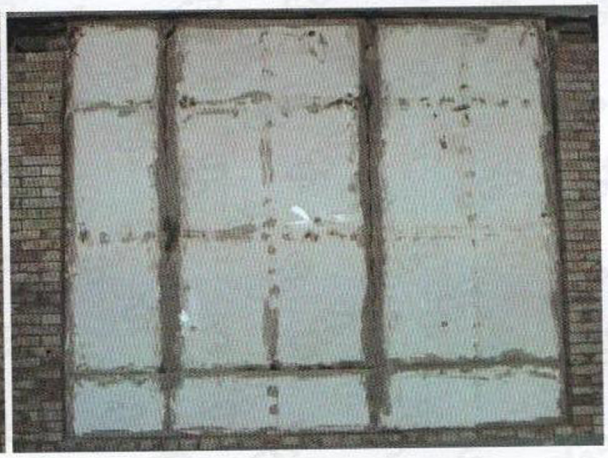
Photo Appendix 5:



Specimen before test



Specimen after test

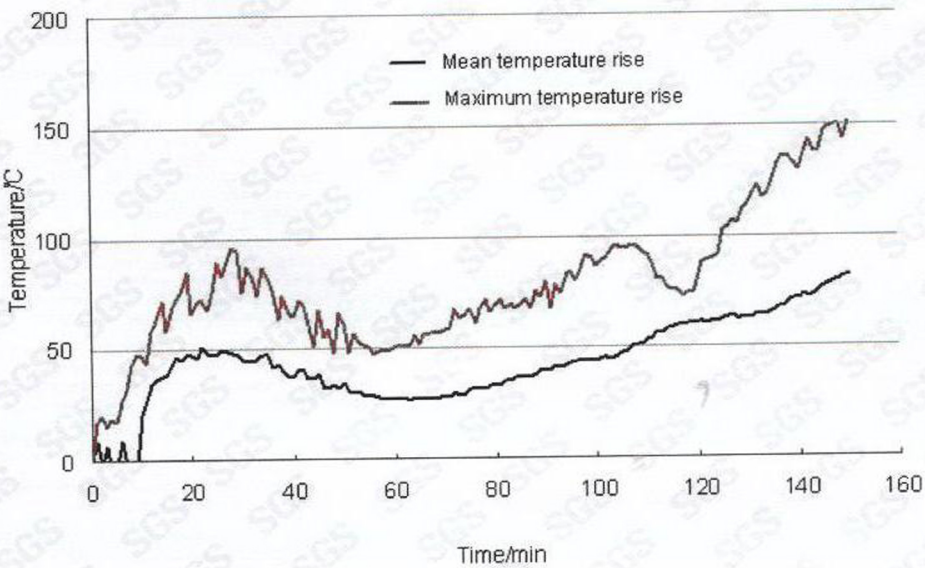


Figure 5. Time/ temperature curve of the unexposed face of the specimen

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

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