RESEARCH ENGINEERING DEVELOPMENT FAÇADE CONSULTANTS LIMITED
雄略幕牆顧問有限公司
DD134, Lung Kwu Tan, Tuen Mun, N.T., Hong Kong

HOKLAS 091
TEST



# FIRE RESISTANCE TEST IN ACCORDANCE WITH BS EN 1364-1: 1999

## On a Non-loadbearing Fully Insulation Partition Boards Wall System

**Test Report No.:** R14F26

**Identification No.:** Q14C32

**Issue Date:** 6 August 2015

**Testing Location:**

RED Hong Kong Laboratory

DD 134, Lung Kwu Tan, Tuen Mun,

N.T., Hong Kong

**Test Sponsor**

**Jason Plasterboard (Huizhou) Company Limited.**

Beach Industrial Park, Huidong Country, Huizhou, P.R. China.

**APPROVED SIGNATORY:** _____ **DATE:** 6 AUG 2015

Ir. Dr. YUEN Sai-wing, MHKIE (FIRE)

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CONTENT

# 1 SUMMARY

**Fire resistance test conducted in accordance with BS EN 1364-1: 1999 on a non-loadbearing fully insulated partition boards wall system.**

A specimen of non-loadbearing fully insulated partition boards wall system had been subjected to a test in accordance with BS EN 1364-1: 1999, in order to determine its fire resistance performance.

As requested by the test sponsor, the specimen was mounted within concrete lined specimen holder by test sponsor. The specimen was symmetrical and only one side of the specimen was tested.

The specimen had overall dimensions of 3,020 mm wide by 3,050 mm high. It was comprised of two layers of nominal 12.5 mm thick 'Jason' Fire Shield Plasterboards mounted on both sides of the steel framework. The steel framework was constructed with top & bottom runners with sizes of 35 mm by 50 mm by 35 mm by 0.6 mm thick U-track and vertical C-studs with sizes of 45 mm by 50 mm by 45 mm by 0.6 mm thick fixed at 610 mm nominal centres. All boards were fixed to the framework by M4 by 25 and 35 mm long self-tapping screws at 350 mm spacing. A steel plate with sizes of 95 mm high by 0.6 mm thick was fixed in the cavity of horizontal board joints. A 50 mm thick 'Rockwool' thermal wool with density of 100 kg/m$^3$ filled between the boards. 'Jason' jointing compound with tape applied at board joints and screw portions. The top and bottom runners and right vertical edge were fixed to the concrete testing rig by M6 with 50 mm long anchor bolts at 500 mm nominal centres. A free edge with approximate 30 mm at the left vertical edge of specimen was filled up with mineral fibre.

The specimen satisfied the performance requirements specified in BS EN 1364-1: 1999 for the following periods:

| | | |
|---|---|---|
| **Integrity:** | **Cotton Pad** | **123** Minutes |
| | **Gap Gauge** | **124** Minutes (No failure) |
| | **Sustained Flaming** | **124** Minutes (No failure) |
| **Insulation:** | | **117** Minutes |

The test was discontinued after a heating period of 124 minutes.

## 2 INTRODUCTION

The objective of the test is to determine the fire resistance performance of specimen of a non-loadbearing fully insulated partition boards wall system when tested in accordance with BS EN 1364-1: 1999, ' Fire resistance tests for non-loadbearing elements – Part 1 Walls'.

This test report should be read in conjunction with BS EN 1363-1: 2012, 'Fire resistance tests – Part 1: General requirements'.

## 3 TEST INFORMATION

### 3.1 Test Sponsor

**Jason Plasterboard (Huizhou) Company Limited.**
Beach Industrial Park, Huidong Country, Huizhou, P.R. China.

### 3.2 Testing Location

Research Engineering Development Façade Consultants Limited, Hong Kong Laboratory of DD 134, Lung Kwu Tan, Tuen Mun, New Territories, Hong Kong.

### 3.3 Date of Test

21st July 2014

### 3.4 Witness of the test

The test was led by Mr. Solaris Chan of Research Engineering Development Façade Consultants Limited (RED) and was witnessed by Mr. Albert Cheung, Mr. Paddy Cheung and Ms. Winnie Chan of Rich Well (Far East) Limited, Mr. J.B. Tang and Mr. Y. Jin, the representatives of the test sponsor.

## 4 EQUIPMENT

Nine (9) 'type K' thermocouples to monitor the temperature of the furnace, which were kept at 100 mm from the exposed face of the specimen (see Figure 1).

Thirteen (13) 'type K' thermocouples to monitor the temperature of of the specimen (see Figure 2).

A 'type K' roving thermocouple to measure temperature on hot spots of unexposed surface.

A micro-manometer provided to monitor the furnace pressure.

Cotton pads, 6 mm and 25 mm gap gauges.

A steel ruler relative to a taut wire to monitor the lateral deflection of the specimen.

A radiometer placed at 1,000 mm away from the unexposed surface to measure the radiation of unexposed surface of the specimen.

## 5 CONDITIONING

The specimen's storage, construction, and test preparation took place in the test laboratory over a total, combined time of 5 days. Throughout this period of time, both of the temperature and humidity of the laboratory were measured and recorded as being within a range of 31 °C to 34 °C and 62 % to 75 % respectively.

## 6 TEST SPECIMEN CONSTRUCTION

The specimen was installed into a concrete specimen holder with pre-prepared opening to form the test construction. The details of the fixings are outlined in Appendix D.

A comprehensive description of the test specimen construction is presented in the appendix, which is based on a survey of the specimen and information supplied by the test sponsor.

## 7 VERIFICATION OF TEST SPECIMEN

In order to ensure the description of the test specimen, and in particular its construction, is on conformity with the test specimen, the laboratory shall either oversee the fabrication of the test specimens or request an additional test specimen.

In this case, the construction details of specimen were verified on site by RED, which is shown in 'APPENDIX D – INFORMATION FROM TEST SPONSOR'.

## 8 TEST PROCEDURES

The test was conducted in accordance with the procedures specified in BS EN 1364-1: 1999. The ambient temperature of the test area during the test was measured. After the first 5 minutes of the test, the furnace pressure was maintained at 0 ± 3 Pa relative to atmosphere, at 500 mm from the notional floor level.

The furnace was monitored by nine (9) thermocouples so that the mean furnace temperature complied with the requirements of Clause 4.5.1.1 of BS EN 1363-1: 2012.

The temperature of the unexposed face was monitored by means of thirteen (13) thermocouples fixed to the unexposed surface (see Figure 2 for the locations and reference numbers of the thermocouples). Thermocouples S1 – S5 were fixed on the specimen for mean and maximum temperatures of the unexposed surface of specimen. Thermocouples S6 – S13 were fixed on specimen for maximum temperature of the unexposed surface of specimen only. The mean and maximum temperatures were recorded.

The cotton pads and gap gauges were used, if considered appropriate, to determine compliance with the integrity criterion of the standard. The occurrence of sustained flaming on the unexposed surface was monitored to determine compliance with this criterion. The lateral deflection of the specimen were measured by a steel rule and recorded. The radiation of the specimen was measured and recorded.

## 9 TEST DATA AND INFORMATION

The ambient temperature of the test area during the test was 34 °C.

The furnace was controlled so that the mean furnace temperature complied with the requirements of Clause 4.5.1.1 of BS EN 1363-1: 2012. The temperature recorded is shown graphically in Figure 4.

The mean and maximum temperatures of the unexposed surface of specimen are shown graphically in Figure 5.

The furnace pressure is shown graphically in Figure 6.

The radiation is shown graphically in Figure 7.

A summary of the observations made on the general behaviour of the specimen is given in the appendix.

The deflection obtained is summarized in Table 1.

The mean furnace temperature obtained is summarized in Table 2.

The temperature rises of specimen obtained are summarized in Table 3.

The test was discontinued after a heating period of 124 minutes.

## 10 RESULTS

When tested in accordance with BS EN 1364-1: 1999, the requirements of the standard were satisfied for the following periods:

| | | |
|---|---|---|
| **Integrity:** | **Cotton Pad** | **123** Minutes |
| | **Gap Gauge** | **124** Minutes (No failure) |
| | **Sustained Flaming** | **124** Minutes (No failure) |
| **Insulation:** | | **117** Minutes |

*Insulation - It is required that the mean temperature rise of the unexposed surface shall not be greater than 140 °C and that maximum temperature rise shall not be greater than 180 °C. Insulation failure also occurs simultaneously with integrity failure.*

The 140 °C rise of the mean temperature of the unexposed surface of specimen did not reach during the test. The 180 °C rise of the maximum temperature of the unexposed surface of specimen reached and measured by thermocouple S7 after a heating period of 117 minutes. The maximum temperature rise was 254 °C measured by thermocouple S9 after a heating period of 124 minutes.

*Integrity - It is required that there is no collapse for the specimen, no sustained flaming on the unexposed surface and no loss of impermeability.*

No failure was observed regarding to the criteria of gap gauge and sustained flaming during the test.
Cotton pad test applied at left portion of top edge of specimen and ignited after a heating period of 123 minutes.
The specimen did not meet the integrity requirements after a heating period of 123 minutes.

## 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 1363–1, and where appropriate EN 1363–2. Any significant deviation 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.

The test results are valid only for the conditions under which the test was conducted.

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

## APPENDIX A – PHOTOS AND TEST RECORD

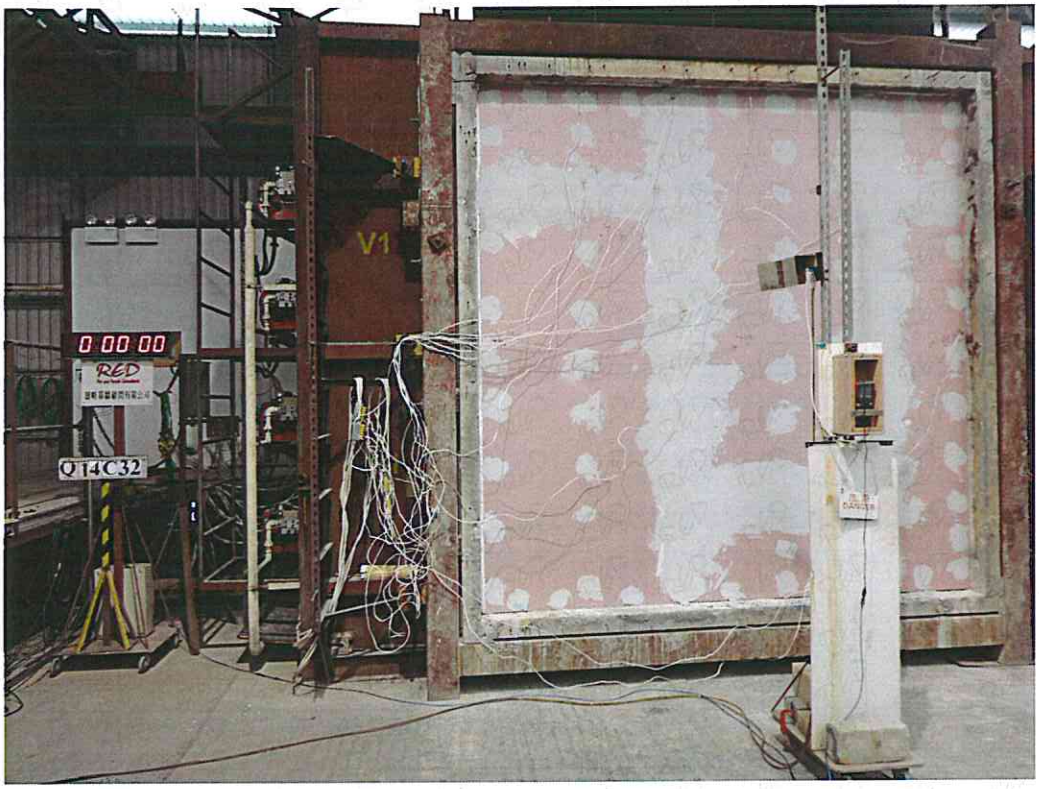



Photo 1: The unexposed face of the specimen before the test.

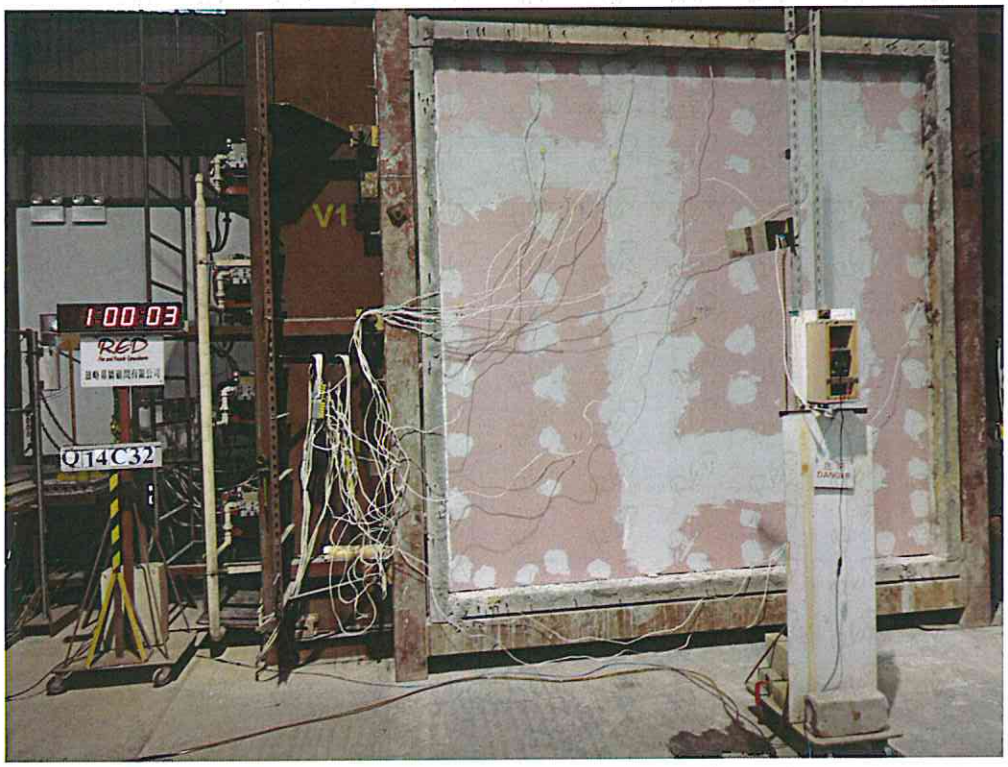



Photo 2: The unexposed face of the specimen after a heating period of 60 minutes.


Photo 3: The unexposed face of the specimen after the test.

Photo 4: The exposed face of the specimen after the test.


Figure 1 – Locations and reference numbers of furnace thermocouples.
(This figure is not to scale and all dimensions are in millimetres.)


Figure 2 – Locations and reference number of thermocouples to monitor the temperature of unexposed surface of the specimen.

(This figure is not to scale.)

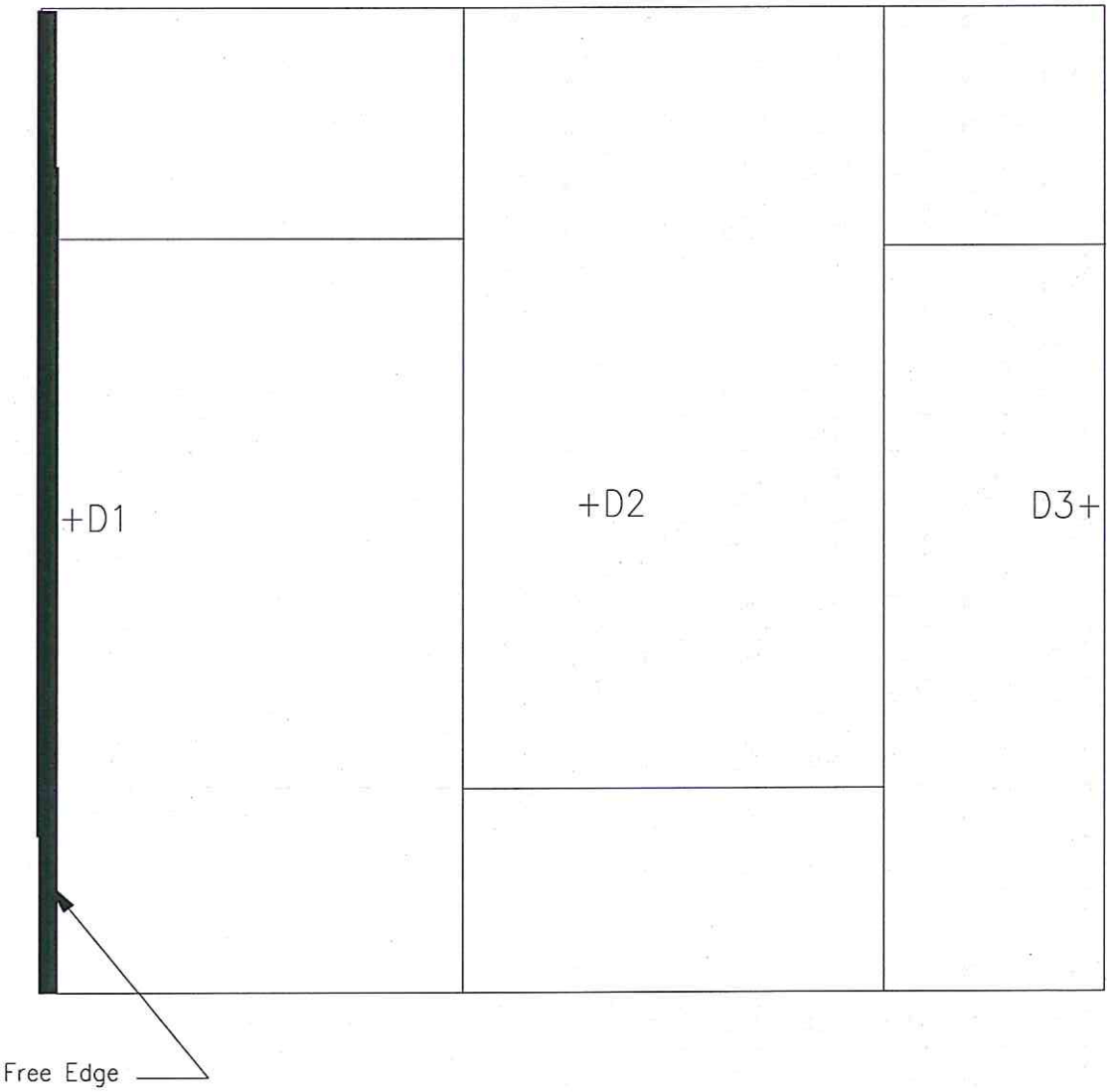



Figure 3 – Locations and reference numbers of displacement measurement.
(This figure is not to scale.)

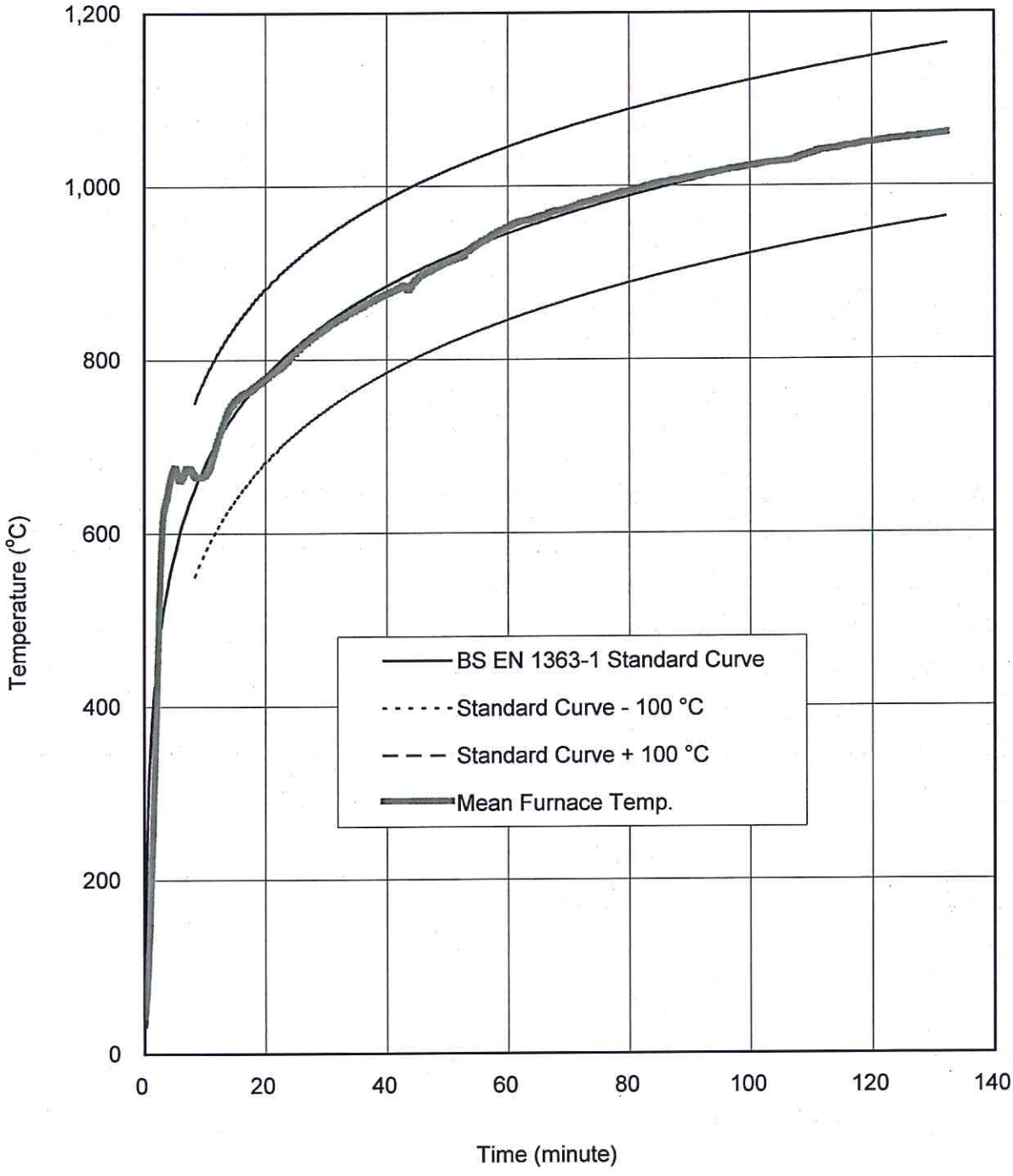



Figure 4 – Mean furnace temperature.

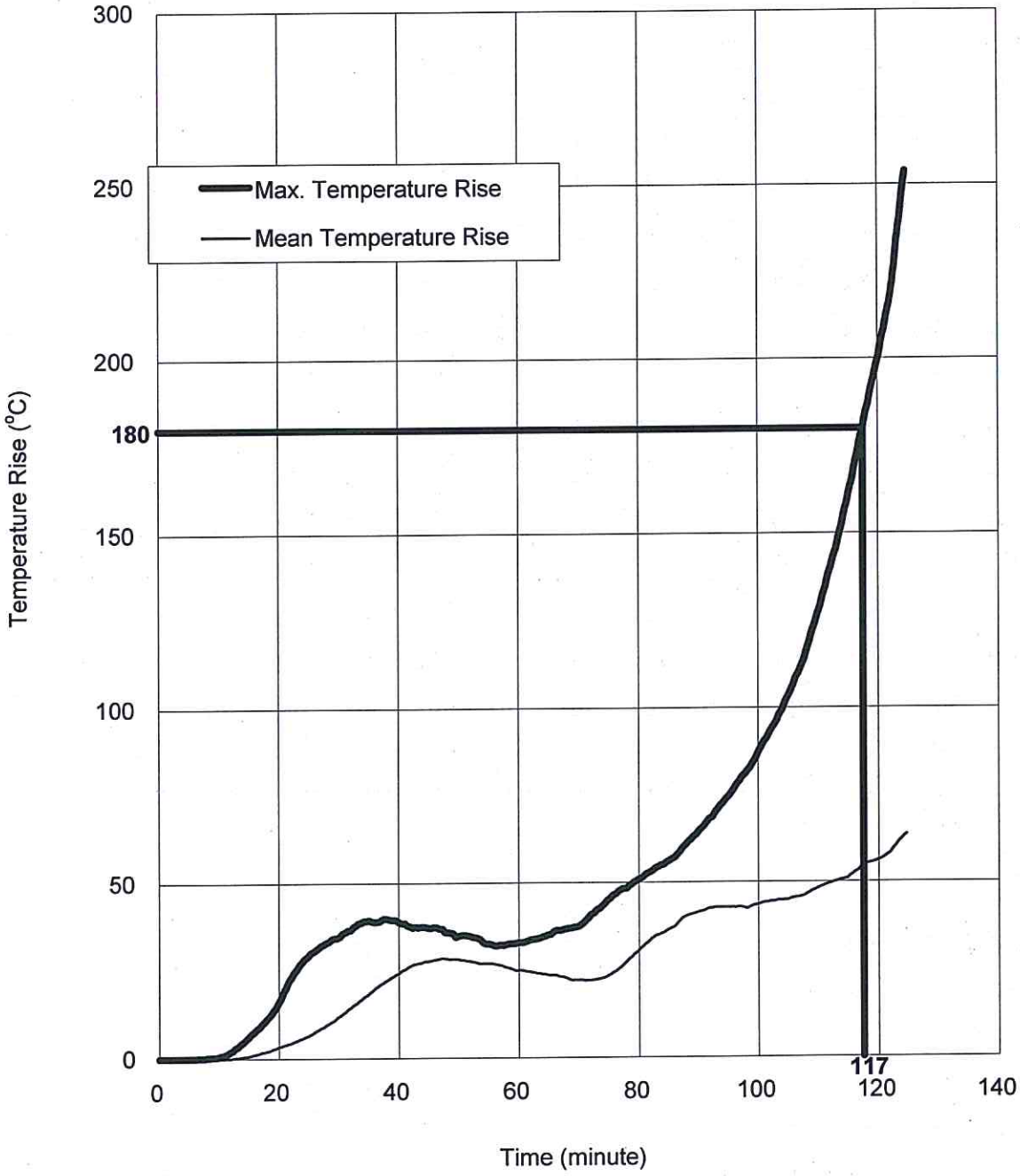



Figure 5 – Temperature rise of unexposed surface of specimen.

After the first 5 minutes of the test, the furnace pressure was maintained at 0 ± 3 Pa relative to atmosphere, at 500 mm from the notional floor level.

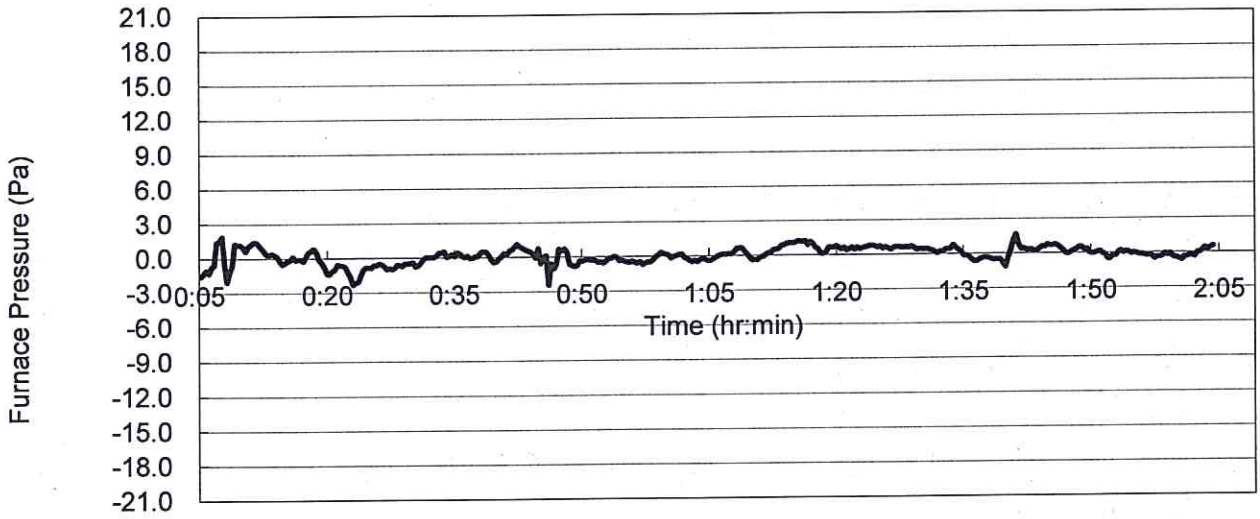



Figure 6 – Furnace pressure.

A radiometer placed at 1,000 mm away from the unexposed surface to measure the radiation of unexposed surface of the specimen.

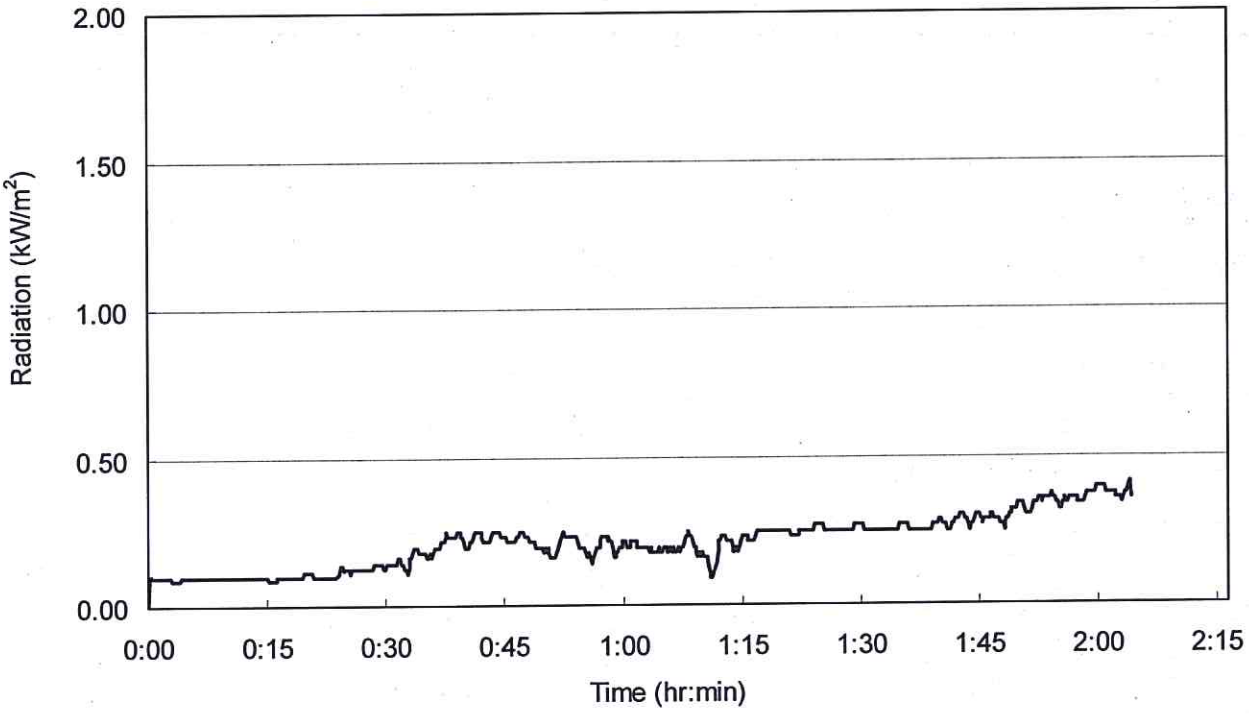



Figure 7 – Radiation.

## APPENDIX B – OBSERVATION

| Time (min.sec) | Exposed (E) or Unexposed (U) | Observation |
|---|---|---|
| 00.00 | - | Test started. |
| 02.05 | U | Smoke started releasing from the specimen. |
| 10.44 | U | Smoke stopped releasing from the specimen. |
| 13.34 | E | Cracks developed on the surface of specimen. |
| 22.44 | E | No significant change was observed from the specimen. |
| 30.00 | U | The specimen satisfied the integrity and insulation requirements performance. |
| 39.19 | U | Smoke released from top left corner of specimen. |
| 47.14 | E | No significant change was observed from the specimen. |
| 59.48 | U | Cotton pad test applied at top left corner of specimen and the test passed. |
| 60.00 | U | The specimen satisfied the integrity and insulation requirements performance. |
| 61.01 | U | Visible deformation was observed from the specimen. |
| 63.08 | E | Jointing tape and boards detached. |
| 74.24 | U | Further deformation was observed from the specimen. |
| 90.00 | U | The specimen satisfied the integrity and insulation requirements performance. |
| 90.44 | E | No significant change was observed from the specimen. |
| 99.14 | E | Thermal wool joints was observed. |
| 108.35 | U | Cotton pad test applied at left portion of top edge of specimen and the test passed. |
| 109.54 | U | Top left corner of specimen turned dark. |
| 113.14 | E | No significant change was observed from the specimen. |
| 119.57 | U | Cotton pad test applied at left portion of top edge of specimen and the test passed. |
| 120.00 | U | The specimen satisfied the integrity requirements performance. |
| 123.51 | U | Cotton pad test applied at left portion of top edge of specimen and the test failed. **Integrity failure.** |
| 124.29 | - | Test was terminated as requested by test sponsor. |

## APPENDIX C - DATA RECORDED DURING THE TEST

Table 1 - Lateral deflection of the specimen during the test, as viewed from the unexposed face.

| Time (mins) / Location | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 |
|---|---|---|---|---|---|---|---|---|---|---|
| D1 (mm) | 0 | 2 | 2 | 1 | 2 | 17 | 24 | 20 | 20 | 22 |
| D2 (mm) | 0 | 10 | 9 | 8 | 10 | 54 | 55 | 58 | 51 | 49 |
| D3 (mm) | 0 | 2 | 2 | 2 | -5 | 5 | 13 | 7 | 1 | 2 |

Positive deflection indicates movement towards the furnace (see also Figure 3 for the locations).

The maximum deflection of the specimen occurred at location D2 was 58 mm moving towards the furnace after a heating period of 90 minutes.

Table 2- Mean furnace temperature

| Time (minute) | BS EN 1363-1 Standard Temp. Curve (°C) | Actual Mean Furnace Temp. (°C) |
|---|---|---|
| 0 | 20 | 36 |
| 5 | 576 | 631 |
| 10 | 678 | 675 |
| 15 | 739 | 745 |
| 20 | 781 | 801 |
| 25 | 815 | 829 |
| 30 | 842 | 853 |
| 35 | 865 | 872 |
| 40 | 885 | 884 |
| 45 | 902 | 903 |
| 50 | 918 | 930 |
| 55 | 932 | 948 |
| 60 | 945 | 961 |
| 65 | 957 | 959 |
| 70 | 968 | 974 |
| 75 | 979 | 998 |
| 80 | 988 | 1007 |
| 85 | 997 | 1010 |
| 90 | 1006 | 1011 |
| 95 | 1014 | 1013 |
| 100 | 1022 | 1018 |
| 105 | 1029 | 1033 |
| 110 | 1036 | 1041 |
| 115 | 1043 | 1049 |
| 120 | 1049 | 1056 |
| 124 | 1054 | 1061 |

Notes: Locations of furnace thermocouples are shown in Figure 1.

The test was terminated as requested by the test sponsor after a heating period of 124 minutes.

Table 3 - Time and related temperature rise measured by thermocouples S1 – S13.

| Time (min) | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| 15 | 1 | 1 | 1 | 1 | 1 | 0 | 2 | 0 | 2 | 0 | 3 | 6 | 2 |
| 20 | 3 | 4 | 4 | 3 | 3 | 2 | 5 | 2 | 6 | 1 | 8 | 16 | 6 |
| 25 | 6 | 8 | 8 | 6 | 7 | 4 | 8 | 4 | 12 | 3 | 17 | 30 | 10 |
| 30 | 12 | 13 | 13 | 10 | 13 | 11 | 13 | 7 | 18 | 6 | 23 | 35 | 13 |
| 35 | 18 | 20 | 19 | 17 | 19 | 21 | 18 | 12 | 25 | 10 | 30 | 39 | 17 |
| 40 | 24 | 26 | 24 | 23 | 25 | 32 | 22 | 18 | 29 | 15 | 33 | 39 | 21 |
| 45 | 27 | 29 | 28 | 27 | 28 | 37 | 25 | 22 | 32 | 20 | 34 | 37 | 25 |
| 50 | 27 | 29 | 29 | 28 | 28 | 33 | 27 | 24 | 33 | 22 | 34 | 35 | 27 |
| 55 | 26 | 28 | 28 | 27 | 27 | 30 | 28 | 25 | 32 | 23 | 32 | 33 | 29 |
| 60 | 24 | 25 | 26 | 25 | 25 | 27 | 30 | 25 | 33 | 22 | 31 | 30 | 29 |
| 65 | 24 | 24 | 24 | 23 | 24 | 27 | 33 | 26 | 35 | 21 | 31 | 28 | 32 |
| 70 | 23 | 22 | 22 | 22 | 23 | 26 | 38 | 28 | 38 | 20 | 32 | 27 | 34 |
| 75 | 28 | 22 | 23 | 23 | 22 | 28 | 46 | 32 | 39 | 21 | 34 | 28 | 37 |
| 80 | 40 | 24 | 31 | 35 | 25 | 33 | 51 | 39 | 41 | 26 | 36 | 30 | 37 |
| 85 | 43 | 33 | 37 | 42 | 30 | 40 | 56 | 43 | 44 | 40 | 38 | 31 | 41 |
| 90 | 44 | 41 | 41 | 43 | 38 | 43 | 65 | 43 | 46 | 41 | 39 | 33 | 46 |
| 95 | 49 | 42 | 41 | 43 | 40 | 43 | 75 | 45 | 51 | 41 | 43 | 38 | 49 |
| 100 | 53 | 42 | 41 | 43 | 39 | 44 | 87 | 47 | 56 | 41 | 47 | 41 | 50 |
| 105 | 57 | 43 | 42 | 43 | 40 | 44 | 103 | 49 | 65 | 42 | 50 | 43 | 53 |
| 110 | 63 | 44 | 43 | 48 | 42 | 46 | 126 | 54 | 79 | 43 | 56 | 46 | 58 |
| 115 | 71 | 47 | 45 | 53 | 41 | 48 | 162 | 60 | 115 | 43 | 62 | 50 | 63 |
| 120 | 76 | 52 | 52 | 59 | 42 | 51 | 201 | 67 | 184 | 45 | 70 | 58 | 68 |
| 124 | 98 | 54 | 55 | 66 | 45 | 55 | 236 | 71 | 254 | 48 | 82 | 66 | 73 |

Notes: Locations of thermocouples S1 – S13 are shown in Figure 2.

The test was terminated as requested by the test sponsor after a heating period of 124 minutes.

## APPENDIX D – INFORMATION FROM TEST SPONSOR

**(The information provided by the test sponsor, which was not verified by RED or unless specified.)**

| Item | Description |
|---|---|
| 1 | **Top & Bottom Runners (U-track)**<br>Brand & Series : Jason.<br>Dimensions : 35 mm x 50 mm x 35 mm x 0.6 mm thick.*<br>Material : Galvanized steel.<br>Fixing method : The top and bottom runners were fixed to the concrete testing rig by M6 with 50 mm long anchor bolts at 500 mm nominal centres.* |
| 2 | **Partition Board**<br>Brand & Series : Jason Fire Shield.#<br>Sizes : 1,220 mm wide by 2,440 mm high.<br>Thickness : 2 layers of 12.5 mm.*<br>Density (kg/m$^3$) : 655 kg/m$^3$.<br>Fixing method : Boards fixed to steel framework by M3.5 by 25 and 35 mm long self-tapping screws at 350 mm c/c spacing.* |
| 3 | **Vertical Steel Stud (C-stud)**<br>Brand & Series : Jason.<br>Dimensions : 45 mm x 50 mm x 45 mm x 0.6 mm thick.*<br>Material : Galvanized steel.<br>Spacing : 610 mm.*<br>Fixing method : On the fixed end the right vertical steel stud was fixed to the concrete lining of test rig using M6 by 50 mm long anchor bolts at 500 mm spacing and the leftvertical steel stud was without fixing as 30 mm wide free edge.* |
| 4 | **Steel Plate**<br>Brand & Series : Jason.<br>Dimensions : 95 mm high by 0.6 mm thick.*<br>Material : Galvanized steel.<br>Fixing method : Fixed in the cavity of horizontal board joints by M4 by 25 mm long self-tapping screws at 350 mm c/c spacing.* |

*Notes: * Verified on site by RED.*

*# As shown on the test construction.*

**Information from Test Sponsor (Con't)**

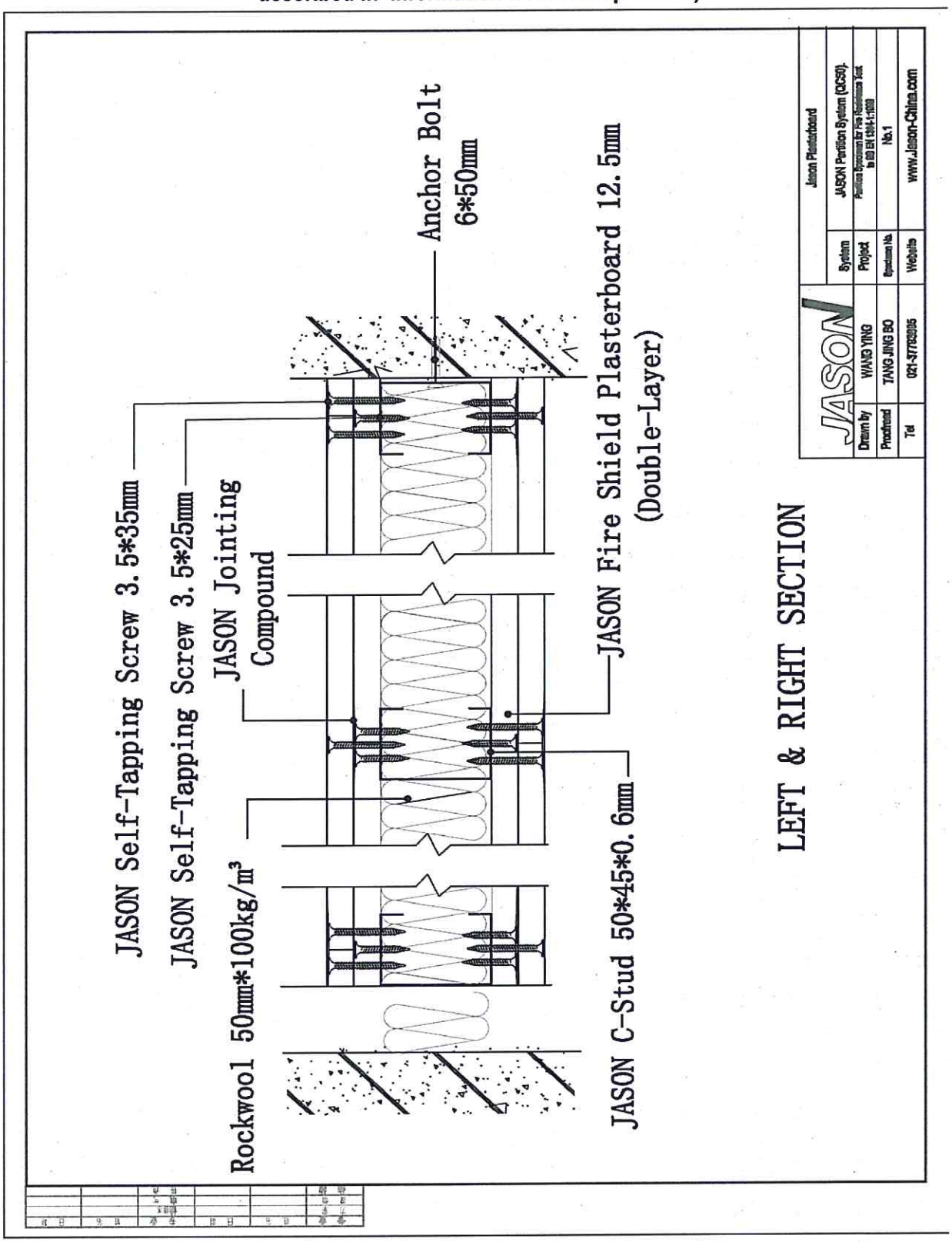
**(The information provided by the test sponsor, which was not verified by RED or unless specified.)**

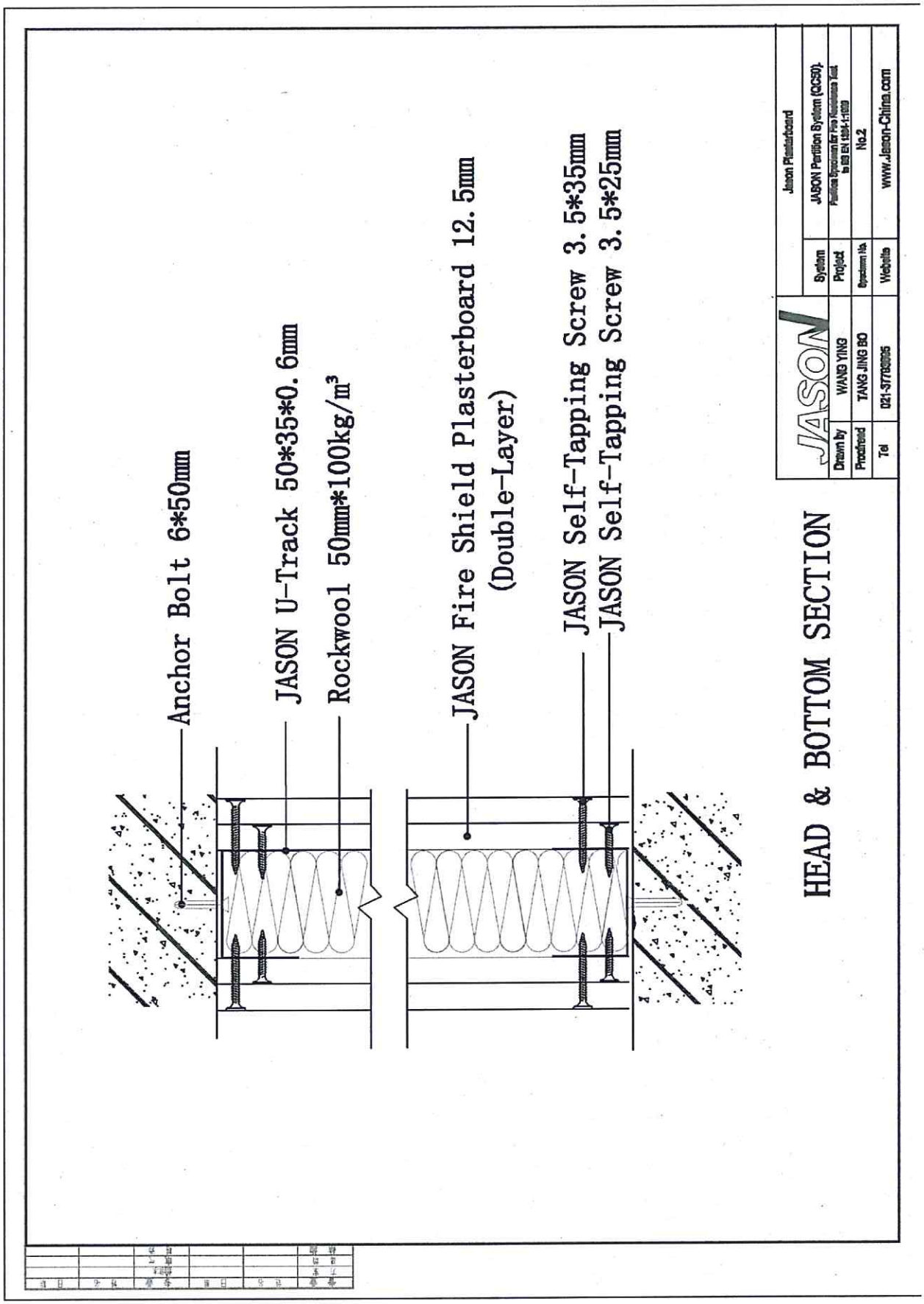
| Item | Description | |
|---|---|---|
| **5** | **Joining Plaster** | |
| | Brand | : Jason.# |
| | Applied location | : Applied at board-to-board joints and screw portions.# |
| **6** | **Joining Tape** | |
| | Brand | : Jason.# |
| | Sizes | : 50 mm wide by 0.3 mm thick. |
| | Applied location | : Applied at board-to-board joints.# |
| **7** | **Rockwool** | |
| | Brand | : Rockwool.# |
| | Thickness | : 50 mm thick.* |
| | Density | : 100 kg/m$^3$.# |
| | Applied location | : In the cavity of system.# |

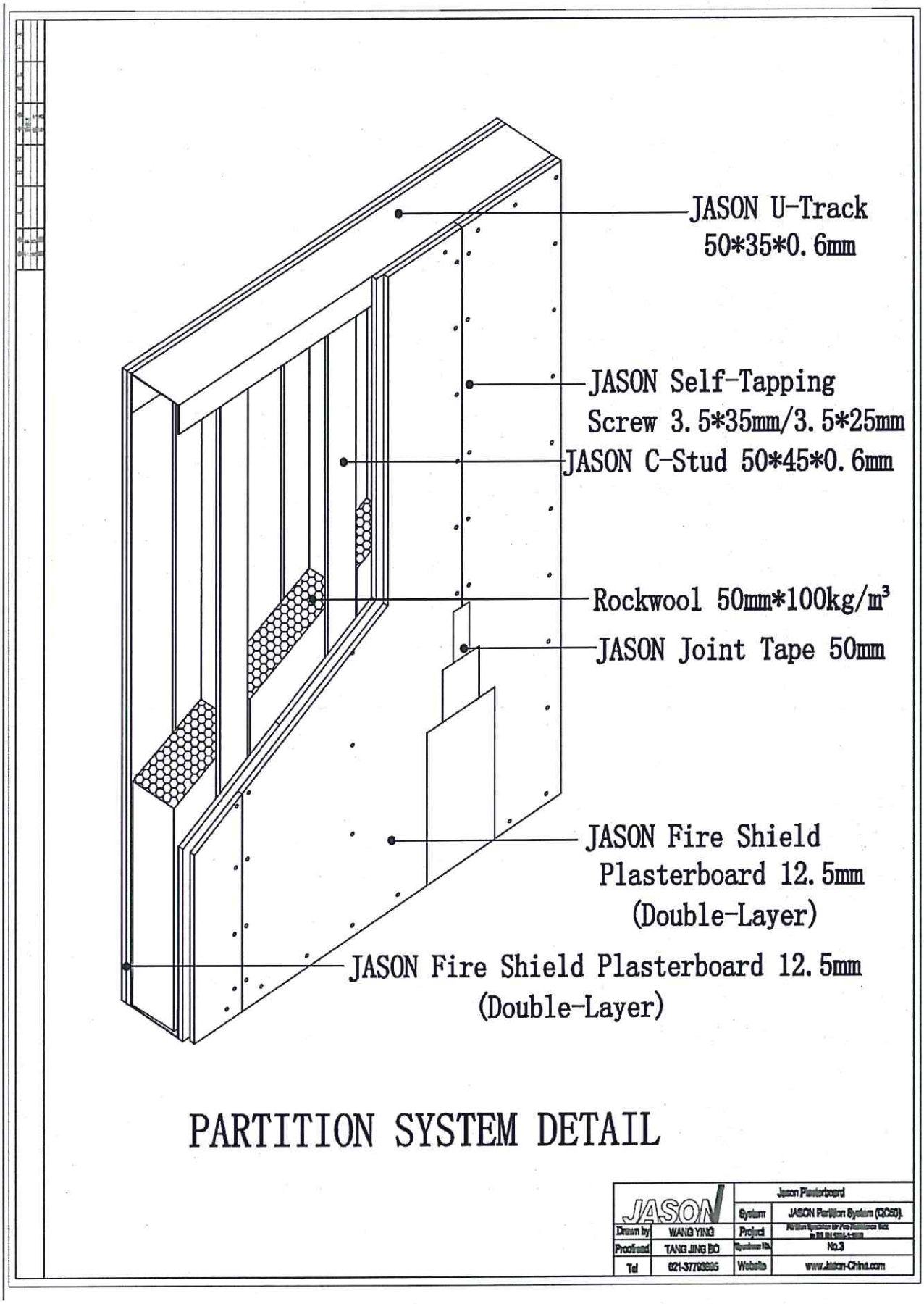
** and # see note on page 20*

**Drawings from Test Sponsor**

**(The drawings provided by test sponsor, which was not verified by RED, except those specified and described in 'information from test sponsor'.)**

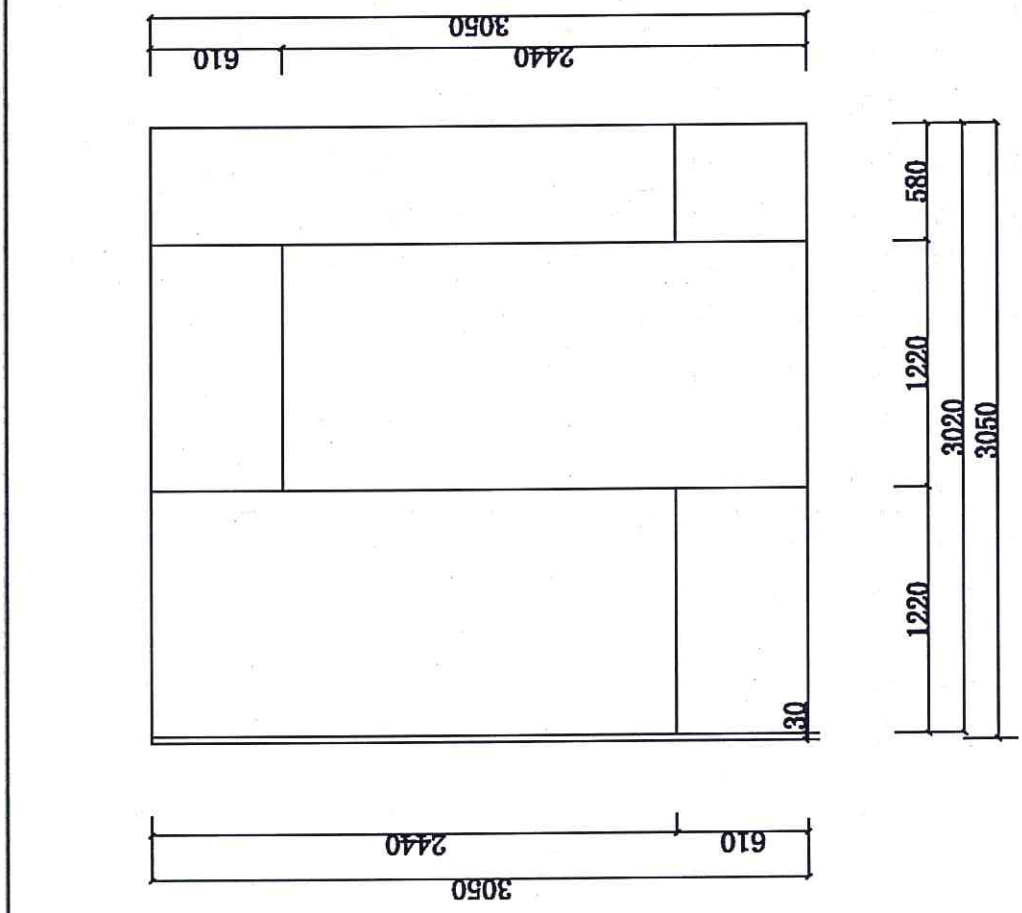



Anchor Bolt 6*50mm
JASON U-Track 50*35*0.6mm
Rockwool 50mm*100kg/m³
JASON Fire Shield Plasterboard 12.5mm
(Double-Layer)
JASON Self-Tapping Screw 3.5*35mm
JASON Self-Tapping Screw 3.5*25mm
HEAD & BOTTOM SECTION
JASON
Jason Plasterboard
System
JASON Partition System (QC50)
Project
Partition Specimen for Fire Resistance Test to BS EN 1364-1:1999
Specimen No.
No.2
Website
www.Jason-China.com
Drawn by
WANG YING
Proofread
TANG JING BO
Tel
021-37785055



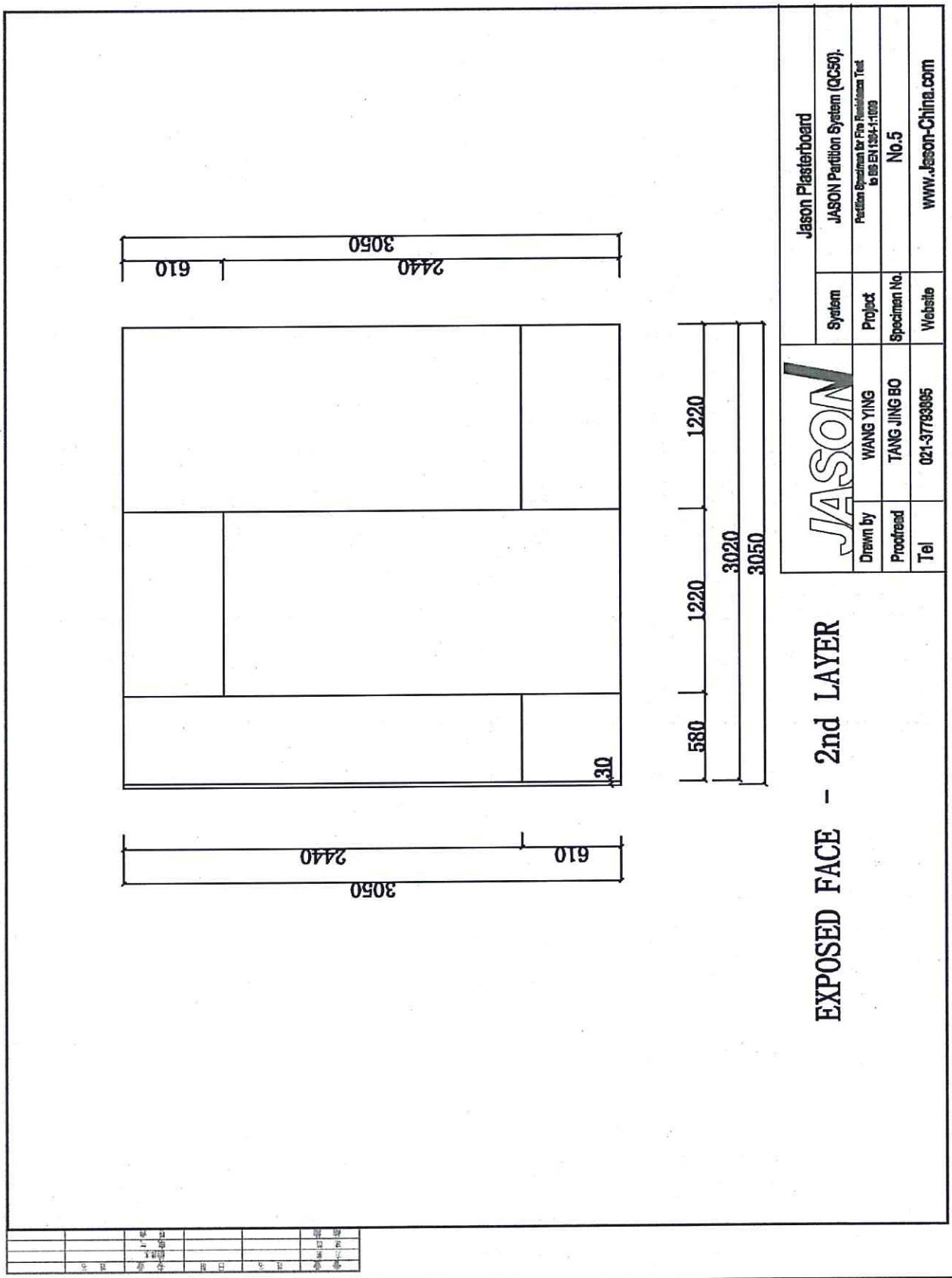

# PARTITION SYSTEM DETAIL

| JASON | | Jason Plasterboard | |
|---|---|---|---|
| | | System | JASON Partition System (QCS0). |
| Drawn by | WANG YING | Project | |
| Proofread | TANG JING BO | | No.3 |
| Tel | 021-37703805 | Website | www.jason-China.com |




EXPOSED FACE - 1st LAYER

| | | | |
|---|---|---|---|
| JASON | System | Jason Plasterboard | |
| | | JASON Partition System (QC50). | |
| | Project | Partition Specimen for Fire Resistance Test to BS EN 1364-1:1999 | |
| | Specimen No. | No.4 | |
| | Website | www.Jason-China.com | |
| Drawn by | WANG YING | | |
| Proofread | TANG JING BO | | |
| Tel | 021-37783885 | | |


3050
610
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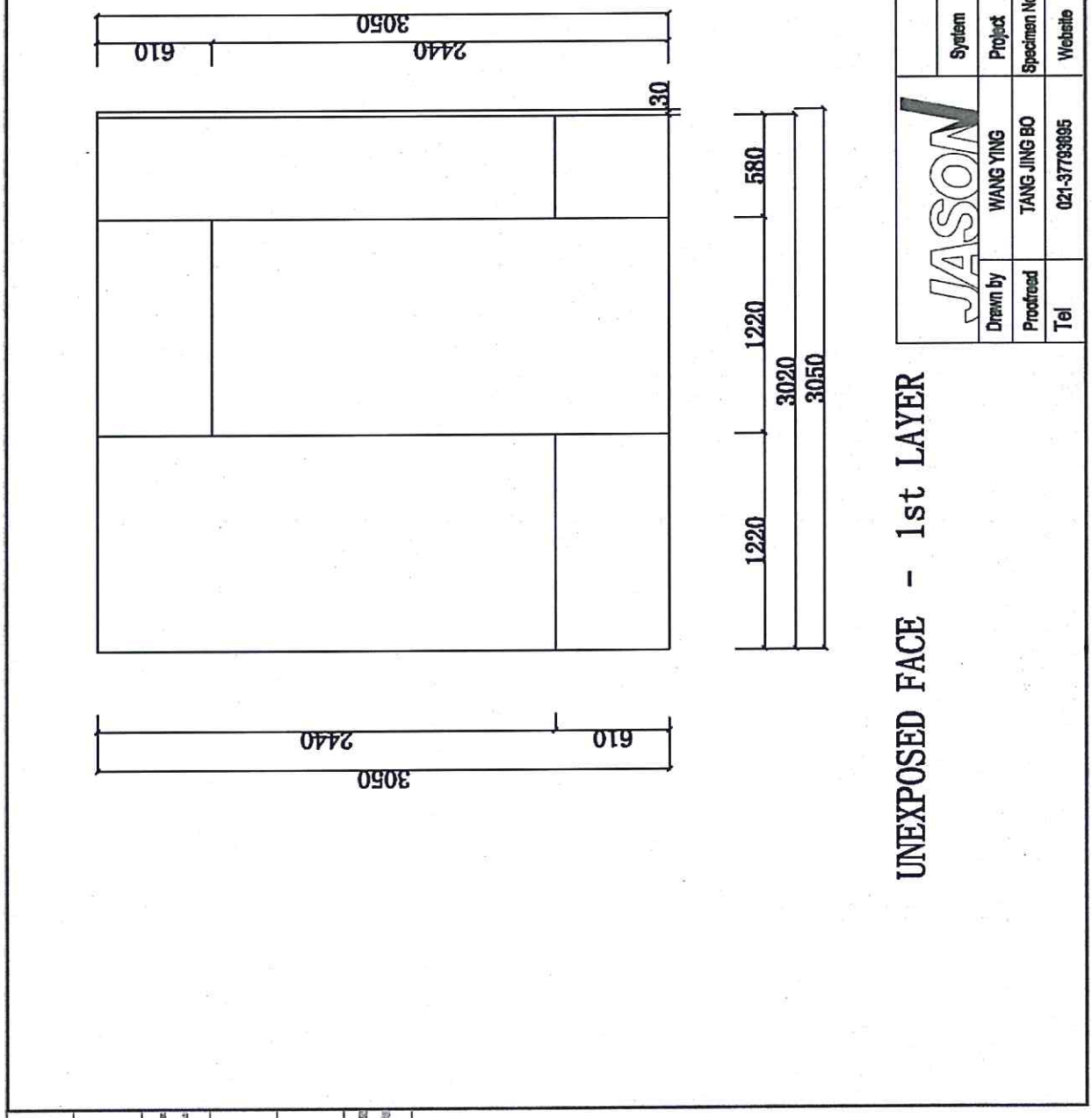
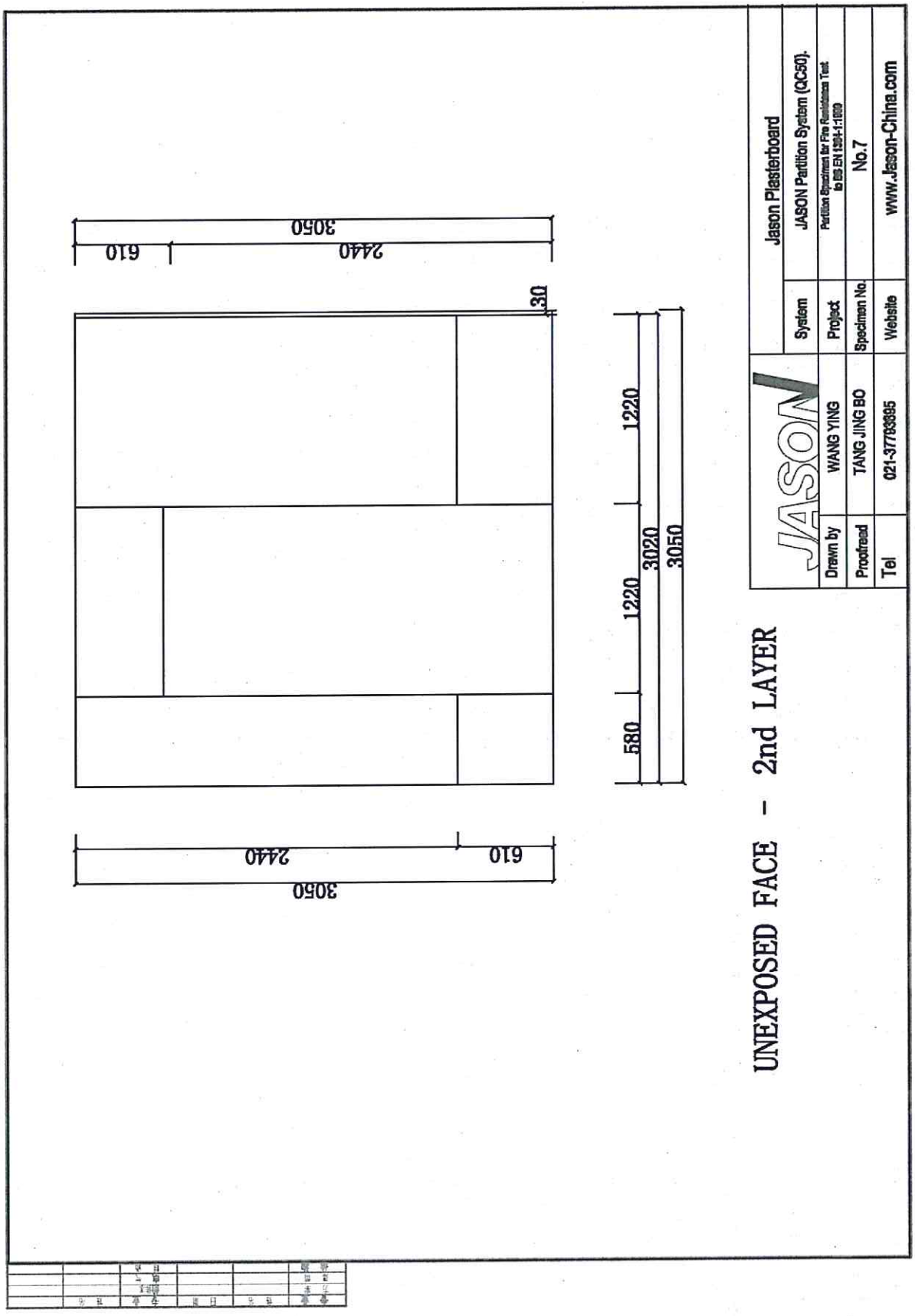
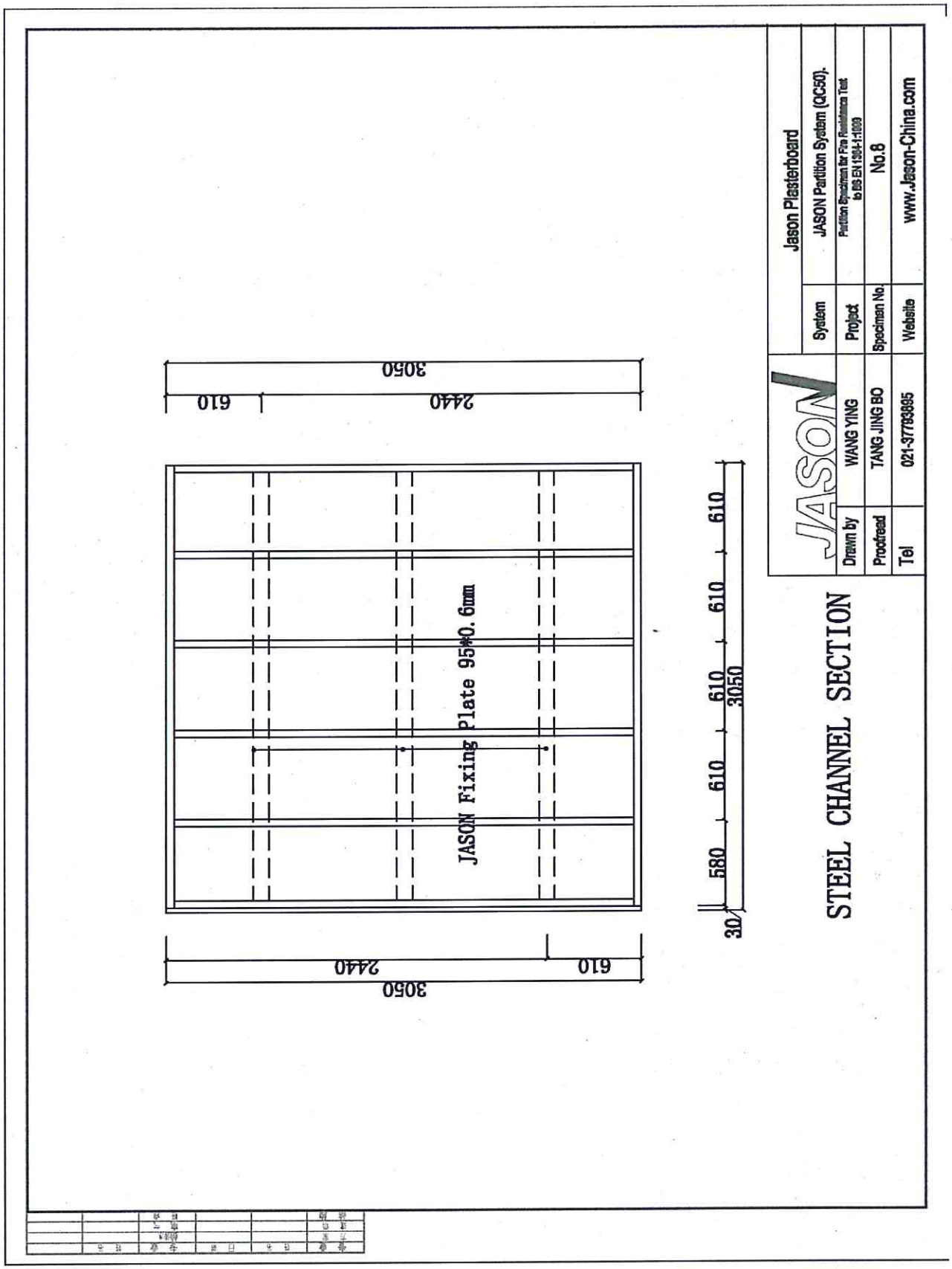
1220
1220
580
3020
3050
30
2440
610
3050
EXPOSED FACE - 2nd LAYER
JASON
Jason Plasterboard
System
JASON Partition System (QC50).
Project
Partition Specimen for Fire Resistance Test to BS EN 1364-1:1999
Specimen No.
No.5
Website
www.Jason-China.com
Drawn by
WANG YING
Proofread
TANG JING BO
Tel
021-37793895


3050
610
2440
30
580
1220
3020
3050
1220
2440
610
3050
UNEXPOSED FACE - 1st LAYER
JASON
Jason Plasterboard
System
JASON Partition System (QC50).
Project
Partition Specimen for Fire Resistance Test to BS EN 1364-1:1999
Specimen No.
No.6
Website
www.Jason-China.com
Drawn by
WANG YING
Proofread
TANG JING BO
Tel
021-37793695


3050
610
2440
30
1220
3020
3050
1220
580
2440
610
3050
UNEXPOSED FACE - 2nd LAYER
Jason Plasterboard
System
JASON Partition System (QC50).
Project
Partition Specimen for Fire Resistance Test to BS EN 1364-1:1999
Specimen No.
No.7
Website
www.Jason-China.com
JASON
Drawn by
WANG YING
Proofread
TANG JING BO
Tel
021-37783885




**- End of report -**