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中聯建築材料有限公司

1-hour Fire Resistance

Performance of Fully Insulated Partition Boards Wall Systems

Smart Challenge to Firea and Noise Attcak

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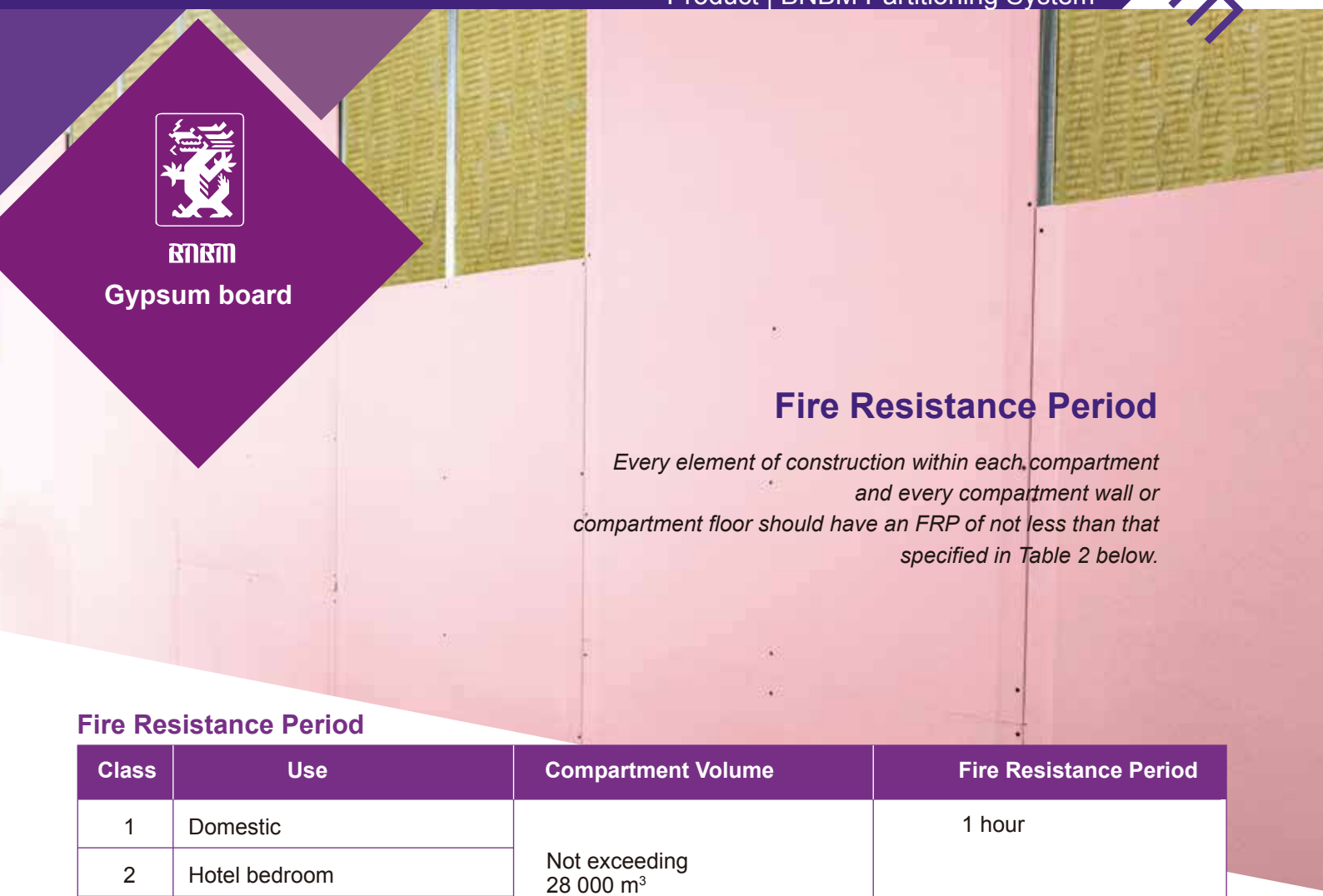
BNBM

Gypsum board



Fire Resistance Period

Every element of construction within each compartment and every compartment wall or compartment floor should have an FRP of not less than that specified in Table 2 below.

Fire Resistance Period

Class	Use	Compartment Volume	Fire Resistance Period
1	Domestic	Not exceeding 28 000 m^3	1 hour
2	Hotel bedroom		
3	Office		
4	Shop restaurant and hotel foyer	Not exceeding 7 000 m^3	1 hour
5	Place of public entertainment		
6	Hospital	Exceeding 7 000 m^3 but not exceeding 28 000 m^3	2 hour
7	Place of assembly		
8	Carparking		
9	Bulk storage and warehouse	Not exceeding 7 000 m^3	2 hour
10	Industrial undertaking except bulk storage and warehouse	Not exceeding 28 000 m^3	2 hour

Notes:

(1) Different use class should be separated in accordance with paragraph 8.

(2) Special hazards should be separated in accordance with paragraph

(3) For any use not covered by Table 2, the fire resistance period required will be determined by the Building Authority having regard to the fire load, hazard level, fire service installations and other relevant features of the building.

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STRENGTH AND ROBUSTNESS

PARTITION DUTY -

BNBM Partitioning System provides strength and robustness. These duty ratings have been calculated in accordance with BS 5234: Part 1 & 2: 1992. The rating is a measure of the ability of the wall to meet therequirements of strength and robustness test. BNBM Partitions are characterized by high acoustic performance, low overall width and high fire resistance.

- Stiffness
- Surface damage by small hard body impact
- Resistance to damage by impact from a large soft body.
- Eccentric downward loading of heavyweight anchorage (wash basin)
- Eccentric downward loading of heavyweight anchorage (high level wall cupboard)
- Crowd pressure
- Perforation by small hard body impact.
- Resistance to structural damage by impact from a large soft body.
- Door slamming
- Pull-out of a lightweight anchorage.
- Pull-down of a lightweight anchorage.

As an aid to specification, the figures below are guidelines for duty-strength/ robustness rating, and minimum sound reduction values for partitions separating various room types.

The wall duty-strength and robustness-rating are grouped as follows:

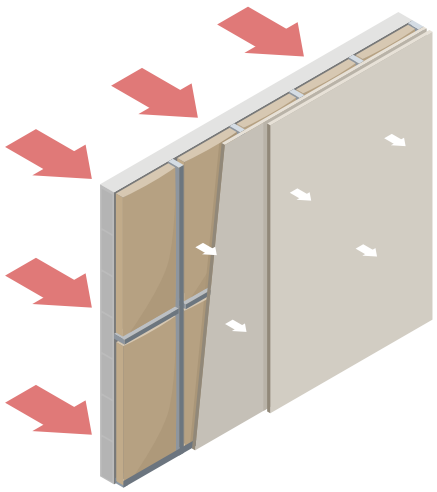
Category	Building Type	Category	Building Type
Light Duty (LD)	Residential	Heavy Duty (HD)	Public or industrial building
Medium Duty (MD)	Office or commercial building	Severe Duty (SD)	Heavy industrial building

Suggested minimum sound insulation values of partitions:

Suggested minimum sound insulation performance levels for privacy in some occupational conditions are given in table below. The values given are based on laboratory measurements.

Location	Weighted sound reduction index $R_w$db
Habitable rooms in dwellings	30
Executive offices	50
Quiet rooms in dwellings	44
Hotel rooms	55
Enclosing bathrooms in dwellings	38
Music practice rooms	60
General offices	38
Cinemas	60
Private offices	44

Note: Where there is a great deal of background noise, a lower R_w may be acceptable.



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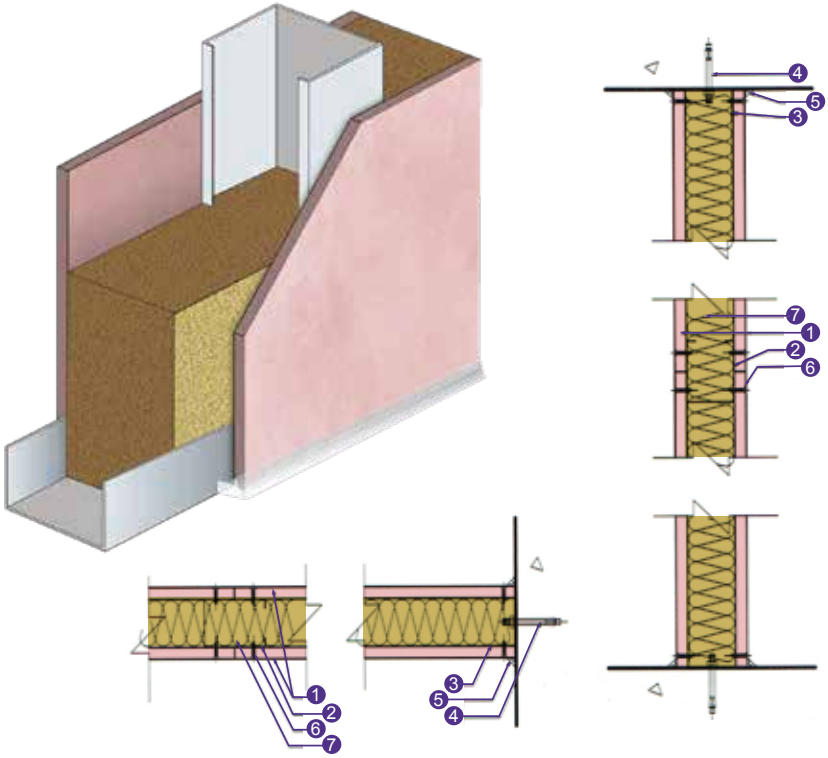
Slim fire resistant and acoustic rated partition for all sorts of internal environments

In congested urban developments, high population is confined to small expensive space.This explains why high rise buildings are everywhere. This phenomenon creates problems in terms of fire risk and acoustic isolation between adjacent rooms, and the need to maximize living / working space for each individual is of paramount importance.

BNBM plasterboard partition systems offer many benefits over conventional masonry wall. Whether it is new construction or refurbishment, BNBM plasterboard partition systems offer greater flexibility in construction and relocation. Unlike conventional masonry wall, they are faster to construct and hence reduce delay to other trades. Because it weighs less than twenty percent of conventional masonry wall, the system reduces the building dead load. The system is also slimmer and the reduced thickness allows for more rentable space, which in turn increases the rental income potential.



Technical Data:

I-Hour fire rating, integrity & insulation
According to BS4 76: Part 22, with fire risk
from both sidesOverall partition thickness= 74 mm
Sound reduction Rw = 48 dB
(when 64mm wide stud and 50mm, I00kg/cu.m rockwool is used)

LEGEND:

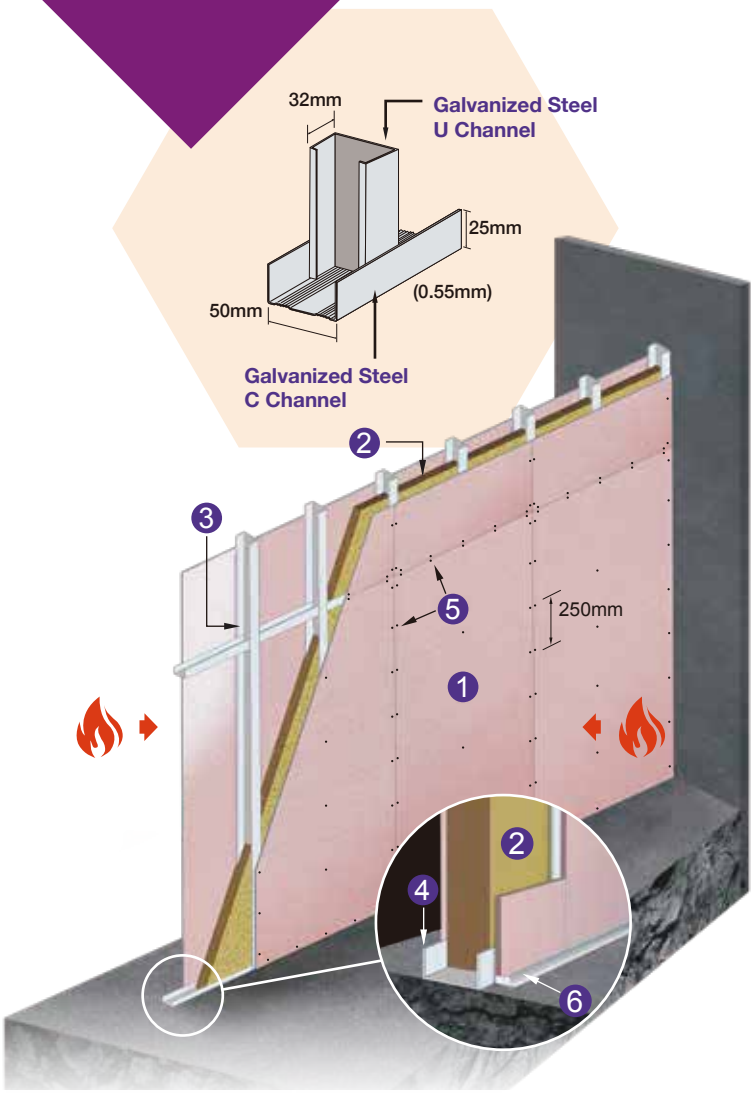
1. One layer of 12mm thick BNBM (fire resistant Gypsum plasterboard)
2. 50mm x 25mm x 0.55mm thick Galvanized Steel C Channel
3. 50mm x 32mm x 0.55mm thick Galvanized Steel U Channel at nominal 610mm
4. Nailable plug at 600mm centers
5. Fire Sealant
6. Self-tapping screws at 250mm centres
7. BNS Rock wool 50mm x 60kg/m3

BNBM

Gypsum board

1-hours fire Rated Gypsum Board Partition (12mm)Systems

1. One layer of 12mm thick BNBM (fire resistant Gypsum plasterboard)
2. BNS Rock wool 50mm x 60kg/m^3
3. 50mm x 32mm x 0.55mm thick Galvanized Steel U Channel at nominal 610mm
4. 50mm x 25mm x 0.55mm thick Galvanized Steel C Channel
5. Self-tapping screws at 250mm centres
6. Fire Sealant



Fire resistance	FRL	-/60/60
	Standard	BS 476: Part 20: 1987 BS 476: Part 22: 1987
	Approval	R10C17 RED
Assessment	Approval	R17K09 - 1A - Issue 1 R23D03 - 1A (RED)
	Maximum height	Up To 6m
	Partition thickness	74mm-124mm
Acousitc	#STC	STC - 48
	Standard	ASTM E 90 ASTM E 413-87
	Predicted assessment	ATS 05-005-RP003 (ATSL)
Physical Performance		EN 520 BS 476: Part 4, 6 & 7

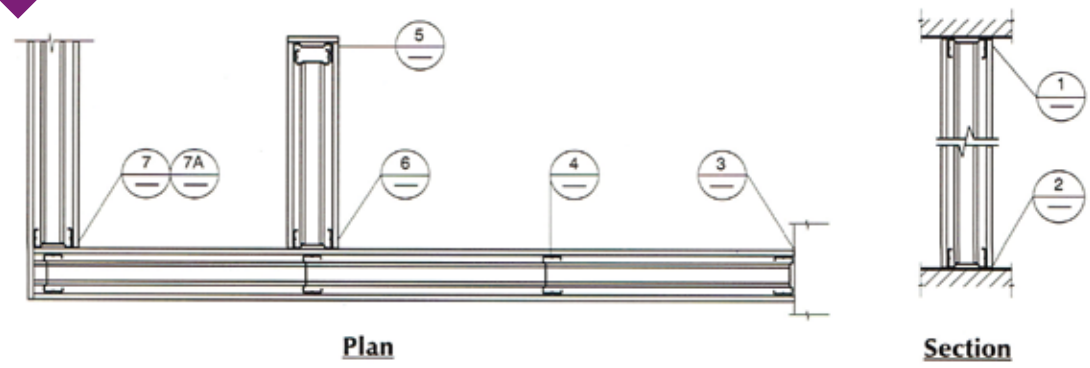
#Acousitc STC-48 is generally used with Rock wool 100kg/m^3 50mm thick

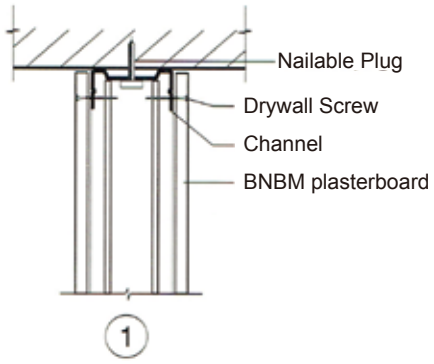
Sizes of studs for the proposed height of partition boards wall systems

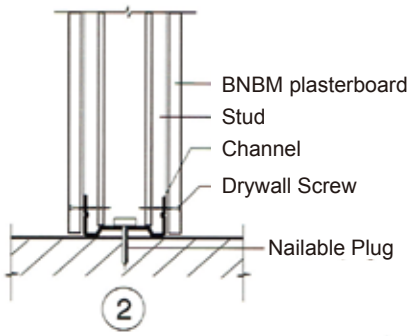
Height up to	Stud sizes (D×F×T)	Studs spacing	Expansion allowance
Up to ≦ 4m	50×32×0.55mm	610mm/ c/c	40mm
4.0m < Height ≦ 4.5m	75×32×1.0mm	610mm/ c/c	45mm
4.5m < Height ≦ 5.5m	75×50×1.0mm	610mm/ c/c	55mm
	100×32×1.0mm		
5.5m < Height ≦ 6.0m	75×50×1.2mm	610mm/ c/c	55mm
	100×50×1.0mm		

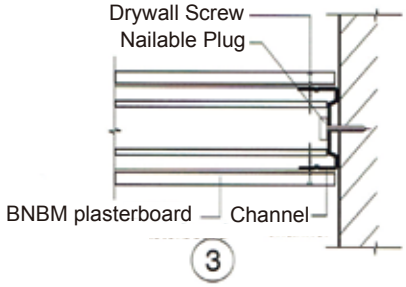
BNBM
Gypsum board

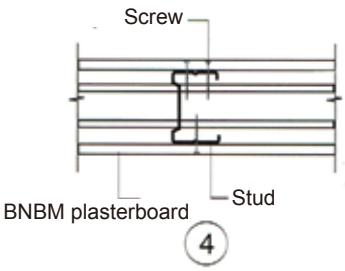
Partition Details

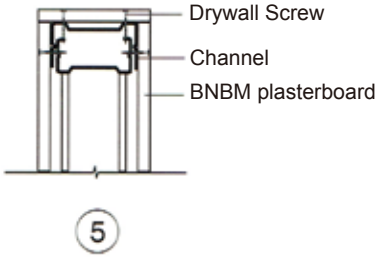


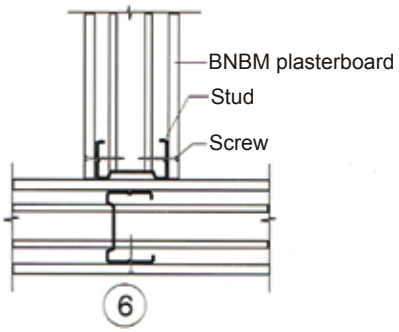


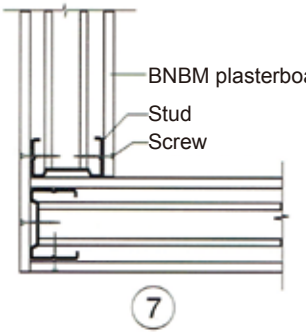


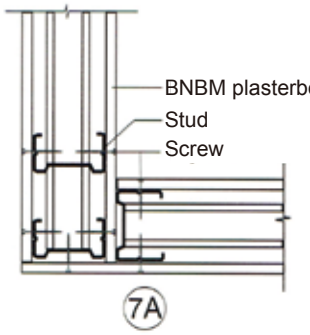












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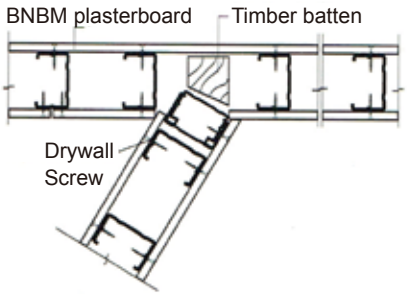
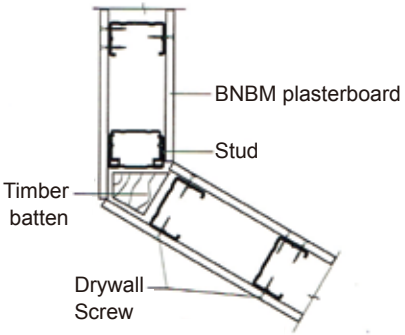
Gypsum board

Partition Details

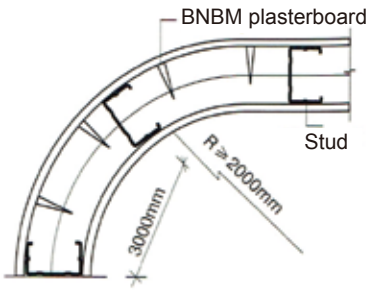
Splayed Corner



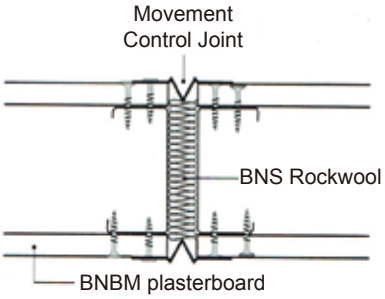
Splayed Corner



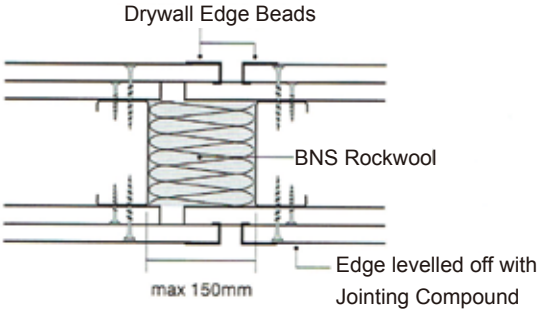
Curved partition



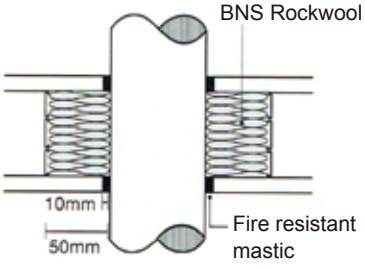
Movement Control Joint



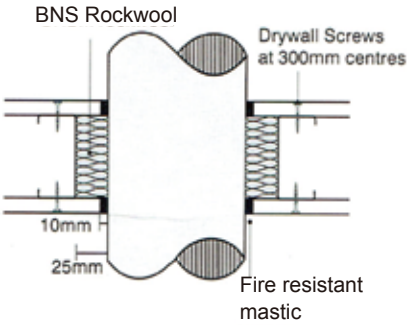
Expansion Joint



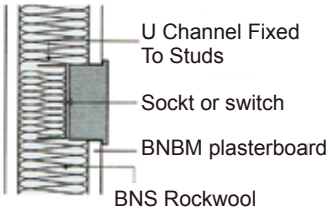
Pipe Penetation



Duct Penetration



Sockets And Switches



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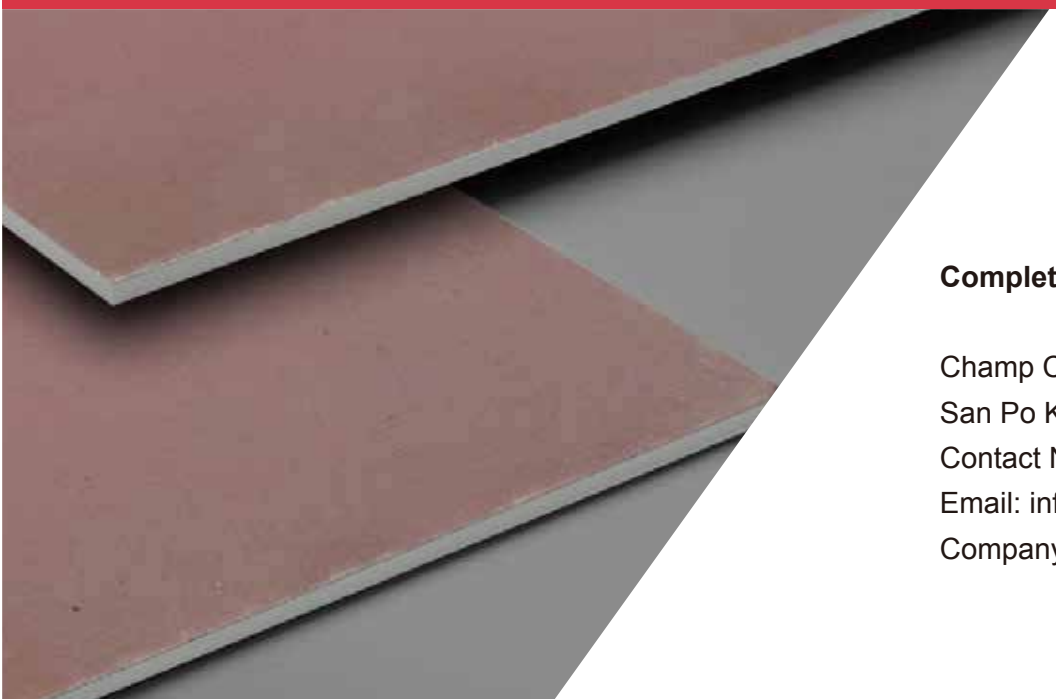
PROFESSIONAL AND RELIABLE

Based on compartmentation of fire and preventing collapse through structural fire resistance, when properly installed and maintained, your building's passive fire protection can save lives and assets, and the building itself.



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HOKLAS 021

TEST REPORT

TEST REPORT NO.: R10C17
DATE OF ISSUE: 7 May 2010

Test Sponsors:	**BNS Company Limited.**
Address of Test Sponsors:	34/F, International Trade Building, Luohu District, Shenzhen, China.
Identification of Test Item:	***Q10C37 – Fully Insulated 'BNBM' Gypsum Plasterboard Partition System.***
Test Method:	Fire resistance test conducted in accordance with BS 476: Part 22: 1987.
Date of Test:	23 April 2010.
Ambient temperature at the time of testing:	24 °C

一小時 防火隔熱牆

APPROVED SIGNATORY: _____ DATE: 7 MAY 2010

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

The test results are valid only for the conditions under which the test was conducted.
Hong Kong Accreditation Service (HKAS) has accredited this laboratory under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS directory of accreditation laboratories. The results shown in this test report were determined by this laboratory in accordance with its terms of accreditation. This report may not be reproduced except in full.

Fire resistance test conducted in accordance with BS 476: Part 22: 1987, Section 5 on Fully Insulated 'BNBM' Gypsum Plasterboard Partition System.

1. Summary

A specimen of a fully insulated 'BNBM' gypsum plasterboard partition system had been subjected to a test in accordance with BS 476: Part 22: 1987, Section 5, in order to determine its fire resistance performance. As requested by the sponsor, the specimen was mounted within concrete lined specimen holder by the test sponsor and the fixing details were shown in the client's drawings (see the appendix). The specimen was symmetrical and only one side of the specimen was tested as per client's request.

The partition system had overall dimensions of 3,030 mm wide by 3,050 mm high by 74 mm thick. It was comprised of a layer of 12 mm thick 'BNBM' fire resistant gypsum plasterboard mounted on each side of the galvanized steel frame. A layer of 50 mm thick rock wool was filled in the cavity between the boards (see clients' drawing). The framework was consisted of 'BNS' steel studs with sizes of 50 mm by 32 mm by 0.55 mm thick and top & bottom runners with sizes of 50 mm by 25 mm by 0.55 mm thick. The boards were fixed to the studs by 3.5 mm diameter with 25 mm long self-tapping screws at 250 mm nominal centres and 200 mm nominal centres along the edges of specimen. A layer of gypsum plaster was applied on the self-tapping screws and board joints. A free edge with approximate 20 mm was applied at the left vertical edge and was filled up with ceramic fibre.

The specimen satisfied the performance requirements specified in Section 5 of BS 476: Part 22: 1987, for the following periods:

Insulation:	**66**	Minutes
Integrity:	**66**	Minutes

The test was discontinued after a period of 66 minutes.

2. Introduction

The specimen was tested in accordance with Section 5 of BS 476: Part 22: 1987, 'Methods for determination of the fire resistance of non-loadbearing elements of construction'.

This test report should be read in conjunction with the BS 476: Part 20: 1987, 'Methods for determination of the fire resistance of elements of construction (general principles)'.

The specimen was mounted by the test sponsor. The test was led by Mr. Rocky Fung and was witnessed by Mr. C.S. Lam, Mr. Asar Cheng and Mr. Lynn Siu, the representatives of the test sponsor.

3. Test Specimen Construction

The specimen was installed into a concrete specimen holder to form the test construction. A comprehensive description of the test construction is presented in the appendix, which is based on a survey of the specimen and information supplied by the test sponsor.

4. Location of Testing Laboratory

Tuen Mun branch laboratory at DD134, Lung Kwu Tan, Tuen Mun, New Territories, Hong Kong.

5. Equipment

Equipment includes:

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

Five (5) thermocouples to monitor the temperature of the unexposed surface of the specimen (see Figure 2).

A 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 deflections of the specimen.

6. Test Procedures

The test was conducted in accordance with the procedures specified in Section 5 of BS 476: Part 22: 1987. The ambient temperature of the test area during the test was measured. After the first 10 minutes of the test, the furnace pressure was maintained at 0 ± 2 Pa relative to atmosphere, at 1,000 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 3.1 of BS 476: Part 20: 1987.

The temperature of the unexposed face of the specimen was monitored by means of five (5) thermocouples fixed to the unexposed surface (see Figure 2 for the locations and reference numbers of the thermocouples). All thermocouples (S1- S5) were the key thermocouples for monitoring both of the mean and maximum temperatures of the unexposed surface of specimen. 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 deflections of the specimen was measured by a steel ruler and recorded.

7. Test Data and Information

The ambient temperature of the test area during the test was 24 °C.

The furnace was controlled so that the mean furnace temperature complied with the requirements of Clause 3.1 of BS 476: Part 20: 1987. The temperatures recorded are shown graphically in Figure 4.

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

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

The deflections obtained are summarized in Table 1.

The test was discontinued after a period of 66 minutes.

8. Results

When tested in accordance with Section 5 of BS 476: Part 22: 1987, the requirements of the standard were satisfied for the following periods:

Insulation:	**66**	Minutes
Integrity:	**66**	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 did not reach during the test. The 180 °C rise of the maximum temperature of the unexposed surface did not reach during the test. The maximum temperature rise of the specimen was 77 °C measured by thermocouple S2 after a heating period of 66 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.

The specimen met the integrity requirements after a heating period of 66 minutes.

9. Limitations

The results relate only 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 (see Clause 12 of BS 476: Part 20: 1987). Application of the results to the specimen of different dimensions or supported other than by a concrete wall or incorporating different components shall be the subject of a design appraisal.

Appendix

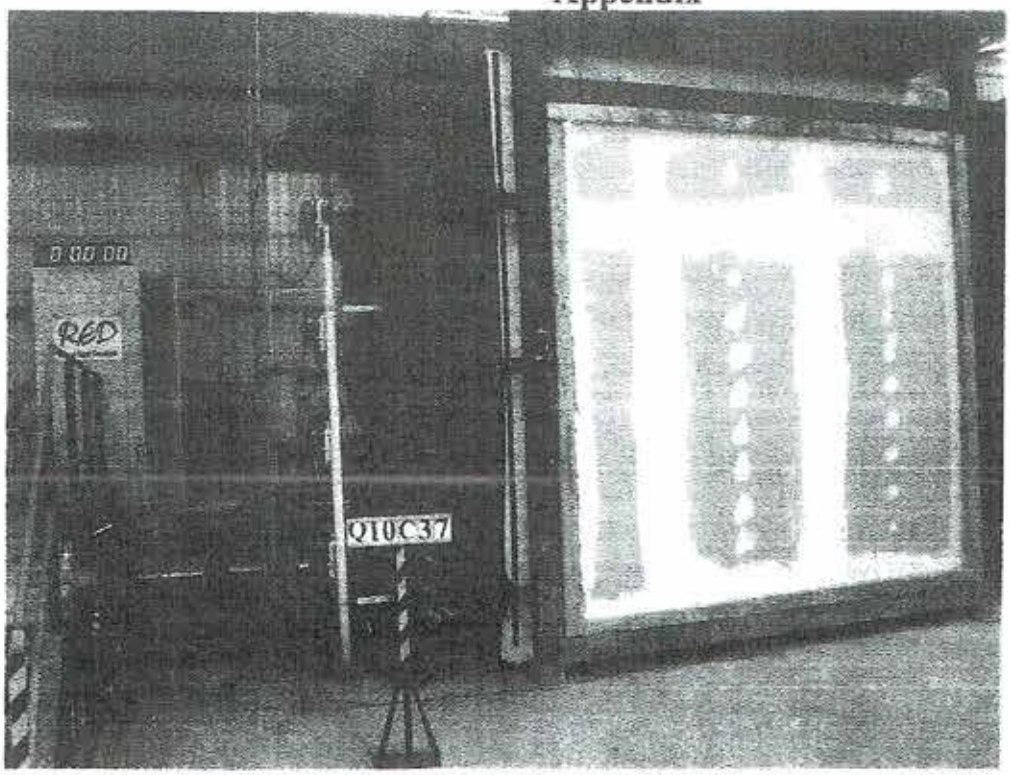


Photo 1 - The unexposed surface of the specimen before the test.

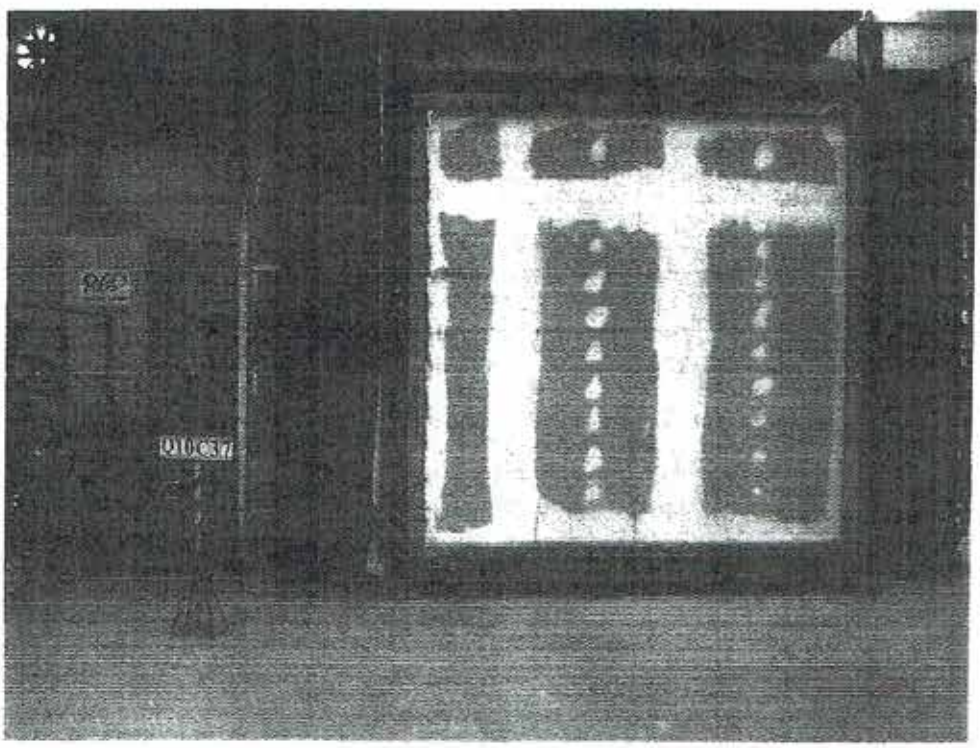


Photo 2 - The unexposed surface of the specimen after a heating period of 30 minutes.

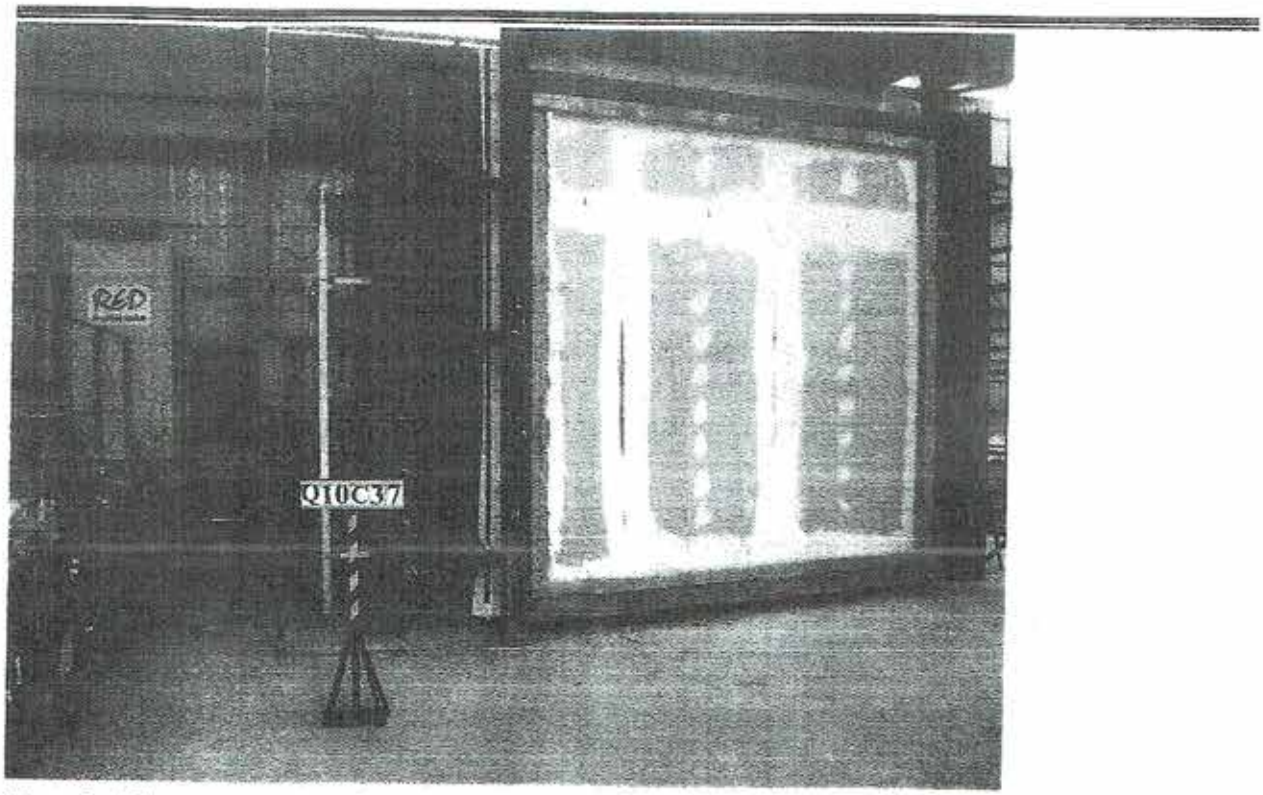


Photo 3 - The unexposed surface of the specimen after a heating period of 60 minutes.

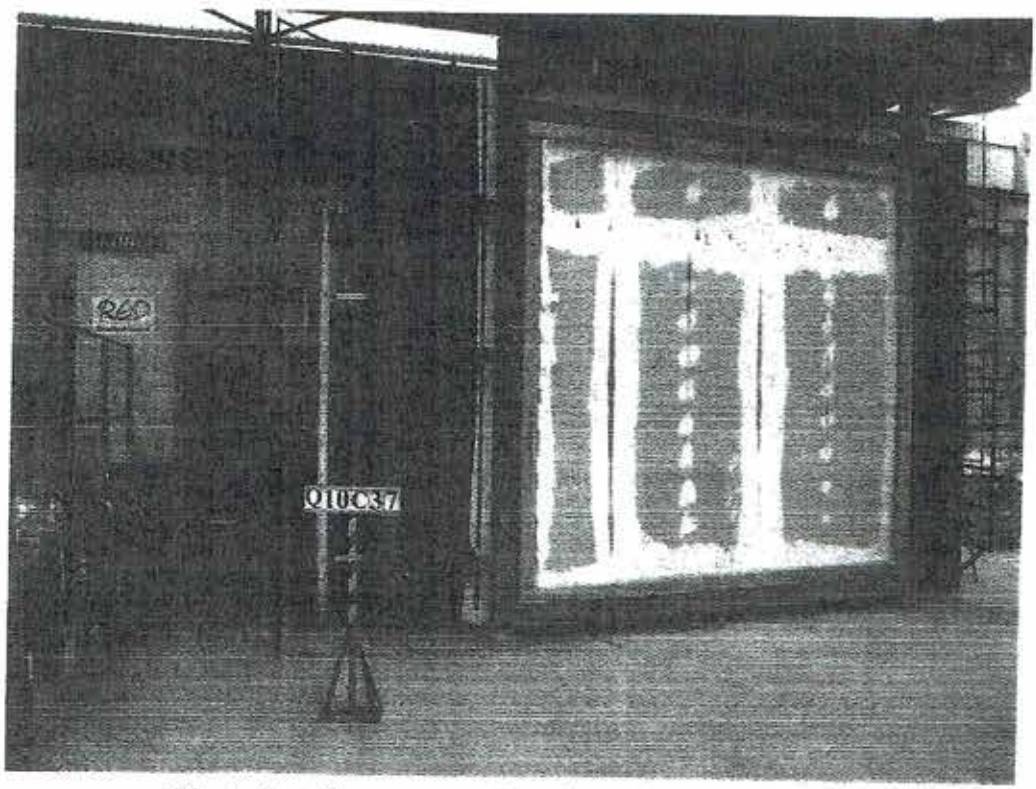


Photo 4 - The unexposed surface of the specimen after the test.

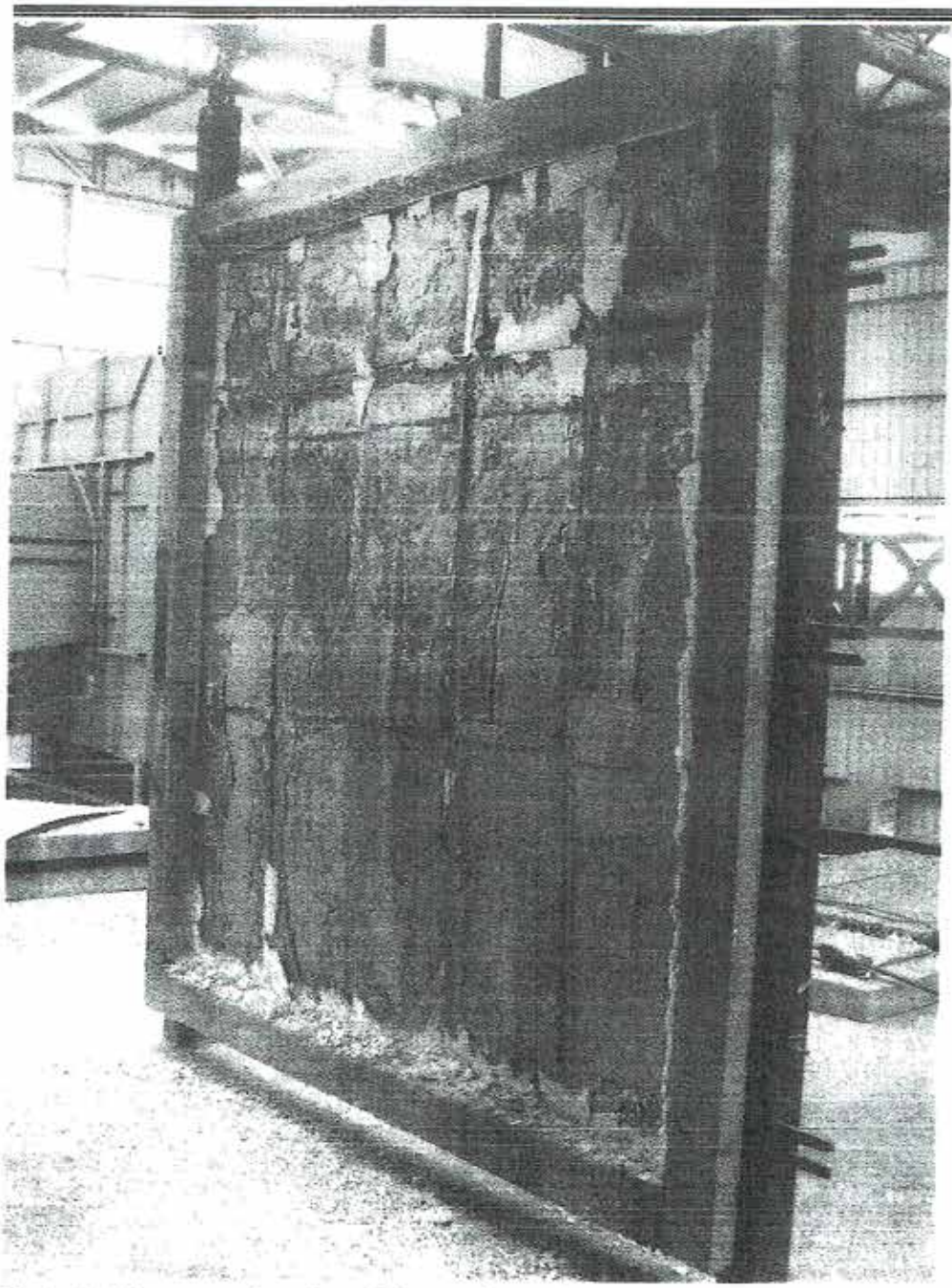


Photo 5 - The exposed surface of the specimen after the test.

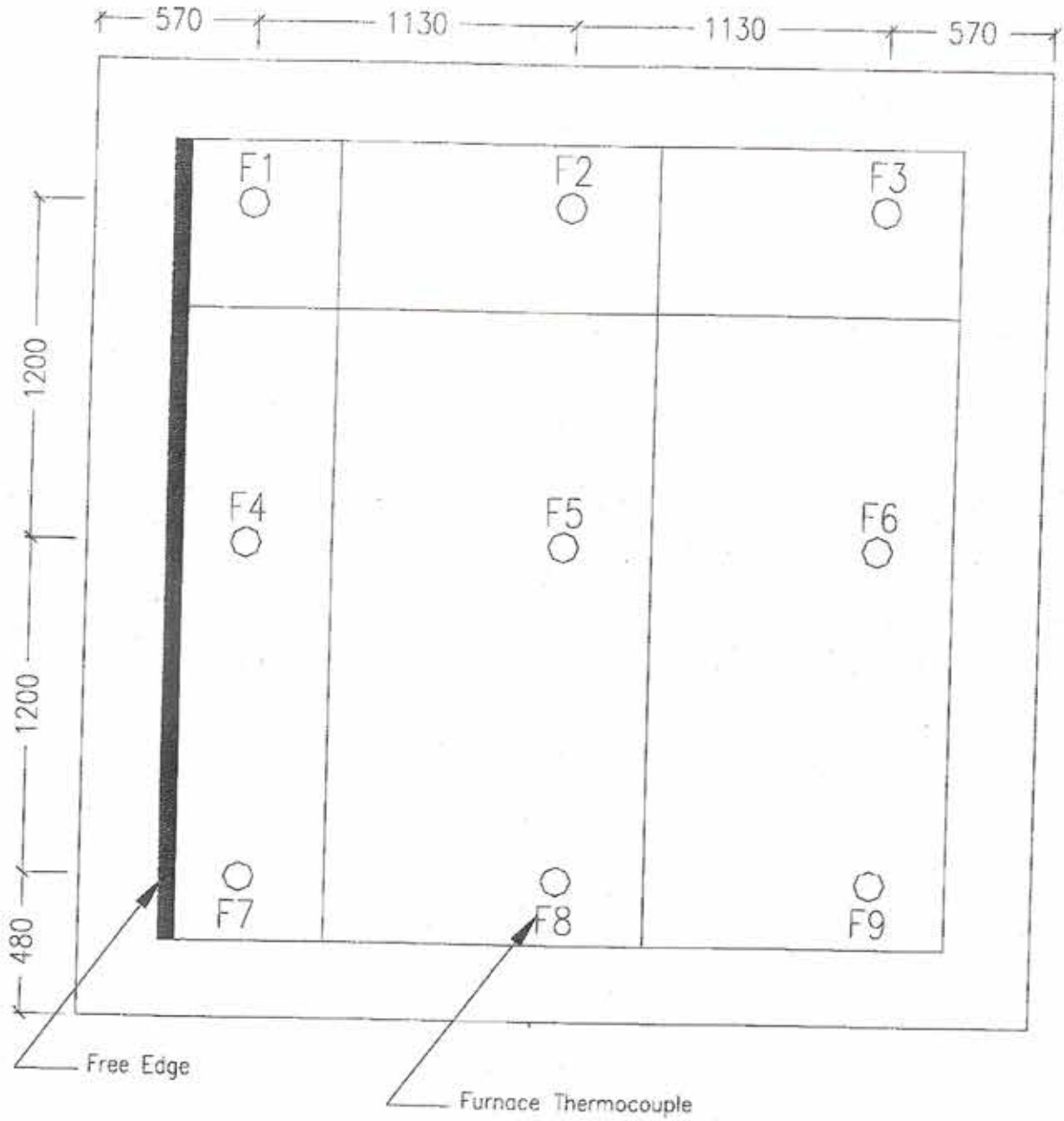


Figure 1 - Locations and reference number of furnace thermocouples.

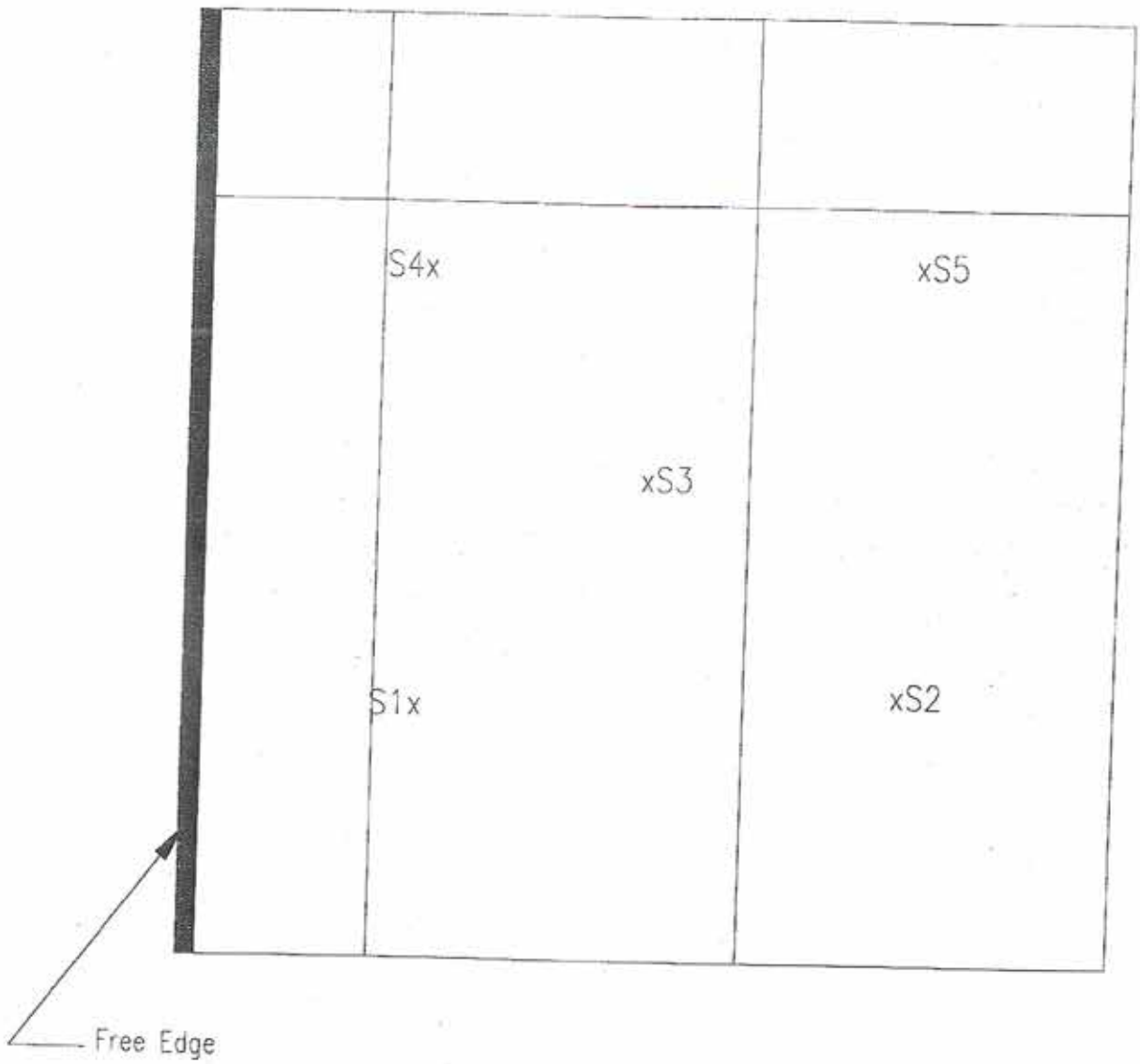


Figure 2 - Locations and reference number of thermocouples to monitor the temperature of unexposed surface of the specimen.

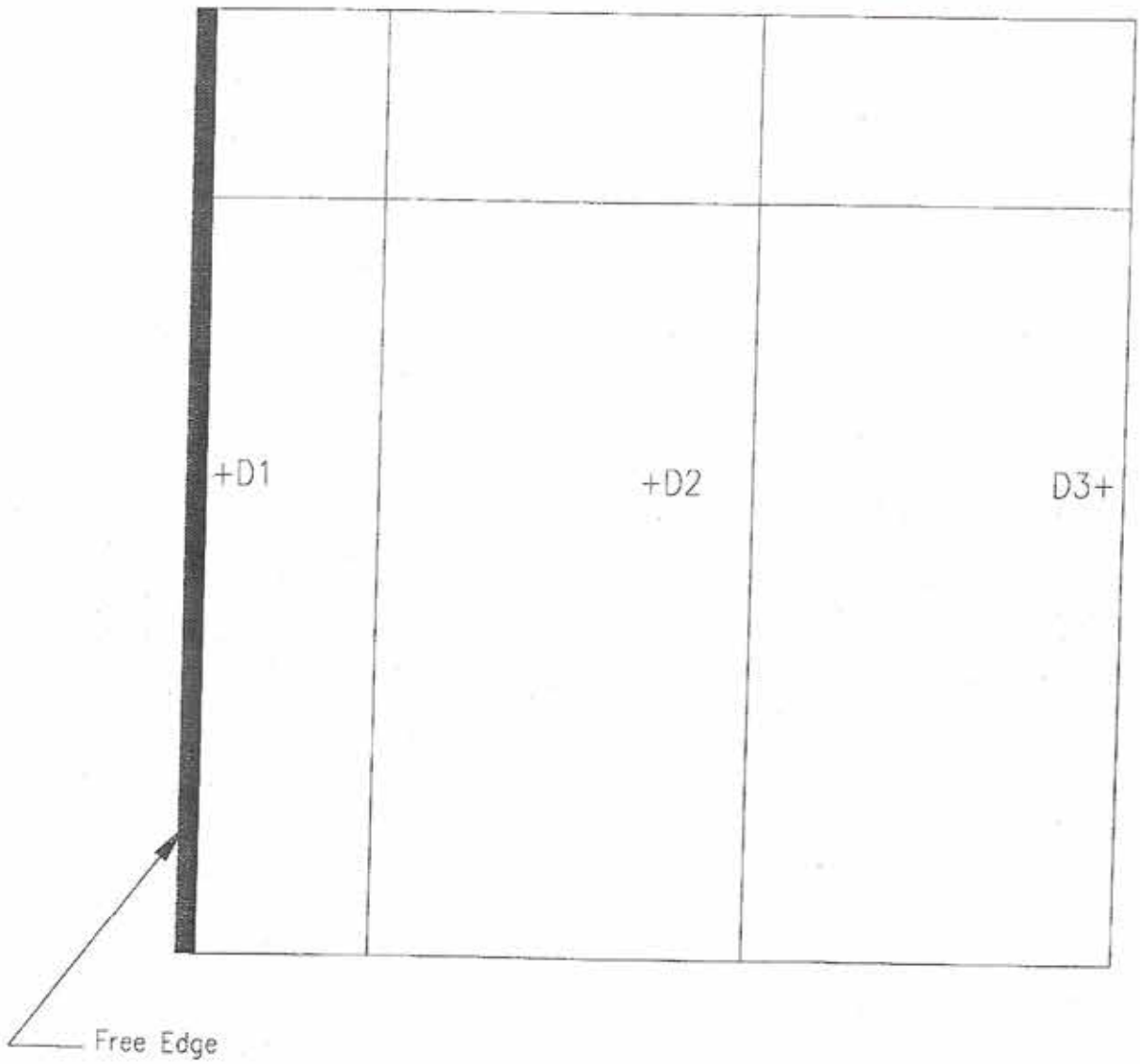


Figure 3 - Locations and reference for measuring displacement of the specimen.

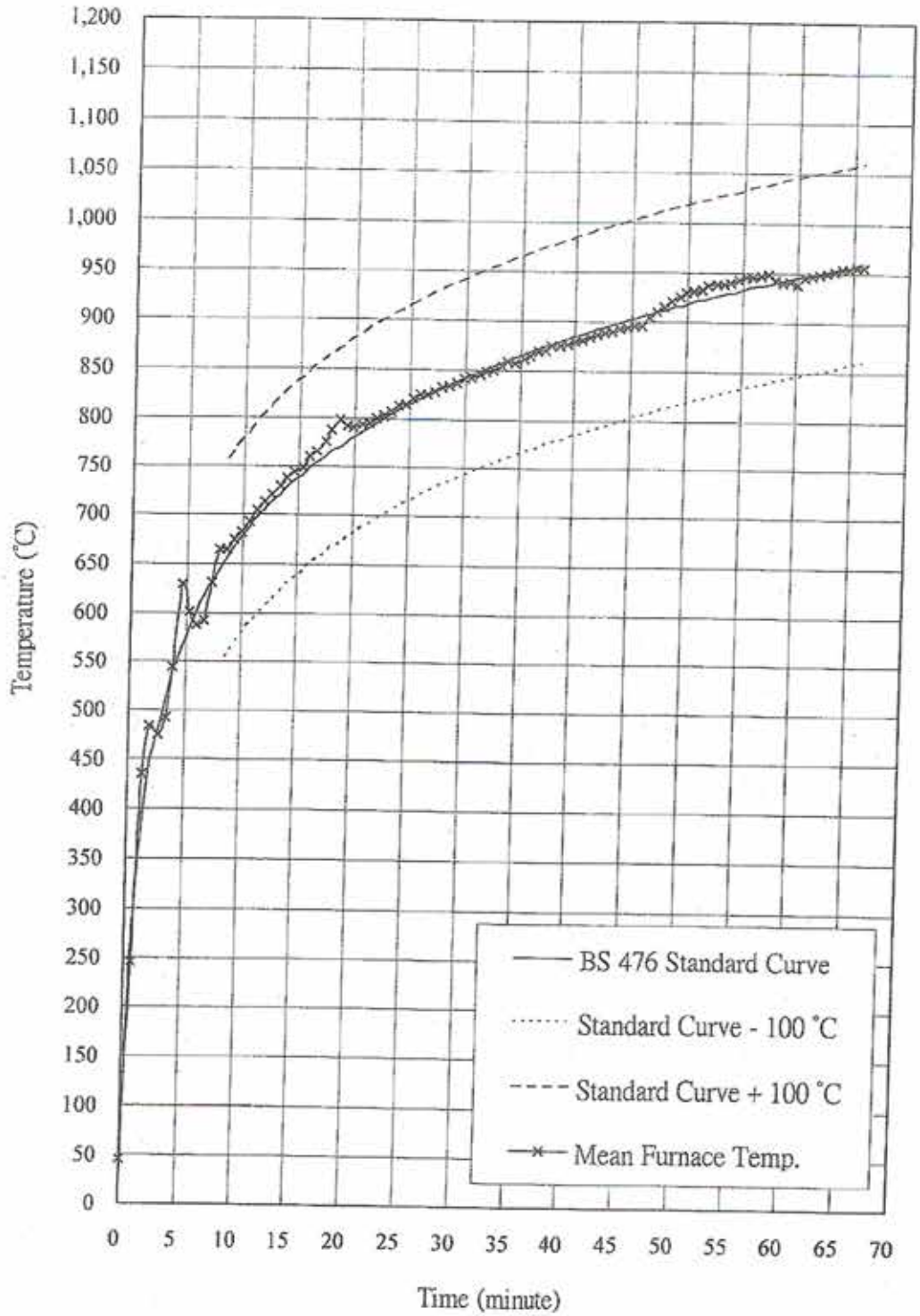


Figure 4 - Mean furnace temperatures.

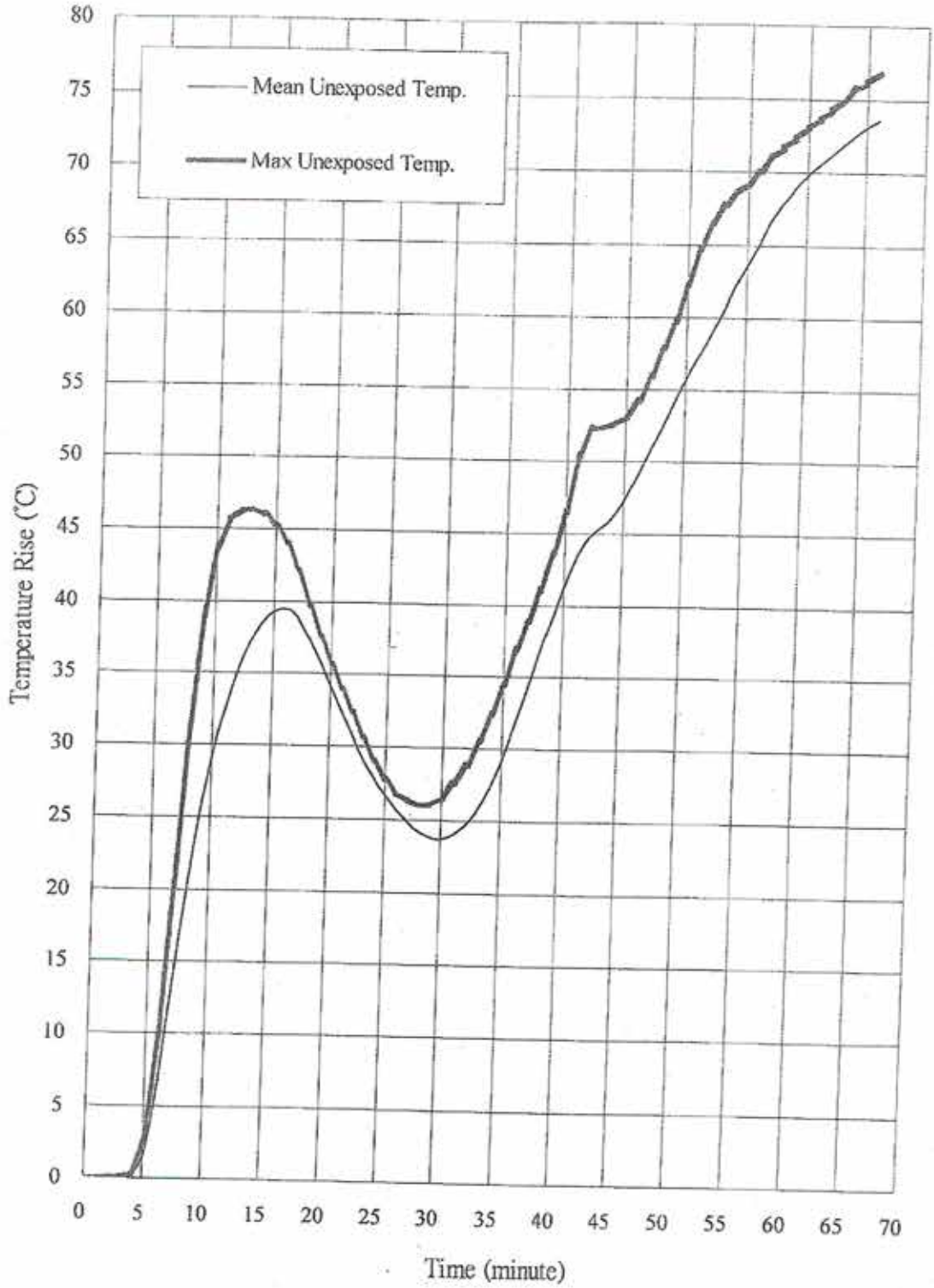


Figure 5 - Temperatures of unexposed surface.

Observation

Time (min.sec)	Exposed (E) or Unexposed (U)	Observation
00.00	-	Test started.
09.50	E	The surface turned grey. Cracks developed on the surface.
17.30	E	The surface peeled off.
18.50	E	The surface expanded.
22.50	U	Visible deformation of the specimen was observed.
30.00	U	The specimen satisfied the integrity and insulation requirements performance.
31.50	E	A gap between the left meeting edge of boards was observed.
38.10	U	Cracks developed at the horizontal meeting edge of boards.
44.50	U	Further deformation of the specimen was observed.
45.30	E	The rock wool core was observed.
50.20	U	Screws on the specimen turned dark. The left meeting edge of boards turned brown.
55.30	U	Cotton pad test was applied on the left meeting edge of boards and the cotton pad test passed.
56.20	U	Cotton pad test was applied on the horizontal edge of boards and the cotton pad test passed.
56.40	U	Cotton pad test was applied on the horizontal edge of boards and the cotton pad test passed.
57.20	U	Cotton pad test was applied on the left meeting edge of boards and the cotton pad test passed.
58.20	U	The meeting edges of boards turned brown.
59.20	U	Cotton pad test was applied on the left meeting edge of boards and the cotton pad test passed.
60.00	U	The specimen satisfied the integrity and insulation requirements performance.
60.30	U	The surface around the left meeting edge of boards peeled off.
63.30	U	Cotton pad test was applied on the left meeting edge of boards and the cotton pad test passed.

Observation (con't)

Time (min.sec)	Exposed (E) or Unexposed (U)	Observation
65.50	U	Cotton pad test was applied on the left meeting edge of boards and the cotton pad test passed.
66.10	-	Test was terminated as requested by client.

Lateral deflections

Table 1

Lateral deflections of the specimen during the test, as viewed from the unexposed face

Location \ Time (mins)	0	10	20	30	45	60
D1	0	0	0	52	56	55
D2	0	0	19	71	90	86
D3	0	-1	-1	6	6	3

Positive deflections indicate movement towards the furnace (see also Figure 3 for the locations). The maximum deflections occurred at D2 is 90 mm moving towards the furnace after a heating period of 45 minutes.

Temperature Rises

Table 2

Time and related temperature rise measured by thermocouples S1-S5

Time (min)	S1	S2	S3	S4	S5
0	0	0	0	0	0
5	1	1	2	3	2
10	21	23	30	44	29
15	31	38	42	45	40
20	31	36	33	35	36
25	26	28	26	27	28
30	22	27	22	25	23
35	28	35	27	32	25
40	46	46	38	42	34
45	50	53	44	47	41
50	60	62	52	53	51
55	66	69	62	64	57
60	70	73	70	69	68
65	72	76	73	72	72
66	73	77	74	72	72

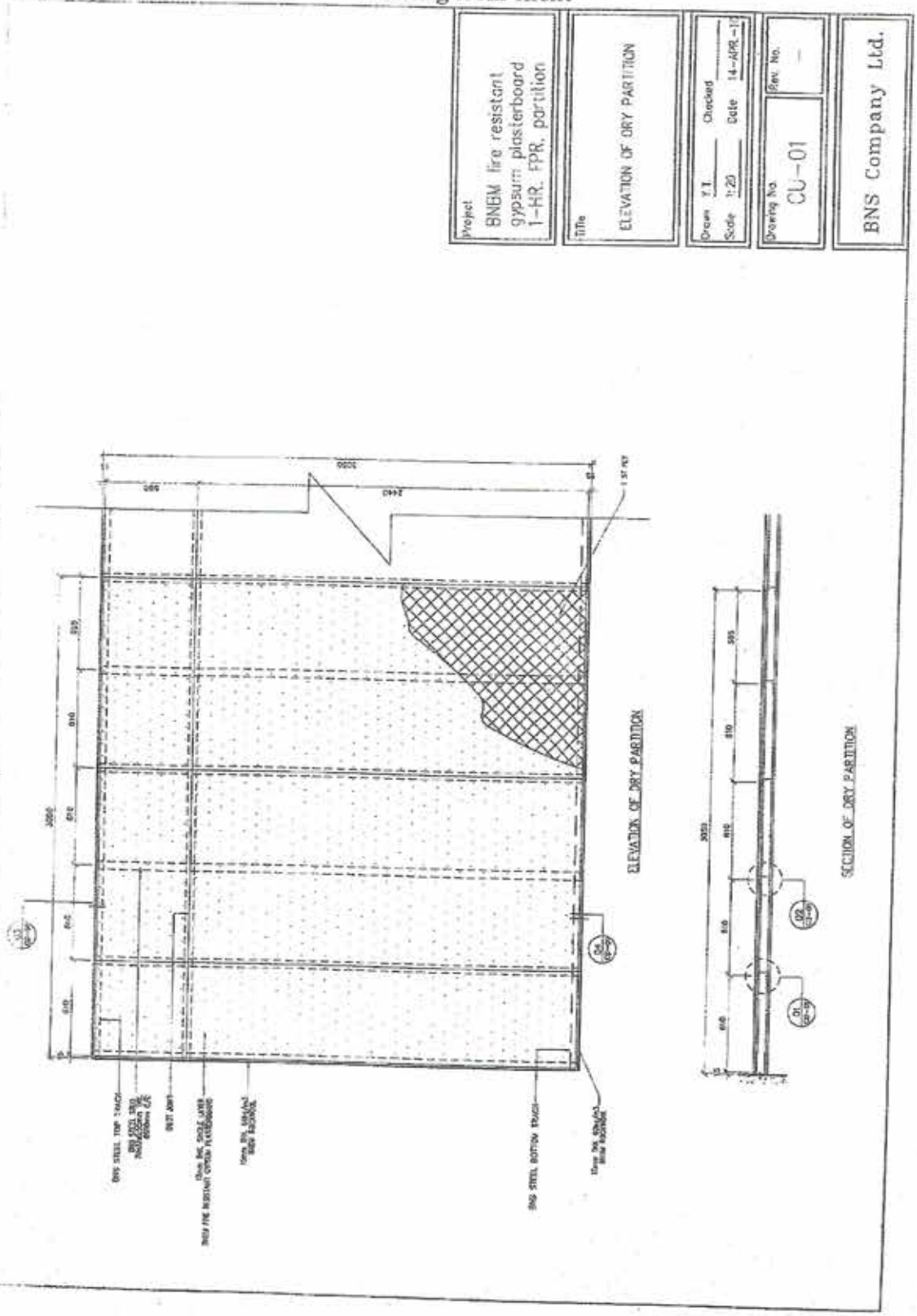
Notes: Locations of thermocouples S1-S5 are shown in Figure 2.

The test was terminated as requested by client after a heating period of 66 minutes.

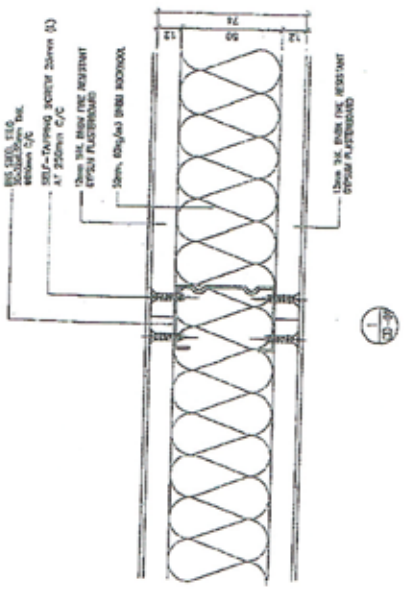
Information from client

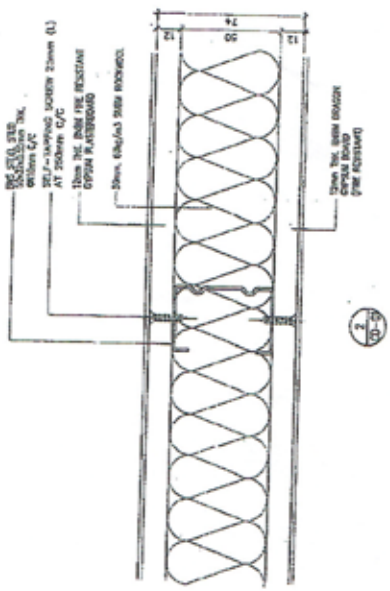
Item	Description	
1	**Partition Lining**	
	Brand	: BNBM fire resistant gypsum plasterboard.
	Nominal thickness	: 12 mm.
	Fixing method	: By 3.5 mm diameter with 25 mm long self-tapping screws at 250 mm c/c and 200 mm c/c along the edges of specimen.
2	**Steel Frame (Vertical Stud)**	
	Brand	: BNS.
	Material	: Galvanized steel.
	Spacing	: 610 mm.
	Sizes	: 50 mm x 32 mm x 0.55 mm thick.
	Fixing method	: By 2 nos. of rivets to fix the steel stud to the bottom runner.
3	**Steel Frame (Top and Bottom Runner)**	
	Brand	: BNS.
	Material	: Galvanized steel.
	Sizes	: 50 mm x 25 mm x 0.55 mm thick.
	Fixing method	: By 6 nos. of 3.5 mm diameter x 32 mm long general purpose nails at 600 mm c/c for each runner.
4	**Rock Wool**	
	Brand	: BNBM.
	Nominal sizes	: 50 mm thick.
	Density (nominal)	: 60 kg/m^3 (not measured by laboratory).
5	**Fire Sealant**	
	Brand	: Firetherm.
	Applied location	: Between the test rig and the edges of specimen.
6	**Gypsum Plaster**	
	Brand	: Goldbond.
	Applied location	: Applied on self- tapping screws and board joints.

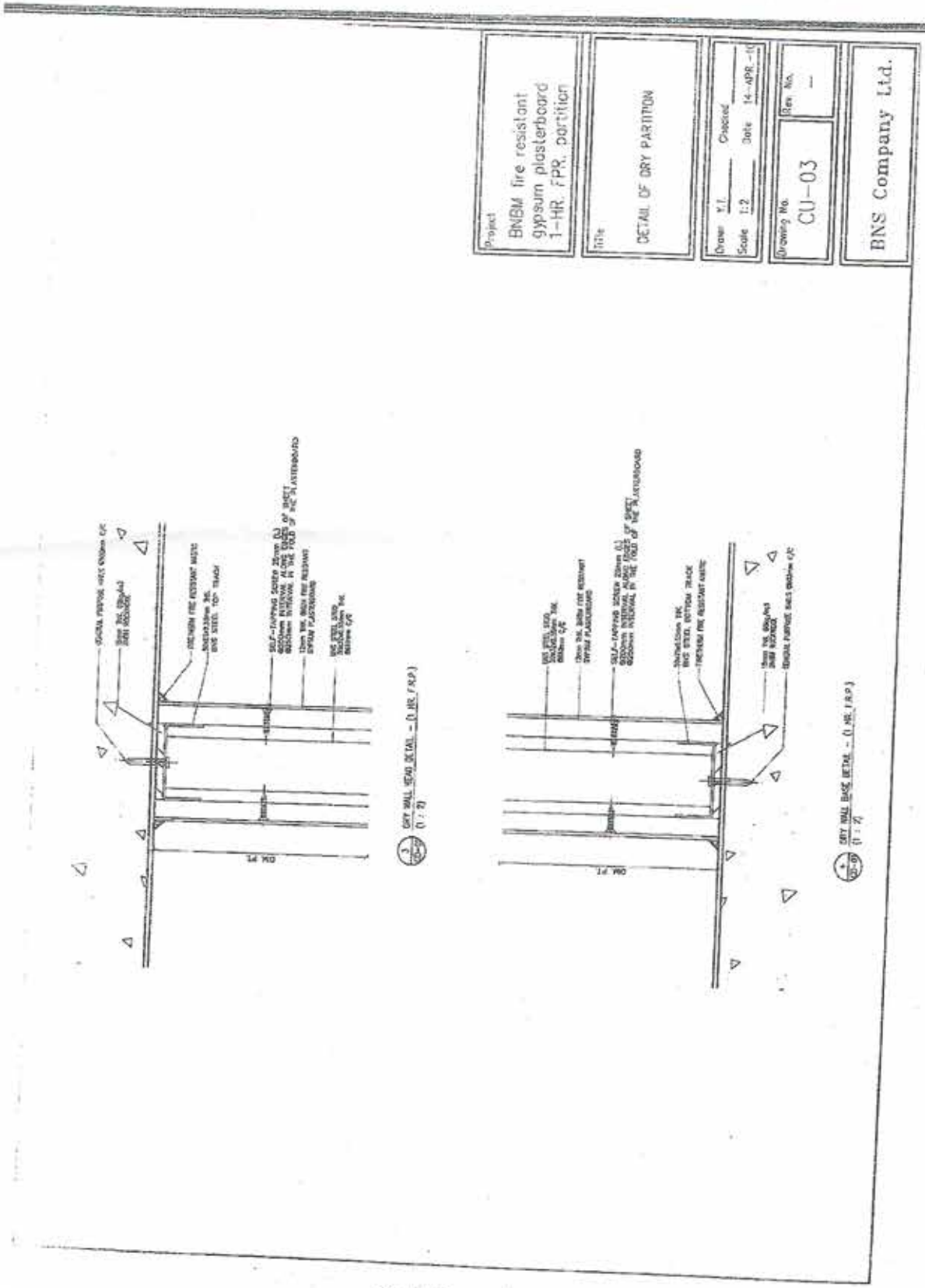
Drawing from client



Project: BNBM fire resistant gypsum plasterboard 1-HR. FPR. partition	Title: DETAIL OF DRY PARTITION	Drawn: Y.T. Checked: Scale: 1:2 Date: 14-APR-10	Drawing No.: CU-02 Rev. No.: -	BNS Company Ltd.







- End of report -

RESEARCH ENGINEERING DEVELOPMENT FAÇADE CONSULTANTS LIMITED -
Fire and Facade Testing Laboratory
雄略幕牆顧問有限公司 - 消防及幕牆檢測實驗中心
DD134, Lung Kwu Tan, Tuen Mun, N.T., Hong Kong

ASSESSMENT REPORT

60 Minutes Fire Resistance Performance of Fully Insulated Partition Boards Wall Systems

Assessment Report No.: R17K09-1A_Issue 1

Issue Date: 8 August 2018

Date of Review: 5 December 2020

Report Sponsor

China Union Building Materials Limited
Workshop 7, 13/F, Fuk Keung Industrial Building,
66-68 Tong Mi Road, Mong Kok, Kowloon, Hong Kong

CONTENT

REVISION HISTORY

Issue date (DD/MM/YYYY)	Issue number	Remark
07/12/2017	0	Initial version
08/08/2018	1	Amendment on date of review

60 MINUTES FIRE RESISTANCE PERFORMANCE OF FULLY INSULATED PARTITION BOARDS WALL SYSTEMS

1 INTRODUCTION

This assessment report presents an appraisal of fully insulated partition boards wall systems with construction details referenced to the one tested and described in R10C17 issued by Research Engineering Development Façade Consultants Limited (RED). This assessment report is prepared for China Union Building Materials Limited of Workshop 7, 13/F, Fuk Keung Industrial Building, 66-68 Tong Mi Road, Mong Kok, Kowloon, Hong Kong.

The proposed fully insulated partition boards wall systems are required to provide a fire resistance performance of 60 minutes integrity and insulation with respect to Section 5 of BS 476: Part 22: 1987.

2 ASSUMPTIONS

The proposed systems are assumed to be installed in a similar manner to that of the previously tested assembly by competent installers. It is assumed that the modified systems will be constructed in a similar manner from materials and components of the same manufacture and equivalent quality as tested with supporting test evidence or otherwise appraised by RED. Further assumptions related to the specific modifications will be stated in the report.

It is also assumed that the supporting structures to which the perimeter of the systems will be fixed are capable of supporting the proposed structure effectively.

Assuming that the issue of the original test report is valid, the current testing standard or testing experience has not been changed and the procedures adopted for the original report have been re-examined and reviewed that there have been no changes to the specification of the construction considered in the original report. If contradictory data or any related evidence becomes available to RED, the assessment will be unconditionally withdrawn and the sponsor will be notified. This report is based on the given information, in which is declared by report sponsor that no contradictory data has become available.

3 SUPPORTING DATA

3.1 Summary of test evidences

Report no.	Section	Description
Primary Test Evidences		
R10C17	4.1	Supporting test evidence for the general construction of fully insulated partition boards wall systems for 60 minutes FRP

3.2 Primary test evidence

3.2.1 RED TEST REPORT NO. R10C17*

A fire resistance test in accordance with Section 5 of BS 476: Part 22: 1987 on a fully insulated 'BNBM' gypsum plasterboard partition system was performed at the RED laboratory on 23 April 2010. The test sponsor was BNS Company Limited who had permitted the use of this data. As requested by the sponsor, the specimen was mounted within concrete lined specimen holder by the test sponsor. The specimen was symmetrical and only one side of the specimen was tested as per client's request.

The partition system had overall dimensions of 3,030 mm wide by 3,050 mm high by 74 mm thick. It was comprised of a layer of 12 mm thick 'BNBM' fire resistant gypsum plasterboard mounted on each side of the galvanized steel frame. A layer of 50 mm thick rock wool was filled in the cavity between the boards. The framework was consisted of 'BNS' steel studs with sizes of 50 mm by 32 mm by 0.55 mm thick and top & bottom runners with sizes of 50 mm by 25 mm by 0.55 mm thick. The boards were fixed to the studs by 3.5 mm diameter with 25 mm long self-tapping screws at 250 mm nominal centres and 200 mm nominal centres along the edges of specimen. A layer of gypsum plaster was applied on the self-tapping screws and board joints. A free edge with approximate 20 mm was applied at the left vertical edge and was filled up with ceramic fibre.

The specimen satisfied the performance requirements specified in Section 5 of BS 476: Part 22: 1987 for the following periods and the test was discontinued after a period of 66 minutes (see R10C17 for full details).

Insulation:	**66**	Minutes
Integrity:	**66**	Minutes

**Note: the test data is more than five years old; we have reviewed this data against the current test procedures as per BS 476: Part 22: 1987 and found it suitable for this assessment.*

4 PROPOSAL & DISCUSSION

4.1 Fully insulated partition boards wall systems for 60 minutes integrity and insulation with respect to Section 5 of BS 476: Part 22: 1987

Proposal

The proposed fully insulated partition boards wall systems are basically similar to the one tested and described in R10C17. The proposed fully insulated partition boards wall systems may provide a fire resistance performance of 60 minutes integrity and insulation with respect to Section 5 of BS 476: Part 22: 1987 with the following variations:

a) the partition boards wall system may be decreased in height;
b) the partition boards wall system may be extended in width;
c) alternative brand of grade S275 steel channels may be used;
d) rockwool with higher density may be used; and
e) the fully insulated partition boards wall systems may be up to 6 m high and the proposed sizes of studs are shown in Table 1.

Table 1 - Sizes of studs for the proposed height of partition boards wall systems

Height up to	Stud sizes (D x F x T)	Studs spacing	Expansion allowance
3 m < Height ≦ 4 m	50 x 32 x 0.55 mm	610 mm c/c	40 mm
4 m < Height ≦ 4.5 m	75 x 32 x 1.0 mm	610 mm c/c	45 mm
4.5 m < Height ≦ 5.5 m	75 x 50 x 1.0 mm 100 x 32 x 1.0 mm	610 mm c/c	55 mm
5.5 m < Height ≦ 6 m	75 x 50 x 1.2 mm 100 x 50 x 1.0 mm	610 mm c/c	60 mm

Discussion

From the test evidence of R10C17, the fully insulated 'BNBM' gypsum plasterboard partition system satisfied 66 minutes integrity and insulation criteria of Section 5 of BS 476: Part 22: 1987.

a) The overall dimensions of the partition boards wall system as tested and described in R10C17 were 3,030 mm wide by 3,050 mm high. The proposed partition boards wall system with reduced height is considered to present a similar or reduced level of risk. This is deemed to be more onerous when the fire exposed area is larger as the potential risk of losing integrity performance will be relatively higher. Hence, the proposal of reducing the height of the partition boards wall system is positively appraised.

b) From the test evidence of R10C17, the partition boards wall system was tested with a vertical free edge of approximate 20 mm wide. The 20 mm wide free edge allows the partition boards wall system

to deform freely under the heating condition, which is used to simulate that the partition boards wall system is a continuous construction. Therefore, the fire resistance performance of the proposed partition boards wall systems with extension in width is expected to be maintained. All other fixing and construction details of the partition boards wall systems shall be the same as the tested prototype.

c) The framework of the partition boards wall system as tested and described in R10C17 was consisted of 'BNS' steel studs with sizes of 50 mm by 32 mm by 0.55 mm thick and top & bottom runners with sizes of 50 mm by 25 mm by 0.55 mm thick. Alternative brand of steel studs may be used, provided that the studs are grade S275 steel. It is reasonable to expect that material properties of the same type of steel will be the same regardless of the brand. Hence, the deflection of partition boards wall systems using different brand of steel channels is expected to be similar as tested, provided that the sizes of steel channels remain unchanged as tested. Therefore, the above proposal is not expected to have any detrimental effect towards the fire resistance performance achieved by the tested prototype.

d) From the test evidence of R10C17, a layer of 50 mm thick 'BNBM' rockwool with density of 60 kg/m^3 was filled in the cavity of the framework of partition boards wall system. It is proposed that 'BNBM' rockwool with higher density may be used. From our experience, the insulation performance of the partition boards wall system mainly depends on the thickness of rockwool filled within the cavity of the framework of partition boards wall system. With the thickness of rockwool remains unchanged as tested, the use of rockwool with higher density is not expected to adversely affect the fire resistance performance achieved by the tested prototype. The use of 'BNBM' rockwool with higher density is positively appraised.

e) The height of the proposed fully insulated partition boards wall systems may be increased up to 6 m high and the proposed sizes of studs are shown in Table 1. In justifying the increase in height of partition boards wall systems, the potential increase in deflection of the system and the ability of the boards to be remained intact with the framework throughout the test duration are the critical factors to be considered. From the test evidences of R10C17, the maximum deflection of the partition boards wall system was 90 mm during the heating period of 60 minutes. The maximum temperature rise of the unexposed side of partition boards wall system as tested and described in R10C17 was less than 80 °C after a heating period of 60 minutes.

For the proposed height of partition boards wall systems up to 4 m, the sizes of studs may remain unchanged as tested. In our opinion, the recorded deflections of the tested partition boards wall systems is not significant and the temperature recorded at the unexposed face is relatively low, it is reasonable to believe from the above test evidences that the proposed partition boards wall systems with height up to 4 m are deemed to be stable. In additions, performance overrun of 10% achieved by the tested partition boards wall system is used to justify the modifications and the above proposal is

considered to be positively appraised.

For the proposed height of partition boards wall systems up to 4.5 m, the calculated deflection based on the use of the same sizes of the studs is the square of the height ratio times the recorded deflection, which is $[(4.5/3)^2 \times 90] = 203$ mm. Therefore, it is suggested that the sizes of the studs shall be increased so as to reduce the expected deflection. In the proposal, the proposed studs are with sizes of 75 mm deep by 32 mm by 1.0 mm thick, the increase in the moment of inertia is about 4.5 times of the original and the increase of overall depth is approximately 1.5 times of the original. The predicted deflection of the proposed 4.5 mm high partition boards wall systems using larger studs is approximate 45 mm, which is less than the one tested and described in R10C17. The span ratio of the predicted system is (45 mm / 4,500 mm) = 0.01, which is much less than the span ratio of the tested system as in R10C17, which was (90 mm / 3,050 mm) = 0.03. With the use of stronger studs, it is likely that the proposed partition boards wall systems will remain stable for the required height. The perimeter fixing of the studs shall remain the same as tested. Also, as the height of the studs are increased, there shall be adequate expansion of at least 45 mm allowance to be incorporated so as to allow rooms for studs' expansion under heating. From our experience, the proposal of increasing the height of partition boards wall systems up to 4.5 m is not expected to have detrimental effect towards the fire resistance performance achieved by the tested prototype.

For the proposed height of partition boards wall systems up to 5.5 m, the calculated deflection based on the use of the same sizes of the studs is the square of the height ratio times the recorded deflection, which is $[(5.5/3)^2 \times 90] = 303$ mm. Therefore, it is suggested that the sizes of the studs shall be increased so as to reduce the expected deflection. In the proposal, the proposed studs are with sizes of 75 mm deep by 50 mm by 1.0 mm thick and 100 mm deep by 32 mm by 1.0 mm thick, the increase in the moment of inertia is about 6 times and 9 times respectively of the original and the increase of overall depth is approximately 1.5 times and 2 times respectively of the original. The predicted deflection of the proposed 5.5 mm high partition boards wall systems using larger studs is approximate 48 mm and 35 mm respectively, which is less than the one tested and described in R10C17. The span ratios of the predicted systems are (48 mm / 5,500 mm) = 0.009 and (35 mm / 5,500 mm) = 0.006, which are much less than the span ratio of the tested system as in R10C17, which was (90 mm / 3,050 mm) = 0.03. With the use of stronger studs, it is likely that the proposed partition boards wall systems will remain stable for the required height. The perimeter fixing of the studs shall remain the same as tested. Also, as the height of the studs are increased, there shall be adequate expansion of at least 55 mm allowance to be incorporated so as to allow rooms for studs' expansion under heating.

For the proposed height of partition boards wall systems up to 6 m, the calculated deflection based on the use of the same sizes of the studs is the square of the height ratio times the recorded deflection, which is $[(6/3)^2 \times 90] = 360$ mm. Therefore, it is suggested that the sizes of the studs shall be increased so as to reduce the expected deflection. In the proposal, the proposed studs are with sizes of 75 mm deep by 50 mm by 1.2 mm thick and 100 mm deep by 50 mm by 1.0 mm thick, the increase

in the moment of inertia is about 7.5 times and 12 times respectively of the original and the increase of overall depth is approximately 1.5 times and 2 times respectively of the original. The predicted deflection of the proposed 6 mm high partition boards wall systems using larger studs is approximate 48 mm and 30 mm respectively, which is less than the one tested and described in R10C17. The span ratios of the predicted systems are (48 mm / 6,000 mm) = 0.008 and (30 mm / 6,000 mm) = 0.005, which are much less than the span ratio of the tested system as in R10C17, which was (90 mm / 3,050 mm) = 0.03. With the use of stronger studs, it is likely that the proposed partition boards wall systems will remain stable for the required height. The perimeter fixing of the studs shall remain the same as tested. Also, as the height of the studs are increased, there shall be adequate expansion of at least 60 mm allowance to be incorporated so as to allow rooms for studs' expansion under heating. Consequently, the height of the proposed fully insulated partition boards wall systems may be increased up to 6 m with the use of studs as shown in Table 1. The insulated partition boards wall systems are expected to satisfy at least 60 minutes integrity and insulation criteria of Section 5 of BS 476: Part 22: 1987, with conservative performance buffer.

5 CONCLUSION

The proposed fully insulated partition boards wall systems are based on the specimen as tested and described in R10C17 and modified as described in section 4.

The proposed fully insulated partition boards wall systems may provide a fire resistance performance of 60 minutes integrity and insulation with respect to Section 5 of BS 476: Part 22: 1987.

6 DECLARATION BY APPLICANT

We, China Union Building Materials Limited, confirm that the materials, components or elements of structure, which is the subject of the test report being reviewed, has not to our knowledge been subjected to another test to the standard against which the assessment is being made.

We agree to withdraw this assessment from circulation should the component or element of structure be the subject of another test to the standard against which the assessment is being made.

We are not aware of any information that could affect the conclusions of this assessment.

If we subsequently become aware of any such information we agree to ask the assessing authority to withdraw the assessment.

7 VALIDITY

This assessment is based on test data, experience and the information supplied. The assessment will be invalidated if the assessed construction is subsequently tested since actual test data is deemed to take precedence over an expressed opinion. Any changes in the specification of product will invalidate this assessment. This assessment relates only to the specimen assessed and does not by itself infer that the product is approved under any other endorsements, approval or certification scheme. Since the appraisal method is under development, the laboratory reserved the right to supersede this assessment in case the appraisal method had been changed.

This report only relates to the specimen(s) tested and may only be reproduced by the sponsor in full, without comment, abridgement and modifications.

8 SIGNATORIES

Assessment by:

Dr. SZE Lip-kit
Authorized Signature
Research Engineering Development
Façade Consultants Limited

Reviewed by:

Ir Dr. YUEN Sai-wing, MHKIE (Fire)
Authorized Signature
Research Engineering Development
Façade Consultants Limited

- End of report -

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

China Union Building Materials Limited
G/F, 619 Reclamation Street,
Mongkok, Kowloon, Hong Kong
Date: 25 January 2021 Our Ref: R21A21-1A

TO WHOM IT MAY CONCERN

Re: Assessment Report no. R17K09-1A_Issue 1 – Fire Resistance Performance of Fully Insulated Partition Boards Wall Systems with respect to 60 Minutes Integrity and Insulation with respect to Section 5 of BS 476: Part 22: 1987

The RED assessment report no. R17K09-1A_Issue 1 was issued on 8 August 2018 and expired on 5 December 2020. The specification and interpretation of test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. Whilst RED has conducted a review of the procedures adopted for the supporting data to ensure they are consistent with current practices, the assessment report no. R17K09-1A_Issue 1 has been reviewed and found satisfactory.

It has been confirmed by China Union Building Materials Limited that there have been no changes to the material specifications and methods of construction considered in the original appraisal of assessment report no. R17K09-1A_Issue 1.

Therefore, it is recommended that the assessment report no. R17K09-1A_Issue 1 is valid until 24 January 2023 and another review shall be undertaken by 23 January 2023.

Yours Sincerely,

Assessment by:

Dr. SZE Lip-kit
Authorized Signature
Research Engineering Development
Façade Consultants Limited

Reviewed by:

Ir Dr. YUEN Sai-wing, MHKIE (Fire)
Authorized Signature
Research Engineering Development
Façade Consultants Limited

TEST REPORT

No. : SZIN1907010650SC
Date : Aug 05, 2019

CUSTOMER NAME: ZHAOQING BEIJING NEW BUILDING MATERIAL PUBLIC CO., LTD
ADDRESS: JINTAO INDUSTRIAL PARK, JINLI, GAOYAO, GUANGDONG PROVINCE

Sample Name	:	BNBM FIRE-RESISTANT GYPSUM BOARD
Product Specification	:	2440X1220X12MM
Manufacturer	:	ZHAOQING BEIJING NEW BUILDING MATERIAL PUBLIC CO., LTD
Buyer	:	DEALERS
Material and Mark	:	GYPSUM

Above information and sample(s) was/were submitted and confirmed by the client. SGS, however, assumes no responsibility to verify the accuracy, adequacy and completeness of the sample information provided by client.

****

SGS Ref. No.	:	XMIN190701735CCM
Date of Receipt	:	Jul 23, 2019
Testing Start Date	:	Jul 23, 2019
Testing End Date	:	Aug 05, 2019
Test result(s)	:	For further details, please refer to the following page(s) (Unless otherwise stated the results shown in this test report refer only to the sample(s) tested)

Signed for
SGS-CSTC Standards Technical
Services Co., Ltd. Shenzhen Branch
Testing Center

Helen Xiong

Helen_Xiong
Authorized signatory

SGS[illegible] 518129 t (86-755) 25328282 f (86-755) 83197625 www.sgsgroup.com.cn
中国·深圳·龙岗区坂田吉华路430号江岭工业园4楼SGS大楼 邮编: 518129 t (86-755) 25328282 f (86-755) 83197625 e sgs.china@sgs.com

Summary of test results:

(Average value)

No	Test items		Test methods	EN 520:2004 +A1-2009 Requirements (Type F, Other thickness - Nominal board thickness 12mm[note])	Test results	Conclusions
1	Density		EN 520:2004 +A1-2009 section 5.11	/	Ave.: 0.8×10^3 kg/m^3	/
2	Flexural breaking load	Transverse direction	EN 520:2004 +A1-2009 section 5.7	Ave.≥202 N Individual≥182 N	Ave.: 306N Min: 292N	Pass
		Longitudinal direction		Ave.≥516 N Individual≥465 N	Ave.: 574N Min: 567N	Pass

Note: The nominal board thickness is declared by client.

1. Density

Test Method:

EN 520:2004 +A1-2009 Gypsum plasterboards - Definitions, requirements and test methods-section 5.11 Specimens: gypsum board, 400mm×300mm×12.5mm, 6pcs

Test Result:

Specimens identification No.	1	2	3	4	5	6
Density ($\times 10^3 kg/m^3$)	0.8	0.8	0.8	0.8	0.8	0.8
Arithmetic mean of the density ($\times 10^3 kg/m^3$)	0.8					

2. Flexural breaking load

Test Method:

EN 520:2004 +A1-2009 Gypsum plasterboards - Definitions, requirements and test methods-section 5.7 Specimens: gypsum board, 400mm×300mm×12.5mm, 6pcs, 3pcs Transverse direction and 3pcs Longitudinal direction

Loading Rate: 250N/min

Span: 350mm

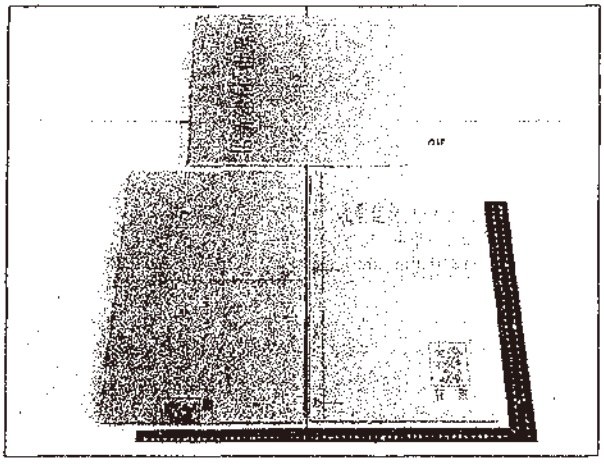
Test Result:

Test item	Test results	
Flexural breaking load	Transverse direction	Ave.: 306N Min: 292N
	Longitudinal direction	Ave.: 574N Min: 567N

TEST REPORT

No. : SZIN1907010650SC
Date : Aug 05, 2019

Specimen photograph:



Appendix information:

The above tests were carried out by SGS-CSTC Standards Technical Services Co., Ltd. Xiamen Branch.

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

SGS-CSTC Standards Technical Services Co., Ltd. Xiamen Branch 518129 t (86-755) 25328282 f (86-755) 83197625 www.sgsgroup.com.cn
中国·深圳·龙岗区坂田吉华路430号江夏工业园4栋SGS大楼 邮编: 518129 t (86-755) 25328282 f (86-755) 83197625 e sgs.china@sgs.com

TEST REPORT

No. : SZIN1907010645SC
Date : Aug 05, 2019
Page: 1 of 3

CUSTOMER NAME: ZHAOQING BEIJING NEW BUILDING MATERIAL PUBLIC CO., LTD
ADDRESS: JINTAO INDUSTRIAL PARK, JINLI, GAOYAO, GUANGDONG PROVINCE

Sample Name	:	BNBM FIRE-RESISTANT GYPSUM BOARD
Product Specification	:	2440X1220X12MM
Manufacturer	:	ZHAOQING BEIJING NEW BUILDING MATERIAL PUBLIC CO., LTD
Buyer	:	DEALERS
Material and Mark	:	GYPSUM

Above information and sample(s) was/were submitted and confirmed by the client. SGS, however, assumes no responsibility to verify the accuracy, adequacy and completeness of the sample information provided by client.

****

Date of Receipt	:	Jul 23, 2019
Testing Start Date	:	Jul 23, 2019
Testing End Date	:	Aug 05, 2019
Test result(s)	:	For further details, please refer to the following page(s) (Unless otherwise stated the results shown in this test report refer only to the sample(s) tested)

Signed for
SGS-CSTC Standards Technical
Services Co., Ltd. Shenzhen Branch
Testing Center

Helen Xiong

Helen_Xiong
Authorized signatory

SGS Bldg No. 4 Jianye Industrial Park, No. 430 Jihua Road, Bantian, Longgang District, Shenzhen China 518129 t (86-755) 25328282 f (86-755) 83197625 www.sgsgroup.com.cn
中国・深圳・龙岗区坂田吉华路430号江源工业园4栋SGS大楼 邮编: 518129 t (86-755) 25328282 f (86-755) 83197625 e sgs.china@sgs.com

TEST REPORT

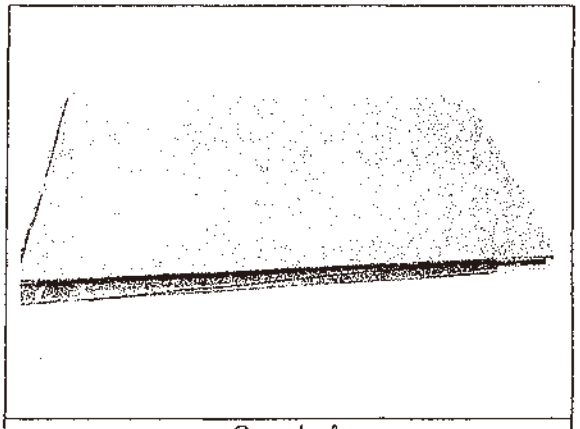
No. : SZIN1907010645SC
Date : Aug 05, 2019

Summary of Results:

No.	Test Item	Test Method	Result	Conclusion
1	Width	EN 520:2004+A1:2009 section 5.2	1218mm	Pass
2	Length	EN 520:2004+A1:2009 section 5.3	2437mm	Pass
3	Thickness	EN 520:2004+A1:2009 section 5.4	12.4mm	Pass

Note: Pass : Meet the requirements;
Fail : Does not meet the requirements;
/ : Not Apply to the judgment.

Original Sample Photo:



Sample A

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
中国·深圳·龙岗区坂田街道华荣路430号江夏工业园4栋SGS大楼 邮编: 518129
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t (86-755) 25328282 f (86-755) 83197625 e sgs.china@sgs.com

TEST REPORT

1. Test Item: Width

Sample Description: See photo

Test Method: EN 520:2004+A1:2009 section 5.2

Test Result:

Test Item	Test Result	Requirement in EN 520:2004+A1:2009 section 4.9.2.1	Conclusion
Width	1218mm	1220mm tolerance -4mm~0mm	Pass

2. Test item: Length

Sample Description: See photo

Test Method: EN 520:2004+A1:2009 section 5.3

Test Result:

Test Item	Test Result	Requirement in EN 520:2004+A1:2009 section 4.9.2.2	Conclusion
Length	2437mm	2440mm tolerance -5mm~0mm	Pass

3. Test Item: Thickness

Sample Description: See photo

Test Method: EN 520:2004+A1:2009 section 5.4

Test Result:

Test Item	Test Result	Requirement in EN 520:2004+A1:2009 section 4.9.2.3	Conclusion
Thickness	12.4mm	12.0mm tolerance -0.5mm~0.5mm	Pass

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

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre
5 Lok Yi Street, Tai Lam
Tuen Mun, NT
Hong Kong

Client Ref. : --

Report No. : G24375ST244042(1)

REPORT ON DETERMINATION OF SURFACE HARDNESS OF PLASTERBOARD

Information Supplied by Client

Client : 北新集團建材股份有限公司
Beijing New Building Materials Public Limited Company

Project : TESTING OF PLASTERBOARD

Sample Description : 耐火紙面石膏板
Type : Type F
Fire-Resistant Gypsum Board
Brand Name: 龍牌 BNBM
Nominal Size : 2440 x 1220 x 12 mm

Laboratory Information

Lab. Sample I.D. : ST244042/15A-15C

Date Received : 17 June 2024

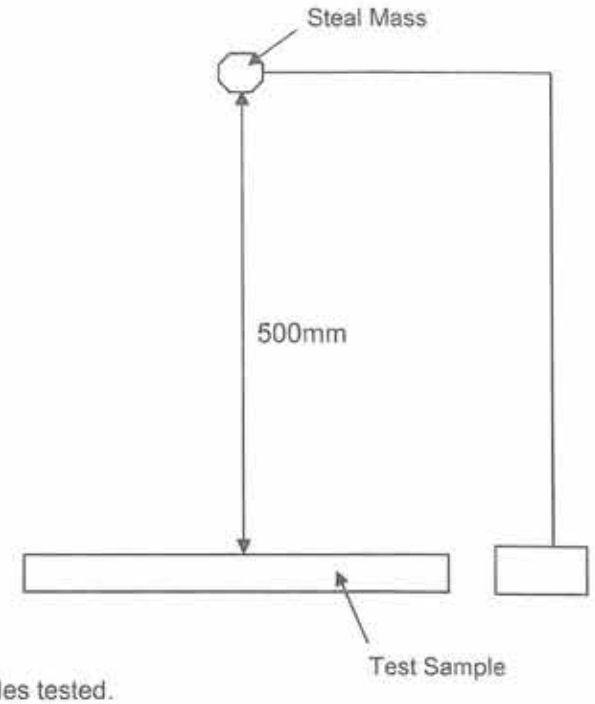
Date Test Started : 06 August 2024

Date Test Completed : 06 August 2024

Test Method : BS EN 520, Clause 5.12

Test Results

Lab. Sample I.D.	Diameter of the coloured impact (mm)	Average of the Diameter (mm)
ST244042/15A	18	17.33
ST244042/15B	15	
ST244042/15C	19	



Remarks : 1.) The test results relate only to the samples tested.
2.) The results apply to the sample as received.

Checked by : Date : 12 AUG 2024 Certified by : Date : 12 AUG 2024

Ng Shu Shing Chris
Assistant Manager (Product Testing Laboratory)

End of Report

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre
5 Lok Yi Street, Tai Lam
Tuen Mun, NT
Hong Kong

Client Ref. : --

Report No. : G24375ST244042(3)

REPORT ON DETERMINATION OF WATER ABSORPTION OF PLASTERBOARD

Information Supplied by Client

Client : 北新集團建材股份有限公司
Beijing New Building Materials Public Limited Company

Project : TESTING OF PLASTERBOARD

Sample Description : 耐火紙面石膏板
Type : Type F
Fire-Resistant Gypsum Board
Brand Name: 龍牌 BNBM
Nominal Size : 2440 x 1220 x 12 mm

Laboratory Information

Lab. Sample I.D. : ST244041/5-6

Date Received : 17 June 2024

Date Test Started : 01 August 2024

Date Test Completed : 01 August 2024

Test Method : BS EN 520, Clause 5.9.1 and 5.9.2

Test Results

Lab. Sample I.D.		Length of Sample (mm)	Width of Sample (mm)	Thickness of Sample (mm)	Weight of Sample (g)	Water Absorption (%)
ST244042/5	Before Test	200.23	200.19	12.44	324.77	28.0
	After in water 23°C for 2 hours	200.24	200.21	12.46	451.04	
ST244042/6	Before Test	200.90	200.65	12.40	330.10	27.8
	After in water 23°C for 2 hours	200.81	200.59	12.41	457.43	

Remarks : 1.) The test results relate only to the samples tested.
2.) The results apply to the sample as received.

Checked by : _____ Date : 12 AUG 2024

Certified by : _____ Date : 12 AUG 2024

Ng Shu Shing Chris
Assistant Manager (Product Testing Laboratory)

End of Report

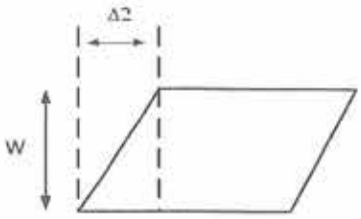
FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre
5 Lok Yi Street, Tai Lam
Tuen Mun, NT
Hong Kong

Client Ref. : --
Report No. : G24375ST244042(4)

REPORT ON THE DETERMINATION OF SQUARENESS OF GYPSUM BOARD

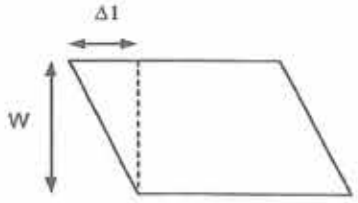
Information Supplied by Client

Client : 北新集團建材股份有限公司
Beijing New Building Materials Public Limited Company
Project : TESTING OF PLASTERBOARD
Sample Description : 耐火紙面石膏板
Type : Type F
Fire-Resistant Gypsum Board
Brand Name: 龍牌 BNBM
Nominal Size : 2440 x 1220 x 12 mm



Laboratory Information

Lab. Sample I.D. : ST244041/7-9
Date Received : 17 June 2024
Date Test Started : 02 August 2024
Date Test Completed : 02 August 2024
Test Method : BS EN 520 : 2004 + A1 : 2009, Clause 5.5



Test Results

Lab. Sample I.D.	Distance (mm)			Squareness (millimetres per metre)		BS EN Requirement / Squareness (mm/m)
	Δ1	Δ2	W	Half Sum	Half Difference	
ST244042/7	1.4	1.7	1219	1.276	0.111	<2.5
ST244042/8	1.5	1.3	1218	1.133	-0.057	
ST244042/9	1.5	1.8	1216	1.332	0.132	

Note : 1.) Half sum = Δ1 + Δ2 / 2W
2.) Half difference = Δ2 – Δ1 / 2W

Remarks : 1.) The test results relate only to the samples tested.
2.) The results apply to the sample as received.

Checked by : Alex Date : 12 AUG 2024 Certified by : Date : 12 AUG 2024

Ng Shu Shing Chris
Assistant Manager (Product Testing Laboratory)

End of Report

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre
5 Lok Yi Street, Tai Lam
Tuen Mun, NT
Hong Kong

Client Ref. : --

Report No. : G24375ST244042(5)

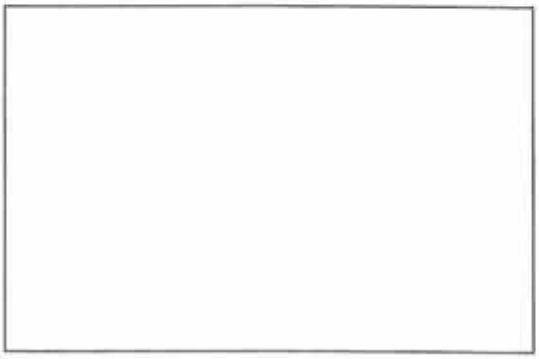
REPORT ON THE DETERMINATION OF TAPER PROFILE (TAPER DEPTH) OF GYPSUM BOARD

Information Supplied by Client

Client : 北新集團建材股份有限公司
Beijing New Building Materials Public Limited Company

Project : TESTING OF PLASTERBOARD

Sample Description : 耐火紙面石膏板
Type : Type F
Fire-Resistant Gypsum Board
Brand Name: 龍牌 BNBM
Nominal Size : 2440 x 1220 x 12 mm



Laboratory Information

Lab. Sample I.D. : ST244042/7-9
Date Received : 17 June 2024
Date Test Started : 02 August 2024
Date Test Completed : 02 August 2024
Test Method : BS EN 520 : 2004 + A1 : 2009, Clause 5.6.2

Test Results

Lab. Sample I.D.	Measurement of Taper Depth (mm)		BS EN Requirement
	1	2	
ST244042/7	1.92	2.67	0.6-2.5 mm
ST244042/8	1.97	2.26	
ST244042/9	2.09	2.00	

Remarks : 1.) The test results relate only to the samples tested.
2.) The results apply to the sample as received.

Checked by : Date : 12 AUG 2024 Certified by : Date : 12 AUG 2024

Ng Shu Shing Chris
Assistant Manager (Product Testing Laboratory)

End of Report

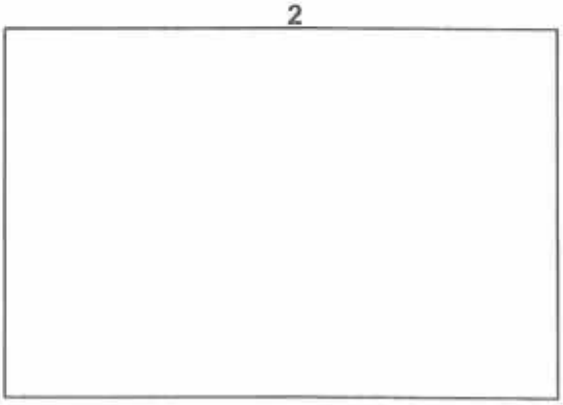
FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre
5 Lok Yi Street, Tai Lam
Tuen Mun, NT
Hong Kong

Client Ref. : --
Report No. : G24375ST244042(6)

REPORT ON THE DETERMINATION OF TAPER PROFILE (TAPER WIDTH) OF GYPSUM BOARD

Information Supplied by Client

Client : 北新集團建材股份有限公司
Beijing New Building Materials
Public Limited Company
Project : TESTING OF PLASTERBOARD
Sample Description : 耐火紙面石膏板
Type : Type F
Fire-Resistant Gypsum Board
Brand Name: 龍牌 BNBM
Nominal Size : 2440 x 1220 x 12 mm



Laboratory Information

Lab. Sample I.D. : ST244042/7-9
Date Received : 17 June 2024
Date Test Started : 02 August 2024
Date Test Completed : 02 August 2024
Test Method : BS EN 520 : 2004 + A1 : 2009, Clause 5.6.1

Test Results

Lab. Sample I.D.	Measurement of Taper Width (mm)		BS EN Requirement
	1	2	
ST244042/7	53	49	40 - 80 mm
ST244042/8	52	51	
ST244042/9	51	53	

Remarks : 1.) The test results relate only to the samples tested.
2.) The results apply to the sample as received.

Checked by : Date : 12 AUG 2024 Certified by : Date : 12 AUG 2024

Ng Shu Shing Chris
Assistant Manager (Product Testing Laboratory)

End of Report

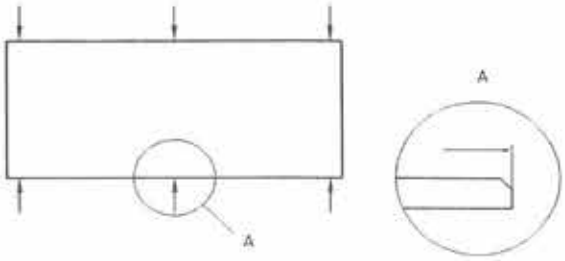
FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre
5 Lok Yi Street, Tai Lam
Tuen Mun, NT
Hong Kong

Client Ref. : --
Report No. : G24375ST244042(7)

REPORT ON THE DETERMINATION OF WIDTH OF GYPSUM BOARD

Information Supplied by Client

Client : 北新集團建材股份有限公司
Beijing New Building Materials Public Limited Company
Project : TESTING OF PLASTERBOARD
Sample Description : 耐火紙面石膏板
Type : Type F
Fire-Resistant Gypsum Board
Brand Name: 龍牌 BNBM
Nominal Size : 2440 x 1220 x 12 mm



Laboratory Information

Lab. Sample I.D. : ST244042/7-9
Date Received : 17 June 2024
Date Test Started : 02 August 2024
Date Test Completed : 02 August 2024
Test Method : BS EN 520 : 2004 + A1 : 2009, Clause 5.2

Test Results

Lab. Sample I.D.	Measurement of width (mm)			Maximum Difference (mm)	Average (mm)	BS EN Requirement / width tolerance (mm)
	1	2	3			
ST244042/7	1219	1219	1219	-1	1219.0	0~-8
ST244042/8	1218	1219	1218	-2	1218.3	
ST244042/9	1215	1219	1219	-5	1217.7	

Remarks : 1.) The test results relate only to the samples tested.
2.) The results apply to the sample as received.

Checked by : Date : 12 AUG 2024 Certified by : Date : 12 AUG 2024

Ng Shu Shing Chris
Assistant Manager (Product Testing Laboratory)

End of Report

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre
5 Lok Yi Street, Tai Lam
Tuen Mun, NT
Hong Kong

Client Ref. : --

Report No. : G24375ST244042(8)

REPORT ON THE DETERMINATION OF THICKNESS OF GYPSUM BOARD

Information Supplied by Client

Client : 北新集團建材股份有限公司
Beijing New Building Materials Public Limited Company

Project : TESTING OF PLASTERBOARD

Sample Description : 耐火紙面石膏板
Type : Type F
Fire-Resistant Gypsum Board
Brand Name: 龍牌 BNBM
Nominal Size : 2440 x 1220 x 12 mm

Laboratory Information

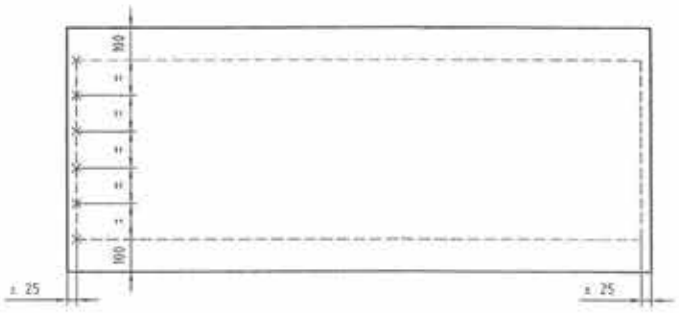
Lab. Sample I.D. : ST244042/7-9

Date Received : 17 June 2024

Date Test Started : 02 August 2024

Date Test Completed : 02 August 2024

Test Method : BS EN 520 : 2004 + A1 : 2009, Clause 5.4



Test Results

Lab. Sample I.D.	Measurement of thickness (mm)						Average (mm)	BS EN Requirement / Average thickness difference (mm)
	1	2	3	4	5	6		
ST244042/7	12.24	12.31	12.7	12.52	12.59	12.74	12.5	±0.5 mm (12-13mm)
ST244042/8	12.48	12.5	12.6	12.54	12.41	12.34	12.5	
ST244042/9	12.4	12.62	12.58	12.34	12.32	12	12.4	

Remarks : 1.) The test results relate only to the samples tested.
2.) The results apply to the sample as received.

Checked by : _____ Date : 12 AUG 2024 Certified by : _____ Date : 12 AUG 2024

Ng Shu Shing Chris
Assistant Manager (Product Testing Laboratory)

End of Report

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre
5 Lok Yi Street, Tai Lam
Tuen Mun, NT
Hong Kong

Client Ref. : --

Report No. : G24375ST244042(9)

REPORT ON THE DETERMINATION OF LENGTH OF GYPSUM BOARD

Information Supplied by Client

Client : 北新集團建材股份有限公司
Beijing New Building Materials Public Limited Company

Project : TESTING OF PLASTERBOARD

Sample Description : 耐火紙面石膏板
Type : Type F
Fire-Resistant Gypsum Board
Brand Name: 龍牌 BNBM
Nominal Size : 2440 x 1220 x 12 mm

Laboratory Information

Lab. Sample I.D. : ST244042/7-9

Date Received : 17 June 2024

Date Test Started : 02 August 2024

Date Test Completed : 02 August 2024

Test Method : BS EN 520 : 2004 + A1 : 2009, Clause 5.3

Test Results

Lab. Sample I.D.	Measurement of length (mm)			Maximum Difference (mm)	Average (mm)	BS EN Requirement / Length tolerance (mm)
	1	2	3			
ST244042/7	2439	2439	2439	-1	2439.0	0~-6
ST244042/8	2439	2438	2439	-2	2438.7	
ST244042/9	2438	2438	2439	-2	2438.3	

Remarks : 1.) The test results relate only to the samples tested.
2.) The results apply to the sample as received.

Checked by : Date : 12 AUG 2024 Certified by : Date : 12 AUG 2024

Ng Shu Shing Chris
Assistant Manager (Product Testing Laboratory)

End of Report

中国认可
国际互认
检测
TESTING
CNAS L6069

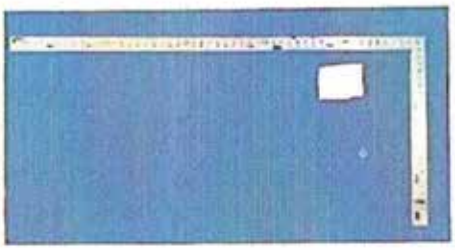
Report No. TC.19.07.004795

Date of Issue 07/23/2019

Applicant: Zhaoqing Beijing New Building Material Public Co.,Ltd.

Applicant address: Jintao Industrial Park, Jinli, Gaoyao, Guangdong Province

Description of the test subject:

Sample	Description	Photo
001	Sample No.: BNBM Gypsum Board Sample Description: Fire-resistant gypsum board, moisture-resistant gypsum board, standard gpsum board Nominal Thickness(mm): (9.5mm+12mm +12.5mm+15mm)layered and wired to form 50mm) End use: Wall partition; ceiling; etc Buyer: Dealer Manufacturer: Zhaoqing Beijing New Building Material Public Co.,Ltd. Country of origin: China	

Receipt Date of Sample: 07/15/2019

Date of Testing: From 07/15/2019 to 07/23/2019

Sample submitted: The sample(s) was (were) submitted by applicant and identified.

Conclusion:

Test Items			Conclusion
No.	Items	Standard	
1	Non-combustibility test for materials	BS 476-4:1970 (R2012)	Pass

Note: (1) General Terms & Conditions as mentioned overleaf.(2) The results relate only to the items tested.(3) The test report shall not be reproduced except in full without the written approval of the company. (4) Samples are tested as received.

Changzhou Jinbiao Railway Transportation Testing Service Co.,Ltd.

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检测
TESTING
CNAS L6069

Report No. TC.19.07.004795

Date of Issue 07/23/2019

Test Results

1. BS 476-4:1970 (R2012) Fire tests on building materials and structures. Non-combustibility test for materials

1.1 Sample describe

Specimen size	50mm x 40mm x 40mm

conditioning	temperature	relative humidity	Period
	60±5°C	desiccative	24h

1.2 Test result

Specimen	1	2	3	Average
Furnace temperature (initial) (°C)	750	751	750	750
Duration of sustained flaming inside the furnace (s)	–	–	–	–
Highest temperature of the centre of specimen Tc(max) (°C)	752	752	751	752
Final temperature of the centre of specimen Tc(final °C)	751	751	750	751
Highest temperature of furnace inside TF(max) (°C)	753	754	753	753
Final temperature of furnace inside TF(final °C)	750	751	751	751
Furnace inside temperature rise ΔTF(°C)	3	3	3	3

Requirement:
The material shall be deemed non-combustible if, during the test, none of the three specimens either
1) Causes the temperature reading from either of the two thermocouples to rise by 50 deg C or more above the initial furnace temperature (the stabilized temperature is 750°C), or
2) Is observed to flame continuously for 10 s or more inside the furnace. Otherwise, the material shall be deemed combustible.

Conclusion: According to the test results, the sample **complied** with the requirement of BS 476-4:1970 (R2012).

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 the sole criterion for assessing the potential smoke and toxicity hazard of the product in use.

Changzhou Jinbao Railway Transportation Testing Service Co.,Ltd.

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Report No. TC.19.07.004795

Date of Issue 07/23/2019

Changzhou Jinbiao Railway Transportation Technical Service Co., Ltd.

Drafted by:

Lynn liu

Approved by:

Shen hui

-End of Report-

Changzhou Jinbiao Railway Transportation Technical Service Co.,Ltd.

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No. 164, Wuyi Road ,Lucheng Street, Wujin District, Changzhou city, Jiangsu Province, 213015 P.R. China

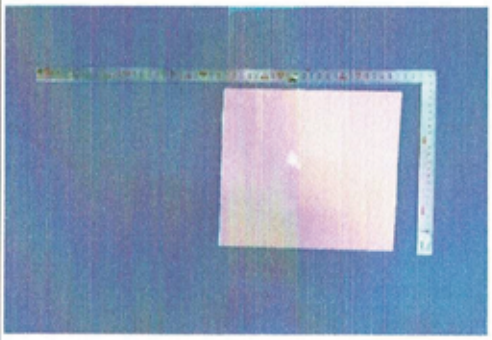
Report No. TC.18.08.004907

Date of Issue 09/10/2018

Applicant: Zhaoqing Beijing New Building Material Public Co.,Ltd.

Applicant address: Tintao Industry Zone, Jinli Town, Gaoyao City, Guangdong Province

Description of the test subject:

Sample	Description	Photo
001	Name: Gypsum plasterboard Style No:Fire-resistant Nominal thickness: 12mm Brand: BNBM End use: wall partition; ceiling; etc... Manufacturer: Zhaoqing Beijing New Building Material Public Co.,Ltd. Country of origin: China	

Receipt Date of Sample: 08/31/2018

Date of Testing: From 08/31/2018 to 09/10/2018

Sample submitted: The sample(s) was (were) submitted by applicant and identified.

Conclusion:

Test Items			Conclusion
No.	Items	Standard	
1	Fire tests on building materials and structures —Part 6: Method of test for fire propagation for products	BS 476-6: 1989+A1:2009	See test result

Changzhou Jinbiao Railway Transportation Technical Service Co.,Ltd.

Phone: +86/ (0) 519-8123-9872
Fax: +86/ (0) 519-8123-9872 ext.123
E-mail: hui.shen@tuv-sud.cn
www.tuv-sud.cn

No. 164, Wuyi Road ,Lucheng Street, Wujin District, Changzhou city, Jiangsu Province, 213015 P.R. China

Report No. TC.18.08.004907

Date of Issue 09/10/2018

Test Results

1. BS476-6:1989+A1:2009Fire tests on building materials and structures —Part 6: Method of test for fire propagation for products

1.1 Sample details

Size of specimen	225mm×225mm
Thickness	About 12 mm

Precondition	Temperature	Relative humidity	Duration
	23±2°C	50±5%R.H.	48h

1.2 Test result

Specimens	Index of performance of specimens			The index of performance
	S_1	S_2	S_3	S
A	0.5	0.7	0.3	1.5
B	0.4	0.8	0.4	1.6
C	0.4	0.7	0.3	1.4

Sample quantity	i_1	i_2	i_3	Fire propagation index I
3	0.4	0.7	0.3	1.4

Note: S, S1, S2 and S3 are given by the following expressions.

$$S_1 = \sum_{t=0.5}^{t=3} \frac{\theta_s - \theta_c}{10t} \quad ; \quad S_2 = \sum_{t=4}^{t=10} \frac{\theta_s - \theta_c}{10t} \quad ; \quad S_3 = \sum_{t=12}^{t=20} \frac{\theta_s - \theta_c}{10t}$$

$$S = S_1 + S_2 + S_3$$

Fire propagation index:

$$i_1 = 1/3\left[(S_1)_A + (S_1)_B + (S_1)_C\right] \quad ; \quad i_2 = 1/3\left[(S_2)_A + (S_2)_B + (S_2)_C\right]$$

$$i_3 = 1/3\left[(S_3)_A + (S_3)_B + (S_3)_C\right] \quad ; \quad I = i_1 + i_2 + i_3$$

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No. 164, Wuyi Road ,Lucheng Street, Wujin District, Changzhou city, Jiangsu Province, 213015 P.R. China

Report No. **TC.18.08.004907**

Date of Issue **09/10/2018**

Remark:

θS the temperature rise for the flue gases
θC the actual temperature rise to the nearest °C

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 the sole criterion for assessing the potential smoke and toxicity hazard of the product in use.

Changzhou Jinbiao Railway Transportation Technical Service Co., Ltd.

Drafted by: Approved by:

Lynn liu Shen hui

-End of Report-

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No. 164, Wuyi Road ,Lucheng Street, Wujin District, Changzhou city, Jiangsu Province, 213015 P.R. China

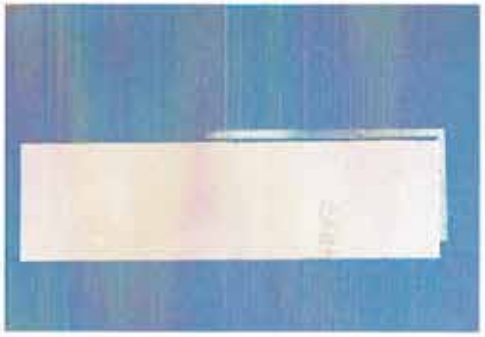
Report No. TC.18.08.004908

Date of Issue 09/10/2018

Applicant: Zhaoqing Beijing New Building Material Public Co.,Ltd.

Applicant address: Tintao Industry Zone, Jinli Town, Gaoyao City, Guangdong Province

Description of the test subject:

Sample	Description	Photo
001	Name: Gypsum plasterboard Style No: Fire resistant Nominal thickness: 12mm Brand: BNBM End use: wall partition; ceiling; etc... Manufacturer: Zhaoqing Beijing New Building Material Public Co.,Ltd. Country of origin: China	

Receipt Date of Sample: 08/31/2018

Date of Testing: From 08/31/2018 to 09/10/2018

Sample submitted: The sample(s) was (were) submitted by applicant and identified.

Conclusion:

Test Items			Conclusion
No.	Items	Standard	
1	Fire tests on building materials and structures Part 7. Method of test to determine the classification of the surface spread of flame of products	BS 476-7:1997	Class 1

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Report No. TC.18.08.004908

Date of Issue 09/10/2018

Test Results

1. BS 476-7:1997: Fire tests on building materials and structures Part 7. Method of test to determine the classification of the surface spread of flame of products

1.1 Sample details:

Specimen size	885mm×270mm
Thickness	About 12 mm
Conditioning	Constant mass at a temperature of 23±2°Cand a relative humidity of 50±10%

1.2 Test results:

Distance (mm)	Time to travel to indicated distance (second)					
	1	2	3	4	5	6
165	--	--	--	--	--	--
455	--	--	--	--	--	--
710	--	--	--	--	--	--
825	--	--	--	--	--	--
Maximum distance traveled at 1.5 minutes (mm)	0	0	0	0	0	0
Maximum distance traveled during the whole test (mm)	0	0	0	0	0	0
Time to reach maximum distance traveled(second)	--	--	--	--	--	--
Observations	--					

Remark: six specimens are usually tested. If the test on any specimen is deemed to be invalid, as defined in the standard, it is permissible for up to a maximum of nine specimens to be tested in order to obtain the six valid test results.

Classification:
In accordance with the tested results and the classifications defined in BS 476: Part 7:1997, the submitted sample is classified as **Class 1**

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Report No. **TC.18.08.004908**

Date of Issue **09/10/2018**

Classification requirements:

Classification	Spread of flame at 1.5 min		Final spread of flame	
	Limit (mm)	Limit for one specimen in sample(mm)	Limit (mm)	Limit for one specimen in sample(mm)
Class 1	165	165+25	165	165+25
Class 2	215	215+25	455	455+25
Class 3	265	265+25	710	710+25
Class 4	Exceeding the limits for class 3			

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 the sole criterion for assessing the potential smoke and toxicity hazard of the product in use.

Changzhou Jinbiao Railway Transportation Technical Service Co., Ltd.

Drafted by:

Lynn liu

Approved by:

Shen hui

-End of Report-

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Acoustic Testing Services Limited
聲學測試服務有限公司

Sound Transmission Loss
Test Report for
Drywall System (One Layer of BNBM Regular)

(Report No.: ATS05-005-RP003)

REPORT TO: **ENTASIS LIMITED**

ADDRESS: 28/F., Devon House,
Tai Koo Place, 979 King's Road,
Hong Kong

ATTN.: **Mr. Fred Chan / Dr. Ernest Cheng**

Issued by:

Ir. Dr. F. Chong
CEng, RPE, MHKIE, MIMechE,
MCIBSE, MIOA, MHKIOA

Date of Issued: 09 August 2005

Unit H, 2/F., Century Industrial Center, 33-35 Au Pui Wan Street, Fo Tan, Shatin, New Territories, Hong Kong
Tel: (852) 2690 9126 Fax: (852) 2690 9125 http://www.atsl.com.hk

1. Method of Measurement

The measurement for sound transmission loss of the drywall system provided by Entasis Limited was carried out according to ASTM E 90 "Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions" in the reverberation rooms of Acoustic Testing Services Limited. And the single number rating of airborne sound transmission loss is given as Sound Transmission Class (STC) by evaluated in accordance with ASTM E413 – 87 "Classification for Rating Sound Insulation".

2. Details of Measurement

2.1 Principle of Measurement

The sound transmission loss of a partition is usually measured in a laboratory by placing the element in an opening between two adjacent reverberant rooms designed for such tests. Noise is introduced into one of the rooms, referred to as the source room, and part of the sound energy is transmitted through the test element into the second room, referred to as the receiving room. The resulting mean space-average sound pressure levels in the source room and the receiving room is L_1 and L_2, respectively.

The sound transmission loss is given by

$$TL = L_1 - L_2 + 10\log(S/A) \quad \text{... (1)}$$

Where

L_1 is the average sound pressure level in the source room, in dB;
L_2 is the average sound pressure level in the receiving room, in dB;
S is the area of the test specimen, in m^2;
A is the equivalent absorption area in the receiving room, in metres sabins.

$$A = (0.9210Vd / c) \quad \text{... (2)}$$

and where

V is the receiving room volume, in m^3;
d is the rate of decay of sound pressure level in receiving room, dB/s;
c is the speed of sound in the medium , m/s.

The speed of sound changes with temperature and is shall be calculated for the conditions existing at the time of test from the equation:

$$c = 20.047\sqrt{273.15 + t} \quad \text{... (3)}$$

where, t is the receiving room temperature, measured to nearest degree.

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The Sound Transmission Class (STC) of test specimen is calculated by comparing the sixteen values of Sound Transmission Loss from 125 Hz to 4000 Hz with a defined reference curve which is incremented until the requirements of ASTM E 413 – 87 are met.

2.2 Location

Unit H, 2/F., Century Industrial Centre,
33-35 Au Pui Wan Street,
Fo Tan, Shatin, N. T., Hong Kong

2.3 Test Condition

Conditions	Source room	Receiving room
Volume	198m^3	91m^3
Air Temperature	25°C	26°C
Relative Humidity	68%	69%

2.4 Test Date

Date of receipt of test material: 04th August 2005
Date of measurement performed: 07th August 2005

2.5 Instrumentation

2.5.1 For sound production

Type	Serial No.
One Real Time Frequency Analyzer –Bruel & Kjaer 3560-B	2487568
One Equalizer – Ultragraph Pro	N0517513166
One Amplifier – STK V-6	C04OM013
One OmniPower Sound Source – Bruel & Kjaer 4296	2485313

2.5.2 For sound measurement

Type	Serial No.
One Real Time Frequency Analyzer –Bruel & Kjaer 3560-B	2487568
Two Random Incident ½" Microphone – Bruel & Kjaer 4942	2365510 for source
	2365511 for receiving
Two ½" Microphone Preamplifier – Bruel & Kjaer 2671	2494533 for source
	2494534 for receiving
One Sound Level Calibrator – Bruel & Kjaer 4231	2478237

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2.5.3 For reverberation time measurement

Type	Serial No.
One Real Time Frequency Analyzer –Bruel & Kjaer 3560-B	2487568
One Random Incident ½" Microphone – Bruel & Kjaer 4942	2365511
One ½" Microphone Preamplifier – Bruel & Kjaer 2671	2494534
One Loudspeaker – ART Series 315A	DGX6565

3. Description of the Test Construction

3.1 One layer 12.5mm BNBM Regular Gypsum Board (size 4'x8'x1/2) inserted between floor and ceiling 64mm x 32mm x 0.8mm"Studco" runners with tab-flange section of 64mmx45mmx0.8mm "Studco" steel C studs between panels. The span of "Studco" Steel C studs is 600mm centre to centre. 50mm thickness with 100kg/m3 "BNBM" rockwool insulation friction fit in stud space. The underneath of top and bottom channel were laid on 15mm thick fibreglass insulation (48kg/m3) with Bostik fire resistant sealant on both sides. It allows building deflection. All the gypsum board panel joint have taped and plastering.

3.2 Effective area of the tested drywall system (One Layer of BNBM Regular) is 10.5m^2 as 3500mm wide by 3000mm high.

3.3 The tested drywall system (One Layer of BNBM Regular) was installed by Entasis Limited on 06 August 2005.

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4. Measurement Results

4.1 The sound transmission loss of the tested drywall system (One Layer of BNBM Regular) at measured frequency bands (1/3 and 1/1 octave band central frequencies) are shown by the following table:

Frequency f, Hz	1/3 Octave Band Sound Transmission Loss, dB	1/1 Octave Band Sound Transmission Loss, dB
100	14.2	18.5
125	24.4	
160	29.4	
200	30.6	34.7
250	40.7	
315	42.5	
400	46.3	48.3
500	49.1	
630	50.8	
800	53.5	54.9
1000	55.3	
1250	56.3	
1600	57.3	58.3
2000	59.2	
2500	58.5	
3150	52.7	50.8
4000	48.8	
5000	52.1	

The above data are presented in Figure 1.

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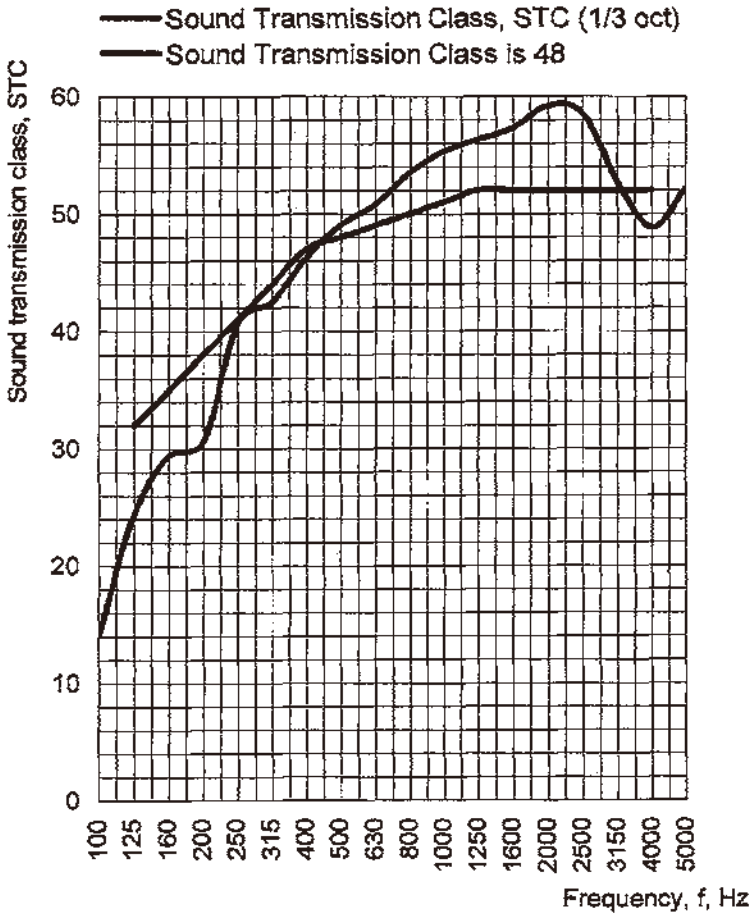

Figure 1. Sound Transmission Loss against Frequency

4.2 The result of sound transmission class (STC) of the tested drywall system (One Layer of BNBM Regular) is shown in the following table.

Description	Sound Transmission Class, STC
Drywall System (One Layer of BNBM Regular)	48

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5. Results Application

5.1 The obtained results can be used to design building elements with appropriate acoustic properties, to compare the sound insulation properties of building elements and to classify such elements according to their sound insulation capabilities.

5.2 The measurements are performed in laboratory test facilities in which transmission of sound on flanking paths is suppressed. Results of measurements shall not be applied directly in the field without accounting for other factors affecting sound insulation, especially flanking transmission and loss factor.

5.3 The test results obtained relate only to the specimen under tested.

5.4 Material information is provided by the Client and/or the material supplier(s), the laboratory has no liability to check.

Reported by: _____

Ir. Dr. F. Chong
CEng, RPE, MHKIE, MIMechE,
MCIBSE, MIOA, MHKIOA

Date: 09 August 2005

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Appendix List

Appendix 1	Detailed Configuration of Drywall System
Appendix 2	Photographic Records

Unit H, 2/F., Century Industrial Center, 33-35 Au Pui Wan Street, Fo Tan, Shatin, New Territories, Hong Kong
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Appendix 1 Detailed Configuration of Drywall System

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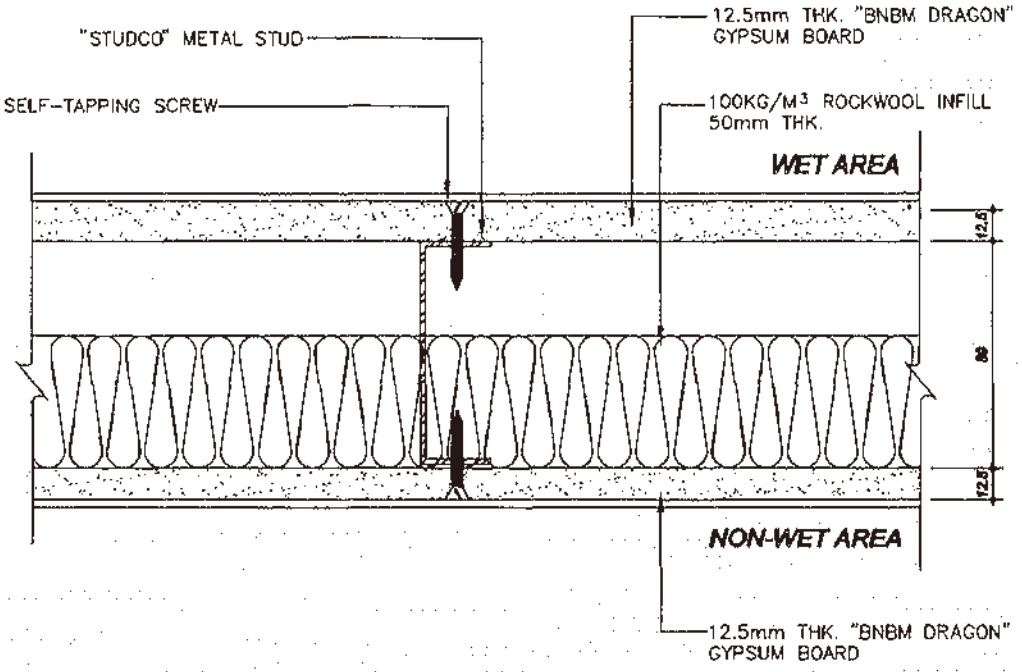
Tel: (852) 2690 9126 Fax: (852) 2690 9125 http://www.atsl.com.hk



3 / - DRY WALL DETAIL - TYPE E

SCALE 1:2

FRP REQUIRED : 1 HRS.
STC REQUIRED : 54

No	Amendments	Date

Job No.

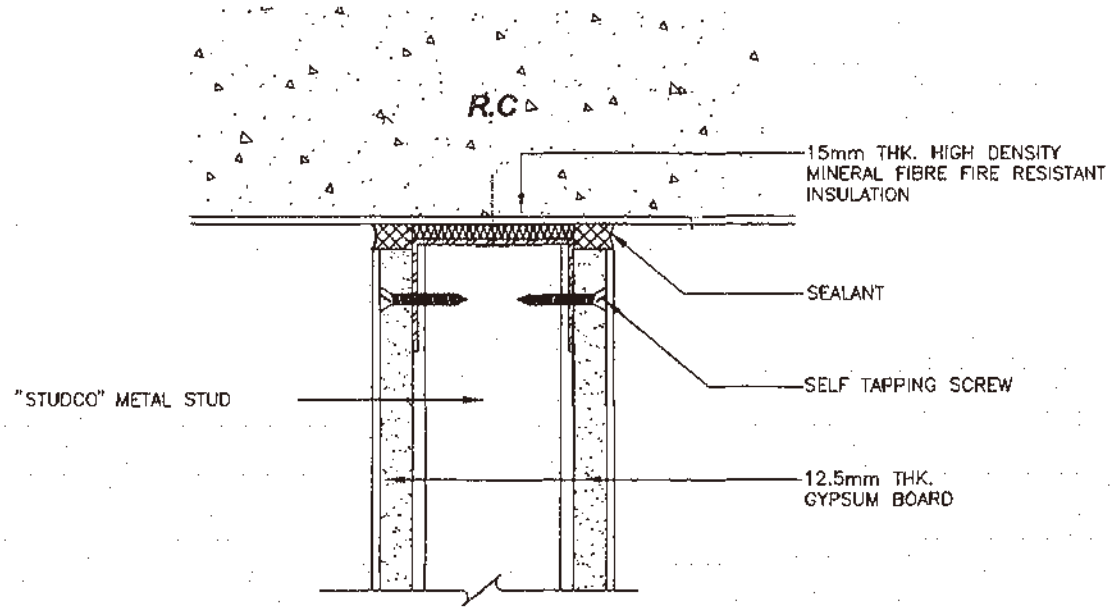
Job Title
VENETIAN MACAU

Drawing Title
DRY WALL DETAIL
TYPE E

Scale	1 : 2 (A3)
Date	22 JULY 05
DRAWING NO.	VEN-D-03A

Drawn By :	Checked By :	REV.
AP		

ENTASIS LTD
A member of Gammon Group
26/F., Devon House
Taikoo Place
979 King's Road, Hong Kong
TEL : [illegible] FAX : [illegible]



DRY WALL HEAD DETAIL - 1 HR. F.R.P.

SCALE 1:2

No	Amendments	Date

Job No.

Job Title
VENETIAN MACAU

Drawing Title
DRY WALL HEAD DETAIL – 1 HR. F.R.P.

Scale	1 : 2 (A3)
Date	22 JULY 05
DRAWING NO.	VEN-D-09

Drawn By :	Checked By :	REV.
AP		

ENTASIS LTD
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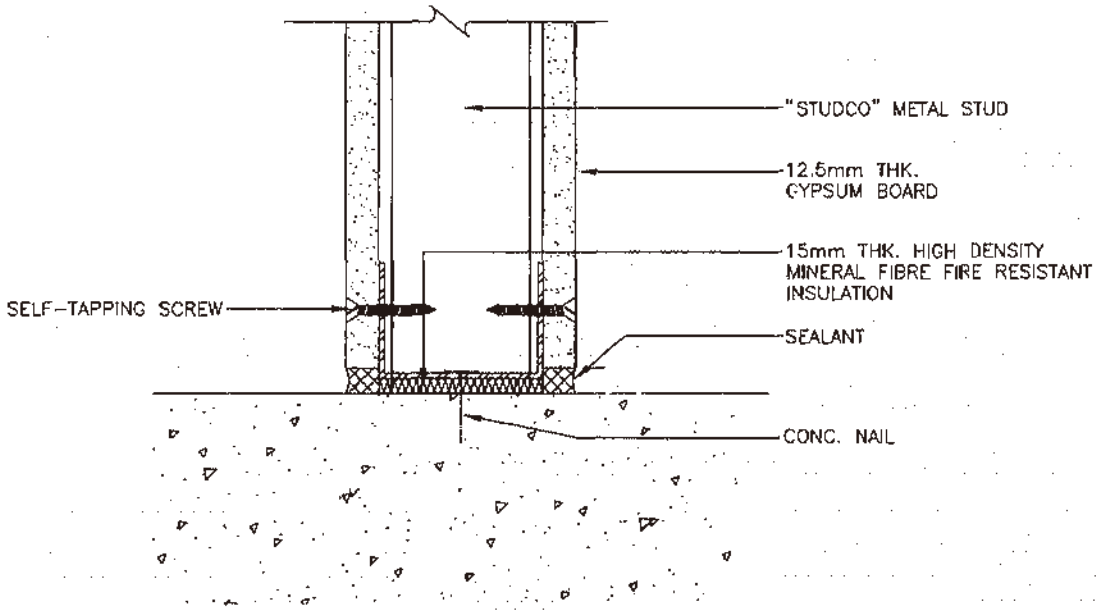
20/F., Devon House,
Dah Sing Financial Centre,
979 King's Road, Hong Kong.
TEL: [redacted] FAX: [redacted]



11 / - DRY WALL BASE DETAIL - 1 HR. F.R.P.

SCALE 1:2

No	Amendments	Date

Job No.

Job Title
VENETIAN MACAU

Drawing Title
DRY WALL BASE DETAIL - 1 HR. F.R.P.

Scale	1 : 2 (A3)
Date	22 JULY 05
DRAWING NO.	VEN-D-11

Drawn By :	Checked By :	REV.
AP		

ENTASIS LTD
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TaiKoo Place,
979 King's Road, Hong Kong.
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Appendix 2 Photographic Records

Installation of Tested Drywall System (in Source room)

Installation of Tested Drywall System (In Receiving room)

Unit H, 2/F., Century Industrial Center, 33-35 Au Pui Wan Street, Fo Tan, Shatin, New Territories, Hong Kong
Tel: (852) 2690 9126 Fax: (852) 2690 9125 http://www.atsl.com.hk

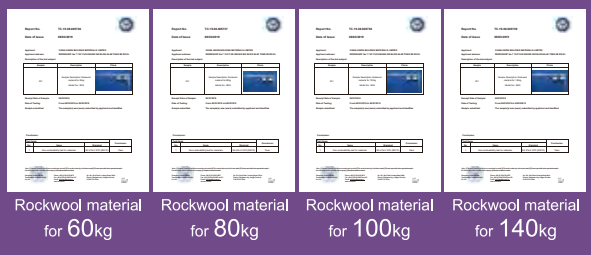
ROCK MINERAL WOOL

BNS mineral rockwool uses selected basalt as the base material and is a heat preservating material made through the processes of being melted at a high temperature, fiber forming through high speed centrifugation and fiber laying through oscillating beltVertically pressed and molded. BNS mineral rockwool is ideal for thermal insulation and sound absorption.It has a stable chemical Properties as well as fireproof and corrosion resistant.It can be made into different forms of boards, felt and pipe shell according to it's different purposes, They are widely applied for exterior walls, roofs, equipments and piping, drywalls help with acoustic corrections & heat preservation as well.

ROCK MINERAL WOOL

Fire Performance Certificate:

BS 476-4:1970, BS 476-6:1970, BS 476-7:1970


Rockwool material for 60kg | Rockwool material for 80kg | Rockwool material for 100kg | Rockwool material for 140kg


Rockwool material for 60kg | Rockwool material for 80kg | Rockwool material for 100kg | Rockwool material for 140kg


Rockwool material for 60kg | Rockwool material for 80kg | Rockwool material for 100kg | Rockwool material for 140kg

Description

BNS rockwool boards are supplied in 1200 x 600mm format with a density of 60- 140 kg/cu.m. The standard product is bare, but could be manufactured with a factory applied foil or tissue facing if required.

Distributed by:

CHINA UNION BUILDING MATERIALS

E-mail: Chinaunion2office@gmail.com

Tel: 5596 7709

Due to it's superior acoustic performances and the speed of installation of drywalls, lightweight steel-framed partitions are becoming more popularly used in commercial use buildings such as hospitals, cinemas studios and offices.

Below are some suggested specifications of BNS drywalls

ROCK MINERAL WOOL

1 Standard metal stud partitions

In all, inside BNS (steel stud) partitions, install acoustic insulation of BNS Rockwool (Unfaced), (50-200mm thick).

Secure BNS Rockwool (Unfaced) at roof of partition using timber batten or light steel angle.

Insulation to fit snugly between studs and at bottom of the structure to ensure that there are no gaps.

Seal partition at sides and all service penetration with acoustic sealant

Fire Performance

BNS rockwool is classified as non-combustible to BS476: Part 4.

Thermal performance

The thermal conductivity of BNS rockwool varies from 0.035 to 0.043 w/mk.

Durability

BNS rockwool is odorless, non-hygroscopic, rot proof, not sustain vermin and does not promote mildew, fungi, or bacteria.

2 Staggered stud partitions

In all, BNS (steel stud) partitions, install acoustic insulation of BNS Rockwool (Unfaced). (50-200mm thick)

Once the BNS studs have been positioned and boarded on one side, wound the insulation through the studs horizontally. Ensure there are no gaps at abutments or between adjacent lengths of the insulation.

Seal partition at sides and all service penetrations with acoustic sealant.

3 High performance twin frame

In all BNS (twin frame) partitions, install acoustic insulation of BNS Rockwool, (50-200mm thick).

Once the BNS studs have been positioned and boarded on one side, the insulation layer should be inserted between the studs horizontally.

Ensure there are no gaps at abutments or between adjacent lengths of the insulation.

Seal partition at side and all service penetrations with acoustic sealant.

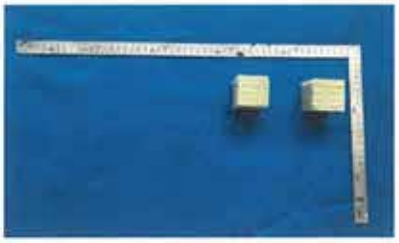
Report No. TC.19.08.005736

Date of Issue 09/03/2019

Applicant: CHINA UNION BUILDING MATERIALS LIMITED

Applicant address: WORKSHOP No.7 13/F FUK KEUNG IND BLDG 66-68 TONG MI RD KL

Description of the test subject:

Sample	Description	Photo
001	Sample Description: Rockwool material for 60kg Model No.: BNS	

Receipt Date of Sample: 08/23/2019

Date of Testing: From 08/23/2019 to 09/03/2019

Sample submitted: The sample(s) was (were) submitted by applicant and identified.

Conclusion:

Test Items			Conclusion
No.	Items	Standard	
1	Non-combustibility test for materials	BS 476-4:1970 (R2012)	Pass

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Report No. TC.19.08.005736

Date of Issue 09/03/2019

Test Results

1. BS 476-4:1970 (R2012) Fire tests on building materials and structures. Non-combustibility test for materials

1.1 Sample describe

Specimen size	40mm x 40mm
Height	50mm

conditioning	temperature	relative humidity	Period
	60±5°C	desiccative	24h

1.2 Test result

Specimen	1	2	3	Average
Furnace temperature (initial) (℃)	745	751	748	748
Duration of sustained flaming inside the furnace (s)	--	--	--	--
Highest temperature of the centre of specimen Tc(max) (℃)	697	696	699	697
Final temperature of the centre of specimen Tc(final ℃)	681	678	683	681
Highest temperature of furnace inside TF(max) (℃)	765	764	764	764
Final temperature of furnace inside TF(final ℃)	750	750	750	750
The centre of specimen temperature rise △TC(℃)	16	18	16	17
Furnace inside temperature rise △TF(℃)	20	13	16	16

Requirement:
The material shall be deemed non-combustible if, during the test, none of the three specimens either
1) Causes the temperature reading from either of the two thermocouples to rise by 50 deg C or more above the initial furnace temperature (the stabilized temperature is 750°C), or
2) Is observed to flame continuously for 10 s or more inside the furnace. Otherwise, the material shall be deemed combustible.

Conclusion: According to the test results, the sample **complies** with the requirement of BS 476-4:1970 (R2012).

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 the sole criterion for assessing the potential smoke and toxicity hazard of the product in use.

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Report No. TC.19.08.005736

Date of Issue 09/03/2019

Changzhou Jinbiao Railway Transportation Technical Service Co., Ltd.

Drafted by:

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Approved by:

Shen hui

-End of Report-

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中国认可
国际互认
检测
TESTING
CNAS L6069

Report No. TC.20.07.003400

Date of Issue 08/04/2020

Applicant: CHINA UNION BUILDING MATERIALS LIMITED

Applicant address: WORKSHOP No.7 13/F FUK KEUNG IND BLDG 66-68 TONG MI RD KL

Description of the test subject:

Sample	Description	Photo
001	Sample Description: Rockwool material for 60kg Style No.: BNS	

Receipt Date of Sample: 07/27/2020

Date of Testing: From 07/27/2020 to 08/04/2020

Sample submitted: The sample(s) was (were) submitted by applicant and identified.

Conclusion:

Test Items			Conclusion
No.	Items	Standard	
1	Fire tests on building materials and structures —Part 6: Method of test for fire propagation for products	BS 476-6:1989+A1:2009	See test results

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CNAS L6069

Report No. TC.20.07.003400

Date of Issue 08/04/2020

Test Results

1. BS476-6:1989+A1:2009 Fire tests on building materials and structures —Part 6: Method of test for fire propagation for products

1.1 Sample details

Size of specimen	225mm×225mm
Thickness	About 50.0 mm

Precondition	Temperature	Relative humidity	Duration
	23±2°C	50±5%R.H.	48h

1.2 Test result

Specimens	Index of performance of specimens			The index of performance
	S_1	S_2	S_3	S
A	0.94	0	0	0.94
B	0.98	0	0	0.98
C	0.95	0	0	0.95

Sample quantity	i_1	i_2	i_3	Fire propagation index I
3	0.96	0	0	0.96

Note: S, S1, S2 and S3 are given by the following expressions.

$$S_1 = \sum_{t=0.5}^{t=3} \frac{\theta_s - \theta_c}{10t} \quad ; \quad S_2 = \sum_{t=4}^{t=10} \frac{\theta_s - \theta_c}{10t} \quad ; \quad S_3 = \sum_{t=12}^{t=20} \frac{\theta_s - \theta_c}{10t}$$

$$S = S_1 + S_2 + S_3$$

Fire propagation index:

$$i_1 = \frac{1}{3}\left[(S_1)_A + (S_1)_B + (S_1)_C\right] \quad ; \quad i_2 = \frac{1}{3}\left[(S_2)_A + (S_2)_B + (S_2)_C\right]$$

$$i_3 = \frac{1}{3}\left[(S_3)_A + (S_3)_B + (S_3)_C\right] \quad ; \quad I = i_1 + i_2 + i_3$$

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Remark:

θ_S the temperature rise for the flue gases, °C

θ_C the actual temperature rise to the nearest, °C

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 the sole criterion for assessing the potential smoke and toxicity hazard of the product in use. Test results are just for internal reference.

Changzhou Jinbiao Railway Transportation Technical Service Co., Ltd.

Drafted by: wayne

Wayne Wang

Approved by: Hui Shen

Shen hui

-End of Report-

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Report No. TC.20.07.002875

Date of Issue 07/14/2020

Applicant: CHINA UNION BUILDING MATERIALS LIMITED

Applicant address: WORKSHOP No.7 13/F FUK KEUNG IND BLDG 66-68 TONG MI RD KL

Description of the test subject:

Sample	Description	Photo
001	Sample Description: Rockwool material for 60kg Model No.: BNS	

Receipt Date of Sample: 07/06/2020

Date of Testing: From 07/06/2020 to 07/14/2020

Sample submitted: The sample(s) was (were) submitted by applicant and identified.

Conclusion:

Test Items			Conclusion
No.	Items	Standard	
1	Fire tests on building materials and structures Part 7. Method of test to determine the classification of the surface spread of flame of products	BS 476-7:1997(R2016)	Class 1

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Test Results

1. BS 476-7:1997(R2016) Fire tests on building materials and structures Part 7. Method of test to determine the classification of the surface spread of flame of products

1.1 Sample details:

Specimen size	885mm×270mm
Thickness	About 46.0 mm
Conditioning	Constant mass at a temperature of 23±2℃and a relative humidity of 50±10%

1.2 Test results:

Distance (mm)	Time to travel to indicated distance (second)					
	1	2	3	4	5	6
165	NR	NR	NR	NR	NR	NR
455	NR	NR	NR	NR	NR	NR
710	NR	NR	NR	NR	NR	NR
825	NR	NR	NR	NR	NR	NR
Maximum distance traveled at 1.5 minutes (mm)	--	--	--	--	--	--
Maximum distance traveled during the whole test (mm)	--	--	--	--	--	--
Time to reach maximum distance traveled(second)	--	--	--	--	--	--
Observations	--					

Remark:

1.Six specimens are usually tested. If the test on any specimen is deemed to be invalid, as defined in the standard, it is permissible for up to a maximum of nine specimens to be tested in order to obtain the six valid test results.

2. NR=Not reached

Classification:

In accordance with the tested results and the classifications defined in BS 476-7:1997(R2016), the submitted sample is classified as **Class 1.**

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Classification requirements:

Classification	Spread of flame at 1.5 min		Final spread of flame	
	Limit (mm)	Limit for one specimen in sample(mm)	Limit (mm)	Limit for one specimen in sample(mm)
Class 1	165	165+25	165	165+25
Class 2	215	215+25	455	455+45
Class 3	265	265+25	710	710+75
Class 4	Exceeding the limits for class 3			

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 the sole criterion for assessing the potential smoke and toxicity hazard of the product in use.Test results are just for internal reference.

Changzhou Jinbiao Railway Transportation Technical Service Co., Ltd.

Drafted by:

Lynn liu

Approved by:

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-End of Report-

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