

Kingtec Building Materials (HK & Macau) Limited

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Report Reference: IA15-029

Date: 22 April 2015

ASSESSMENT ON FIRE RESISTANCE OF DRYWALL PARTITION SYSTEM
WITH SINGLE LAYER LINING AND ROCK WOOL INFILL
(60 MINUTES INTEGRITY AND INSULATION)

Introduction

We were requested by Kingtec Building Materials (HK & Macau) Limited to provide an assessment of the fire performance of drywall partition system with 9 mm Hawk Pan Board single layer lining with rockwool infill. This assessment report presents an appraisal of fire resistance performance of drywall partition system, which will satisfy the integrity and insulation criteria of BS 476: Part 22: 1987 for not less than 60 minutes.

Contents

1. Assumptions and Limitations
2. Background
3. Analysis
4. Assessment/Conclusion
5. Term of validity
6. Declaration by the applicant

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1. Assumptions and Limitations

It is assumed that the proposed assembly will be installed to a masonry or reinforced concrete structure or equivalent, which can provide a particular stability, integrity and insulation of fire resistance period. The materials and constituents of the proposed assembly are in similar manners and quality as tested or otherwise appraised by Forte Testing and Consultants Company Limited (FORTE). This assessment may only be reproduced in full by applicant.

2. Background

2.1 Test Report No.IT 14-088

A fire resistance test was conducted by FORTE in accordance with BS EN 1364-1: 1999 on a specimen of non-loadbearing drywall partition system, to determine its fire resistance performance. The test sponsor was Kingtec Building Materials (HK & Macau) Limited. The overall sizes of the specimen were 3,050 mm width by 3,100 mm height by 86 mm thick. It was constructed with one layer of 9 mm thick Hawk Pan Board which fixed to both side of 0.6 mm thick steel stud framework through a 9 mm thick by 50 mm width Hawk Pan Board fillet. The steel studs spaced at maximum 600 mm centres. The cavity was filled with 50 mm by 100kg/m³ rock wool. The specimen satisfied the integrity criterion of the standard for 90 minutes and 78 minutes insulation criterion. Full construction details of the partition system and the test results were recorded in the test report numbered IT14-088.

Table 1: Gap analysis between BS 476: Part 22: 1987 and BS EN 1364-1: 1999

Parameter	BS 476 : Part 22	BS EN 1364-1: 1999
Standard fire curve	BS 476 : Part 20: 1987 $T = 345 \log_{10}(8t + 1) + 20$	EN 1363-1: 1999 $T = 345 \log_{10}(8t + 1) + 20$
Furnace thermocouple	Type K according to BS 4937.4 with diameter 0.75 mm - 1.5mm, insulated with twin bore porcelain insulators, hot junction project 25 mm from the insulator, or; Mineral insulated metal sheathed type K with overall diameter 1.5 mm, protected with porcelain insulator, hot junction project 25 mm from the insulator.	Plate thermometer, consisted of a mineral insulated steel sheathed type K according to IEC 584-1 with diameter 1 mm, connected to with a steel plate of final size 100 mm square
Furnace pressure	Neutral pressure plane at 1M	Neutral pressure plane at 500 mm
INTEGRITY:		
Sustained flaming	Failure shall be deemed to have occurred when one of the following occurs: Not less than 10s	Failure shall be deemed to have occurred when one of the following occurs: More than 10s
Cotton pad	Applied for 10 – 15 seconds	Applied for 30 seconds
Gap gauges	Employed after 5min : 6mm X 150mm (other than at sill level), 25mm dia. For any gap	Employed after 5min : 6mm X 150mm (other than at sill level), 25mm dia. For any gap

Parameter	BS 476 : Part 22	BS EN 1364-1: 1999
INSULATION:	<p>Failure shall be deemed to have occurred when one of the following occurs:</p> <p>a) if the mean unexposed face temperature increases by more than 140 °C above its initial value;</p> <p>b) if the temperature recorded at any position on the unexposed face, either by a fixed thermocouple or by the roving thermocouple subject to the following provisions is in excess of 180 °C above the initial mean unexposed face temperature;</p> <p>c) when integrity failures as defined in above.</p>	<p>Failure shall be deemed to have occurred when one of the following occurs:</p> <p>a) if the mean unexposed face temperature increases by more than 140 °C above its initial value;</p> <p>b) if the temperature recorded at any position on the unexposed face, either by a fixed thermocouple or by the roving thermocouple subject to the following provisions is in excess of 180 °C above the initial mean unexposed face temperature;</p> <p>c) when integrity failures as defined in above.</p>
Fixed unexposed surface thermocouple	<p>Position five surface temperature measuring thermocouples with one placed approximately in the centre of the specimen and one at the centre of each quarter section.</p> <p>Attach additional surface temperature measuring thermocouples at positions other than those specified to determine the temperature at other points on the surface where the temperature rise is likely to be higher than elsewhere due to lower levels of insulation, and which may be required for evaluation of the maximum temperature rise.</p>	<p>The unexposed face shall be measured by means of five thermocouples, one located close to the centre of the specimen and one close to the centre of each quarter section. Maximum temperature thermocouples shall be applied to the unexposed faces as follows:</p> <p>a) The head of the specimen at mid-width</p> <p>b) The head of the specimen in line with a stud/mullion</p> <p>c) Junction of the stud and a rail</p> <p>d) Mid height of the fixed edge</p> <p>e) Mid height of the free edge</p> <p>f) Mid width and height adjacent to a horizontal and vertical joint respectively.</p>
Deflection measurement	Monitor lateral deflection.	Deformation measurements to be made at specified locations.
Direct field of application	Not included.	Included.

The test specification and failure criteria for both BS 476 and BS EN 1364-1 are shown in table 1. The time/temperature relationship is the same for both test standards; however, the EN test is controlled using plate thermometers that, due to their slow response, result in the EN test being more severe than the BS test during the early stages of a test. However, unexposed surface temperature measuring points for the partition system under BS EN 1364-1 are more than the requirements stated in the standard of BS 476: Part 22. The Hawk Pan Board with 9 mm thick on the unexposed surface of the partition system remained intact, no notable fractures and without insulation failure observed from the test reports numbered IT14-088. There is no integrity between the joint of the board system during the fire test. Based upon the test evidence, the tested specific partition system with 9 mm thick Hawk Pan Board would be capable of achieving the integrity and insulation of 60 minutes in accordance with BS 476: Part 22: 1987.

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4. Assessment/Conclusion

It is concluded that the drywall partition system with 9 mm thick Hawk Pan Board single lining with rock wool infill detailed in Section 3 of this report will also achieve the fire resistance of not less than 60 minutes integrity and insulation if tests in accordance with BS 476: Part 22: 1987.

5. Term of validity

This assessment is issued on the basis of test data and information to hand at the time of issue and it is valid only if presented with proper test evidence(s) and all noted supporting data. If contradictory evidence becomes available to FORTE, the assessment will be unconditionally withdrawn and the applicant will be notified in writing. Similarly the assessment is invalidated if the assessed construction is subsequently tested since actual test data is deemed to take precedence over an expressed opinion. This assessment will expire on 22 April 2020, which time it is recommended that it be submitted to FORTE for re-appraisal.

For and on behalf of Forte Testing and Consultants Company Limited:



CHENG San Mei, Sammi
Laboratory Manager



Dr CHAN Yuk Kit, James, RPE (Fire)
Managing Director

6. Declaration by the applicant

- We the undersigned confirm that we have read and complied with the obligations placed on us by this guide on undertaking assessments.
- We confirm that the component or element of structure, which is the subject of this assessment, has not to our knowledge been subjected to a fire test to the standard against which this assessment is being made.
- We agree to withdraw this assessment from circulation should the component or element of structure be the subject of a fire test to the standard against which this 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 FORTE to withdraw the assessment

Name: Sammy chan choi wai

Signed: 

For and on behalf of: 