

# assessment report

**Title:**

**The Fire Resistance  
Performance of a Concrete  
Blockwork Wall**

**Report No:**

174432

**Prepared for:**

**Kwok Chi Construction  
Materials Limited**  
Lot 38 Cha Kwo Ling Road  
Yau Tong, Kowloon  
Hong Kong

**Date:**

25<sup>th</sup> June 2008

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## Executive Summary

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**Objective** This report presents an appraisal of the expected fire resistance performance of a range of symmetrical, non-loadbearing, aerated concrete blockwork walls, of a construction similar to that tested under the reference WF Test Report No. 173470, but incorporating alternative blocks having reduced thickness for reduced fire resistance performance.

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**Summary of Conclusions** Symmetrical, non-loadbearing, aerated concrete blockwork walls, similar in construction to that tested under the reference WF No. 173470, but having blocks of reduced thickness (namely 75 mm) in lieu of the tested 100 mm thick would be expected to provide 120 minutes integrity and 120 minutes insulation performance, should it be subjected to a fire resistance test in accordance with BS 476: Part 22: 1987, Clause 5.

**Valid until** 1<sup>st</sup> June 2013

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## Introduction

This report presents an appraisal of the expected fire resistance performance of a symmetrical, non-loadbearing, concrete blockwork wall, of a construction similar to that tested under the reference WF No. 173470, but having blocks of reduced thickness for a reduced fire resistance performance.

The blockwork wall, incorporating concrete blocks with alternative dimensions to that tested, are required to provide 120 minutes integrity and 120 minutes insulation performance with respect to Clause 5 of BS 476: Part 22: 1987, should the walls be subjected to a fire resistance test from either direction.

### FTSG

The data referred to in Section 8 has been considered for the purpose of this appraisal, which has been prepared in accordance with the Fire Test Study Group Resolution No. 64A: 1993.

## Assumptions

It is assumed that the wall will be constructed using a stretcher bond pattern, and that the method of jointing the blocks by the use of adhesive, will be similar to that of the tested specimen. The density of the blocks will remain identical to that tested.

It is also assumed that the moisture content of the blocks will be at a similar level to that of the tested assembly.

The degree of vertical restraint afforded to the proposed wall will be similar to that provided for the tested assembly, and that there will be no imposed load to the wall other than its own self weight.

## Proposals

### Scope

It is proposed to provide a symmetrical, non-loadbearing, aerated concrete blockwork wall, similar in construction to that tested under the reference WF No. 173470, but having blocks of reduced thickness (75 mm) for a reduced fire resistance performance. The table below provides details of the proposed block dimensions along with the required fire resistance periods:

Block Dimensions			Fire Resistance	
Thickness (mm)	Height (mm)	Length (mm)	Integrity (minutes)	Insulation (minutes)
75	200	600	120	120

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## Basic Test Evidence

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**WF No. 173470** The report referenced WF No. 170568 relates to a fire resistance test performed in accordance with BS 476: Part 22: 1987, Clause 5, on a single specimen of a symmetrical, non-loadbearing, concrete blockwork wall.

The specimen was of overall dimensions 3000 mm high by 3000 mm wide by 100 mm thick, and was constructed from precast aerated concrete blocks referenced 'Green Pine Autoclaved Aerated Concrete Block K100', each of nominal size 600 mm long by 200 mm high by 100 mm thick with a measured density of 724kg/m<sup>3</sup>. The blocks were laid in stretcher bond, the blocks being bonded using an adhesive referenced 'Q/JZK02-2005'.

The test demonstrated the ability of the specimen to be capable of providing 264 minutes integrity and 264 minutes insulation performance.

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## Assessed Performance

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The test referenced WF No. 173470 demonstrated the ability of a wall with a total thickness of 100 mm to provide in excess of 240 minutes integrity and 240 minutes insulation performance.

No significant deflection of the wall, which could prove detrimental to its fire resistance performance, was observed throughout the 264 minutes test duration, indicating a very stable construction.

The proposal involves construction of the wall using a reduced block thickness. The critical dimension that will affect the fire resistance performance of a block wall is the thickness.

The tested wall achieved a fire resistance performance of 264 minutes after which time the test was discontinued with the specimen continuing to satisfy the performance criteria. The performance equates to a 120% overrun compared to the required 120 minute performance with the proposed block thickness being 25% less than that tested. In terms of a simple comparison between the block thickness/fire performance ratio, the proposal is considered reasonable.

Further confidence in the proposal is given by reference to the following documents. The minimum thickness of un-rendered aerated concrete block walls, specified in Table 16(B) of BS 5628: Part 3: 1985, for a fire resistance of 120 minutes is 63 mm. The report published by the Building Research Establishment (BRE), referenced 'Guidelines for the construction of fire resisting structural elements' provides similar data in Table 1.

Both of the above referenced documents indicate that a block thickness of 63 mm, when utilised in an un-rendered wall would provide 120 minutes fire resistance. This data, together with the achieved performance of the tested construction, provides confidence that a block thickness of 75 mm would provide at least this level of fire resistance.

The data given in the above reports can be logic checked against the performance of the wall in question. The documents state that the minimum thickness of un-rendered aerated concrete block walls for a fire resistance of 240 minutes is 100 mm. The empirical evidence generated from WF No. 173470 shows that the 100 mm blocks performs significantly better than the document suggests. This provides a good degree of confidence in the 'assumed' performance of the 75 mm thick blocks for 120 minute.

The proposed block thickness of 75 mm for a fire resistance performance of 120 minutes is therefore positively assessed.

## Conclusions

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Symmetrical, non-loadbearing, aerated concrete blockwork walls, similar in construction to that tested under the reference WF No. 173470, but having blocks of reduced thickness (namely 75 mm) in lieu of the tested 100 mm thick would be expected to provide 120 minutes integrity and 120 minutes insulation performance, should it be subjected to a fire resistance test in accordance with BS 476: Part 22: 1987, Clause 5.

## Validity

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This assessment is issued on the basis of test data and information available at the time of issue. If contradictory evidence becomes available to warringtonfire the assessment will be unconditionally withdrawn and **Kwok Chi Construction Materials Limited** will be notified in writing. Similarly the assessment is invalidated if the assessed construction is subsequently tested because actual test data is deemed to take precedence over an expressed opinion. The assessment is valid initially for a period of five years i.e. until 1st July 2013, after which time it is recommended that it be returned for re-appraisal.

The appraisal is only valid provided that no other modifications are made to the tested construction other than those described in this report.

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## Summary of Primary Supporting Data

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### **WF No. 173470**

A report relating to a fire resistance test performed in accordance with BS 476: Part 22: 1987, Clause 5, on a single specimen of a rendered, symmetrical, non-loadbearing, aerated concrete blockwork wall.

The specimen was of overall dimensions 3000 mm high by 3000 mm wide by 100 mm thick, and was constructed from precast aerated concrete blocks referenced 'Green Pine Autoclaved Aerated Concrete Block K100', each of nominal size 600 mm long by 200 mm high by 100 mm thick with a measured density of 724kg/m<sup>3</sup>. The blocks were laid in stretcher bond, the blocks being bonded using an adhesive referenced 'Q/JZK02-2005'.

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

Integrity : 264 minutes

Insulation : 264 minutes

Report Date : 19<sup>th</sup> May 2008

Test Sponsor : Kwok Chi Construction Materials Limited

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## Declaration by Kwok Chi Construction Materials Limited

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We the undersigned confirm that we have read and complied with the obligations placed on us by the UK Fire Test Study Group Resolution No. 82: 2001.

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 the 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 adversely affect the conclusions of this assessment.


If we subsequently become aware of any such information we agree to cease using the assessment and ask warringtonfire to withdraw the assessment.


Signed:

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For and on behalf of:  
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## Signatories


Responsible Officer
A Kearns* - Technical Manager


Approved
C Johnson* - Technical Consultant

\* For and on behalf of Bodycote **warringtonfire**.

Report Issued: 25<sup>th</sup> June 2008

The assessment report is not valid unless it incorporates the declaration duly signed by the applicant.

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