

1. Scope of Test

This report is a record of a fire resistance test conducted by Forte Testing and Consultants Company Limited, in conformity with requirements in *BS EN 1634-1: 2008 "Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware Part 1: Fire resistance tests for doors, shutters and openable windows"* and particular requirements in *BS EN 1363-1: 1999 "Fire resistance tests – Part 1: General requirements"*.

The test subject was double-leaf composite timber door with glazed element and overhead panel. The specimen was manufactured and supplied for test by Leung's Wooden Company Limited.

The specimen achieved the following fire resistance:

INTEGRITY (E)				INSULATION (I)			
Sustained Flaming	74	Minutes		Door Frame	Max. Temp. Rise (I ₁)	74	Minutes
Gap Gauge	74	Minutes		Door Leaves	Average Temp. Rise	74	Minutes
Cotton Pad	73	Minutes		Door Leaves	Max. Temp. Rise (I ₁)	74	Minutes
				Glazed Element	Average Temp. Rise	74	Minutes
				Glazed Element	Max. Temp. Rise	74	Minutes
				Overhead Panel	Average Temp. Rise	74	Minutes
				Overhead Panel	Max. Temp. Rise	74	Minutes

2. Test Information

Test Laboratory:	FORTE Testing and Consultants Company Limited		
Test Location:	West Side of Huan Xiang Shan, Xin Yu Road, Shajin, Baoan District, Shenzhen, Guangdong Province, China.		
Test Sponsors:	Leung's Wooden Company Limited Garish Crown Fire Engineering & Consultancy Shun Hing Fire Rated Building Materials Limited		
Specimen Manufacturer:	Leung's Wooden Company Limited		
ID no. of the specimen:	QT14-014A		
Date Received:	2014-01-16		
Test Number:	QA14-014A and QT14-014B *A total of three sets of report (Report no. IT14-007, IT14-048 and IT14-077) are issued on this test		
Date Tested:	2014-01-20	Start Time:	15:20
Approved Test Operator from FORTE:	Ms. Cheng San Mei, Sammi		
Witness of the Test:	Mr. C.K. Leung– Official Delegate of the Sponsor		

Door Leaves

Manufacturer:		Leung's Wooden Company Limited
Overall Sizes:		(1300 mm + 1150 mm) by 2436 mm
Stiles and Rails	Material:	Softwood
	Width:	45 mm
	Thickness:	38 mm
	Density:	350 kg/m ³ - 450 kg/ m ³ *
	Moisture Content:	12 - 17% *
Core	Supplier:	Leung's Wooden Company Limited
	Material:	Perlite
	Thickness:	38 mm
	Density:	380 kg/ m ³ *

Door Leaf Lippings

Manufacturer:	Leung's Wooden Company Limited
Material:	Hardwood
Thickness:	8 mm
Density:	550 kg/m ³ - 700 kg/m ³ *

Door Leaf Facings

Manufacturer:	Leung's Wooden Company Limited
Material:	PLYWOOD
Thickness:	3 mm ± 0.5 mm
Density:	350 kg/m ³ - 450 kg/m ³ *

Door Leaf Sub-facings

Supplier:	Leung's Wooden Company Limited
Brand:	Gemtree
Material:	Fire Rated Board (Magnesium Oxide) *
Thickness:	5 mm
Density:	950 kg/m ³ - 1000 kg/m ³ *

Intumescent Material – Door Edges

Supplier:	Leung's Wooden Company Limited	
Brand:	Lorient	
Model:	LP3004 *	LP1004 *
Size:	30 mm by 4 mm	10 mm by 4 mm
Location:	Meeting Edge of Inactive Door Leaf, Head and Jambs of Door Frame, Bottom Edge of Overhead Panel	Meeting Edge of Active Door Leaf, Hinge Edge and Bottom Edge of Door Leaves, Top Edge and Side Edge of Overhead Panel

Fixing – Door Frame

Supplier:	Hilti (Hong Kong) Limited
Brand:	Hilti
Model:	HT *
Sizes:	M10 x 112 mm

Fire Sealant

Supplier:	Hilti (Hong Kong) Limited
Brand:	Hilti
Model:	CP606
Locations of Application:	Gap between the Door Frame and Sub-frame and Edges of the Glass Pane and the Glazing Beads

Intumescent Pad

Supplier:	Leung's Wooden Company Limited
Model:	CT56019 *
Thickness:	3 mm

Glue

Supplier:	Leung's Wooden Company Limited
Type:	木膠粉 *

5.4 Unexposed Surface Temperature

The unexposed surface temperatures of the specimen were measured by 44 numbers of type K thermocouples. These thermocouples were positioned and fixed on unexposed surface of the test specimen in conformity with *BS EN 1634-1: 2008*.

The specimen was evaluated against the maximum temperature rise criterion given by supplementary procedure – Classification I₁ at the request of the Sponsor.

The positions of unexposed surface temperature measurement points are shown in *Figure 3*. The locations of thermocouples are explained in the following table.

Thermocouple	Area	Description
U1 – U5	Door Leaves	For average and maximum unexposed surface temperature rise
U6 – U13 U14 – U22	Door Leaves	For maximum unexposed surface temperature rise (Supplementary Procedure, I₁)
U23 – U24 U28 – U30	Door Frame	For maximum unexposed surface temperature rise
U31 – U33	Glazed Element	For average and maximum unexposed surface temperature rise
U34 – U47	Overhead Panel	For average and maximum unexposed surface temperature rise (Supplementary Procedure, I₁)

5.5 Pressure Condition

The pressure inside the furnace was continuously monitored in compliance with *BS EN 1363-1: 1999* during the whole test. The pressure at a point 500 mm above the notional floor level was to be maintained 0 ± 5 Pa by five minutes from commencement of the test and 0 ± 3 Pa that from ten minutes onwards with respect to the atmosphere.

5.6 Deflection Measurements

Measurements of the deflection of the test specimen were taken with a steel rule from cross line laser across the top, mid-height and bottom of the specimen.

The positions of deflection measurement points are shown in *Figure 4*.

6. Test Data

6.1 Retention Forces

The retention forces on each door leaf for each direction of opening were determined. The respective highest gauge measurements are summarized in the following table.

Leaf	Push	Pull
Active	66.0 N	95.2 N
Inactive	63.4 N	70.0 N

6.2 Gaps Measurement

Primary gaps of the specimen were measured and subsequently processed in accordance with BS EN 1634-1: 2008 and summarized in the following table.

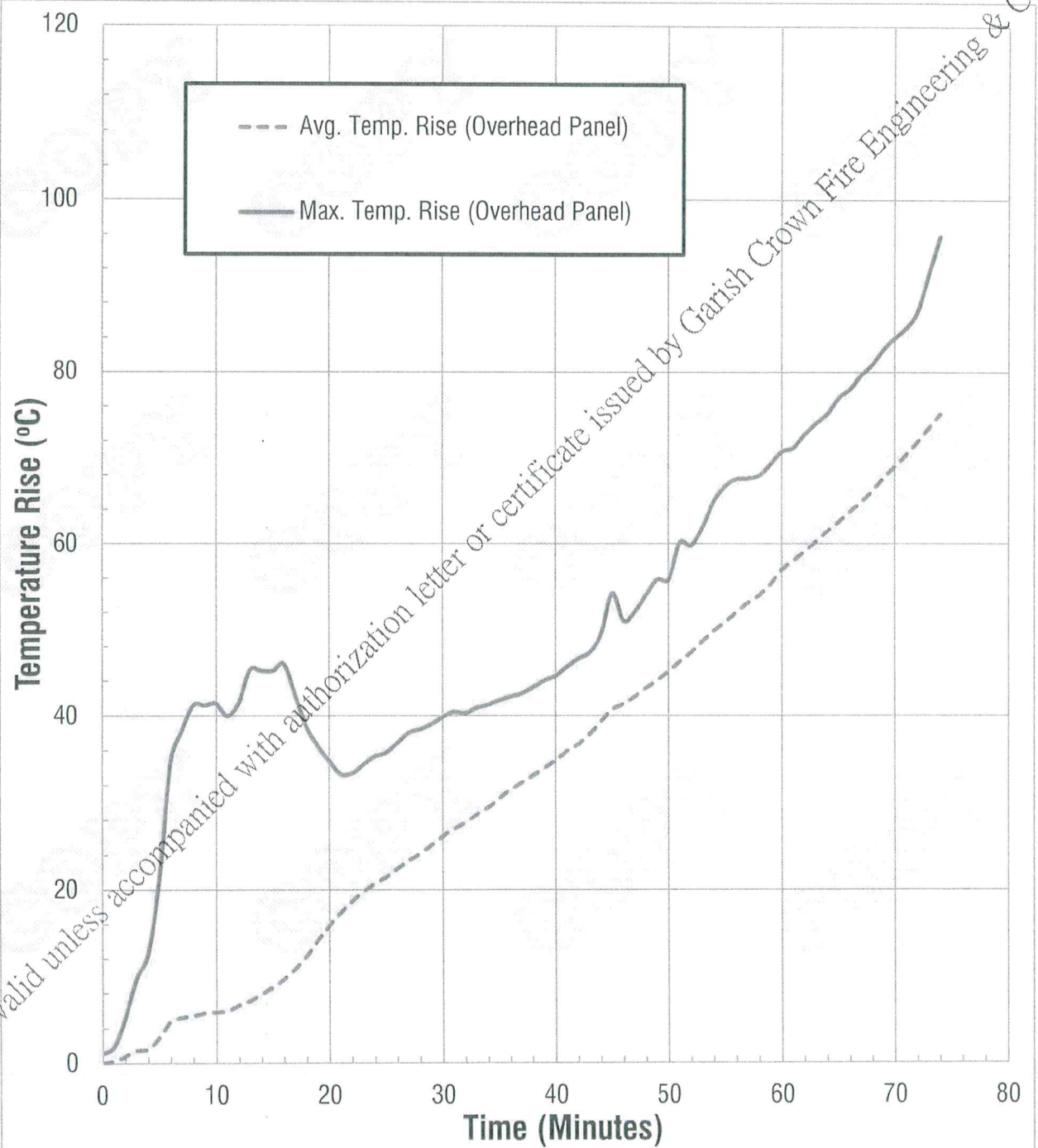
Measurements were taken in mm.

Gap	Measured		
	Minimum	Maximum	Average
A	4.3	5.2	4.9
B	4.3	6.5	5.7
C	0.5	2.2	1.4
G	1.8	3.8	2.4
H	1.1	2.6	1.9
P	2.5	4.4	3.5
R	3.1	4.5	3.9
X	1.1	4.9	2.8
Y	2.1	4.1	3.2

6.4.3 Fixed Surface Thermocouples – Overhead Panel

The temperature rises of unexposed surface of overhead panel measured by fixed surface thermocouples over the test period are shown in *Figure 8*

Figure 8. Average and maximum temperature rise on overhead panel over the test period.



7. Test Results

The test on Door A was terminated after a test period of 74 minutes at request of the Sponsor.

The test data obtained from the fire resistance test was assessed against performance criteria given in BS EN 1634-1: 2008. The test results are summarized in the following table.

Performance Criteria		Elapsed Time before Failure Occurrence	
Integrity (E)			
Criteria of Failure	Description	Elapsed Time before Failure Occurrence	
Sustained Flaming	Continuous flaming for a period of time greater than 10 seconds on unexposed surface	74 minutes	
Gap Gauge	Ø6 mm Penetration of the gauge into the furnace through the specimen and movable along a 150 mm gap	74 minutes (No Failure)	
	Ø25 mm Penetration of the gauge into the furnace through the specimen		
Cotton Pad	Ignition of the cotton pad	73 minutes	
Performance Criteria		Elapsed Time before Failure Occurrence	
Insulation (I)			
Criteria of Failure	Description	Elapsed Time before Failure Occurrence	
Integrity Failure	The performance criterion "insulation" shall automatically be assumed not to be satisfied when the "integrity" criterion ceases to be satisfied	73 minutes	
Average Temperature Rise	An increase of the average temperature of unexposed surface of the specimen above the initial average temperature by more than 140 °C	[Door Leaves]	74 minutes (No Failure)
		[Glazed Element]	74 minutes (No Failure)
Maximum Temperature Rise [Supplementary Procedure, I.]	An increase of temperature at any other point of the specimen above the initial average temperature by more than 180 °C	[Door Frame]	74 minutes (No Failure)
		[Door Leaves]	74 minutes (No Failure)
		[Glazed Element]	74 minutes (No Failure)
		[Overhead Panel]	74 minutes (No Failure)

8. Limitations

This report details the method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outlined in *BS EN 1363-1*, and where appropriate *BS EN 1363-2*. Any significant deviation with respect to size, construction details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.

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

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9. Field of Direct Application

The field of direct application defines the allowable changes to the test specimen following a successful fire resistance test. These variations can be introduced automatically without the need for the sponsor to seek additional evaluation, calculation or approval.

The series of rules and guidelines are defined in *Clause 4.8 "Field of direct application of test results"*, *BS EN 1634-1: 2008* and relevant clauses and annexes. Permitted variations away from the test specimen include 1) materials and construction, 2) size variations, 3) coverage of asymmetrical doorsets and 4) supporting constructions.

The field of direct applications may only be defined following the identification of classification(s). The field of direct and, where applicable, extended application will be included in classification relevant documents.

END OF REPORT