

SMOKE CONTROL TEST IN ACCORDANCE WITH BS EN 1634-3: 2004

On Single-leaf, Single-acting Composite Timber Doorsets

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Test Sponsor

Garish Crown Fire Engineering & Consultancy

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APPROVED SIGNATORY: _____




DATE: 14 APR 2014

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CONTENT

Section	Description	Page
1	SUMMARY	3
2	INTRODUCTION	5
3	INFORMATION	5
4	CONDITIONING	6
5	TEST SPECIMEN	6
6	TEST PROCEDURE	7
7	RESULTS	9
8	POST-TEST OBSERVATION	9
9	LIMITATIONS	10
	APPENDIX A – PHOTOS AND TEST RECORD	11
	APPENDIX B – OBSERVATION	22
	APPENDIX C - DATA RECORDED DURING THE TEST	24
	APPENDIX D – PRODUCT INFORMATION FROM TEST SPONSOR	25

1 SUMMARY

Smoke control test conducted in accordance with BS EN 1634-3: 2004 on single-leaf, single-acting, composite timber doorsets

Two identical specimens of single-leaf, single-acting, composite timber doorsets had been subjected to the tests in accordance with BS EN 1634-3: 2004, in order to determine the smoke leakage (S_a and S_m) from one side to the other under the ambient and medium temperature at pressure differences of 10 Pa, 25 Pa and 50 Pa. As requested by the test sponsor, the specimens were mounted within concrete lined specimen holders and the fixing details were as shown in the test sponsor's drawings (see the appendix). The leakage rates from both sides of the doorsets were assessed for full evaluation.

Two identical specimens, referenced Doorset '1' and Doorset '2', had been submitted by the test sponsor. Each doorset had overall dimensions of 1,276 mm wide by 2,772 mm high by 100 mm thick. It incorporated a door leaf of size 1,200 mm wide by 2,700 mm high by 54 mm thick. The door leaf was fitted with a glazed panel with 25 mm thick 'Kingmax EI60/60' glass pane of vision sizes of 550 mm wide by 1,800 mm high. The door leaf core was composed of 38 mm thick perlite boards with nominal density of 380 kg/m³. The core was sandwiched by one inner layer of 3 mm thick M.D.F. boards and one outer layer of 5 mm thick fire rated boards on both sides by screws and glue. The MDF boards were of nominal density of 350 - 450 kg/m³ and the glass fire rated board were of nominal density of 900 kg/m³. The door leaf lippings were nominal 8 mm thick, made of hardwood with nominal density of 550 - 700 kg/m³. The door leaf was hung to the door frame by four (4) nos. of 'Ying Mu' CH concealed hinges and fitted with 'Dorma' ITS 96 concealed door closer at the head.

Doorset '1' was installed such that the Side B (closing face, i.e. the door leaves swing towards the door frame stopper) towards the test chamber while Doorset '2' was installed such that the Side A (opening face, i.e. the door leaves swing away from the door frame stopper) towards the test chamber. Both doorsets were latched and bolted during the tests. The doorsets were fitted with smoke control seals as follows:

Door Frame

- (i) Gallford AD003T, 12 x 12 mm compression type smoke seals fitted at the corner of the frame rebate, full height, with partially interruption at the hinges and striking plate (see photos 5, 6 and 7).

Door Leaf

- (ii) Lorient LP 1004 DS, full height at the two vertical edges of the door leaf (see photo 8).
- (iii) Gallford AD003T, 12 x 12 mm compression type smoke seals fitted at the corner of the head of the door leaf full width with partially interruption at the concealed door closer (see photo 9).
- (iv) Gallford GF-B09, 14 mm wide x 36 mm high concealed drop seal fitted at the centre of door leaf bottom edge, full width (see photo 10).

The smoke leakage rates of the doorsets were summarized as below:

Test	Face exposed to pressure	Temp	Leakage rate Q_{spec} (m ³ /h) at pressure difference of			S_m Criterion (m ³ /h)	Linear leakage rate Q_l (m ³ /h/m) at pressure difference of		S_a Criterion (m ³ /h/m)
			10 Pa	25 Pa	50 Pa		10 Pa	25 Pa	
1	Closing face	Ambient	3.98	7.39	12.25	< 20	0.61	1.13	< 3.0
2	Closing face	Medium	1.02	1.43	4.78	< 20	N/A	N/A	N/A
3	Opening face	Ambient	5.10	3.97	6.25	< 20	0.78	0.61	< 3.0
4	Opening face	Medium	5.66	7.70	11.01	< 20	N/A	N/A	N/A

The performance criteria of the smoke leakage rate (S_a) and (S_m) as mentioned in the BS EN 1634-3: 2004 shall be referenced to BS EN 13501-2: 2007 + A1: 2009 where

Smoke leakage (S_m) – when the maximum leakage rate measured at both ambient temperature and 200°C and up to a pressure of 50 Pa does not exceed 20 m³/h for a single-leaf doorset;

Smoke leakage (S_a) – when the maximum leakage rate measured at ambient temperature, and at a pressure of up to 25 Pa only, does not exceed 3 m³/h per meter length of gap between the fixed and movable components of the doorset, excluding leakage at the threshold.

According to the performance criteria as given in BS EN 13501-2: 2007 + A1: 2009, it can be concluded that the tested single-leaf doorset **satisfied both the S_a and S_m** requirements.

2 INTRODUCTION

The specimens were tested in accordance with BS EN 1634-3: 2004, 'Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware – Smoke control test for door and shutter assemblies'. Both ambient and medium temperature leakage rates were considered in the tests.

The specimens were submitted by the test sponsor, and was mounted and constructed by the test sponsor. The test was led by Dr. Lipmann Sze and Ms. Ivy Zou of Research Engineering Development Façade Consultants Limited (RED) and was witnessed by Mr. Leung of Leung's Wooden Company Limited.

3 INFORMATION

3.1. Testing laboratory

Research Engineering Development Façade Consultants Limited (RED)
No. 111, Jiaoxin Road, Lanhe Town, Nansha District, Guangzhou, China

3.2. Test date

9th December, 2013

3.3. Equipment

A test chamber with an open front of size 3 m by 3 m to mount the test construction and provide a sealed enclosure to generate the necessary heating and pressure condition.

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

A flowmeter to measure the volume flow rate supplied to the apparatus to compensate for the total leakage.

A micro-manometer provided to monitor the furnace pressure.

Displacement transducers provided to measure the deflection of the doorset.

3.4. Test environment

The temperature around the test area during the test was 22.4 °C – 23.1 °C.

The chamber was controlled so that the mean test chamber temperature at medium temperature test complied with the requirement of Clause 10.2.2.2 of BS EN 1634-3: 2004. The temperatures recorded are shown graphically in Figures 5 and 6.

Summaries of the observations made on the general behaviour of the specimens are given in the appendix of this report.

4 CONDITIONING

The specimens were conditioned to equilibrium as specified in BS EN 1363-1.

Mechanical conditioning as required in clause 8.2 of BS EN 1634-3 in terms of operational ability with the test method referenced to clause 5.1.1.1 of BS EN 14600: 2005 had been conducted prior to test. The specimens to be tested were checked for operability in the test frame by operating from fully closed to fully open to the maximum possible or at least 90° for 25 cycles.

5 TEST SPECIMEN

5.1. Selection of specimen

The specimens were submitted to the test location by the test sponsor. RED did not involve in the selection of the specimens.

5.2. Verification of specimen

The specifications of the door assembly provided by the test sponsor were as shown in Appendix D of this report. Items that had been verified by RED were clearly identified.

5.3. Supporting construction

The supporting constructions were concrete lined system of 150 mm thick with a structural opening of 1,345 mm wide by 2,840 mm high.

5.4. Specimen construction

Two identical specimens, referenced Doorset '1' and Doorset '2', had been submitted by the test sponsor. Each doorset had overall dimensions of 1,276 mm wide by 2,772 mm high by 100 mm thick. It incorporated a door leaf of size 1,200 mm wide by 2,700 mm high by 54 mm thick. The door leaf was fitted with a glazed panel with 25 mm thick 'Kingmax EI60/60' glass pane of vision sizes of 550 mm wide by 1,800 mm high. The door leaf core was composed of 38 mm thick perlite boards with nominal density of 380 kg/m³. The core was sandwiched by one inner layer of 3 mm thick M.D.F. boards and one outer layer of 5 mm thick fire rated boards on both sides by screws and glue. The M.D.F. boards were of nominal density of 350 - 450 kg/m³ and the glass fire rated board were of nominal density of 900 kg/m³. The door leaf lippings were nominal 8 mm thick, made of hardwood with nominal density of 550 - 700 kg/m³. The door leaf was hung to the door frame by four (4) nos. of 'Ying Mu' CH concealed hinges and fitted with 'Dorma' ITS 96 concealed door closer at the head. Doorset '1' was installed such that the Side B (closing face, i.e. the door leaves swing towards the door frame stopper) towards the test chamber while Doorset '2' was installed such that the Side A (opening face, i.e. the door leaves swing away from the door frame stopper) towards the test chamber. Both doorsets were latched and bolted during the tests. The doorsets were fitted with smoke control seals as follows:

Door Frame

- (i) Gallford AD003T, 12 x 12 mm compression type smoke seals fitted at the corner of the frame rebate, full height, with partially interruption at the hinges and striking plate (see photos 5, 6 and 7).

Door Leaf

- (ii) Lorient LP 1004 DS, full height at the two vertical edges of the door leaf (see photo 8).
- (iii) Gallford AD003T, 12 x 12 mm compression type smoke seals fitted at the corner of the head of the door leaf full width with partially interruption at the concealed door closer (see photo 9).
- (iv) Gallford GF-B09, 14 mm wide x 36 mm high concealed drop seal fitted at the centre of door leaf bottom edge, full width (see photo 10).

6 TEST PROCEDURE

The tests were conducted in accordance with the procedures specified in Section 10 of BS EN 1634-3: 2004.

6.1. Pre-test procedure

The doorsets were opened to an angle of at least 30° and closed 10 times to ensure the assembly operates normally prior to the test.

The retention forces of the doorsets were measured in accordance with Clause 10.1.2 of BS EN 1634-3: 2004 as shown in the table below.

Doorset	Retention force measured
1	65 N
2	65 N

The lengths of gap and the clearance between the fixed and moving components of the doorset were measured as shown in appendix A, Figures 3 and 4 of this report.

The leakage rate through the apparatus together with the associated/supporting construction at 50 Pa and ambient temperature was measured to be lower than 10 m³/hr.

6.2. Air Leakage test

The ambient temperature of the test area during the test was measured. The furnace was monitored by nine (9) thermocouples so that the mean test chamber temperature complied with the requirements of Clause 10.2.2.2 of BS EN 1634-3: 2004.

6.3. Sequence of test

The tests were carried out in the following sequence:

- i) Doorset '1' was mounted with one of the face towards the test chamber;
- ii) Determine the leakage rate through the test chamber and any support or associated construction at ambient temperature;
- iii) Determine the total leakage rate at ambient temperature;
- iv) Determine the total leakage rate at medium temperature;
- v) Determine the leakage rate through the apparatus and any supporting or associated construction at medium temperature; and
- vi) Repeat the steps (ii) to (v) on Doorset '2' while the doorset was mounted with the opening face towards the test chamber.

6.4. Test conditions

The temperature in the test chamber was controlled to be lower than 30 °C before the start of the test. The leakage rates through the test chamber and any supporting or associated construction and the total leakage rate at ambient temperature at pressure differences of 10 Pa, 25 Pa and 50 Pa were measured. The leakage rates were measured while the pressure difference was maintained for 2 minutes.

The temperature of the test chamber was raised to medium temperature (200°C) in 30 ± 5 minutes at neutral pressure as stated in Clause 10.2.2.2 of BS EN 1634-3: 2004.

The leakage rates through the test chamber and any supporting or associated construction and the total leakage rate at medium temperature at pressures differences of 10 Pa, 25 Pa and 50 Pa were measured. The leakage rates were measured while the pressure difference was maintained for 2 minutes.

7 RESULTS

When tested in accordance with BS EN 1634-3: 2004, the measured leakage rates and the calculated linear leakage rates were summarized below. There was no failure of any components observed during the test. The observations during and after the test were summarized in Appendix B. The deflections of the doorsets were summarized in Table 2 of Appendix C.

Door type: Single-leaf, single-acting, composite timber doorset
Door opening size: 1,200 mm (wide) by 2,700 mm (high)
Side A: Opening Side
Side B: Closing Side

Test	Face exposed to pressure	Temp	Leakage rate Q_{spec} (m^3/h) at pressure difference of			S_m Criterion (m^3/h)	Linear leakage rate Q_l ($m^3/h/m$) at pressure difference of		S_a Criterion ($m^3/h/m$)
			10 Pa	25 Pa	50 Pa		10 Pa	25 Pa	
1	Closing face	Ambient	3.98	7.39	12.26	< 20	0.61	1.13	< 3
2	Closing face	Medium	1.02	1.43	4.78	< 20	N/A	N/A	N/A
3	Opening face	Ambient	5.10	3.97	6.25	< 20	0.78	0.61	< 3
4	Opening face	Medium	5.66	2.70	11.01	< 20	N/A	N/A	N/A

The performance criteria of the smoke leakage rate (S_a) and (S_m) as mentioned in the BS EN 1634-3: 2004 shall be referenced to BS EN 13501-2: 2007 + A1: 2009 where

- (a) Smoke leakage (S_m) – when the maximum leakage rate measured at both ambient temperature and 200°C and up to a pressure of 50 Pa does not exceed 20 m^3/h for a single-leaf doorset;
- (b) Smoke leakage (S_a) – when the maximum leakage rate measured at ambient temperature, and at a pressure of up to 25 Pa only, does not exceed 3 m^3/h per meter length of gap between the fixed and movable components of the doorset, excluding leakage at the threshold.

According to the performance criteria as given in BS EN 13501-2: 2007 + A1: 2009, it can be concluded that the tested single-leaf doorset **satisfied both the S_a and S_m** requirements.

8 POST-TEST OBSERVATION

In general, there was no damage to the doorsets after the test. All smoke seals remained intact in positions. Both doorsets were able to open manually after the test.



Fire and Facade Consultants

9 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 1634-3: 2004. Any significant deviations with respect to size, construction details, loads, stresses, edges or end conditions other than those allowed under the field of application in the relevant test method is not covered by this report.

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APPENDIX A – PHOTOS AND TEST RECORD



Photo 1: The exposed face of the Doorset '1' before the medium temperature test.



Photo 2: The unexposed face of Doorset '1' after the medium temperature test.

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Photo 3: The exposed face of Doorset '2' before the medium temperature test.



Photo 4: The exposed face of Doorset '2' after the medium temperature test.

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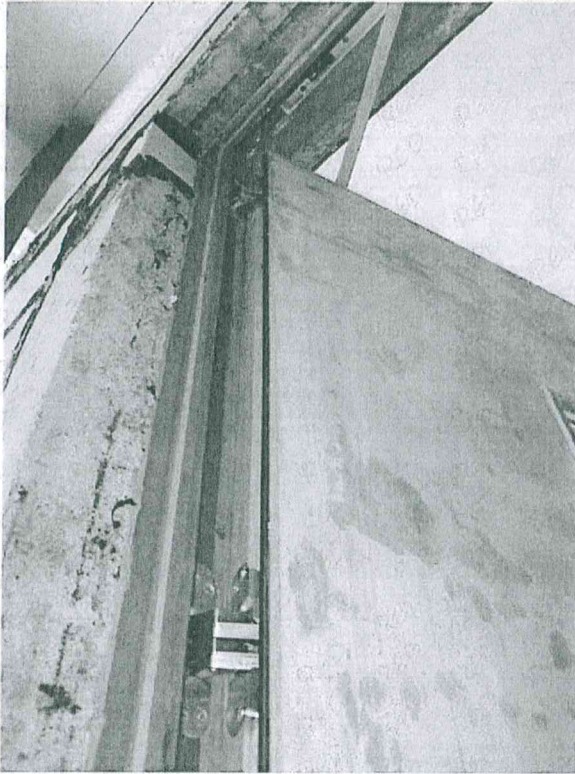


Photo 5: The fire & smoke seal at the frame vertical jamb

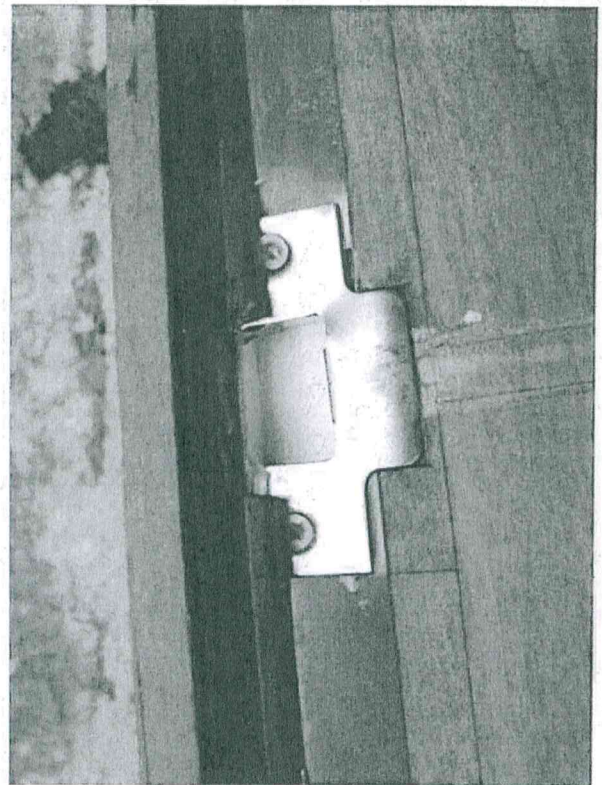


Photo 6: The smoke seals at the frame vertical jamb, partially interrupted at the striking plate



Photo 7: Fire & Smoke seal at the door leaf closing edge, fully interrupted at hinge positions



Photo 8: The automatic drop seal at the bottom edge of the door leaf

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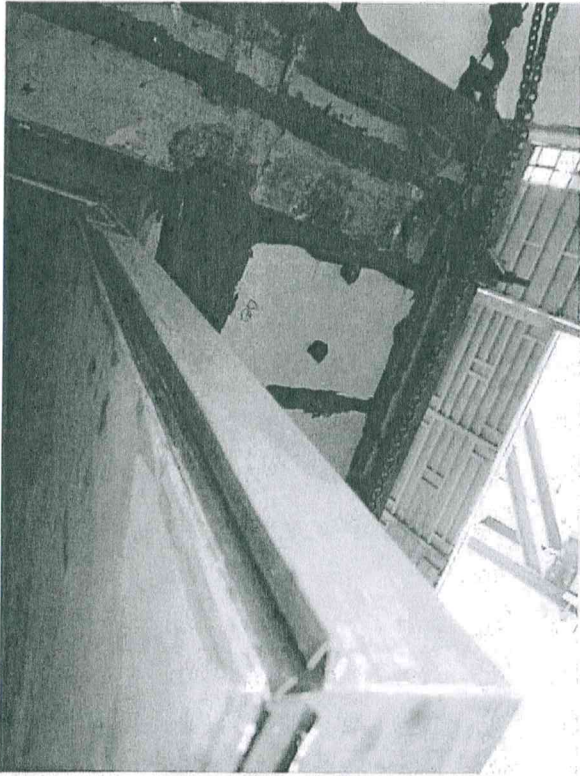


Photo 9: The smoke seal at the head of the door leaf

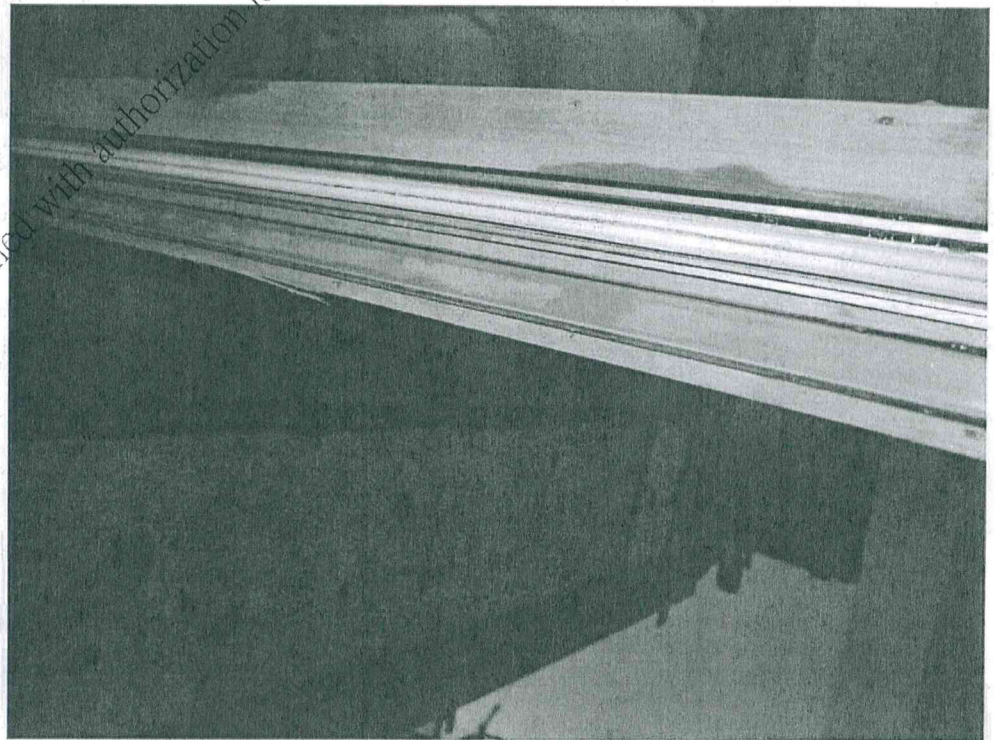
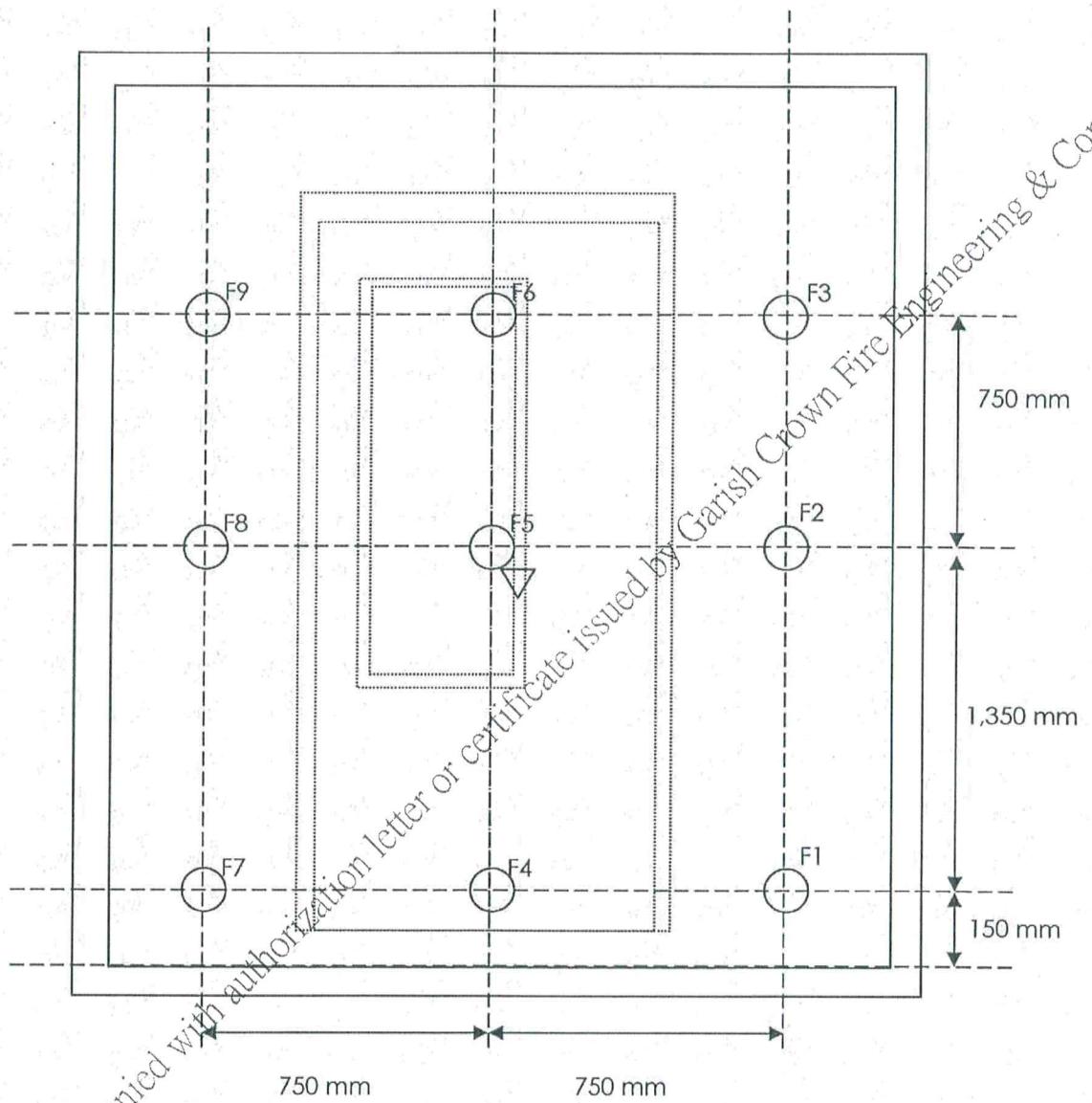


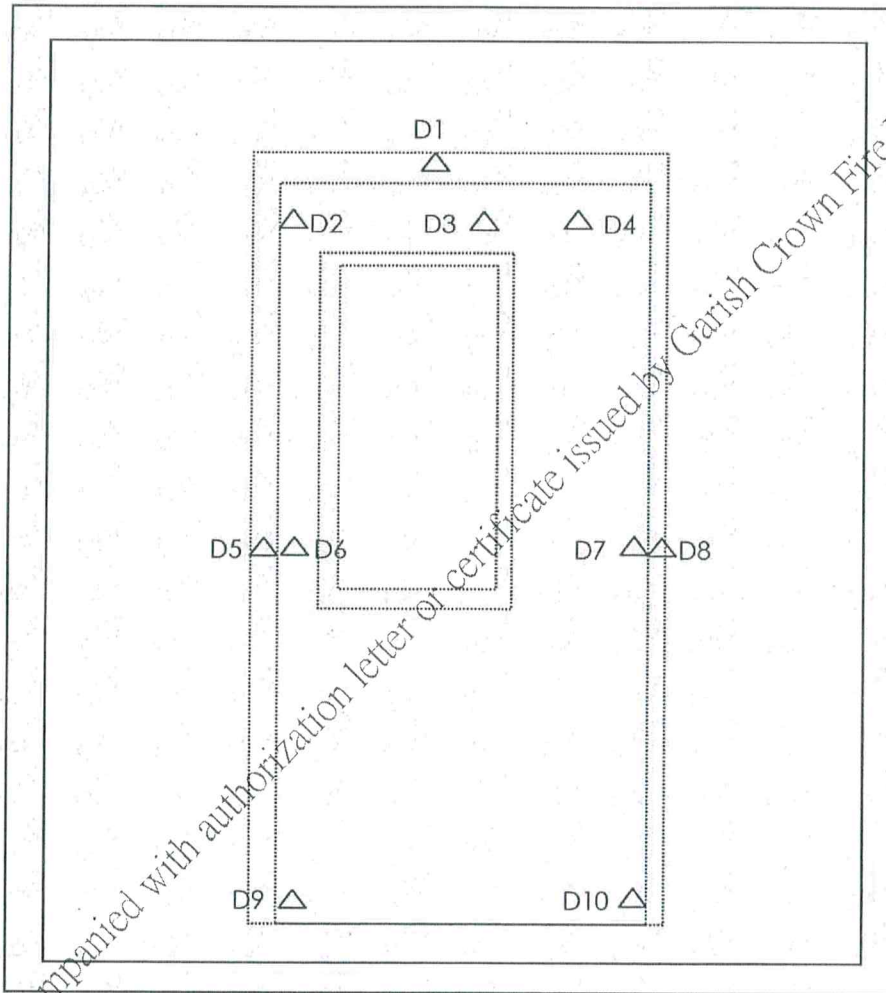
Photo 10: The automatic drop seal and the fire and smoke seal at the bottom edge of the door leaf



- Furnace thermocouples
- ▽ Pressure probe

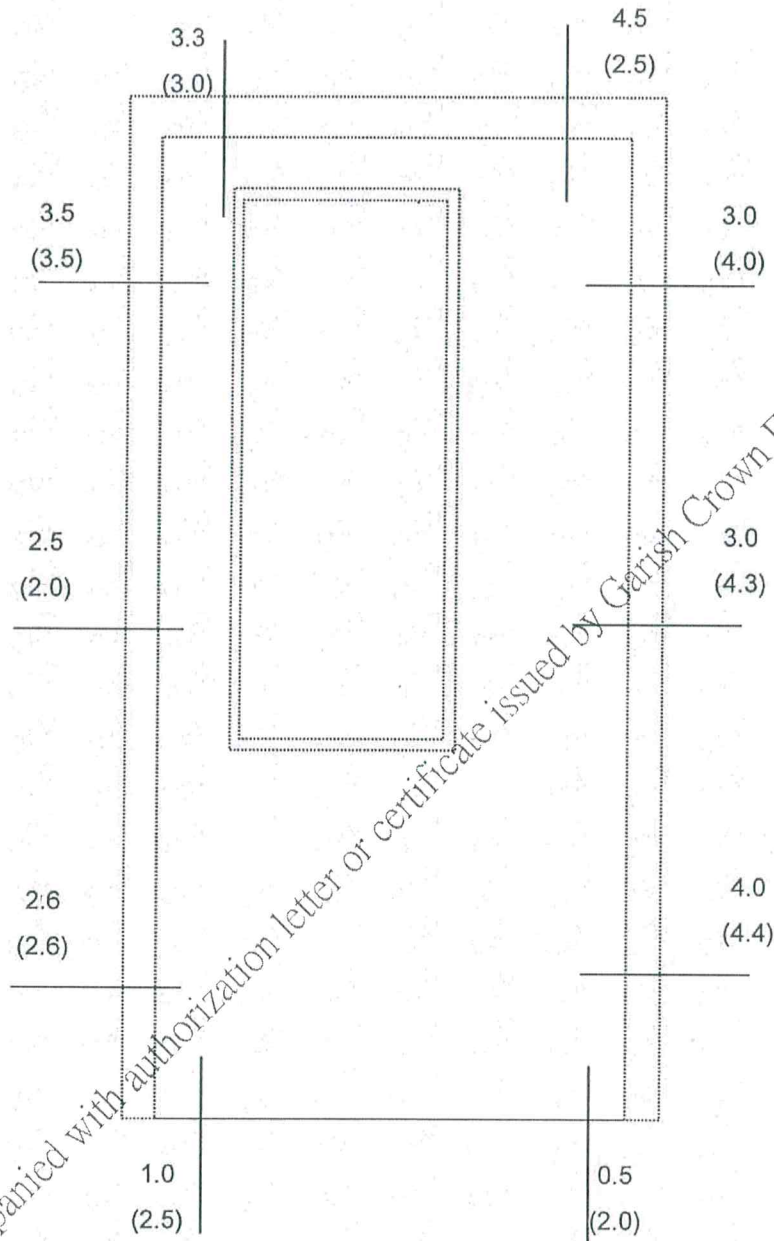
(The illustration not to scale)

Figure 1 – Locations and reference numbers of furnace thermocouples.



(The illustration not to scale)

Figure 2 – Locations and reference numbers of displacement measurement.

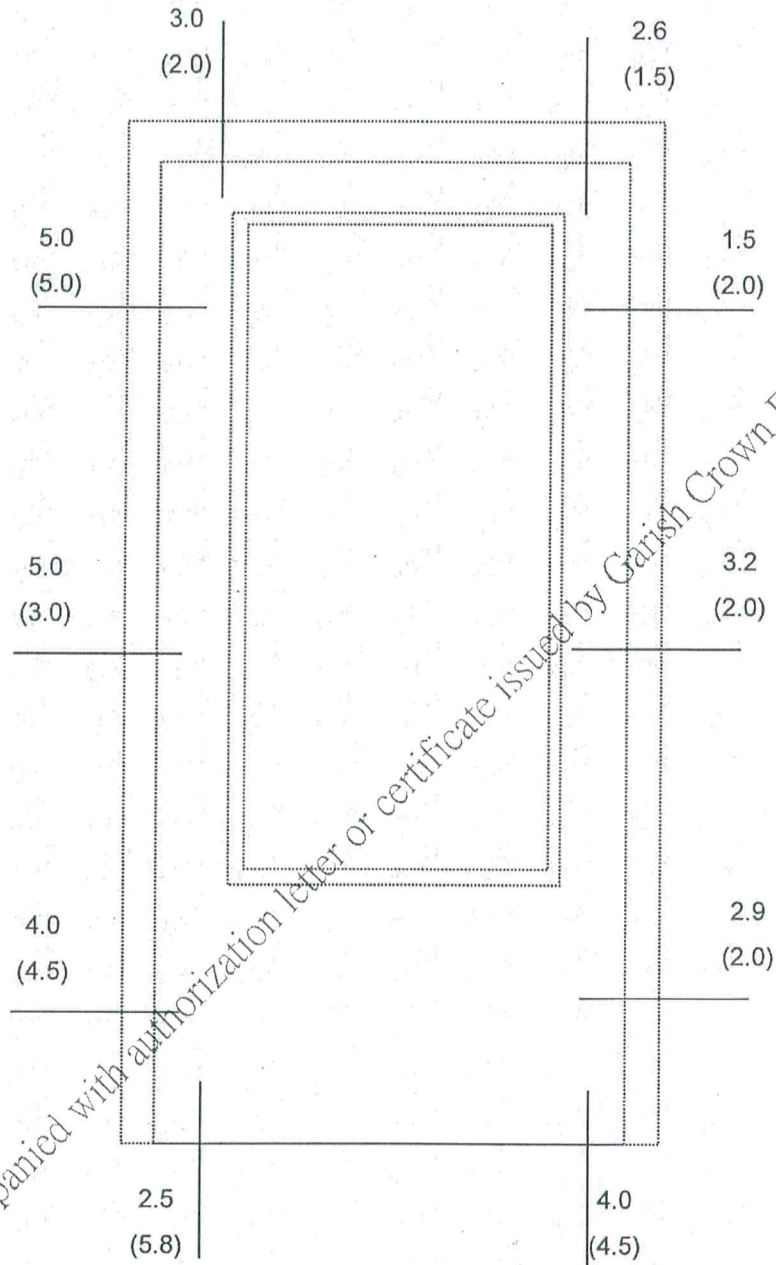


(The illustration not to scale)

Length of clearance		Jamb edges (mm)		Top edge (mm)	Bottom edge (mm)	Total (excluding the bottom edge) (mm)
		Doorset '1'	Opening	2,702	2,703	1,203
	Closing	2,687	2,686	1,174	1,175	6,547

Figure 3 – Doorset '1' clearance gap in mm, measured from opening face.

(Measurements from closing face are in brackets)



(The illustration not to scale)

Length of clearance		Jamb edges (mm)		Top edge (mm)	Bottom edge (mm)	Total (excluding the bottom edge) (mm)
Doorset '2'	Opening	2,706	2,704	1,203	1,203	6,613
	Closing	2,694	2,690	1,176	1,175	6,560

Figure 4 – Doorset '2' clearance gap in mm, measured from opening face.

(Measurements from closing face are in brackets)

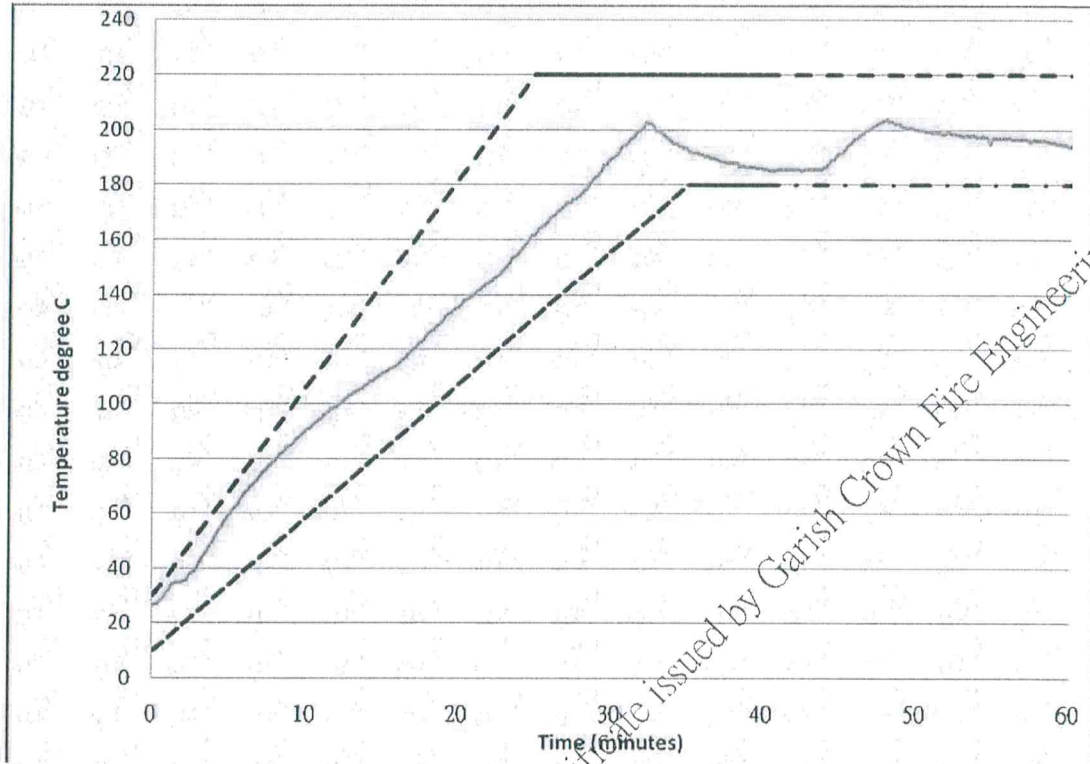


Figure 5 – Test chamber temperature of Doorset '1' (Medium Test)

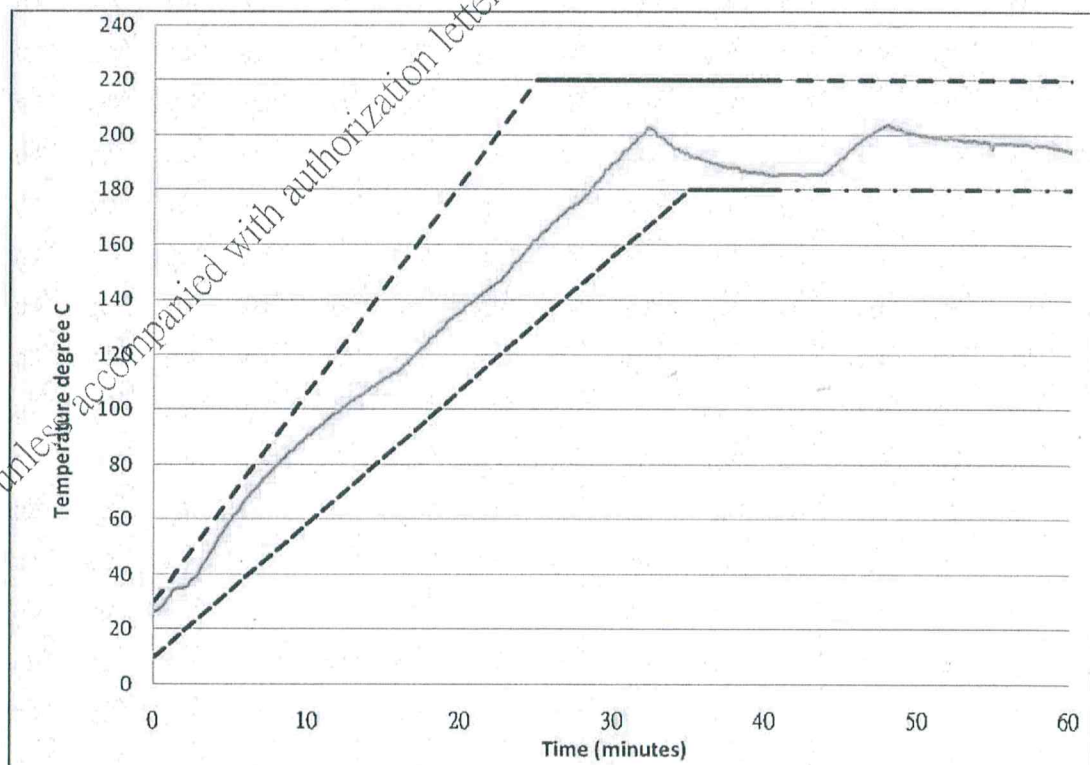


Figure 6 – Test chamber temperature of Doorset '2' (Medium Test)

Medium Temperature Test of Doorset '1'									
Time (mins)	Temperature (°C)								
	F1	F2	F3	F4	F5	F6	F7	F8	F9
0	25	26	26	26	27	27	27	27	27
5	58	60	64	59	62	64	57	62	65
10	86	90	95	89	92	95	86	92	96
15	105	111	116	108	113	117	104	114	118
20	128	135	142	132	139	143	127	139	144
25	153	161	170	158	165	170	154	166	173
30	175	187	199	185	194	198	178	195	204
35	179	190	199	186	195	201	179	197	204
40	172	186	192	181	189	194	172	189	195
45	179	192	199	187	196	200	180	197	203
50	185	200	207	194	204	208	187	204	210
55	183	197	202	193	201	204	185	201	207
60	181	195	201	189	198	201	182	197	203
61.5	180	193	199	187	197	199	180	195	201

Medium Temperature Test of Doorset '2'									
Time (mins)	Temperature (°C)								
	F1	F2	F3	F4	F5	F6	F7	F8	F9
0	28	30	30	29	31	31	30	31	31
5	48	53	56	54	55	56	51	56	57
10	76	81	86	82	84	86	78	84	86
15	95	102	106	101	105	108	97	105	108
20	118	127	133	127	131	134	122	132	137
25	145	155	168	158	164	167	155	167	175
30	171	184	197	186	193	197	179	195	205
35	190	206	220	205	214	215	195	217	227
40	194	208	219	206	216	221	200	217	225
45	188	202	210	197	207	212	193	208	215
50	191	204	213	202	210	215	192	211	218
55	191	204	211	198	208	211	193	209	215

Figure 7 – Temperature measured by individual thermocouples

APPENDIX B – OBSERVATION

Table 1 - Ambient and Medium Temperature Test, Doorset 1, Side B

Time (min.sec)	Observation
Ambient Temperature Test	
00.00	All the door gaps were sealed with pressure sensitive tapes.
00.01	Measurement of leakage rates through apparatus and supporting construction started.
08.00	Removal of pressure sensitive tapes started.
14.20	Measurement of total leakage rates started.
23.30	Ambient temperature test ended
Medium Temperature Test	
00.00	Setup of displacement transducer completed and heat up of the test chamber cavity started.
35.10	The mean temperature of the test chamber reached 200 oC, no further significant change on the specimen was observed.
35.11	Measurement of total leakage rates started.
43.21	Measurement of total leakage rates ended
44.10	The door gaps were sealed with pressure sensitive tapes.
52.20	Measurement of leakages rate through apparatus and supporting construction started.
61.30	Test ended.
00.00	Setup of displacement transducer completed and heat up of the test chamber cavity started.
Post-test observation	
1.	The doorset was able to open manually after the test.
2.	All smoke seals were remained intact in positions without significant deterioration.

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Table 2 - Ambient and Medium Temperature Test, Doorset 2, Side A

Time (min.sec)	Observation
Ambient Temperature Test	
00.00	All the door gaps were sealed with pressure sensitive tapes.
00.01	Measurement of leakage rates through apparatus and supporting construction started.
07.10	Removal of pressure sensitive tapes started.
08.10	Measurement of total leakage rates started.
21.10	Ambient test ended
Medium Temperature Test	
00.00	Setup of displacement transducer completed and heat up of the test chamber cavity started.
30.30	The mean temperature of the test chamber reached 200 °C, no further significant change on the specimen was observed.
30.31	Measurement of total leakage rates started.
39.55	Measurement of total leakage rates ended.
40.00	The door gaps were sealed with pressure sensitive tapes.
47.25	Measurement of leakages rate through apparatus and supporting construction started.
55.00	Test ended.
Post-test observation	
<ol style="list-style-type: none"> 1. The doorset was able to open manually after the test. 2. All smoke seals were remained intact in positions without significant deterioration. 	

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APPENDIX C – DATA RECORDED DURING THE TEST

Table 3 - Lateral deflections of the specimen after the measurement of Q_{total} during the medium temperature test, as viewed from the unexposed face.

Doorset	Doorset 1	Doorset 2
Location		
D1	-1.1	-1.0
D2	-0.9	-0.2
D3	-1.6	-0.8
D4	-0.5	-1.3
D5	-1.4	-1.4
D6	-1.7	-1.5
D7	-1.6	-3.3
D8	-1.5	-1.6
D9	3.0	0.4
D10	0.5	0.5

Positive deflections indicate movement away the test chamber (see also Figure 2 for the locations).

APPENDIX D – PRODUCT INFORMATION FROM TEST SPONSOR

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

Item	Description
1	Door Frame Manufacturer : Leung's Wooden Co., Ltd. Material : Hardwood Density : 550 – 700 kg/m ³ * Overall size : Nominal 1,276 mm wide by 2,742 mm high* Section size : 50 mm by 100 mm* Rebate : 15 mm* Jambs to head jointing : Mitered joint with groove and tongue and fixed by wood screws method Frame to concrete lining : By M10 x 112 mm long frame anchors fixing method Gap insulation between door frame and concrete lining : Sealed up with fire sealant
2	Door Leaf Manufacturer : Leung's Wooden Co., Ltd. Overall sizes : 1,200 mm wide by 2,700 mm high* Overall construction : Perlite core sandwiched by fire rated boards and M.D.F. boards facing
2a	Door Core Material : Perlite Thickness : 38 mm Density : 380 kg/m ³ . Fixing method : Fix to the stiles and rails by glue
2b	Door Leaf Stiles/ Rails Material : Wooden slats Density : 350 - 450 kg/m ³ Sizes of stiles and rails : 38 mm thick by 50 mm wide* Fixing method : Fixed together by brackets and glue

Notes: * Verified on site by RED.

As shown on the test construction.

2c	Fire Rated Boards Supplier : Leung's wooden Co., Ltd. Material : Magnesium Oxide Thickness : 5 mm Density : 900 kg/m ³ Fixing method : By wood screws
2d	Door Leaf Facings Material : Medium Density Fiberboard (MDF) Thickness : 3 mm* Density : 350 - 450 kg/m ³ Fixing method : By glues
2e	Door Leaf Lippings Material : Hardwood Thickness : 8 mm Density : 550 – 700 kg/m ³ Fixing method : By wood nails
3a	Glass Panel Supplier : Kwok Shing Construction Ltd. Reference : Kingmax E-60/60 Thickness : 25 mm Aperture sizes : 550 mm wide by 1,800 mm high Vision sizes : 500 mm wide by 1,600 mm high* Fixing method : Sandwiched by steel angle and timber beading on both sides. Bedded by ceramic fibre tape
3b	Glazing Bead Material : Hardwood Density : 550 – 700 kg/m ³ Section sizes : 25 mm high x 14.5 mm wide* Fixing method : Fixed by wood nails @ 200 mm c/c

* and # refer to page 25

4a	<p>Smoke Seal</p> <p>Brand : Gallford</p> <p>Reference : AD003T</p> <p>Overall size(s) : 12 mm x 12 mm*</p> <p>Applied location : a) At the corner of the door frame rebate, partially interrupted at the hinges positions and the striking plate</p> <p style="padding-left: 20px;">b) At the corner of the head of the door leaf rebate, full width and partial interrupted and the concealed closer position</p>
4b	<p>Intumescent Fire & Smoke Seal</p> <p>Brand : Lorient</p> <p>Reference : LP 1004DS</p> <p>Overall size(s) : 10 mm wide by 4 mm thick with two 4 mm high plastic fins*</p> <p>Applied location : a) Vertical edges of door leaf, full height and full width without interruption</p> <p style="padding-left: 20px;">b) Bottom edge of door leaf, aside the drop seal towards the opening face</p>
4c	<p>Intumescent Fire Seal</p> <p>Brand : Gallford</p> <p>Model : Y21004</p> <p>Overall size(s) : 10 mm wide x 4 mm thick*</p> <p>Applied location : Top edge of door leaf</p>
4d	<p>Intumescent Fire Seal</p> <p>Brand : Gallford</p> <p>Model : Y23004</p> <p>Overall size(s) : 30 mm wide x 4 mm thick*</p> <p>Applied location : The head and vertical jambs of door frame</p>
4e	<p>Automatic Drop Seal – Door Leaf</p> <p>Brand : Gallford</p> <p>Model : GF-B09</p> <p>Overall size(s) : 36 mm high by 14 mm thick*</p> <p>Applied location : Fitted centrally at the bottom of the door leaf</p>

* and # refer to page 25

5	Concealed hinges
	Brand : Ying Mu
	Model : CH
	Material : Stainless Steel
	Overall size : 140 mm long by 48 mm wide by 50 mm deep*
	Fixing method : Fixed by stainless steel screws
6	Cylinder Latchset
	Brand : Fox's
	Model : BB 870
	Material : SS Stainless steel
	Overall size : 70 mm diameter
	Size of striking plate : 70 mm long x 45 mm wide
	Size of forend plate : 55 mm long x 25 mm wide
	Status during test : Unlatched and unlocked
7	Concealed Door Closer
	Brand : Dorma
	Model : ITS 96
	Material : Stainless steel
	Overall size : 277 mm long x 42 mm high x 32 mm wide*
	Track size : 440 mm long x 31 mm high x 20 mm wide*
	Applied location : Fitted at the head of the door leaf

* and # refer to page 25

Drawing from Test Sponsor

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

<p>NOTE</p> <p>(1) 45mm THK. 180x45mm DOOR FRAME</p> <p>(2) 2x3mm THK INTERLOCK STRIP</p> <p>(3) AUTOMATIC DOOR BOTTOM SMOKE SEALS</p> <p>(4) 25mm WIRE MESH STRIP</p> <p>(5) 32mm THK FIREPROOF DOOR CORE BOARD</p> <p>(6) 3mm THK MDF FINISHED ON BOTH SIDES</p> <p>(7) 20mm THK CLEAR FRP GLASS PANEL</p> <p>(8) ADHESIVE SMOKE SEALS</p> <p>(9) 3x3mm THK HARDWOOD AGENTRAVE</p> <p>(10) 3x3x3mm THK WOODEN STRIP</p> <p>(11) 20mm THK GLASS FIREFRP BOARD ON BOTH SIDES</p> <p>(12) 20mm THK WOVEN LIPPINGS</p> <p>(13) 25x25mm THK 180x45mm GLASS BEADS</p> <p>(14) 25mm THK INTERLOCK STRIP</p> <p>(15) 15x15mm GALVANIZED INGGES</p> <p>(16) 20mm THK INTERLOCK STRIP</p> <p>(17) 20mm THK 15 ANGLE</p> <p>(18) FRP ROCK WOOL</p> <p>(19) 20mm THK 180x45mm RECYCLE LIPPINGS</p>	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th>REV.</th> <th>DATE</th> <th>ITEM</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	REV.	DATE	ITEM							<p>PROJECT</p> <p>60 MIN FIRE RESISTANCE TEST ON TWO SIDE HUNG TIMBER DOORSET.</p> <p>DRAWING TITLE</p> <p>DETAILS FOR 60 MIN FIRE & SMOKE RESISTANCE TEST SINGLE DOORSET</p> <p>54mm THICK SOLID CORE FLUSH DOOR</p>
REV.	DATE	ITEM									
<p>60 MIN FIRE RESISTANCE TEST ON TWO SIDE HUNG TIMBER DOORSET</p>											
<p>DRAWING NO.: SPT-TDS-D01</p>											
<p>SCALE: 1:50</p>											
<p>DATE: 2014-MAR-14th</p>											

This report is invalid unless accompanied with authorization letter for Garish Crown Fire Engineering & Consultancy

- End of report -