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SHANGHAI GALLFORD FIRE SEALING MATERIAL CO., LTD.

TEST REPORT

SCOPE OF WORK

EN 1634-1:2014+A1:2018 TESTING ON INTUMESCENT FIRE SEAL, MODEL YZ1504, YZ2004, YZ1004, YZ3004, RM1002, RM1502, RM3002, RM2002 AND RM2502; INTUMESCENT FIRE AND SMOKE SEAL, MODEL YZ1014 AND YZ1514; SMOKE SEAL, MODEL AD006T AND AD005T; AUTOMATIC DOOR BOTTOM SEAL, MODEL GF-B17 AND GF-B08; FIRE GLAZING APERTURE LINER, MODEL RM5301; FIRE GLAZING SEAL, MODEL YZ2504 AND F8028; LOCK KIT, MODEL GF0037; HINGE PAD, MODEL GF10040; FIRE DOOR VIEWER, MODEL FV25; FIRE GRILLE, MODEL FG3030; FIRE GRILLE FACEPLATE, MODEL FGP3030

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TEST REPORT

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REPORT ISSUED TO

SHANGHAI GALLFORD FIRE SEALING MATERIAL CO., LTD.
BUILDING 2, NO.390 MAOLIAN ROAD, JIUTING TOWN, SONGJIANG DISTRICT
SHANGHAI, CHINA

SECTION 1

SCOPE

Intertek has conducted an evaluation for Shanghai Gallford Fire Sealing Material Co., Ltd. to determine the fire resistance characteristics of Intumescent Fire Seal, Model YZ1504, YZ2004, YZ1004 and YZ3004; Intumescent Fire and Smoke Seal, Model YZ1014 and YZ1514; Smoke Seal, Model AD006T; Automatic Door Bottom Seal, Model GF-B17; Fire Glazing Aperture Liner, Model RM5301; Fire Glazing Seal, Model F8028; Lock Kit, Model GF0037; Hinge Pad, Model GF10040 in single swing wooden composite fire doorset, Model GF-001. Intumescent Fire Seal, Model RM1002, RM1502, RM3002, RM2002 and RM2502; Smoke Seal, Model AD005T; Automatic Door Bottom Seal, Model GF-B08; Fire Glazing Aperture Liner, Model RM5301; Fire Glazing Seal, Model YZ2504; Lock Kit, Model GF0037; Hinge Pad, Model GF10040; Fire Door Viewer, Model FV25; Fire Grille, Model FG3030; Fire Grille Faceplate, Model FGP3030 in single swing wooden composite fire doorset, model GF-002. This evaluation began on December 29, 2021 and was completed on January 25, 2022. The test was conducted on January 10, 2022.

The test was conducted in accordance with EN 1634-1:2014+A1:2018, Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware – Part 1: Fire resistance test for door and shutter assemblies and openable windows.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

For INTERTEK B&C:

COMPLETED BY:	Ivy Qiu	**REVIEWED BY:**	Jason Xu
TITLE:	Project Engineer – Building & Construction	**TITLE:**	Operation Supervisor Building & Construction
SIGNATURE:		**SIGNATURE:**	
DATE:	2022-02-18	**DATE:**	2022-02-18

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TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

SECTION 2
SUMMARY OF TEST RESULTS

Summary of specimens installed on Single Swing Wooden Composite Fire Doorset, Model GF-001:
Intumescent Fire Seal, Model YZ1504, YZ2004, YZ1004 and YZ3004;
Intumescent Fire and Smoke Seal, Model YZ1014 and YZ1514;
Smoke Seal, Model AD006T;
Automatic Door Bottom Seal, Model GF-B17;
Lock kit, Model GF0037;
Hinge Pad, Model GF10040;
Fire Glazing Aperture Liner and Fire Glazing Seal, Model RM5301 and Model F8028

Summary of specimens installed on Single Swing Wooden Composite Fire Doorset, Model GF-002:
Intumescent Fire Seal, Model RM1002, RM1502, RM3002, RM2002 and RM2502;
Smoke Seal, Model AD005T;
Automatic Door Bottom Seal, Model GF-B08;
Lock kit, Model GF0037;
Hinge Pad, Model GF10040;
Fire Door Viewer, Model FV25;
Fire Grille and Fire Grille Faceplate, Model FG3030 and FGP3030;
Fire Glazing Aperture Liner and Fire Glazing Seal, Model RM5301 and Model YZ2504

These two test doorsets satisfied the performance requirements for the following periods:

Single Swing Wooden Composite Fire Doorset, Model GF-001

PERFORMANCE CRITERIA	RESULTS	
Integrity	Sustained flaming	68 minutes, no failure
	Gap gauge	68 minutes, no failure
	Cotton pad	68 minutes, no failure
Insulation	Area 1 (Doorset excluding glazed area)	68 minutes, no failure
	Area 2 (Glazed area)	68 minutes, no failure

Single Swing Wooden Composite Fire Doorset, Model GF-002

PERFORMANCE CRITERIA	RESULTS	
Integrity	Sustained flaming	68 minutes, no failure
	Gap gauge	68 minutes, no failure
	Cotton pad	68 minutes, no failure

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TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

Insulation	Area 1 (Doorset excluding glazed area and Grille area)	68 minutes, no failure
	Area 2 (Glazed area)	68 minutes, no failure
	Area 3 (Grille area)	0 minutes

The test was discontinued after a period of 68 minutes at the request of the sponsor.

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 EN 1363-1, and where appropriate EN 1363-2. Any significant deviation with respect to size, constructional 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.

SECTION 3
TEST METHODS

The specimens were evaluated in accordance with the following:

EN 1634-1:2014+A1:2018, *Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware – Part 1: Fire resistance test for door and shutter assemblies and openable windows*

EN 1363-1:2020, *Fire resistance tests – Part 1: General Requirements*

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Website: www.intertek.com

TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

SECTION 4
MATERIAL SOURCE/INSTALLATION

Test specimens were provided to Intertek directly by the client and were not independently selected for testing. Test specimens were received at the Evaluation Center on December 27, 2021. The manufacturer is Wuhu Gallford Fire Material Co., Ltd, located at 1# Plant, No. 59, Longtan Road, Wuhu Pilot Free Trade Zone, Wuhu, Anhui, China.

A description of the test assembly is given in the table below. The description of the specimen is based on a survey of the specimen and information provided by the sponsor of the test. All values quoted below are nominal, unless tolerances are given. All dimensions are in mm in this report, unless otherwise specified.

TESTED ASSEMBLY DESCRIPTION – GF-001			
Door	Type	Single leaf Single Action Swing Wooden Composite Door	
	Nominal size	836mm (wide) × 2040mm (high) × 55mm thick	
	Facing	2.5mm MDF, density of 816 kg/m^3	
	Sub-facing	5mm MgO board, density of 1339kg/m^3	
	Core	40mm Mineral board, density of 452kg/m^3	
	Rail	60mm × 30mm solid wood, density of 731kg/m^3	
	Stile	60mm × 30mm solid wood, density of 731kg/m^3	
	Glazing assembly	Fire Glass	Size: 720mm high × 170mm wide × 26 mm thick Visible size: 690mm high × 140mm wide
		Glazing Bead	30 × 30mm solid wood, density of 731 kg/m^3
		Fire Glazing Seal	Model F8028 One strip of 28 × 6.4mm thick seal located between the glazing and glazing bead on both sides.
		Fire Glazing Aperture Liner	Model RM5301 One strip of 53 × 1.2mm thick seal located around the perimeter of the opening, underneath the glazing and glazing bead.
Frame	Nominal size	906mm wide by 2080mm high by 140mm deep	
	Material	Solid wood, density of 731 kg/m^3, clad with 5 mm MgO board, density of 1339 kg/m^3 on both sides.	

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TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

Hardware	Hinge	Stainless steel ball bearing hinge Size: 4" × 4" × 3mm thick; Quantity: 3pcs; 1mm thick Intumescent Hinge Pad, Model GF10040 located between hinge and leaf or frame
	Lock	Type: Mortise lock, Model FRL72 Backset: 55mm; Latch throw: 12mm Latch bolt: Engaged; Dead bolt: Disengaged; 1mm thick Intumescent Lock kit, Model GF0037 located between lock body and leaf, strike plate and frame
	Door closer	Model: 603 Installation: Surface mounted standard installation on opening face of doorset
	Automatic Door Bottom Seal	Model: GF-B17 Section Size: 30mm high × 15mm wide Installation: Mortise mounted under leaf
Smoke Seal		Triangular seal, Model AD006T Size: 12 × 12mm Location: One strip surface mounted on the stop of frame
Intumescent Fire Seal		Type 1: Model YZ1504 Size: 15 × 4mm Location: One strip mortise mounted on the hinge edge of leaf
		Type 2: Model YZ2004 Size: 20 × 4mm Location: One strip mortise mounted on the leading edge of leaf
		Type 3: Model YZ1004 Size: 10 × 4mm Location: One strip mortise mounted on the top edge of leaf
		Type 4: Model YZ3004 Size: 30 × 4mm Location: One strip mortise mounted on head of frame
Intumescent Fire and Smoke Seal		Type 1: Model YZ1014 Size: 10 × 4mm Location: One strip mortise mounted on strike jamb of frame
		Type 2: Model YZ1514 Size: 15 × 4mm Location: One strip mortise mounted on hinge jamb of frame

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TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

TESTED ASSEMBLY DESCRIPTION – GF-002			
Door	Type	Single leaf Single Action Swing Wooden Composite Door	
	Nominal size	836mm (wide) × 2040mm (high) × 55mm thick	
	Facing	2.5mm MDF, density of 816kg/m^3	
	Sub-facing	5mm MgO board, density of 1339kg/m^3	
	Core	40mm Mineral board, density of 452kg/m^3	
	Rail	60mm × 30mm solid wood, density of 731kg/m^3	
	Stile	60mm × 30mm solid wood, density of 731kg/m^3	
	Glazing assembly	Fire Glass	Size: 720mm high × 170mm wide × 26mm thick Visible size: 690mm high × 140mm wide
		Glazing bead	30 × 30mm solid wood, density of 731kg/m^3
		Fire Glazing Seal	Model YZ2504 One strip of 25 × 4mm thick seal located between the glazing and glazing bead on both sides.
		Fire Glazing Aperture Liner	Model RM5301 One strip of 53 × 1.2mm thick seal located around the perimeter of the opening, underneath the glazing and glazing bead.
Frame	Nominal size	906mm wide by 2080mm high by 140mm deep	
	Material	Solid wood, density of 731kg/m^3, clad with 5mm MgO board, density of 1339kg/m^3 on both sides.	
Hardware	Hinge	Stainless steel ball bearing hinge Size: 4" × 4" × 3mm thick; Quantity: 3pcs; 1mm thick Intumescent Hinge Pad, Model GF10040 located between hinge and leaf or frame	
	Lock	Type: Mortise lock, Model FRL72 Backset: 55mm; Latch throw: 12mm; Latch bolt: Engaged; Dead bolt: Disengaged; 1mm thick Intumescent Lock kit, Model GF0037 located between lock body and leaf, strike plate and frame	
	Door Closer	Model: 603 Installation: Surface mounted standard installation on opening face of doorset	

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TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

	Fire Door Viewer	Model: FV25 Bore hole: Ø 25mm Location: At 380mm from hinge edge and 1500mm from bottom of leaf
	Fire Grille	Model: FG3030 Size: 300mm high × 300mm wide Location: At mid-width and 400mm from bottom of the leaf
	Fire Grille Faceplate	Model: FGP3030 Size: 340mm high × 345mm wide
	Automatic Door Bottom Seal	Model: GF-B08 Section Size: 28mm high × 13mm wide Installation: Mortise mounted under leaf
Smoke Seal		Triangular seal, Model AD005T Size: 10 × 10mm Location: One strip surface mounted on the stop of frame
Intumescent Fire Seal		Type 1: Model RM1002 Size: 10 × 2mm Location: One strip mortise mounted on the leading edge of leaf
		Type 2: Model RM1502 Size: 15 × 2mm Location: One strip mortise mounted on the top edge of leaf
		Type 3: Model RM3002 Size: 30 × 2mm Location: One strip mortise mounted on hinge jamb of frame
		Type 4: Model RM2002 Size: 20 × 2mm Location: One strip mortise mounted on strike jamb of frame
		Type 6: Model RM2502 Size: 25 × 2mm Location: One strip mortise mounted on head of frame

The sample ID number assigned by the test lab is S211229003HF.001~026.

The drawings of the Single Swing Wooden Composite Fire Doorset, Model GF-001 and GF-002, test specimens and test wall construction can be found in Section 6, 7 and 8 respectively.

These two doorsets were installed in a steel restraint frame and built into a concrete masonry unit partition, with fully mortared joints. The test assembly was placed in front of the furnace for the fire exposure. Prior to the commencement of the EN 1634-1 fire test, the specimen to be

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tested was checked for operability in the fire test frame by operating from fully closed to fully open, for 25 cycles. The test measurement data was shown in Section 9.

Two doorsets were mounted in one test frame. Both doorsets were mounted so that each leaf swung towards the fire and tested at the same time at the request of the client.

The nominal dimension of the test wall was 3 m high by 3 m wide.

After positioning the assembly frame over the furnace opening, the burners were ignited, and the timer was started. Temperatures within the furnace were monitored using thermocouples and the data was recorded. The burners were controlled to keep the furnace temperatures within the allowable limits specified in the test standards. After 5 minutes, the furnace pressure was adjusted so that the neutral plane was established at approximately 500 mm above notional floor level. Periodic observations were made of the surfaces of the test assembly during the fire resistance test.

Door deflection relative to the frame, where applicable, was monitored throughout the test. Position for measurement of deflection and unexposed temperature were presented in the drawing of Section 9.

SECTION 5
TEST RESULTS

Integrity

The Doorset GF-001 withstood the fire resistance test without passage of flame or gases hot enough to ignite cotton waste for 68 minutes. No through openings or penetrations were evident at this 68 minutes fire exposure portion of the test and the door latch remained engaged to the strike. During this 68 minutes fire exposure period no flaming was observed on the unexposed face of the assembly.

The Doorset GF-001 therefore met the criteria of the test standards for integrity performance of 68 minutes.

The Doorset GF-002 withstood the fire resistance test without passage of flame or gases hot enough to ignite cotton waste for 68 minutes. No through openings or penetrations were evident at this 68 minutes fire exposure portion of the test and the door latch remained engaged to the strike. During this 68 minutes fire exposure period no flaming was observed on the unexposed face of the assembly.

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Website: www.intertek.com

TEST REPORT

The Doorset GF-002 therefore met the criteria of the test standards for integrity performance of 68 minutes.

Insulation

Transmission of heat through doorset GF-001 excluding glazed area during the fire resistance test of 68 minutes did not raise the average temperature on the unexposed surface by more than 140°C above its initial value and did not raise the maximum temperature on the unexposed surface by more than 180°C above the initial mean unexposed face temperature. In addition, the transmission of heat through the assembly did not raise the maximum temperature of the unexposed surface of the frame by more than 360°C for 68 minutes.

Doorset GF-001 excluding glazed area therefore met the criteria of the test standards for insulation performance of 68 minutes.

Transmission of heat through glazed area of dooset GF-001 during the fire resistance test of 68 minutes did not raise the average temperature on the unexposed surface by more than 140°C above its initial value and did not raise the maximum temperature on the unexposed surface by more than 180°C above the initial mean unexposed face temperature.

Glazed area of doorset GF-001 therefore met the criteria of the test standards for insulation performance of 68 minutes.

Transmission of heat through doorset GF-002 excluding glazed area and Fire grillearea during the fire resistance test of 68 minutes did not raise the average temperature on the unexposed surface by more than 140°C above its initial value and did not raise the maximum temperature on the unexposed surface by more than 180°C above the initial mean unexposed face temperature. In addition, the transmission of heat through the assembly did not raise the maximum temperature of the unexposed surface of the frame by more than 360°C for 68 minutes.

Doorset GF-002 excluding glazed area and Fire grille area therefore met the criteria of the test standards for insulation performance of 68 minutes.

Transmission of heat through glazed area during the fire resistance test of 68 minutes did not raise the average temperature on the unexposed surface by more than 140°C above its initial value and did not raise the maximum temperature on the unexposed surface by more than 180°C above the initial mean unexposed face temperature.

Glazed area of Doorset GF-002 therefore met the criteria of the test standards for insulation performance of 68 minutes.

TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

When exposed to the fire for a period of 1 minutes, the maximum temperature of T37, T38 and T39 on Fire grille increase by more than 180°C above its initial mean unexposed face temperature.

Therefore, Fire grille area of Doorset GF-002 had insulation performance of 0 minutes.

A full set of test data is included in Section 10, and photographs have been presented in Section 11.

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SECTION 10
TEST DATA

Standards: EN 1634-1:2014+A1:2018, Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware – Part 1: Fire resistance test for door and shutter assemblies and openable windows

Procedure: Part 1: Fire resistance test for door and shutter assemblies and openable windows

Conditioning: According to EN 1363-1, Section 8

Equipment:

ITEM	ID
Vertical furnace	SH1097
Furnace pressure gauge	SH1097-15-1~2
Test Clock	SH1042
Furnace thermocouple	SH1097-4
Ambient temperature gauge	SH1097-11
Unexposed thermocouple	SH1097-12
Clearance Measurements	SH1057-1
Displacement Measurements	SH1377-1~14
Force Gauge	SH1211

Heating Conditions: According to EN 1363-1, Section 5.1
Pressure Conditions: According to EN 1363-1, Section 5.2
Ambient Conditions: 10~40°C according to EN 1363-1, Section 5.6
Test Specimen: According to EN 1634-1, Section 6
Installation of test specimen: According to EN 1634-1, Section 7
Furnace Thermocouples: According to EN 1634-1, Section 9.1.1
Unexposed Face Thermocouples: According to EN 1634-1, Section 9.1.2
Thermocouple Pads: Length and width 30 mm, thickness 2.0 ± 0.5 mm, dry density 900 ± 90 kg/m^2
Pressure Measurements: According to EN 1634-1, Section 9.2
Deflection Measurements: According to EN 1634-1, Section 9.3
Pre-test Examination: According to EN 1634-1, Section 10.1
Test Procedure: According to EN 1634-1, Section 10.2

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TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

Test Observations – Single Swing Wooden Composite Fire Doorset, Model GF-001

Time		All observations are from the une×posed face unless noted otherwise.
Mins	Secs	
00	00	Test started.
01	07	The inner layer of glass began to crack.
01	53	Smoke issued from the leading edge of the leaf.
02	45	The glass lost transparency completely.
02	52	Smoke issued from vertical edge of the glass.
03	27	Smoke issued from vertical edge and bottom horizontal edge of the glass.
04	00	Smoke still issued from the leading edge of the leaf, vertical edge and bottom horizontal edge of the glass.
06	40	Heavy smoke issued from four edges of leaf, four edges of the glass.
11	25	Heavy smoke still issued from four edges of leaf, four edges of the glass.
20	40	Smoke issued from the leading edge and head of the leaf, top edge of the glass.
30	00	Smoke still issued from leading edge and head of the leaf, top edge of glass. Discoloration was observed at top glass bead.
40	00	Smoke still issued from the leading edge and head of the leaf, top edge of the glass.
50	00	Smoke still issued from the leading edge and head of the leaf, top edge of the glass.
59	01	A cotton pad was applied at top right corner of doorset and the pad was not ignited.
65	00	Smoke still issued from the leading edge and head of the leaf, top edge of the glass.
68	00	Test was discontinued at the request of the client. Neither flaming, ignition of cotton pad nor through opening were evident on the unexposed surface of the doorset.

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TEST REPORT

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Test Observations – Single Swing Wooden Composite Fire Doorset, Model GF-002

Time		All observations are from the une×posed face unless noted otherwise.
Mins	Secs	
00	00	Test started.
00	39	Smoke issued from the fire grille.
01	17	The inner layer of glass began to crack.
01	53	Heavy smoke issued from fire grille. Smoke issued from leading edge of leaf.
02	15	Intermittent flame was observed on the fire grille, lasted about 1s.
02	20	There was a glow visible from fire grille.
02	45	Intumescent seals expanded and began to seal the gaps in fire grille. The glass lost transparency completely.
03	27	Heavy smoke still issued from the fire grille.
04	00	There was a glow visible from fire grille. Heavy smoke still issued from the fire grille.
04	57	There was a glow visible from fire grille. Heavy smoke still issued from the fire grille.
05	18	There was a glow visible from fire grille. Heavy smoke still issued from the fire grille.
05	25	Intumescent seals continued to expand and sealed the gaps in fire grille completely. Heavy smoke still issued from fire grille.
06	40	Heavy smoke issued from four edges of leaf, four edges of glass, fire grille and door viewer.
11	25	Heavy smoke still issued from four edges of leaf, four edges of glass, fire grille and door viewer.
20	40	Smoke issued from leading edge and head of leaf, top edge of glass and the fire grille.
30	00	Smoke still issued from leading edge and head of leaf, top edge of glass and the fire grille.
40	00	Smoke still issued from leading edge and head of leaf, top edge of glass and the fire grille.
50	00	Smoke still issued from leading edge and head of leaf, top edge of glass and the fire grille. Discoloration was observed at door viewer position and top of the fire grille on leaf.
59	01	A cotton pad was applied at the top of fire grille and the pad was not ignited.
65	00	Smoke still issued from leading edge and head of leaf, top edge of glass and the fire grille.
68	00	Test was discontinued at the request of the client. Neither sustained flaming, ignition of cotton pad nor through opening were evident on the unexposed surface of the doorset.

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TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

Temperature Data:
Mean furnace temperature together with temperature-time relationship specified in the standard

Time Mins	Specified Furnace Temperature (°C)	Furnace Mean Temperature (°C)
0	20	11
2	445	219
4	544	548
6	603	631
8	645	617
10	678	683
12	705	691
14	728	719
16	748	737
18	766	759
20	781	780
22	796	799
24	809	807
26	820	816
28	832	829
30	842	840
32	851	849
34	860	859
36	869	869
38	877	877
40	885	882
42	892	887
44	899	898
46	906	903
48	912	911
50	918	917
52	924	921
54	930	930
56	935	932
58	940	940
60	945	943
62	950	952
64	955	953
66	960	957
68	964	963

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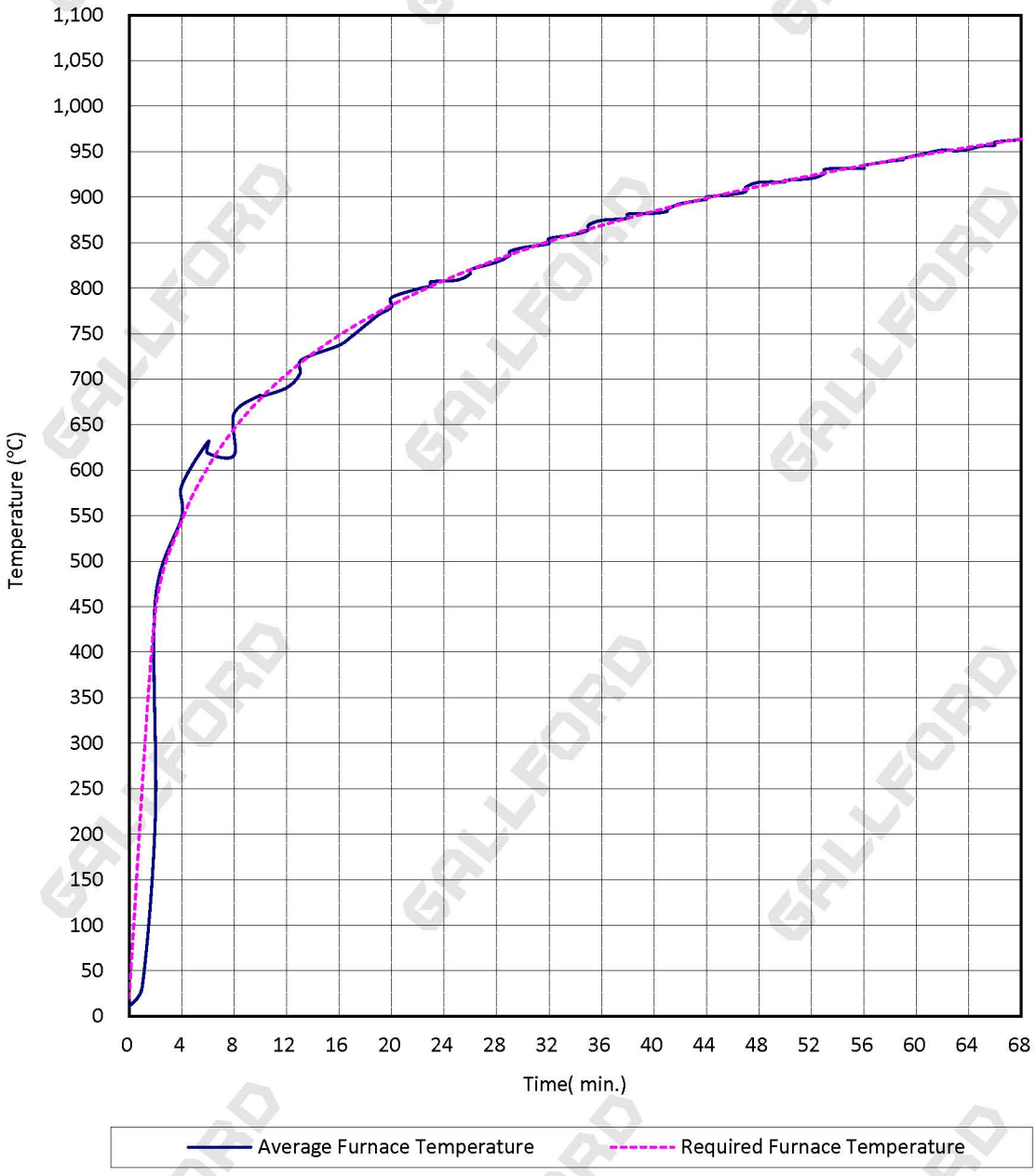
Graph for mean furnace temperature and temperature-time curve specified in the standard



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Unexposed surface temperatures – Doorset, Model GF-001

Time Mins	T1 (°C)	T2 (°C)	T3 (°C)	T4 (°C)	T5 (°C)	Mean temperature (°C)
0	10	9	9	8	8	9
2	10	9	9	9	9	9
4	10	9	9	9	8	9
6	10	9	9	9	8	9
8	11	10	9	9	8	9
10	11	10	9	9	9	10
12	11	11	9	10	9	10
14	12	12	11	11	10	11
16	14	14	12	11	12	13
18	16	17	14	13	14	15
20	19	21	17	15	17	18
22	22	25	20	18	20	21
24	25	30	23	21	23	24
26	29	34	27	24	26	28
28	32	39	30	27	30	32
30	36	44	34	30	33	35
32	39	48	37	33	36	39
34	42	51	40	35	41	42
36	45	55	43	37	44	45
38	48	58	46	39	46	47
40	50	60	49	41	49	50
42	52	62	52	42	52	52
44	55	65	54	44	54	54
46	57	67	57	45	56	56
48	59	69	59	46	58	58
50	61	70	61	47	60	60
52	63	72	63	48	62	62
54	65	73	65	49	64	63
56	67	74	67	50	65	65
58	68	75	68	51	67	66
60	70	76	70	53	69	68
62	71	76	71	57	71	69
64	72	77	73	60	71	71
66	73	78	74	63	72	72
68	74	78	75	66	72	73

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TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

Unexposed surface temperatures – Doorset, Model GF-001

Time Mins	T6 (°C)	T7 (°C)	T8 (°C)	T9 (°C)	T10 (°C)	T11 (°C)	T12 (°C)	T13 (°C)	T14 (°C)	T15 (°C)	T16 (°C)	T17 (°C)	T18 (°C)
0	9	9	9	9	9	9	9	8	9	8	9	9	9
2	9	9	9	9	9	9	9	8	9	8	9	9	9
4	9	9	9	9	9	9	9	8	9	8	10	10	10
6	9	9	9	9	9	9	9	8	9	8	16	16	16
8	9	9	10	9	9	9	9	9	9	8	25	25	26
10	9	10	10	9	9	9	9	9	9	8	35	35	38
12	9	11	11	10	10	9	10	9	9	9	46	47	50
14	10	13	13	10	11	9	10	10	9	9	53	55	56
16	12	16	14	11	12	9	11	11	9	9	60	63	62
18	15	21	17	17	14	9	11	11	9	9	67	71	68
20	18	27	21	23	17	9	11	11	9	9	73	76	73
22	21	33	26	27	20	9	12	12	9	9	78	81	77
24	25	39	31	34	23	10	12	12	9	9	82	84	81
26	29	45	36	37	26	10	12	12	10	9	85	86	84
28	33	50	41	42	30	10	13	12	10	9	89	89	87
30	37	54	46	47	33	10	13	12	10	10	92	90	89
32	41	57	50	52	36	10	14	13	11	10	94	92	91
34	45	60	53	57	39	10	14	13	12	10	96	93	92
36	49	63	57	60	42	11	14	14	12	10	97	94	94
38	52	65	60	64	44	11	15	15	13	10	98	96	94
40	55	67	63	66	47	11	15	16	14	11	99	97	95
42	58	68	65	67	50	11	16	17	15	11	99	99	96
44	62	71	67	69	52	12	17	18	16	12	100	101	97
46	64	72	70	71	54	12	18	19	18	12	101	101	97
48	67	73	71	72	56	13	19	21	19	12	101	102	98
50	69	75	73	74	58	13	20	23	20	13	102	102	99
52	71	76	75	75	60	13	21	24	22	14	102	102	99
54	73	77	76	76	62	14	22	26	23	15	102	102	99
56	74	78	77	77	64	14	23	28	25	15	103	102	100
58	76	79	78	79	66	15	24	30	26	16	103	103	100
60	76	79	79	79	68	16	25	32	28	17	104	103	101
62	77	80	80	80	70	17	26	33	29	18	104	104	101
64	78	80	80	80	71	17	27	35	31	19	104	104	102
66	79	81	81	81	72	18	28	37	33	20	104	104	102
68	79	81	82	82	74	18	29	39	34	21	105	105	103

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TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

Unexposed surface temperatures – Doorset, Model GF-002

Time Mins	T19 (°C)	T20 (°C)	T21 (°C)	T22 (°C)	T23 (°C)	Mean temperature (°C)
0	9	9	9	9	9	9
2	13	10	11	11	11	11
4	15	10	11	10	10	11
6	21	10	12	10	10	13
8	22	10	11	10	10	13
10	20	10	11	10	10	12
12	20	11	11	11	10	13
14	21	12	12	12	11	14
16	24	14	13	14	12	15
18	30	16	14	18	14	18
20	34	20	17	24	16	22
22	40	25	19	30	18	26
24	43	30	22	36	21	30
26	47	35	26	41	23	34
28	50	40	29	46	27	38
30	54	45	31	50	29	42
32	56	48	34	54	33	45
34	59	51	37	56	36	48
36	62	55	40	60	39	51
38	65	58	43	62	42	54
40	68	61	45	64	44	56
42	70	63	48	65	47	59
44	72	66	51	68	50	61
46	74	68	53	70	52	63
48	75	70	55	71	54	65
50	76	71	58	72	57	67
52	78	73	59	75	58	69
54	79	75	61	75	60	70
56	80	76	63	76	62	71
58	81	77	65	77	64	73
60	82	77	67	77	66	74
62	83	79	69	78	68	75
64	83	80	70	79	69	76
66	84	80	72	79	71	77
68	84	80	73	79	72	78

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TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

Unexposed surface temperatures – Doorset, Model GF-002

Time Mins	T24 (°C)	T25 (°C)	T26 (°C)	T27 (°C)	T28 (°C)	T29 (°C)	T30 (°C)	T31 (°C)	T32 (°C)	T33 (°C)
0	9	9	9	9	9	9	9	9	9	9
2	11	11	11	11	10	9	9	10	9	9
4	10	11	11	11	10	9	10	11	10	9
6	11	11	13	11	10	9	11	13	11	9
8	10	11	13	11	10	9	11	13	11	9
10	10	11	13	11	10	9	11	13	11	9
12	11	12	13	11	10	9	11	13	11	9
14	12	14	14	12	12	9	11	13	11	9
16	14	17	16	13	14	10	11	13	11	9
18	17	22	20	15	17	10	11	13	11	9
20	22	29	25	17	21	10	11	13	12	9
22	27	36	30	20	25	10	11	14	13	9
24	32	42	36	24	29	11	12	14	13	9
26	37	48	41	27	34	11	12	15	13	9
28	42	53	46	31	39	12	13	15	14	10
30	47	57	51	34	44	13	13	16	14	10
32	50	60	55	38	48	13	14	17	15	10
34	54	62	58	41	52	14	14	17	15	10
36	57	65	61	44	55	14	15	18	16	10
38	60	67	64	47	58	15	15	18	16	11
40	63	69	66	50	60	15	16	19	17	11
42	64	70	68	53	63	16	17	20	18	11
44	67	72	70	56	65	16	18	21	18	12
46	69	74	72	59	67	17	19	22	19	12
48	70	74	74	62	69	18	20	23	20	12
50	72	75	75	64	71	19	21	24	22	13
52	74	77	76	66	72	19	22	25	23	14
54	75	78	77	68	73	20	23	26	24	14
56	76	78	79	70	75	21	24	27	26	15
58	77	79	79	72	77	22	25	29	27	15
60	78	79	80	74	78	23	26	30	29	16
62	79	80	81	76	79	23	27	31	30	16
64	80	80	82	77	80	24	29	32	32	17
66	81	80	82	78	81	25	30	33	33	17
68	81	80	83	80	81	26	32	34	35	18

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TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

Unexposed surface temperatures – Doorset, Model GF-002

Time Mins	T34 (°C)	T35 (°C)	T36 (°C)	T37 (°C)	T38 (°C)	T39 (°C)	T40 (°C)
0	9	9	9	10	10	10	9
1	9	10	10	310	300	293	148
2	10	10	10	115	111	90	108
3	10	10	11	232	222	131	120
4	10	11	11	131	137	59	63
6	17	17	17	113	119	139	149
8	26	26	25	102	101	82	89
10	35	34	33	108	100	62	66
12	45	43	42	125	112	72	78
14	53	52	49	142	129	93	97
16	60	58	55	160	145	116	121
18	66	65	61	175	161	140	144
20	71	71	68	190	175	160	165
22	76	77	74	202	187	176	183
24	81	82	79	214	197	191	198
26	86	87	83	231	208	206	213
28	89	90	87	245	220	221	227
30	92	93	91	259	235	235	240
32	94	96	94	265	259	248	253
34	95	97	95	273	270	262	266
36	96	99	96	277	279	274	274
38	98	100	97	286	272	283	282
40	98	101	98	295	262	293	287
42	99	101	98	304	263	300	295
44	100	101	98	314	269	310	304
46	101	102	98	322	276	319	312
48	102	102	99	330	282	326	321
50	102	102	100	338	288	334	329
52	102	103	100	344	291	342	338
54	103	103	100	352	296	348	346
56	103	103	100	358	301	354	353
58	103	103	101	364	305	359	359
60	103	104	101	365	308	366	366
62	104	104	102	374	313	375	373
64	104	104	102	380	318	381	380
66	105	105	103	385	322	388	386
68	105	105	103	389	326	393	391

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TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

Horizontal Deflection –Doorset, Model GF-001 (Positive values indicate movement into the furnace)

Time Mins	D1 (mm)	D2 (mm)	D3 (mm)	D4 (mm)	D5 (mm)	D6 (mm)	D7 (mm)
0	0	0	0	0	0	0	0
10	0	0	5	0	/	/	/
20	0	2	7	0	10	6	12
30	0	4	9	0	15	16	22
40	0	5	13	0	17	20	29
50	0	5	25	0	20	29	34
55	0	5	31	0	22	31	34
65	0	5	31	0	22	35	37

Note: At 10 minutes, deflection measurement at D5, D6 and D7 were discontinued due to the heavy smoke.

Horizontal Deflection – Doorset, Model GF-002 (Positive values indicate movement into the furnace)

Time Mins	D8 (mm)	D9 (mm)	D10 (mm)	D11 (mm)	D12 (mm)	D13 (mm)	D14 (mm)
0	0	0	0	0	0	0	0
10	0	3	0	0	7	/*	/*
20	0	8	/*	0	12	/*	/*
30	0	13	/*	0	17	/*	7
40	0	13	/*	0	29	/*	19
50	0	17	/*	0	31	18	22
55	0	17	15	0	/*	/*	/*
65	0	17	23	0	/*	27	/*

**Note: Deflection measurement at D10, D12, D13 and D14 were discontinued due to the heavy smoke.*

TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

Door Closer Closing Force – Doorset, Model GF-001

Closing Force		
Highest gauge reading (N)	Distance (m)	Moment (N.m)
61.8	0.75	46.3
62.5		
60.7		

Door Closer Closing Force – Doorset, Model GF-002

Closing Force		
Highest gauge reading (N)	Distance (m)	Moment (N.m)
58.8	0.75	44.4
58.6		
60.3		

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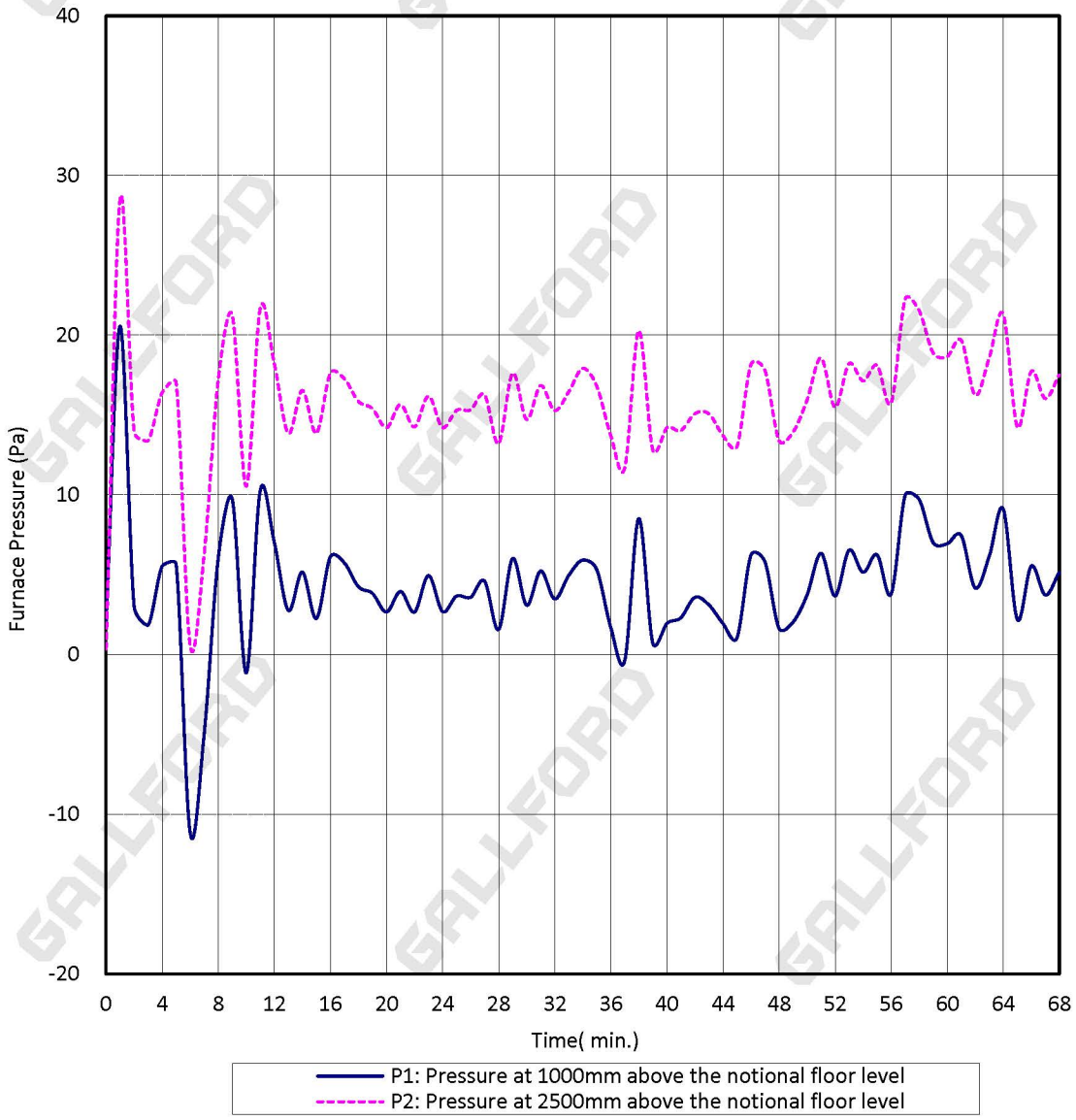
TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

Graph for Furnace pressure



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TEST REPORT

Issue Date: 2022-02-18 Intertek Report No.: 211229003SHF-001

SECTION 12
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	2022-02-18	N/A	Original Report Issue