



TITLE	:	Report on the evaluation of the proposed P&H Rocklite® Class F (452 x 652 Glazing) Fire Door assembly when classified in accordance with SANS 1253
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SCOPE

This report contains the evaluation of the proposed **P&H Rocklite® Class F (452 x 652 Glazing) Fire Door** when classified in accordance with **SANS 1253: Fire-doors and fire-shutters**.

Section 1: Evaluation requirements

Section 2: Detailed information on the fire door assembly received for testing

Section 3: Test protocols used for classification

Section 4: Test results

Section 5: Discussion of results

Section 6: Conclusion

Annexure “A”: Company information

Annexures “B”: Product information supplied by **P&H Protective Plaster Systems**

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1. INTRODUCTION

P&H Protective Plaster Systems submitted the proposed **P&H Rocklite® Class F (452 x 652 Glazing) Fire Door** assembly for classification in accordance with **SANS 1253**.

The criteria for the classification, evaluation and testing of Fire Door Assemblies are as follows:

Class	Inspection	Test for Reliability	Sandbag Impact	Steel Tool Impact	Fire Resistance
A	✓	✓			✓
B	✓	✓			✓
C	✓	✓	✓	✓	✓
D	✓	✓	✓	✓	✓
E	✓	✓			✓
F	✓	✓			✓

Table 1.1: Test requirements (Section 5.1. of SANS 1253)

In accordance with **SANS 1253, Section 4**, the following aspects must be tested or determined. The relevant **Clauses** are indicated below and the results are found in **Section 4** of this report.

4.1	General	Applicable
4.2	Class & Type	Applicable
4.3	Materials	Applicable
4.4	Glazing and Hardware	Applicable to hardware only
4.5	Hinged-door assemblies	Applicable (Includes Test for Reliability)
4.6	Sliding door assemblies	<i>Not applicable</i>
4.7	Dimensions	Applicable
4.8	Smoke emission	Applicable
4.9	Resistance to fire	Applicable
4.10	Structural strength	<i>Not applicable</i>

2. FIRE DOOR ASSEMBLY DETAIL

FIRELAB installed the specimen for the **Reliability** and **Fire Resistance** tests.

Description of the door assembly:

Door Assembly Name:	P&H Rocklite® Class F Fire Door with 452 x 652 Glazing
Abbr. Name:	452 Glazed Door
Overall size:	± 2 072 mm high x 990 mm wide
Fire Door assembly:	Symmetric
Proposed Classification:	Class F
Proposed Application:	Internal and external office doors

Door leaf (Symmetric);

Core:	Rocklite (Light-weight inorganic core)
Cladding/Facing:	White Oak Veneer
Edges:	Stainless steel channel surround

Door frame;

Type:	Steel
Fixing lugs:	4
Rebate size:	50 mm x 25 mm

Hinge;

Type:	PH01SS Stainless Steel ball bearing hinges
Quantity:	4
Fixing to door leaf:	Screws (4.8 x 50 mm CSK Pozi Zinc)
Fixing to door frame:	Screws (4.8 x 19 mm CSK Pozi Zinc)

Lockset & Ironmongery;

Type:	Lever handle, deadlock with cylinder & escutcheons
Fixing:	M4 Male & Female & CSK Pozi Screws

Closing devices;

Active leaf:	QS700 EN1154
Inactive leaf:	N/A

The exposed and unexposed sides of the door specimen prior to the test, are shown in Figures 2.1 and 2.2.

The Test Report and results only relate to the assembly submitted for testing as identified in Section 2 and Annexures and do not apply to any similar assemblies that have not been tested. This Test Report is only valid for 5 years or until there is a change to the product composition, manufacturing processes, or previously approved supplier(s).



Figure 2.1: The 452 Glazed Door from the exposed side prior to the test

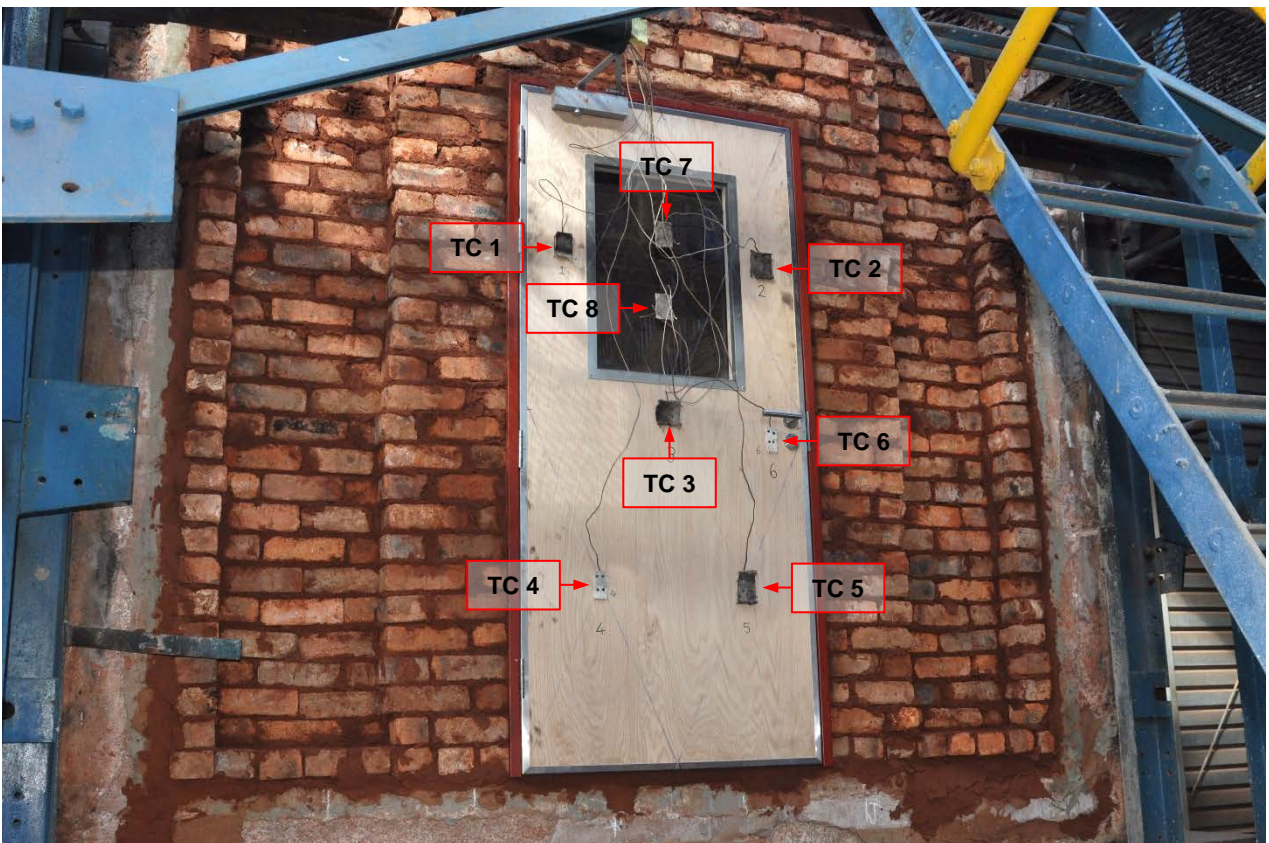


Figure 2.2: The 452 Glazed Door with thermocouples from the unexposed side




3. TEST PROCEDURE: SANS 1253:2016

3.1. INSPECTION AND TEST FOR RELIABILITY




The specimen was inspected to verify if the specimen door meets all the requirements as stipulated in **Section 4.1 to 4.7 of SANS 1253**. Measurements were taken where required.

During the **Test for Reliability (Section 5.3 of SANS 1253)** the door specimen was subjected to 1 000 cycles of opening and closing at a rate of 4 cycles per minute.

The specimen door fails should one of the following occur:

-  Signs of undue wear
-  Hinges and fastenings not operate properly
-  Clearance between the door and frame increased by more than 0.1 mm

3.1.1. TEST EQUIPMENT

-  Actuating mechanism
-  Stopwatch
-  Mounting Frame

3.2. FIRE RESISTANCE

The **Fire Resistance** test was conducted in accordance with **SANS 10177 – 2:2005**. **FIRELAB**'s large-scale air-aspirated diesel furnace was used.

The furnace temperature was controlled to follow the **ISO standard time-temperature curve** as stipulated in **SANS 10177 – 2**. Six thermocouples (TC) are used to measure the furnace's temperature (three on each side).

In terms of **Section 4.9 of SANS 1253 Fire Resistance** is determined as follows:

- Stability (R):** The door assembly shall withstand the prescribed fire exposure without the doors moving out of the frame by more than 25 mm. No flaming may occur on the unexposed face of the door within the first 30 minutes of the classification period. Light intermittent flames of approximately 150 mm long may occur, for periods not exceeding 5-minute intervals along the edges of the door, after 30 minutes. Light flaming may occur during the last 15 minutes of the classification period on the unexposed side face area of the door, provided it is contained within a distance of 40 mm from the vertical door edge and within 75 mm from the top edge of the door and within 75 mm from the top edge of the frame of the viewing panel.
- Integrity (E):** The door is deemed to have failed should there be a straight-through gap exceeding 10 mm of width or a straight-through gap with a width more than 6 mm, not exceeding 10 mm and of combined length which exceeds the greater of the width or the height of the door.
- Insulation (I):** The temperature on the unexposed surface may not exceed 140 °C plus ambient temperature on average or 180 °C plus ambient maximum at any of the measured single surface position.





Class	Stability (minutes)	Integrity (minutes)	Insulation (minutes)
A	60	30	30
B	120	60	60
C	120	120	No requirement
D	120	120	120
E	30	30	30
F	30	30	No requirement

Table 3.2.1: Minimum **Fire Resistance** requirements (Section 4.2.1. of SANS 1253)

The **Insulation** criteria of the door specimen were measured using 5 thermocouples (TC 1 – TC 5) placed in a grid of equal area. TC 7 and 8 were placed on the glazing. TC 6 was placed near the lockset for additional information. The positions of the thermocouples are shown in Figure 2.2.

Note: In accordance with **Section 4.8** of **SANS 1253** smoke emission was also evaluated during the **Fire Resistance** test.

3.2.1. TEST EQUIPMENT

-  Data logging equipment c/w controller
-  Stopwatch
-  Type K thermocouples
-  **SANS 10177 – 2** Vertical Testing Facility

4. TEST RESULTS

4.1. INSPECTION AND TEST FOR RELIABILITY

P&H Protective Plaster Systems – 452 Glazed Door

INSPECTION IN ACCORDANCE WITH SANS 1253

General:		
Specimen Door was submitted as an assembly		✓
Class and Type:		
Class		Refer to Section 5.2
Type: Single-leaf, hinged, single action		✓
Materials:		
Structural materials		✓
Insulation materials		✓
Intumescent materials		✓
Glazing and Hardware:		
General		✓
Glazing		✓
Hinges		✓
Fastenings		✓
Closing Device		✓
Additional optional hardware		✓
Hinged-Door Assemblies:		
Closing of hinged door		✓
Fitting of door leaf		✓
Frames	Dimensions	✓
Frames	Fixing lug	✓
Test for Reliability		1 000 Oscillations
Reliability	No undue wear	✓
Reliability	Hinges and fastenings operate properly	✓
Reliability	Clearance not increased by more than 0.1 mm	✓
Dimensions:		
Width and height do not exceed 1.2 m & 2.7 m respectively		✓
Note(s): Inspection conducted on 17/07/2023		

Table 4.1.1: Results of inspections performed in accordance with SANS 1253

4.2. FIRE RESISTANCE

P&H Protective Plaster Systems – 452 Glazed Door

OBSERVATIONS DURING THE FIRE RESISTANCE TEST

TIME (hh:mm:ss)	DESCRIPTION
00:00:00	– Test Started –
00:05:07	Light smoke release on left and right perimeters
00:05:41	Light smoke release from top perimeter
00:06:08	Door surface aflame inside furnace
00:06:33	General smoke release increase
00:07:14	Smoke release from sides of glazing (view panel)
00:07:45	Flaming stopped inside furnace
00:08:42	Glass inside darkening
00:10:47	Discoloration at right top corner and left of glazing (view panel)
00:11:46	Discoloration on bottom perimeter and lockset
00:14:09	Condensate forming inside glazing (view panel)
00:14:57	Discoloration increases at bottom perimeter
00:18:20	Glass continues to darken
00:19:12	Lockset darkening
00:20:20	Flaming on inside edges of glazing (view panel)
00:22:37	Delamination of material inside glazing (view panel)
00:25:35	Smoke release from TC 7 and TC 8
00:26:10	Discoloration on bottom perimeter gone
00:26:38	Crack sound heard and discoloration increase at lockset
00:27:24	Unexposed surface of leaf bulging/deforming
00:29:29	Smoke release from lockset
<i>Continues on next page /...</i>	

00:38:00	Material between steel frame and glass on unexposed side expanding
00:39:24	Discoloration darkening around lockset
00:40:57	Charring at lockset
00:41:36	Liquid oozing from door closer and crack sound can be heard
00:44:03	Discoloration at left and bottom perimeters
00:48:17	Darkened film coming off glass
00:48:55	Glass on exposed side melting
00:52:06	Glass on unexposed side deforming
00:56:59	Charring increase at lockset
01:02:53	Charring increase on edges of glazing (view panel)
01:04:19	Glowing on timber left of glazing
01:05:23	Opening forming to right of lockset
01:12:07	Charring increase around edges
01:13:00	Discoloration on steel near lockset
01:14:05	Steel stripping away from timber on left of glazing (view panel)
01:14:58	White material on inside of glazing expanding
01:17:13	Lockset turning yellow
01:18:05	Degradation on edges of glazing (view panel)
01:25:08	Discoloration increases on left, top and right perimeters
01:31:38	Smoke release from door closer
01:36:52	Smoke release from small crack above glazing (view panel) on the right
01:39:35	All discoloration darkening
01:41:06	Glowing above TC 1
01:41:32	Glowing in crack at lockset
01:43:12	Timber degrading at top right corner
01:44:56	More deformation of glass
01:45:49	Smoke release from TC 6
01:47:13	Ignition left of glazing (view panel)
01:47:42	– Test Concluded –

Note(s): Tested on 03/08/2023, ambient temperature during the test = 15.6 °C

During the test, TC 7 malfunctioned. Its data has thus been removed from the graph.

Table 4.2.1: Observations recorded during the **Fire Resistance** test

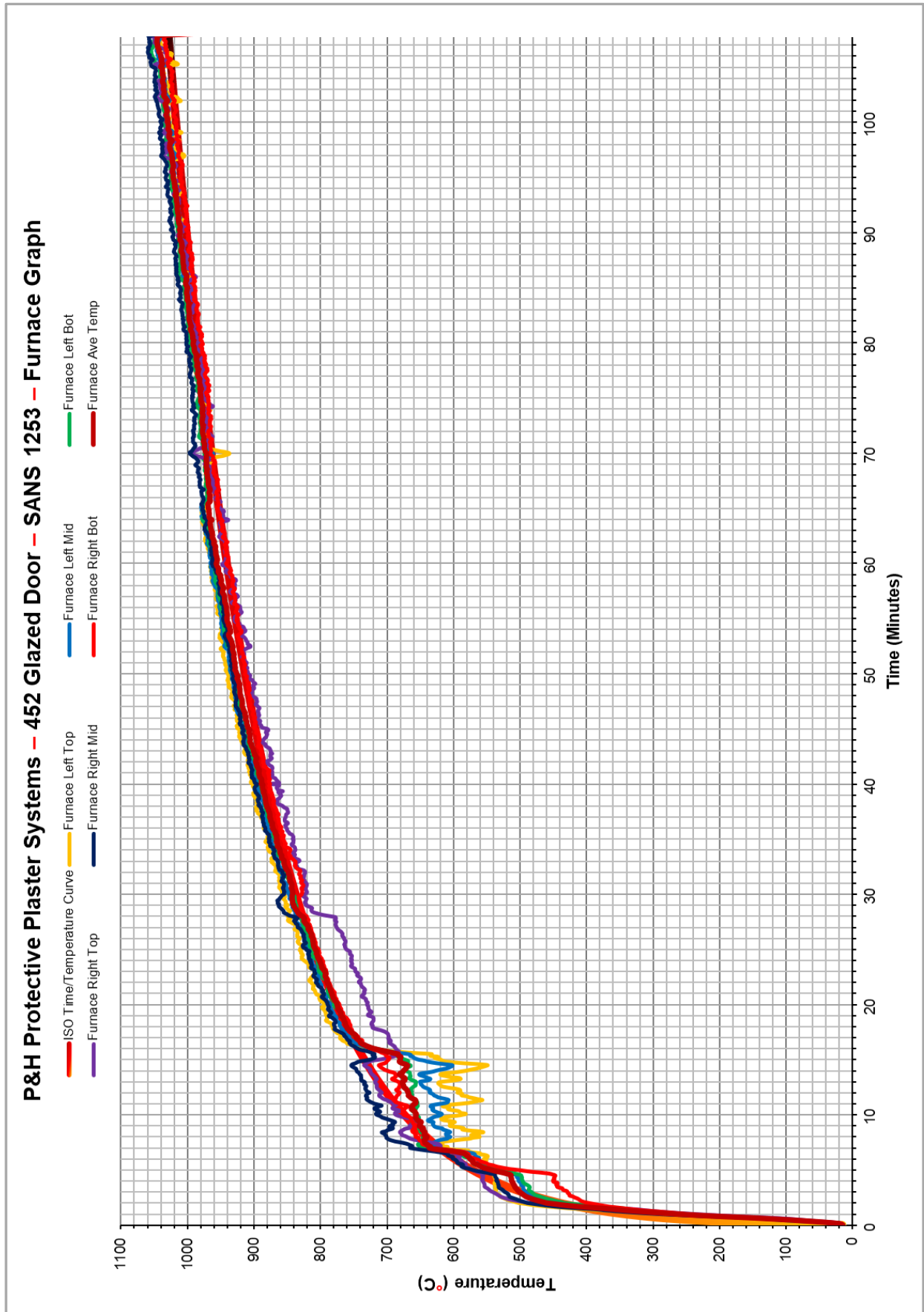


Figure 4.2.1: Furnace temperatures recorded during the large-scale FR test

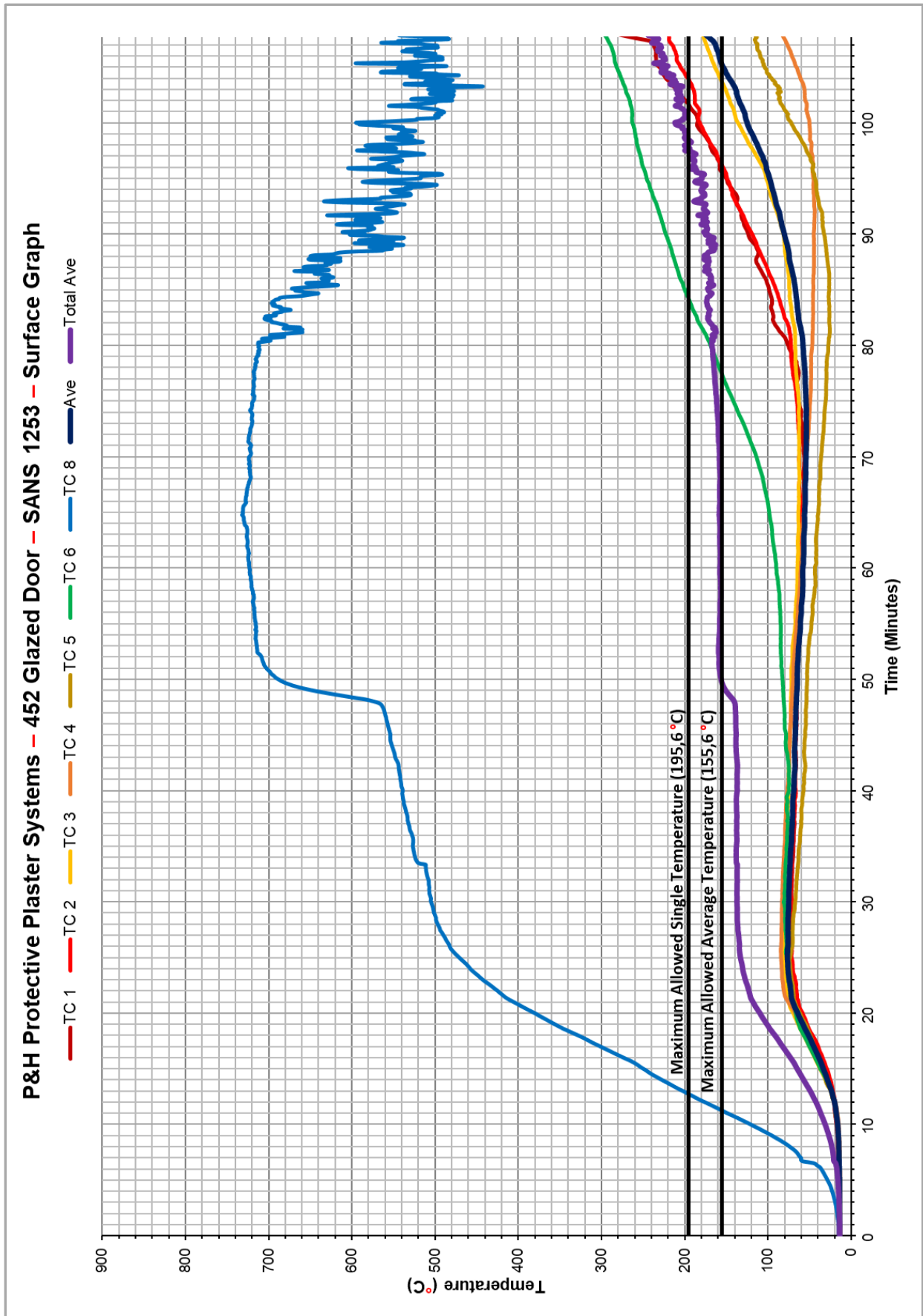


Figure 4.2.2: Temperatures recorded on the surface of the specimen

The Test Report and results only relate to the assembly submitted for testing as identified in Section 2 and Annexures and do not apply to any similar assemblies that have not been tested. This Test Report is only valid for 5 years or until there is a change to the product composition, manufacturing processes, or previously approved supplier(s).



Figure 4.2.3: Light smoke release from left and right perimeter



Figure 4.2.4: Door surface aflame inside furnace

The Test Report and results only relate to the assembly submitted for testing as identified in Section 2 and Annexures and do not apply to any similar assemblies that have not been tested. This Test Report is only valid for 5 years or until there is a change to the product composition, manufacturing processes, or previously approved supplier(s).



Figure 4.2.5: General smoke release increase



Figure 4.2.6: Glass darkening



Figure 4.2.7: Discoloration at lockset



Figure 4.2.8: Discoloration and smoke release on edge of glazing (view panel)

The Test Report and results only relate to the assembly submitted for testing as identified in Section 2 and Annexures and do not apply to any similar assemblies that have not been tested. This Test Report is only valid for 5 years or until there is a change to the product composition, manufacturing processes, or previously approved supplier(s).



Figure 4.2.9: Condensate forming inside glazing (view panel)



Figure 4.2.10: Lockset darkening



Figure 4.2.11: Material between glass and steel frame expanding

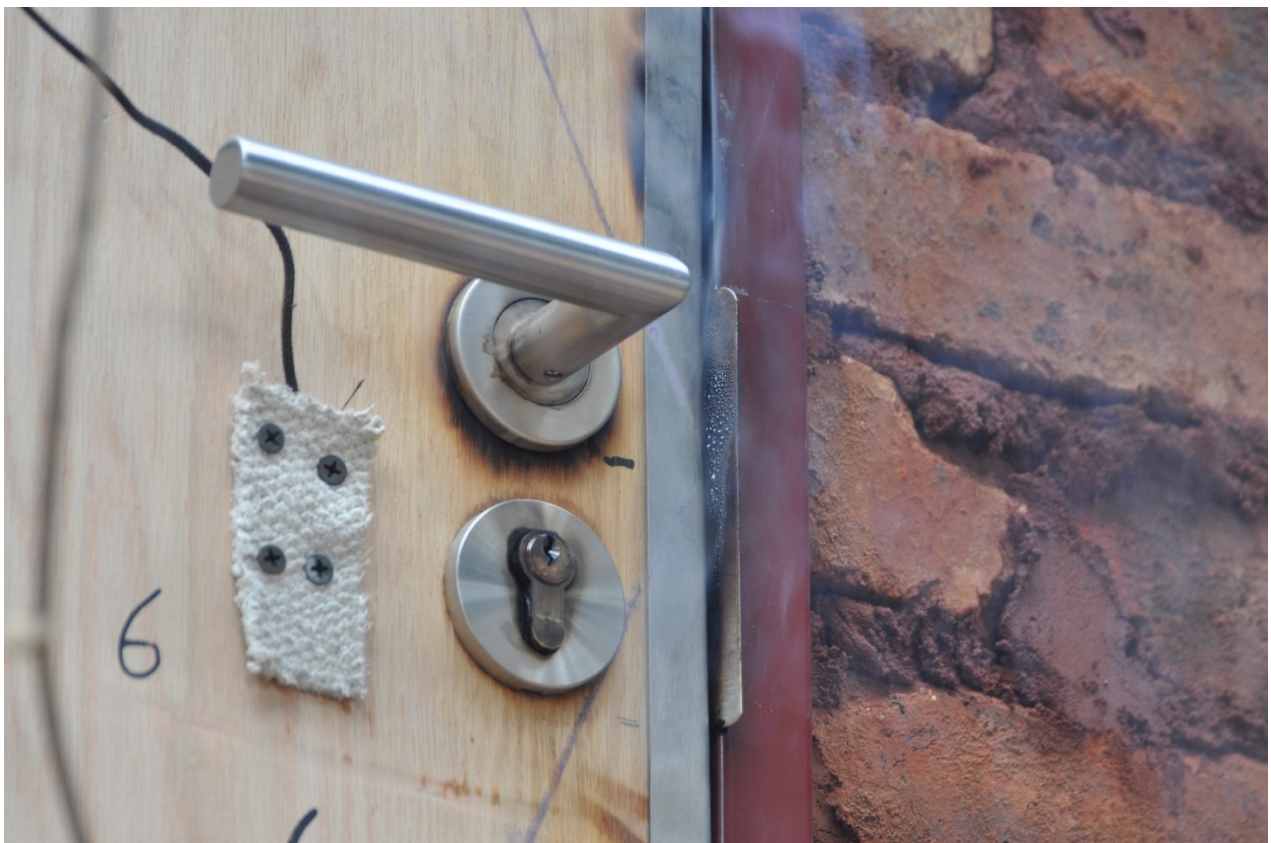


Figure 4.2.12: Charring at lockset



Figure 4.2.13: Glass on exposed side melted



Figure 4.2.14: Glass on unexposed side deforming



Figure 4.2.15: Glowing on timber, left of glazing (view panel)



Figure 4.2.16: Discoloration on steel near lockset

The Test Report and results only relate to the assembly submitted for testing as identified in Section 2 and Annexures and do not apply to any similar assemblies that have not been tested. This Test Report is only valid for 5 years or until there is a change to the product composition, manufacturing processes, or previously approved supplier(s).



Figure 4.2.17: Lockset turning yellow



Figure 4.2.18: Ignition left of glazing (view panel)

The Test Report and results only relate to the assembly submitted for testing as identified in Section 2 and Annexures and do not apply to any similar assemblies that have not been tested. This Test Report is only valid for 5 years or until there is a change to the product composition, manufacturing processes, or previously approved supplier(s).



Figure 4.2.19: Flaming rapidly spreading on unexposed side



Figure 4.2.20: Exposed side of specimen at conclusion of the **Fire Resistance** test

The Test Report and results only relate to the assembly submitted for testing as identified in Section 2 and Annexures and do not apply to any similar assemblies that have not been tested. This Test Report is only valid for 5 years or until there is a change to the product composition, manufacturing processes, or previously approved supplier(s).








Figure 4.2.21: Unexposed side of specimen at conclusion of the **Fire Resistance** test

5. DISCUSSION OF RESULTS

5.1. INSPECTION

Summary of the inspection results:

-  **General:** Complied to all requirements
-  **Class & Type:** Complied to all requirements
There was a plate fixed inside the frame that stated that the door was a Class E Door – The plate should be replaced with one that states it is a Class F door.
-  **Materials:** Complied to all requirements
The Intumescent strip was not embedded but glued to the rebate. The intumescent strip has deformed after the reliability test. This can be corrected in the manufacturing process by recessing it into the door leaf which will offer more protection.
-  **Glazing and Hardware:** *Dimensions exceeded 100 mm x 300 mm.*
The glazing exceeded the size of the dimensions as set out in **SANS 1253**'s inspection section. The large size of the view panel automatically classifies the door as a Class F door, matching the client's application, where the insulation criteria of the fire resistance test is not applicable.
-  **Hinged-door assemblies:** Complied to all requirements

5.2. FIRE RESISTANCE

Performance of the door specimen in accordance with **SANS 1253**:

- 🔥 Stability (R):** The specimen sustained flaming on the unexposed side at approximately 1 hour and 47 minutes. The maximum distance that the door moved out of its frame was 22 mm at 100 minutes at the bottom right corner.

Stability satisfied for 60 minutes

- 🔥 Integrity (E):** No straight through gaps were observed that exceeded 10 mm in width. There were also no straight through gaps with a width more than 6 mm, not exceeding 10 mm and of combined length which exceeded the greater of the width or the height of the door for a period of 60 minutes. The cracks that were observed on the unexposed side were not wide and long enough to contribute to failure of the test. The flaming on the unexposed side of the specimen was assisted by a large gap that formed on the side of the view panel, which also led to integrity failure.

Integrity satisfied for 60 minutes

- 🔥 Insulation (I):** None of the standard 5 thermocouples, placed on the remaining door leave, registered temperatures above the allowed maximum of 195.6 °C before 60 minutes. TC 1 and 2, however, raised above this maximum just after 100 minutes and the average above its allowed maximum of 155.6 °C between 100 and 110 minutes. The temperatures measured on the view panel went above 195.6 °C at approximately 13 minutes of the test.

Insulation criteria not satisfied – not required as the door is classified as a Class F door assembly



Smoke evaluation

The specimen released smoke during the test, but the smoke did not cause any discomfort in the vicinity area.

6. CONCLUSION

The proposed **P&H Rocklite® Class F (452 x 652 Glazing) Fire Door** supplied by **P&H Protective Plaster Systems** was evaluated in accordance with **SANS 1253**.

Results and classification:

 Inspection	»	Satisfactory (Refer to Section 5.1)
 Test for Reliability	»	1000 oscillations
 Fire Resistance	»	Class F 60 (no insulation)

The door may only be used where a Class F Fire Door assembly is permitted.




.....
Compiled by: **T.H. Swart**




.....
Approved by: **J.S. Strydom**

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– Company Information –		 FIRELAB
Company Name:	P&H PROTECTIVE PLASTER SYSTEMS (PTY) LTD	
Company Trading Name:	P&H PROTECTIVE PLASTER SYSTEMS (PTY) LTD	
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Company VAT Nr.:	4140104219	
Core Business Activities:	CONSTRUCTION / MANUFACTURING	
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Email address:	bernd@phrocklite.co.za	
Financial (name):	RAINER JONISCHKEIT	
Cell phone number:	011 979 3319	
Email address:	rainer@phrocklite.co.za	
– Test & Sample Information –		
Test Required:	CLASS F (120 MIN)	
Sample/Product name:	P&H ROCKLITE ®	
Intended Use:	REQUIRED FOR BUILDINGS	
Sample/Product Description:	P&H ROCKLITE ® CLASS F 120MIN SINGLE FIRE DOOR & 1.6MM FRAME INSIDE REBATE SIZE: 926 X 2040 X 230MM WALL WHITE OAK VENEER FINISH 452X652MM DBL GLAZED PYRAN S GLASS VIEW PANEL & S/S FRAME 2 PAIRS PH01SS STAINLESS STEEL BALL BEARING HINGES	
<i>(Short description of sample or product submitted for testing, and type of material to be tested)</i>		

ANNEXURE "B"

– SANS 10177 Part 2 – – Door Specimen Description –		 FIRELAB		
Proposed Usage:	X Class E/F	Class	Class B	Class D
Specify use:	INTERNAL & EXTERNAL OFFICE DOORS			
Door Assembly description:				
Assembly name:	P&H ROCKLITE CLASS F (120MIN) FIRE DOOR			
Overall size:	X Single	Double	926 mm width	2040 mm length
Door leaf:				
Core:	ROCKLITE			
Cladding / Facing:	WHITE OAK VENEER			
Edges:	STAINLESS STEEL CHANNEL SURROUND			
Door frame:				
Type:	Timber	X Steel	Double X / Single Rebate	
Dimensions:	Frame dimensions 990 X 2072 mm			Rebate 50 x 25 mm
Hinges:				
Type:	PH01SS STAINLESS STEEL BALL BEARING HINGES			
Quantity:	4			
Fixing to door leaf:	4.8 X 50MM CSK POZI ZINC			
Fixing to door frame:	4.8 X 19MM CSK POZI ZINC			
Lockset & Ironmongery:				
Type:	LEVER HANDLE, DEADLOCK WITH CYLINDER & ESCUTCHEONS			
Fixing:	M4 MALE & FEMALE & CSK POZI SCREWS			
Closing devices:				
Active leaf:	Model QS700	Type EN1154		
Inactive leaf:	Model	Type		
Door glazing / viewing panel:				
Dimension:	452 X 652MM			
Glass Type:	DOUBLE GLAZED PYRAN S WITH S/S FRAME			
Installation details: <small>Full details required, incl. drawing</small>	BUILT-IN SINGLE FIRE DOOR & FRAME			