



Test Report

**Fire Resistance Test
On
Fire Rated Steel Double Door**

**Test Sponsor:
Karachi Steel Services**

Test Report

On

Fire Resistance of Steel Fire Rated Double Door

Testing Laboratory	: Material Lab
Lab Reference No.	: STQ-170605/1041 SN 1/1
Lab Project No.	: P-3725
Test Reference No.	: 170524499
Test Standard	: BS 476: Part 22: 1987: Amd 2014.

Sample Description	: 1. Fire rated steel Double door with 44mm thick steel leaf with Rockwool core with vision panel on both leaves, Ironmongery from CONSORT & ISEO.
Test Sponsor	: Karachi Steel Services
Manufacturer	: Karachi Steel Services
Test Sponsor Address	: 187, Nishter Road, Near Nishter Road Post Office, Garden West, Karachi, Pakistan
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Date Samples Received	: 20/05/2017
Date of test	: 20/05/2017
Date Report Issued	: 10/06/2017
Required Duration of test	: 120 minutes
No. of Pages	: 25



MATERIAL LAB is **ACCREDITED** by the **DUBAI ACCREDITATION CENTER (DAC)**, accreditation certificate no: LB-008-TEST, to conduct Fire Resistance Tests in accordance with the following standards:

BS EN 1364 – 1	:	1999	Fire resistance tests for non-loadbearing elements – Part 1: Walls
BS EN 1364 – 3	:	2014	Fire resistance tests for non-loadbearing elements – Part 3: Curtain walling – Full configuration (complete assembly)
BS EN 1364 – 4	:	2014	Fire resistance tests for non-loadbearing elements – Part 4: Curtain walling – Part configuration
BS EN 1634 – 1	:	2014	Fire resistance and smoke control tests for doors and shutter assemblies, openable windows and elements of building hardware – Part 1: Fire resistance test for door and shutter assemblies and openable windows
BS 476 part 20	:	1987	Fire tests on building materials and structures- Part 20: Methods for determination of the fire resistance of elements of construction (general principles)
BS 476 part 22	:	1987	Fire tests on building materials and structures- Part 22: Methods for determination of the fire resistance of non-loadbearing elements of construction
ISO 834 – 1	:	2012	Fire-resistance tests – Elements of building construction – Part 1: General requirements
ISO 834 – 8	:	2002	Fire-resistance tests – Elements of building construction – Part 8: Specific requirements for non-loadbearing vertical separating elements
ISO 3008	:	2007	Fire-resistance tests – Doors and shutter assemblies
ISO 3009	:	2003	Fire resistance tests – Elements of building construction – Glazed elements



LB-008-TEST



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INTERNATIONAL TESTING AND CERTIFICATION BODIES

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ACCREDITATION CERTIFICATE

LB-008-TEST

Dubai Accreditation Department

has accredited

Material Lab

**Al Quoz Industrial Area 4
Dubai- United Arab Emirates**

In accordance with the requirements of ISO/ IEC 17025: 2005 to undertake the tests
in the fields of:

**Construction Materials Testing
Geotechnical Investigation
Environmental Testing**

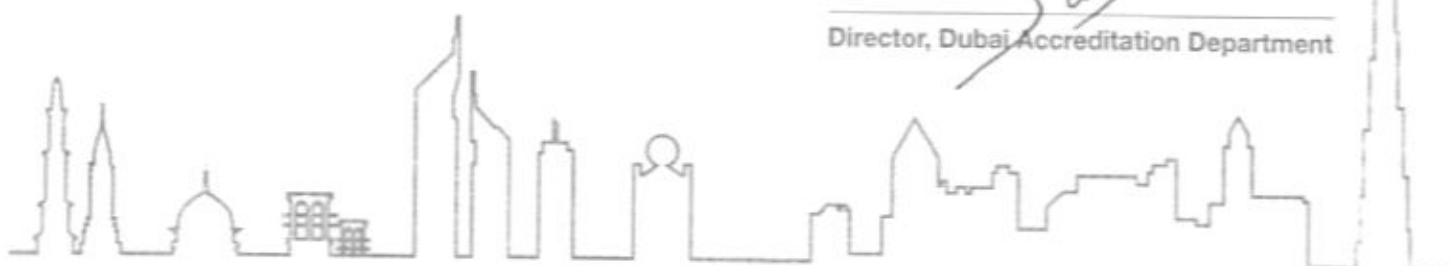
Listed in the attached Scope of Accreditation

This Accreditation is invalid without the attached scope of accreditation and shall remain in
force within the validity period printed below, subject to continuing compliance with the
requirements of the accreditation program.

Validity of Certificate: from 07- 03- 2016 to 06- 03- 2019

Initial Accreditation Date: 05- 02- 2004


Director, Dubai Accreditation Department





SCOPE OF ACCREDITATION

Construction Materials Testing

Material Lab

Al Quoz Industrial Area 4

Dubai- United Arab Emirates

Scope Issue No: 10

Accreditation Certificate No: LB-008-TEST

Scope Validity Period: 07-03-2016 to 06-03-2019

Issued by (Head of Section):

Type of Task	Materials/Products	Task Name	Standard method
Fire Resistance	Non load bearing Concrete blocks, Wall	Fire resistance tests for non-load bearing elements. Part 1. Walls <u>Performance criteria</u> Integrity, Insulation and Radiation	BS EN 1364-1
	Non load bearing elements-Curtain wall- full configuration (complete assembly)	Fire resistance tests for non-load bearing elements. Curtain walling. Full configuration (complete assembly) <u>Performance criteria</u> Integrity, Insulation and Radiation	BS EN 1364-3
	Non load bearing elements-Curtain wall- (Part configuration)	Fire resistance tests for non-load bearing elements. Curtain walling. Part configuration <u>Performance criteria</u> Integrity, Insulation and Radiation	BS EN 1364-4

Note: For history details of accredited conformity assessment activities, please refer to Dubai Accreditation Department, Dubai Municipality.



SCOPE OF ACCREDITATION
Construction Materials Testing

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Al Quoz Industrial Area 4

Dubai- United Arab Emirates

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Issued by (Head of Section):

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Type of Task	Materials/Products	Task Name	Standard method
Fire Resistance	Doors, Shutters and open able windows	Fire resistance and smoke control tests for door and shutter assemblies, open able windows and elements of building hardware. Fire resistance test for door and shutter assemblies and open able windows <u>Performance criteria</u> Integrity, Insulation and Radiation	BS EN 1634-1
	Building materials and structures	Fire tests on building materials and structures- method for determination of the fire resistance of elements of construction (general principles) (non load bearing only) <u>Performance criteria</u> Integrity, Insulation and Radiation	BS 476.20

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Construction Materials Testing

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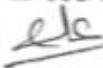
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Scope Issue No: 10

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Scope Validity Period: 07-03-2016 to 06-03-2019

Issued by (Head of Section): 

Type of Task	Materials/Products	Task Name	Standard method
Fire Resistance	Building materials and structures	Fire tests on building materials and structures- method for determination of the fire resistance of non-load bearing elements of construction <u>Performance criteria</u> Integrity ,Insulation and Radiation	BS 476.22
		Fire-resistance tests - Elements of building construction - Part 1: General requirements (non load bearing only) <u>Performance criteria</u> Integrity ,Insulation and Radiation	ISO 834-1
		Fire-resistance tests -- Elements of building construction -- Part 8: Specific requirements for non-load bearing vertical separating elements <u>Performance criteria</u> Integrity ,Insulation and Radiation	ISO 834-8

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SCOPE OF ACCREDITATION Construction Materials Testing

Material Lab

Al Quoz Industrial Area 4

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Type of Task	Materials/Products	Task Name	Standard method
Fire Resistance	Doors and shutters	Fire resistance tests- Door and shutter assemblies. <u>Performance criteria</u> Integrity ,Insulation and Radiation	ISO 3008
	Building construction – glazed elements	Fire-resistance tests - Elements of building construction - Glazed elements <u>Performance criteria</u> Integrity ,Insulation and Radiation	ISO 3009
Mechanical/ Physical	Water proofing membrane	Standard Test Method for Water Absorption of Plastics	ASTM D570
		Special Directive for the Assessment of Reinforced Water proof Covering of Atactic Polypropylene (APP) polymer Bitumen and Styrene Butadiene-styrene(SBS) Elastomeric Bitumen- Heat Resistance	European Union of Agreement, UEA to M.O.A.T 30 & 31 Para E
		Flexible sheets for waterproofing. Determination of tensile properties. Bitumen sheets for roof waterproofing	EN 12311-1

Note: For history details of accredited conformity assessment activities, please refer to Dubai Accreditation Department, Dubai Municipality.

1: Introduction

Material Lab is accredited to perform fire resistance tests in accordance with British, European and International Standards by the Dubai Accreditation Centre (DAC), accreditation certificate no: LB-008-TEST. Material Lab is approved from the United Arab Emirates Ministry of Interior Civil Defence GHQ.

The Fire Testing Division of Material Lab, located in Al Quoz industrial area of Dubai, was commissioned by Karachi Steel Services to perform a fire resistance test on a double leaf, latched fire rated steel door assembly. The test was witnessed by Mr. Wali Ahmed, representative of the test sponsor and representatives from C.C.S. (Conformity Certification Services)

The aim of this test report is to provide a comprehensive description of the procedure exercised to obtain the fire resistance of a single-action, latched, double leaf fire rated steel door assembly with vision panel. The door set, provided by the client, was tested in accordance with British Standard 476 part 22:1987/Amd: 2014 on 24th of May 2017 at Material Lab's main facility.

2: Instrumentation

A fully computerized and automated 3.03m by 3.03m vertical fire resistance testing furnace employing the latest technology in PLC system by Siemens was used for this test. The furnace relies on its 10 powerful burners, which utilize a fixed proportion of liquefied petroleum gas and air, to raise temperature inside the furnace to around 1200 °C. All instruments vital for obtaining conclusive fire resistance data during the test have been identified in table 1.

Equipment ID	Equipment Description
FTF-1	Vertical Large Fire testing furnace, complete with LPG supply system
PLCS-1	PLC system for data acquisition by Siemens
WINCC-1	Visual and calculating software by Siemens
PS-1 to 2	Calibrated Pressure Transducers
IFTC-1 to 9	Calibrated Furnace Internal Thermocouple (K Type)
FSF-2	Steel Frame for sample assembly.
FTIR-1 to 5	Calibrated IR sensors for deflection measurements.
FGG6-1	Gap Gauge ϕ 6 mm
FGG25-1	Gap Gauge ϕ 25 mm
FCP-1	Cotton pad
FCPF-1	Cotton pad supporting frame
EFTC-1 to 10	Calibrated Unexposed Surface Thermocouple (K Type)
FVRT-1	Calibrated Roving Thermometer
FATS-2	Calibrated Ambient temperature sensor
RPF-1	Ambient temperature sensor assembly

Table 1: Detail of equipment used to perform the test

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3: Door Conditioning

The specimens were delivered to the lab on 20/05/2017 by representatives of the client. The doors were stored in ambient conditions of 20°C - 26°C and the moisture content of the supporting construction constituents were determined.

4: Specimen Description:

The specimen under observation was a single - action, latched, double-leaf steel door assembly with 44mm thick leaf having Rockwool core and a vision panel. All components used for the assembly of the fire rated steel double door set, including all hardware, are provided in table 2.1.

Name	Manufacturer/Supplier	Physical Properties	Additional Details (provided by test sponsor)
Fire Rated Steel Double Door Leaf	KSS (Manufacturer)	Overall Thickness: 44 mm	2mm thick hot dipped galvanized steel sheet bent to form hollow steel leaf profile and filled in with Rockwool
Fire Rated Steel Double Door Frame	KSS (Manufacturer)	Jamb Width: 200 mm	2mm thick galvanized Iron sheet bent to form hollow steel frame profile and filled in with standard grout
SS Pivots for Fire Rated Steel Double Door	KSS (Manufacturer)	Overall Length: 175mm	8 Nos. of Stainless steel pivots, 4 for each door leaf
Panic Push Bar Device for Fire Rated Steel Double Door	ISEO (Supplier)	Overall Dimension: (842 x 165 x 63) mm	Model No.: 944408458T, Chassis painted black and bar painted red
Overhead Door Closer for Fire Rated Steel Double Door	CONSORT (Supplier)	-	Model No.: CDC903, Silver color Over Head Door Closer
Flush Bolt for Fire Rated Steel Double Door	CONSORT (Supplier)	Overall Dimension: (171 x 27 x 25) mm	Model No.: CH282D, Lever action flush bolt in Satin Chrome Plate finish
Perimeter Seal for Fire Rated Steel Double Door	PEMKO (Supplier)	-	Model No.: IR 80
Rockwool Infill for Fire Rated Steel Double Door	INCOM ROCKWOOL (PVT) LIMITED	-	Wired Mat Type Rockwool having stated density of 60 – 140 kg/m ³ used as leaf infill
Glass for Vision Panel of Fire Rated Steel Double Door	SAINT GOBAIN (Manufacturer)	Nominal Thickness: 5 mm	Trade Name: KERALITE, 5mm Fire Rated Glass
Tape for Vision Panel Glass of Fire Rated Steel Double Door	-	Nominal Thickness: 3 mm & 5 mm	Trade Name: KERAFIX 2000

Table 2.1: Items used for design of fire rated steel double door

Comprehensive detail regarding the fire rated steel double door frame is provided in table 2.2.

Comprehensive detail regarding the fire rated steel door double leaf is provided in table 2.3.

Details on all essential hardware (ironmongery) applied to the fire rated steel double door set is provided in tables 2.4 to 2.8.

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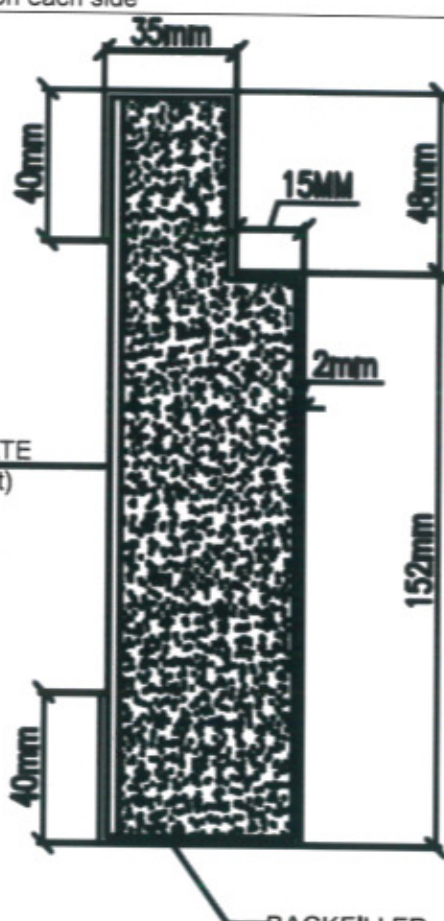
Fire Rated Steel Double Door Frame	
Overall Dimension of Frame	Height x Width: (2400 x 2400) mm
Overall Width of Jamb	200 mm
Type of Frame	Steel Hollow Frame with Grout as infill
Frame Constituents	2mm thick Galvanized Iron Sheet bent to form frame outer profile
	(196 x 200) mm frame backing plate 3mm thick
	(100 x 12) mm anchor bolts, 3 on each side
Frame Dimensions	
	Rebate Face: 35 mm Frame Stop: 15 mm Rebate: 48 mm Soffit: 152 mm

Table 2.2: Steel Double Door Frame Details



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Fire Rated Steel Double Door Leaves	
Overall Dimension of Leaves	Height x Width: 2358 x (Right Leaf: 1161.5; Left Leaf: 1161.5) mm
Overall Thickness of Leaves	44 mm
Core Type	Rockwool Infill
Leaf Constituents	2mm thick galvanized Iron sheet bent to form hollow steel leaf profile
	38mm x 50mm x 1.5mm Fabricated G.I. Box for all Peripheral Frame and Midrails
	38mm x 38mm x 14 Gauge Fabricated G.I. Box
	Wired Mat Type Rockwool having stated density of 100 kg/m ³ used as infill

Table 2.3: Steel Door Leaf Details

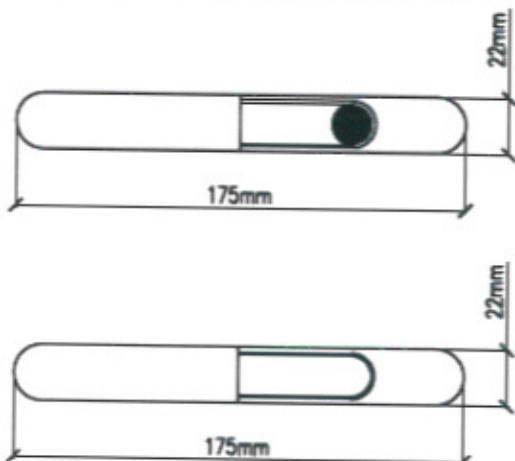
SS Pivot for Fire Rated Steel Double Door	
Manufacturer	Karachi Steel Services
Overall Dimension	Length x Thickness: (175 x 22) mm
Material	Stainless Steel
No. of Pivots used	8 (4 for each leaf)
Pivot Location for both leaves	1) 150 mm from top leaf edge to top of 1 st hinge
	2) 150 mm from bottom of 1 st hinge and top of 2 nd hinge
	3) 604 mm from bottom of 2 nd hinge and top of 3 rd hinge
	4) 604 mm from bottom of 3 rd hinge and top of 4 th hinge
	5) 150 mm from bottom leaf edge to bottom of 4 th hinge
Pivot Dimension Details	

Table 2.4: Door Hinge Details



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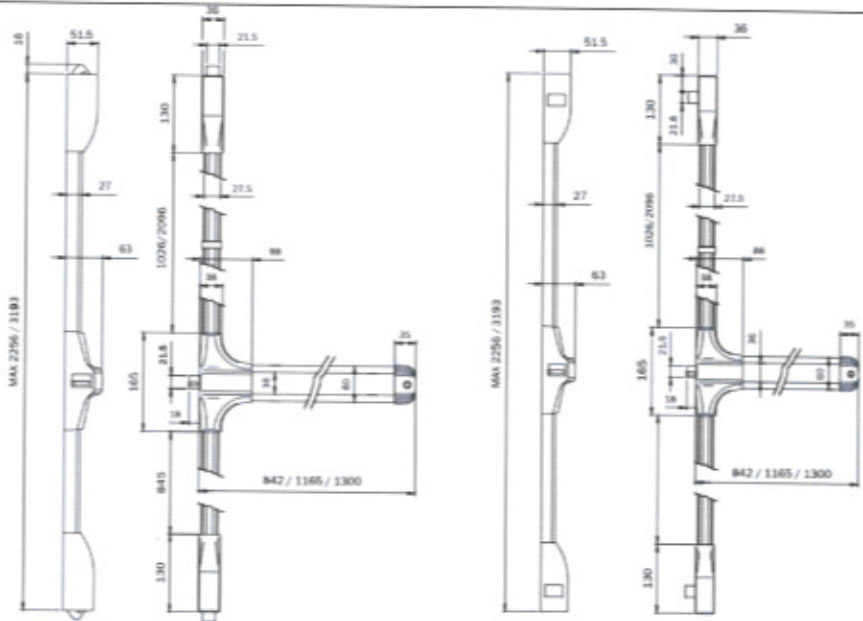
Panic Push Bar Device for Fire Rated Steel Double Door	
Brand/Supplier (Model No.)	ISEO/JB Saeed (944408458T)
Overall Dimension	Length x Height: (842 x 165) mm
Overall Thickness	63 mm
Additional Details	Modular Reversible, Prearranged for Rods, Self Locking Steel Latch
Push Bar Figure	
Push Bar Dimensions	

Table 2.5: Panic Push Bar Device Details

Over Head Door Closer for Fire Rated Steel Double Door	
Brand/Supplier (Model No.)	CONSORT (CDC903)
Finish	Silver Colour
Additional Details	Power Size 3 - 6
Door Closer Figure	

Table 2.6: Overhead Door Closer Details

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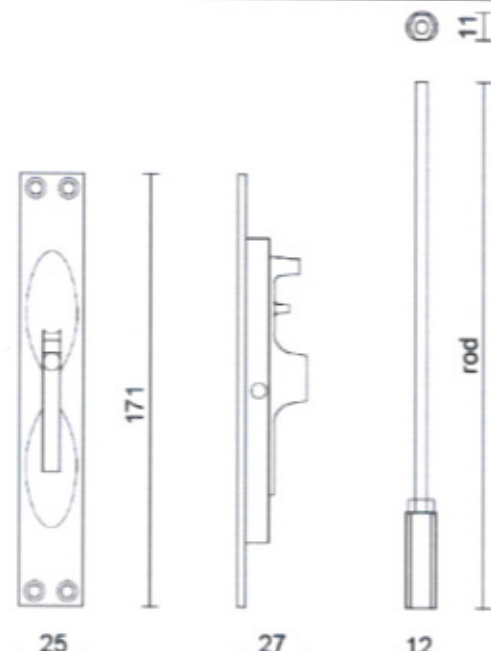
Flush Bolt for Fire Rated Steel Double Door	
Brand/Supplier (Model No.)	CONSORT (CH282D)
Overall Dimension	Length x Height: (171 x 27) mm
Overall Thickness	25 mm
Additional Details	Lever action flush bolt in Satin Chrome Plate finish
Flush Bolt Figure	
Flush Bolt Dimensions	

Table 2.7: Flush Bolt-Details



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Vision Panel Details for Fire Rated Steel Double Door

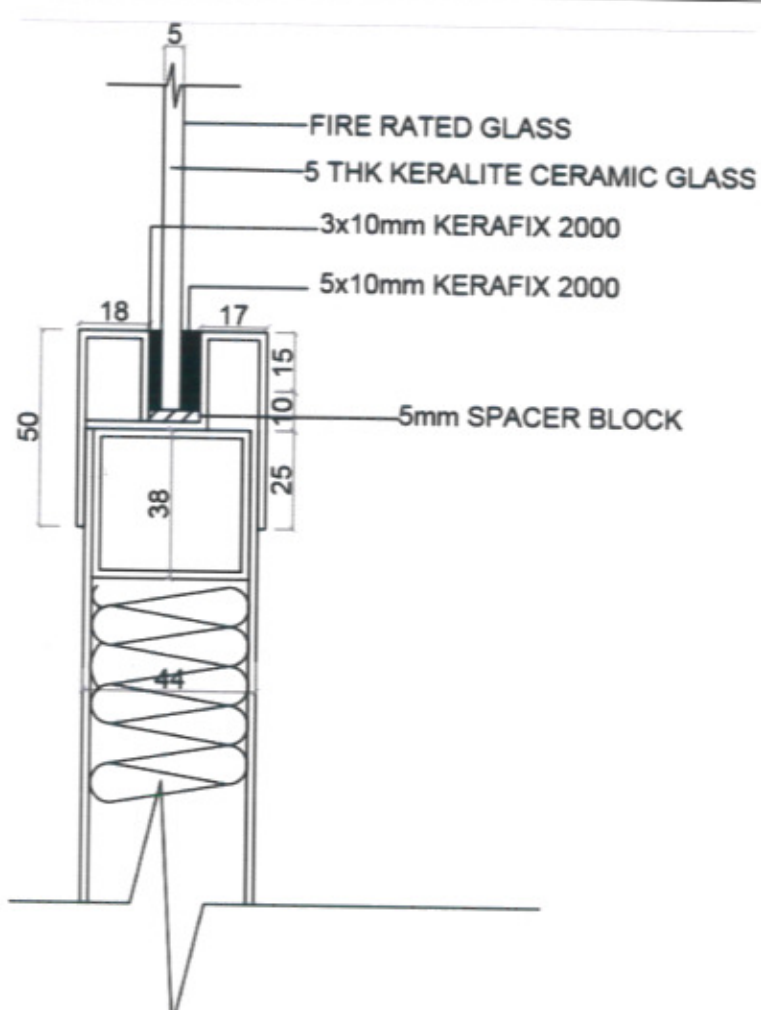
Manufacturer (Trade Name)	SAINT GOBAIN (KERALITE)
Vision Panel Overall Dimensions	(950 x 350) mm
Glass Nominal Thickness	5 mm
Aperture Dimension	(910 x 310) mm
Glass Overall Dimension	(900 x 300) mm
Visible Glass Dimension	(850 x 250) mm
Glass Seal Details	KERAFIX 2000 Tape (3mm thick on non fire side and 5mm thick on fire side) applied on steel beading perimeter and 5mm thick non combustible spacers on bottom only
Vision Panel Frame Detail	(50 x 44) mm & (50 x 17) mm, 2mm thick Steel Beading Profiles
Vision Panel Frame Fixing Detail	Steel Beading tack welded to leaf on exposed side and screwed on unexposed side
Vision Panel Details	 Diagram illustrating the cross-section of the Vision Panel Details for Fire Rated Steel Double Door. The assembly includes: - FIRE RATED GLASS 5 THK KERALITE CERAMIC GLASS 3x10mm KERAFIX 2000 5x10mm KERAFIX 2000 5mm SPACER BLOCK Dimensions shown in the diagram: - Top glass thickness: 5 - Top frame height: 18 - Top frame width: 17 - Spacer block height: 15 - Spacer block width: 25 - Bottom frame height: 38 - Bottom frame width: 44 - Overall height: 50

Table 2.8: Vision Panel Details



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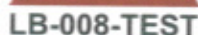
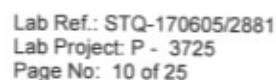


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Table 2.9: Dimensional verification of height of steel double door dimensions from exposed side

Table 2.10: Dimensional verification of width of steel double door dimensions from exposed side



5: Specimen Preparation

A rigid steel frame with fire resistive concrete blocks fixed on its internal perimeter having an opening of 3.03 x 3.03 meter was used to prepare the specimen for testing. Masonry blocks were used as rigid supporting construction, in accordance with clause 7.3.1 of BS 476-22, as these blocks had a fire resistance greater than the specimen. The blocks were assembled in the testing frame by the laboratory's skilled workers. An opening of 2405mm x 2410mm was left in the center of this supporting construction for the fire rated steel double door with vision panel.

The steel double door assembly was then fixed in to the supporting construction opening by the sponsor's skilled workers. The door frame was fixed to the supporting construction and gaps in between the frame and blocks were sealed using mortar. Upon the request of the client opening of the door was kept inside towards the furnace.

After fixation, the specimen was verified to be in accordance with technical drawings provided by the sponsor. Gap measurements were taken. The door was left in its closed position. No locks were engaged and only the lock latch held the door in its closed position in accordance with clause 7.3.2 of BS 476-22.

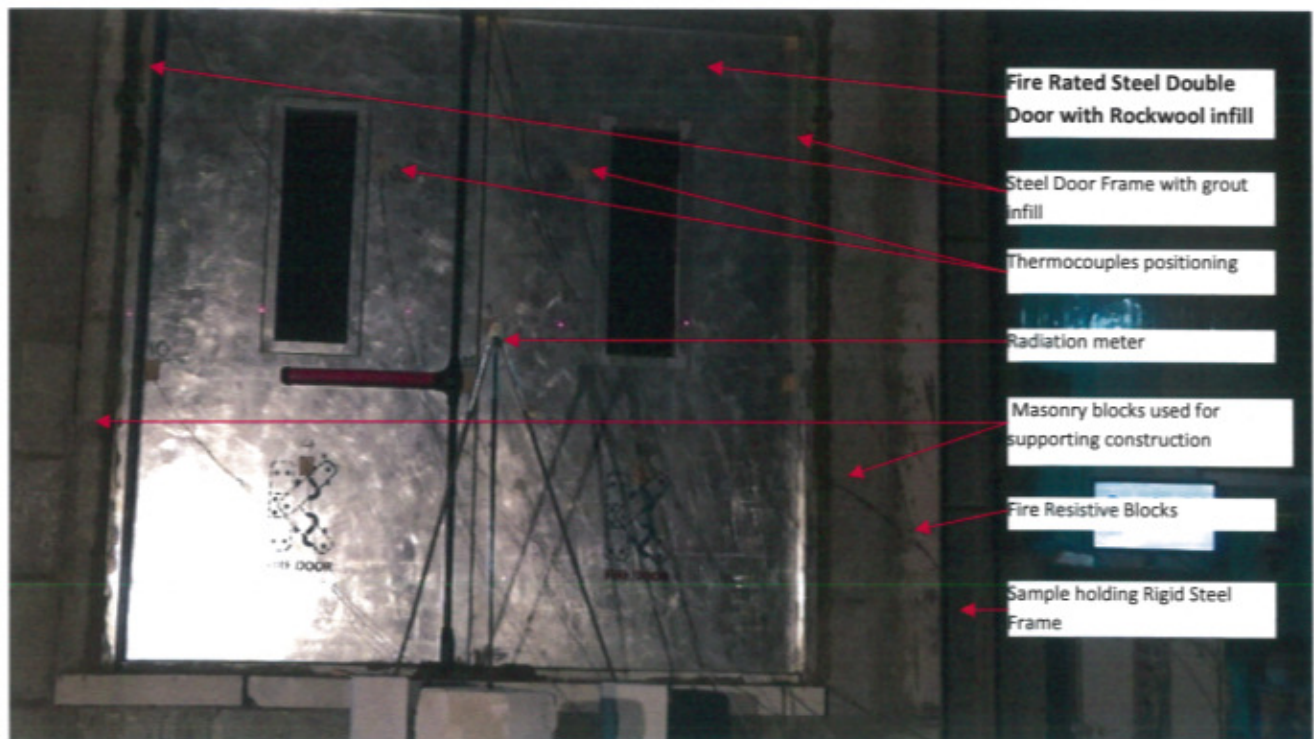


Figure 2: Test specimens mounted in frame for testing



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6: Application of Instruments

Nine internal unshielded K type thermocouples were positioned in accordance with clause 7.4.3 of BS 476-22 for measurement of internal temperature of the furnace. A positioning diagram, figure 8, for the internal thermocouples has been provided in appendix 3.

In order to ensure the insulation properties of the double door assembly, 15 K type thermocouples were installed on unexposed surface of the specimen as per the requirements of BS 476: Part 22. 1987: Amd 2014.

As per clause 7.4.5(a) of BS 476-22, for measuring average temperature rise, five thermocouples (TC-1 to TC-5) were located on the specimen. The thermocouples were placed at the center of the specimen and at the center of each quarter section of the specimen. A positioning diagram, figure 10, for thermocouples placed on the door has been provided in appendix 3.

For the determination of maximum temperature rise on the unexposed side of the double door leaves and door frame, 10 additional thermocouples (TC-6 to TC-15) were positioned as shown in figure 9 of appendix 3. None of these thermocouples were located closer than 50mm of any hardware or door leaf edges.

Graph used for determining the average temperature of the unexposed side of the fire rated steel double door, for evaluation of insulation criteria, can be seen in appendix 2, figure 4. Graph used for determining the maximum temperature rise on the unexposed side of the fire rated steel double door, for evaluation against insulation criteria, can be examined in appendix 2, figure 5.

Four infrared sensors were set up for measuring the deflection at mid height of the door leaves and its frame. D1 was set at mid height of left vertical frame member and D2 was set to measure deflection at approximately the center of the left door leaf. D3 was set to measure deflection at approximately the center of the right door leaf and D4 was set to measure deflection at mid height of right vertical frame member. Results have been provided in table 5.2.

Two pressure sensing heads, located at 1 m and approximately 2.5 m above the furnace floor, were installed to monitor furnace pressure as per the requirements of clause 3 of BS 476: Part 20. 1987: Amd 2014.



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7: Test Procedure

The preparation and fixation of the thermocouples were followed by mounting of the test frame in front of the furnace. Prior to test commencement, proper functionality of all sensors and thermocouples were ensured for accurate display and data acquisition.

The specimen and its associated supporting construction were thoroughly inspected for cracks or damage. Any gaps between the door frame and the supporting construction was filled in with mortar.

Ambient air temperature surrounding the laboratory was noted. Values characterizing ambient environment directly before and after the test are given in table 3.

Ambient temperature @ 10:09 p.m. before start of test (°C)	Ambient temperature @ 12:14 a.m. at end of test (°C)	Difference between ambient at start and end of test (°C)
33.8	35.6	1.8

Table 3: Ambient air temperature surrounding the laboratory

The furnace was then initiated to commence the actual test and a trained fire testing engineer was instructed to take specimen observations throughout the test duration. These observations have been tabulated in Test Results section.

A video camera was set up to record the full duration of the test. A DVD containing a PDF copy of the test report, pictures from the test and complete video recording of the test has been provided along with this report.

Furnace conditions during the test, such as temperature and pressure, were kept in accordance with clause 3 of BS 476: Part 20: 1987: Amd 2014. During the test a neutral pressure plane was set up 1m above the furnace floor and the pressure at the top of the furnace was not allowed to exceed 20 Pa.

The temperature inside the furnace did not deviate and remained within the tolerance limits set in BS 476: Part 20. The graph representing regulation of internal temperature of the furnace in accordance with BS 476-22 has been provided in figure 3 of appendix 2.



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8: Test Results

OBSERVATIONS:

Observations shown in table 4 form an integral part of this report:

Time [min]	Observation on unexposed side of Fire Rated Steel Double Door
0	Commencement of Test.
21	Light smoke observed escaping from top left corner of left leaf from in between frame and leaf.
23	Dense smoke observed escaping from top left corner of left leaf from in between frame and leaf.
29	Perimeter seal observed dislodging and falling off from in between frame and leaf at top horizontal edge of both leaves.
31	Inward deflection of both leaves observed. No development of gaps.
35	Unexposed surface temperature has exceeded 300 °C. Application of cotton pad has been discontinued from this point onwards.
38	Formation of dark brown patches at top horizontal edge of left leaf.
51	Discoloration of both leaves along external perimeter and on steel beading of both vision panels.
61	Discoloration of both leaves at meeting stile.
73	Further inward deflection of both leaves observed. No development of gaps.
86	Discoloration of both leaves at location of stiffeners.
97	Further inward deflection of both leaves observed. Gap along meeting stile from top edge up till mid height has increased by 1mm.
110	Further inward deflection of both leaves observed. Gap along meeting stile from top edge up till mid height has increased by 2mm to 3mm. Application of 6mm gap gauge but no penetration observed.
118	Further inward deflection of both leaves observed. Gap along meeting stile from top edge up till mid height has increased by 3mm to 4mm. Application of 6mm gap gauge but no penetration observed.
122	Gap along meeting stile from top edge up till mid height has increased. Application of 6mm gap gauge. Penetration observed but no vertical movement of 150mm.
125	Gap along meeting stile from top edge up till mid height has increased. Application of 6mm gap gauge. Penetration and vertical movement of 150mm observed. SPECIMEN HAS FAILED INTEGRITY CRITERIA AFTER 125 MINUTES OF TESTING.
125	Termination of Test.

Table 4: Observations on unexposed side of fire rated steel double door with vision panel



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After being exposed for a total duration of 125 minutes, the fire rated double-leaf steel door assembly with vision panel was evaluated against the integrity and insulation criteria set in clause 7.6 of BS 476: Part 22: 1987: Amd 2014. The door system was found to achieve the following fire resistance properties illustrated in table 5.1.

Fire Resistance of Steel Double Door Assembly with Vision Panel after 125 minutes of testing:

Fire Rated Steel Double Door Assembly with Rockwool Infill and Vision Panel		
Test Parameters	Results	Remarks
Insulation: 31 Minutes		
1. Average Temperature	-	Specimen has failed insulation due failure in maximum temperature rise on unexposed surface.
2. Maximum Temperature	31 minutes	Maximum temperature recorded after 31minutes of testing was 220 °C @ TC-8 which exceeded standard limits.
Integrity: 125 Minutes		
1. 6mm Gap Gauge	125 minutes	Development of gap at mid-height of meeting stile through which 6mm gap gauge penetrated and was able to move 150mm vertically after 125 minutes of testing
2. 25mm Gap Gauge	-	Development of crack/gap in frame or leaf through which 25mm gap gauge could penetrate did not occur for 125 minutes of testing
3. Sustained Flaming	-	No Sustained flaming observed for more than 10 seconds up till 125 minutes of testing
4. Cotton Pad	-	No ignition or glowing of cotton pad after 31 minutes of testing. Use of cotton pad was discontinued after 35 minutes of testing as temperature on unexposed side had exceeded 300 °C

Table 5.1: Integrity & Insulation Evaluation of Fire Rated Steel Double Door According to BS 476: Part 22: 1987: Amd 2014

Total Deflection on Steel Double Door after 125 minutes:

Infra-red Sensor Number	D1	D2	D3	D4
Deflection (mm)	10	35	41	15

Table 5.2: Deflection Results:

RADIATION passing through the Steel Double Door:

Heat Flux Sensor 1 Reading	15 KW/m ²	50 KW/m ²	100 KW/m ²
Time (minutes)	51	71	94

Table 5.3: Radiation Reading:



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9: Limitations

This report details the method of construction, specimen and test preparations, test conditions and the results which were obtained strictly following only the procedures outlined in BS 476: Part 22: 1987: Amd. 2014 and BS 476: Part 20:1987 (General Requirements).

The results only relate to the behavior of the specimen of the elements of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential fire performance of the elements in use nor do they reflect the actual behavior in fires.

The test results refer only to the items tested and does not apply to assemblies with different dimensions or different components. Any interpretations or opinions expressed in this report are outside the scope of DAC accreditation. The test was carried out under standard conditions using testing equipment that is property of the Material Lab, Dubai. This report shall not be reproduced except in full, without the written approval of the laboratory.

Material Lab is an accredited independent laboratory. It is not associated / affiliated with any certification agency, manufacturer or producer in or out side of United Arab Emirates. Material Lab was not involved in any selection of the sampling procedure. The specimens were supplied by representatives of the client. Information regarding the source and model no. of intumescent and hardware were provided by the client.

Upon the request of the client, opening of the steel double door was kept inside towards the furnace.

Tested and Prepared By



Muhammad Zuhaib Saleem
Fire Testing Engineer

Verified By



Sohail Zafar
Laboratory Manager
مستشار مختبر
Sohail Zafar
Laboratory Manager



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Appendix 1:

Specimen drawings as provided by the sponsor (All dimensions are in 'mm')



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Appendix 2:

Data Results & Graphical Illustrations:

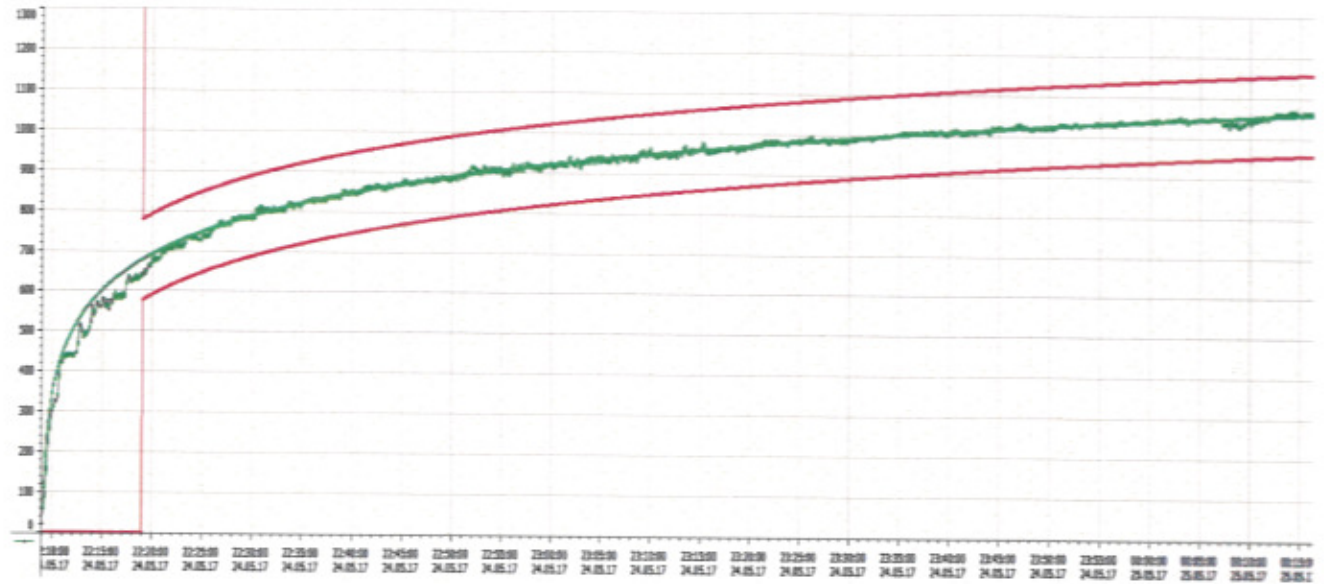


Figure 3: Average Temperature graph of internal furnace thermocouples for complete duration of the test

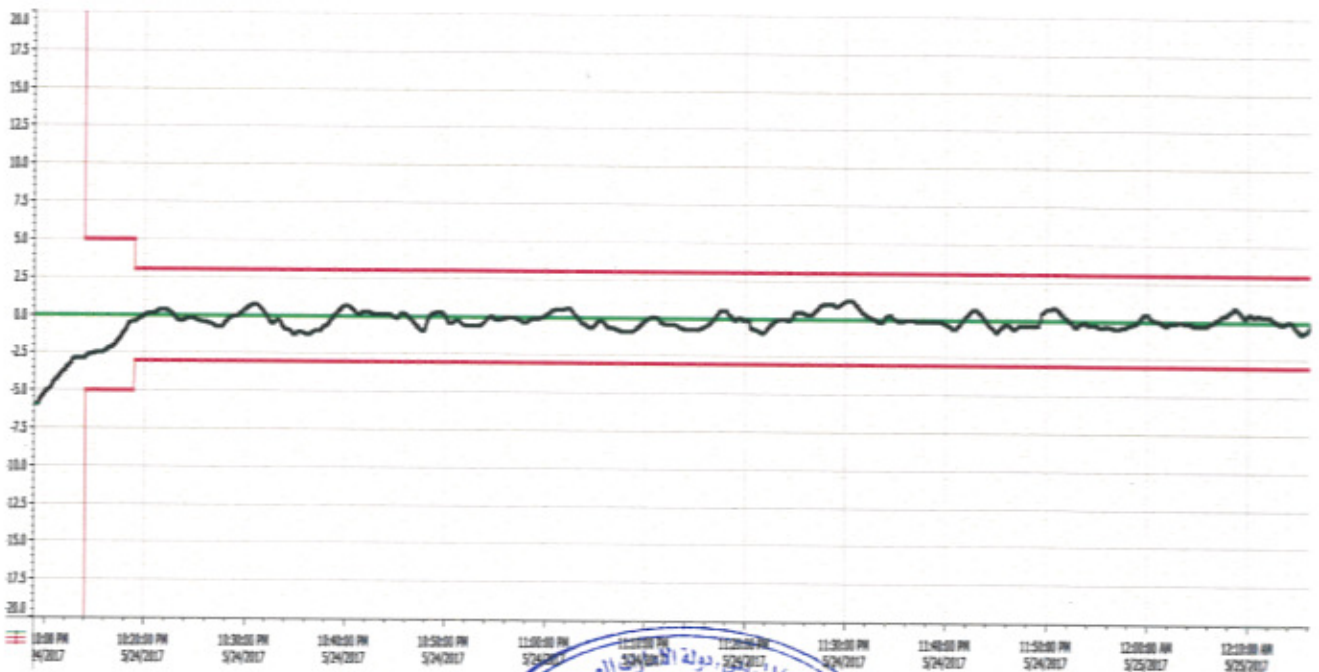


Figure 4: Furnace internal pressure graph for complete duration of the test

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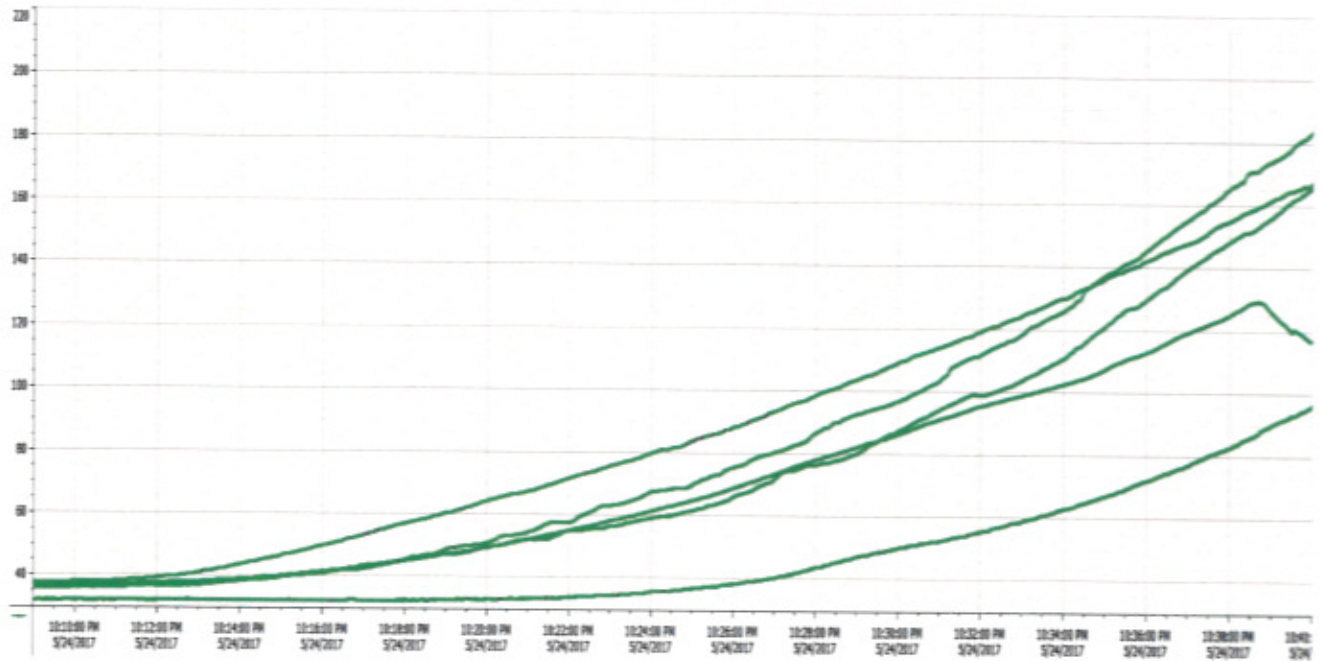


Figure 5: Thermocouple graphs used for obtaining average unexposed surface temperature of steel double door assembly (TC1 to TC5) up till 31mins

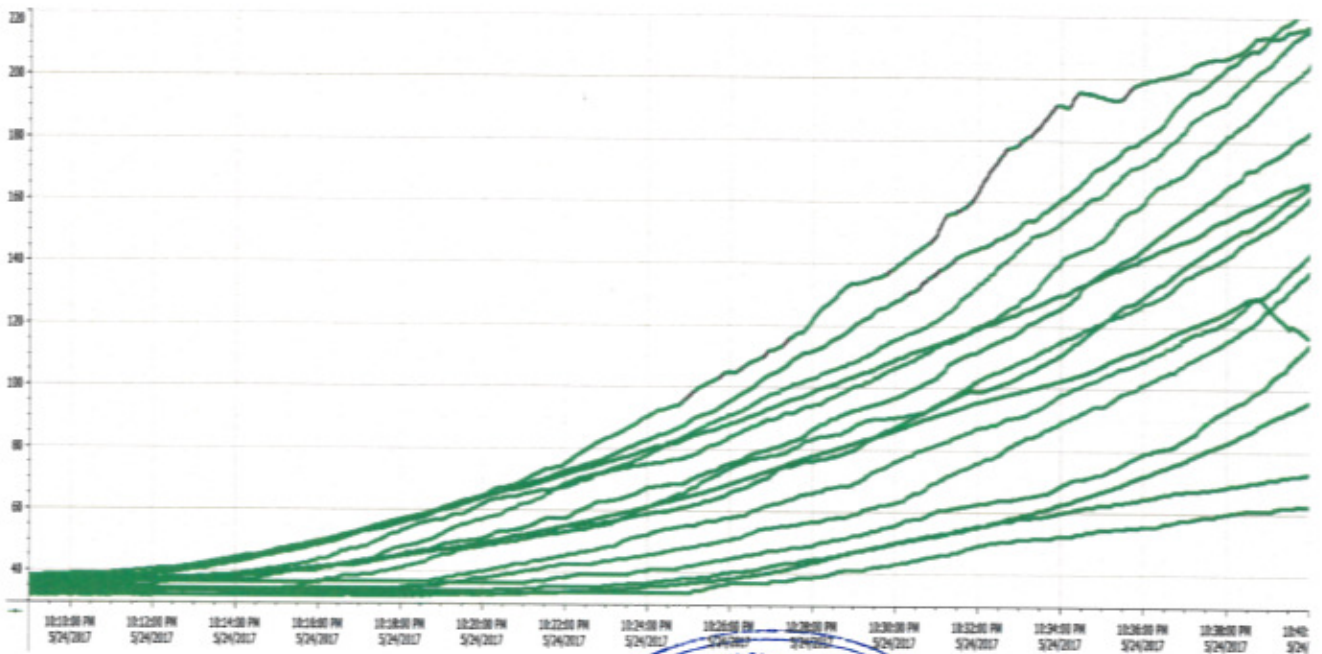


Figure 6: Thermocouple graphs used for obtaining maximum unexposed surface temperature of steel double door assembly (TC1 to TC15) up till 31mins

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Appendix 3:

Instrumentation Positioning: (Not to scale, all dimensions in 'mm')

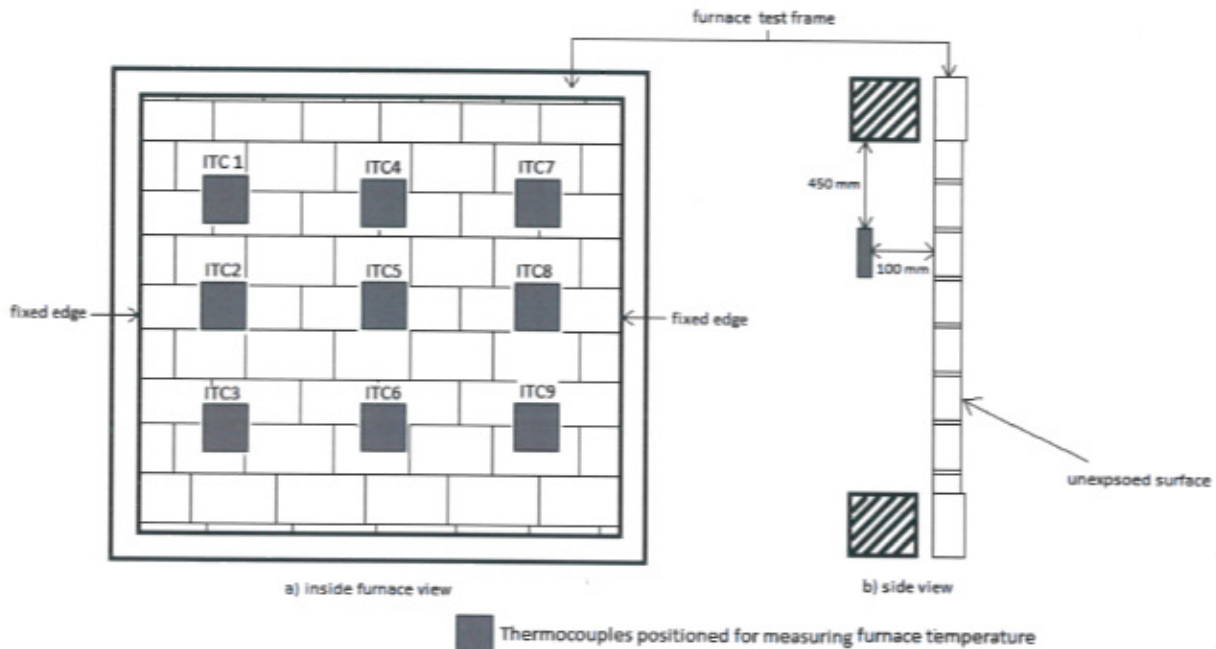
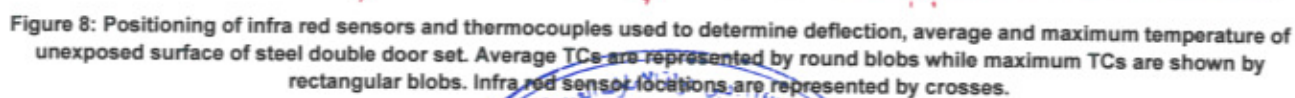


Figure 7: Front view of furnace showing positions of furnace internal thermocouple



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Appendix 4:

Photographs



Specimen after 30mins of testing



Specimen after 45mins of testing

Figure 9.1: Unexposed side of specimen during exposure to fire

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Specimen after 60mins of testing



Specimen after 90mins of testing

Figure 9.2: Unexposed side of specimen during exposure to fire

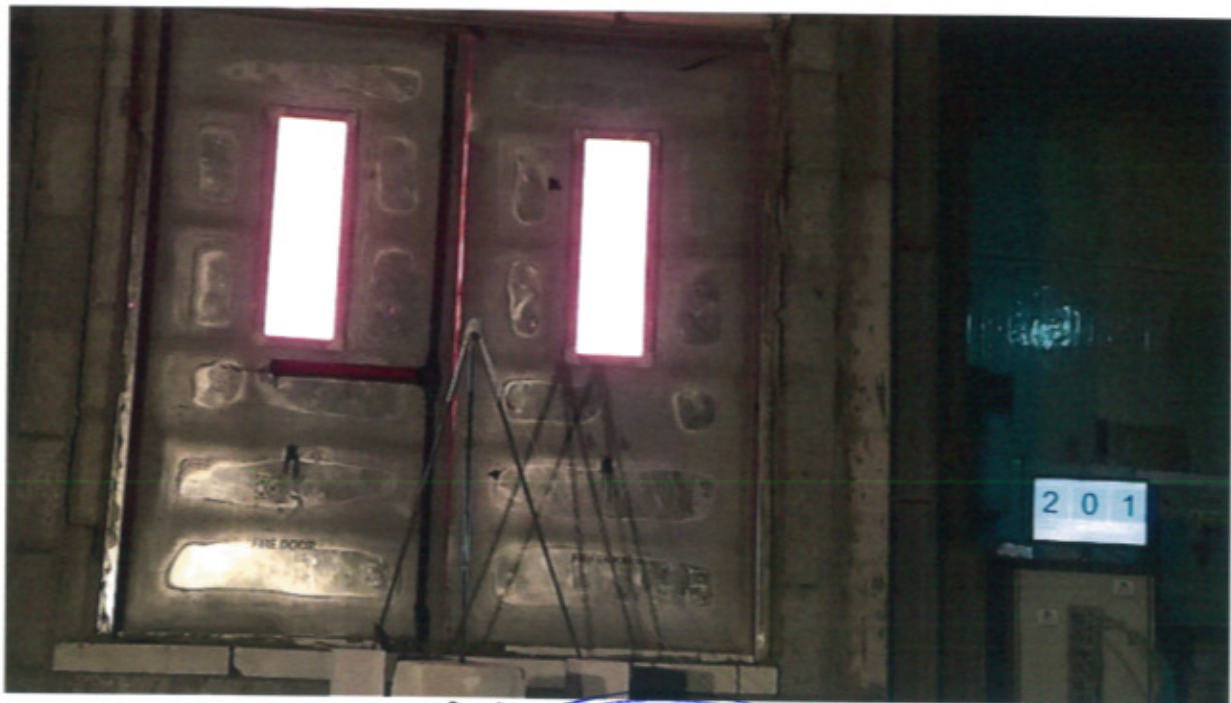
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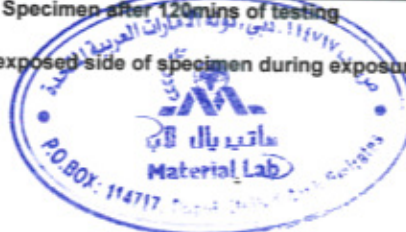
Specimen after 105mins of testing



Specimen after 120mins of testing

Figure 9.3: Unexposed side of specimen during exposure to fire

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Penetration of and 150mm vertical movement of 6mm gap gauge at mid-height of meeting stile after 125mins of testing

Figure 9.4: Unexposed side of specimen during exposure to fire

--- END OF TEST REPORT ---



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