



अग्नि अभियांत्रिकी अनुसंधान प्रयोगशाला
आईआईटी गांधीनगर, पालज, गांधीनगर, गुजरात - ३८२ ०५५

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FERL

FIRE ENGINEERING RESEARCH LABORATORY
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Test Report

(Document No.: FERL/TR/01/I3/U0)

Project Number		P77	
Unique Laboratory Report (ULR) No:		TC1207226000000014F	
Type of Sample		Fire Rated Hinged Door (Wooden Composite)	
Sample ID	P77-S1	Report Number	FERL/LR-84
Date of Receipt	27.04.2026	Date of Issue	08.05.2026
Date of Test	30.04.2026	Location	FERL, IIT Gandhinagar
Revision No.	R0	Date of Revision	Not applicable (original report)
Name & Address of Laboratory		Name & Address of Test Sponsor	
Fire Engineering Research Laboratory (FERL) Indian Institute of Technology Gandhinagar Palaj, Gandhinagar, Gujarat – 382055, India		Greenlam Industries Limited E -176-175, E-176 To 179, SP-02, GI-180F, Phase II, RIICO Industrial Area, P.O Behror, Dist. Alwar Rajasthan (India)	

Test Information

Sr. No	Test Description	Test Method	Specimen Specification	Performance Criteria	Results (minutes)
1	Fire Resistance Test	IS 17518-1: 2022 / ISO 3008-1: 2019 / BS 476 Part 22	IS 3614: 2021	Integrity	120
				Insulation	118

Note:

- The results relate only to the items tested and apply to the sample as received.
- The report shall not be reproduced except in full without the approval of the laboratory.
- This report provides the constructional details, the test conditions, and the results obtained when a specific element of the construction was tested following the procedure specified in 3008-1:2019 and ISO 834-1. Any significant deviation with respect to size, constructional details, loads, stresses, edge, or end conditions may invalidate the test results.
- The scope of installation of the test specimen is within the sponsor, as intended for use in practice, incorporating all hardware and other items that can influence the performance of the specimen.
- The specimen information provided by the sponsor is denoted by (*).

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Authorized Signatory: Dr. Gaurav Srivastava
Chief Executive of Laboratory





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1. Specimen description*

Type and material of specimen

Single Leaf Hinged Door (Wooden Composite)

Manufacturer of specimen

Greenlam Industries Limited.

Supporting Construction	
Details	Made of AAC block, dimension(mm):300 x 200 x 200 (length x width x height) with symmetrical faces.
Wall Opening	1160 x 2380mm (width x height).
Block Jointing Mortar	Made up of cement-graded and polymeric additives with the appearance of greyish powder.
Lintel	Made of concrete of dimensions 2400 x 200 x 100mm (length x width x height).
Curing Time	24 Hours (As per IS 17518-1 A.2.2).

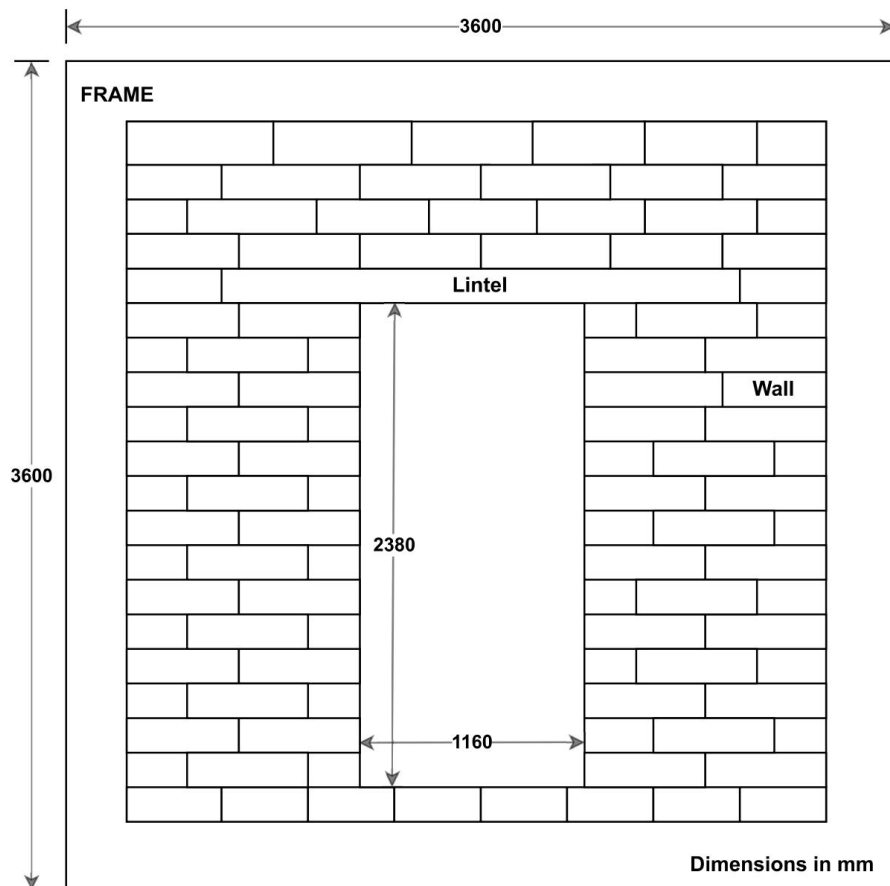


Figure 1: Schematic of supporting construction for door assembly.



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Frame	
Dimension	2370 x 1140mm (height x width).
Cross-section view (Dimensions are in mm)	180 x 65mm (Refer to <i>Figure 3</i> for more details).
Material*	Red-meranti wood (density 650Kg/m ³).
Gap between the frame and supporting wall is filled with	Filled with 10mm Fire rated PU Foam(Boss 813+)
Fixing	Anchor Fastener 10x120mm(Make: Rawl Plug Model -R-FF1-10L-120), 15 Nos.

Shutter/Leaf (Refer Figure 3 for more details)	
Dimension(mm)	2316 x 1043 x 65mm (height x width x thickness).
Core*	High density Particle board calcium silicate board both side+ MDF both side
Skin*	5331 MIDNIGHT ACACIA Laminate Both Side
Swings	Towards the exposed Side.

Hardware	Quantity	Make	Description
Hinges	5 Nos	Assa Aabloy	AAH203
Door Closer	1 Nos	Assa Aabloy	Aluminium Door closer DC105U/EV1
Mortise Lock	1 Nos	Assa Aabloy	JL24EUS-SS-60
Handle	1 Nos	Assa Aabloy	Pull handle AEH-05-SINGLE
Pin cylinder	1 Nos	Assa Aabloy	AACT 45/45 SNKD-S
Door viewer	1 Nos	Assa Aabloy	ADSS-03-70mm-FR
Intumescent Seal	1 Nos	Galford	10 x 2mm (width x thickness), mounted on the frame.
Intumescent Seal	2 Nos	Galford	20 x 4mm (width x thickness), mounted on the frame.
Intumescent Seal	1 Nos	Galford	30 x 2mm (width x thickness), mounted on all four edges of the leaf.

Retention Force	58N force required to open the door.
Mechanical Conditioning	A series of 50 opening/closing cycles of at least 75° was performed before test.
Door Condition before test	Locked and latched.
Verification of specimen	The door dimension and hardware make were verified before the test, other than the information displayed as provided by the sponsor.



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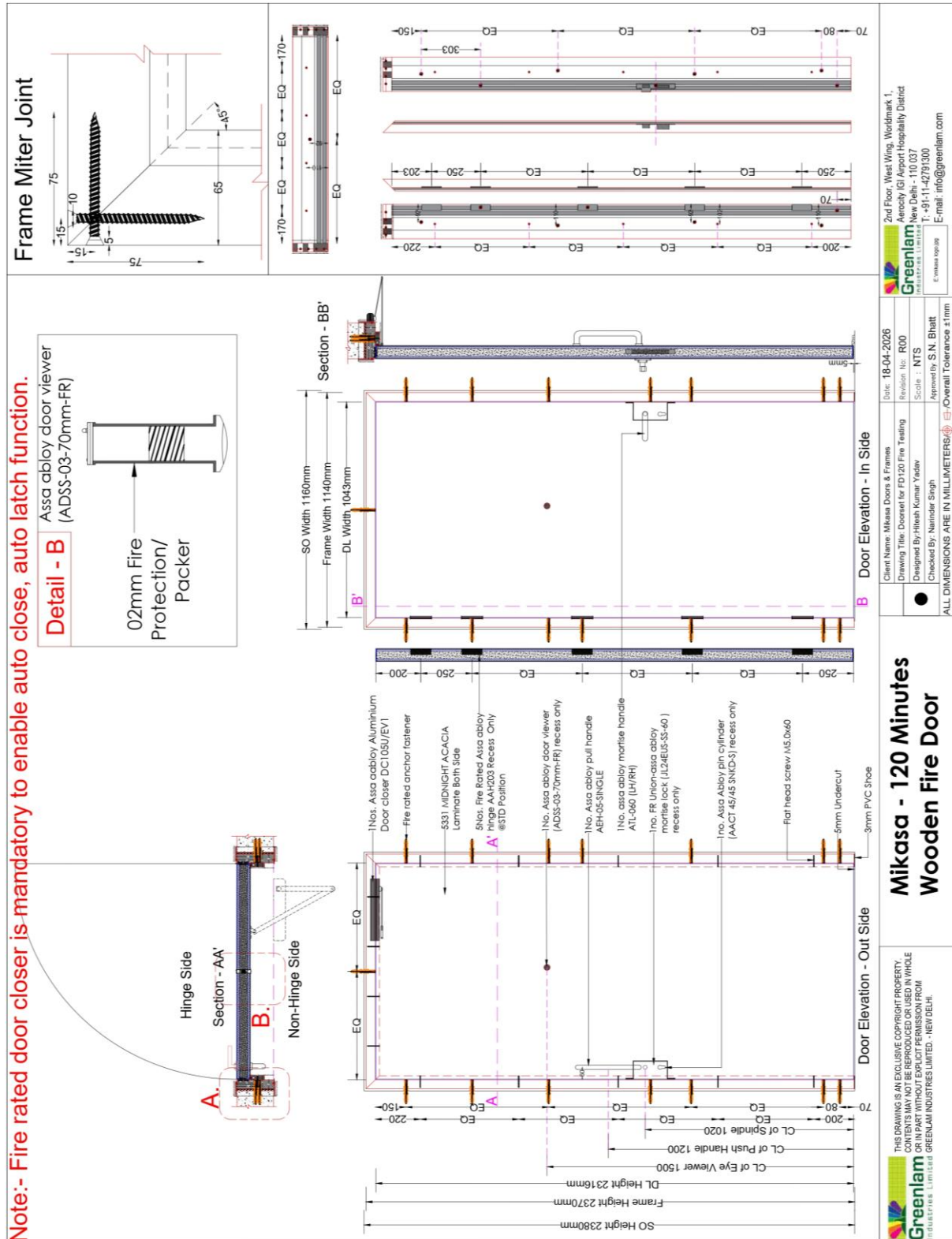


Figure 2: Drawing provided by the manufacturer*.





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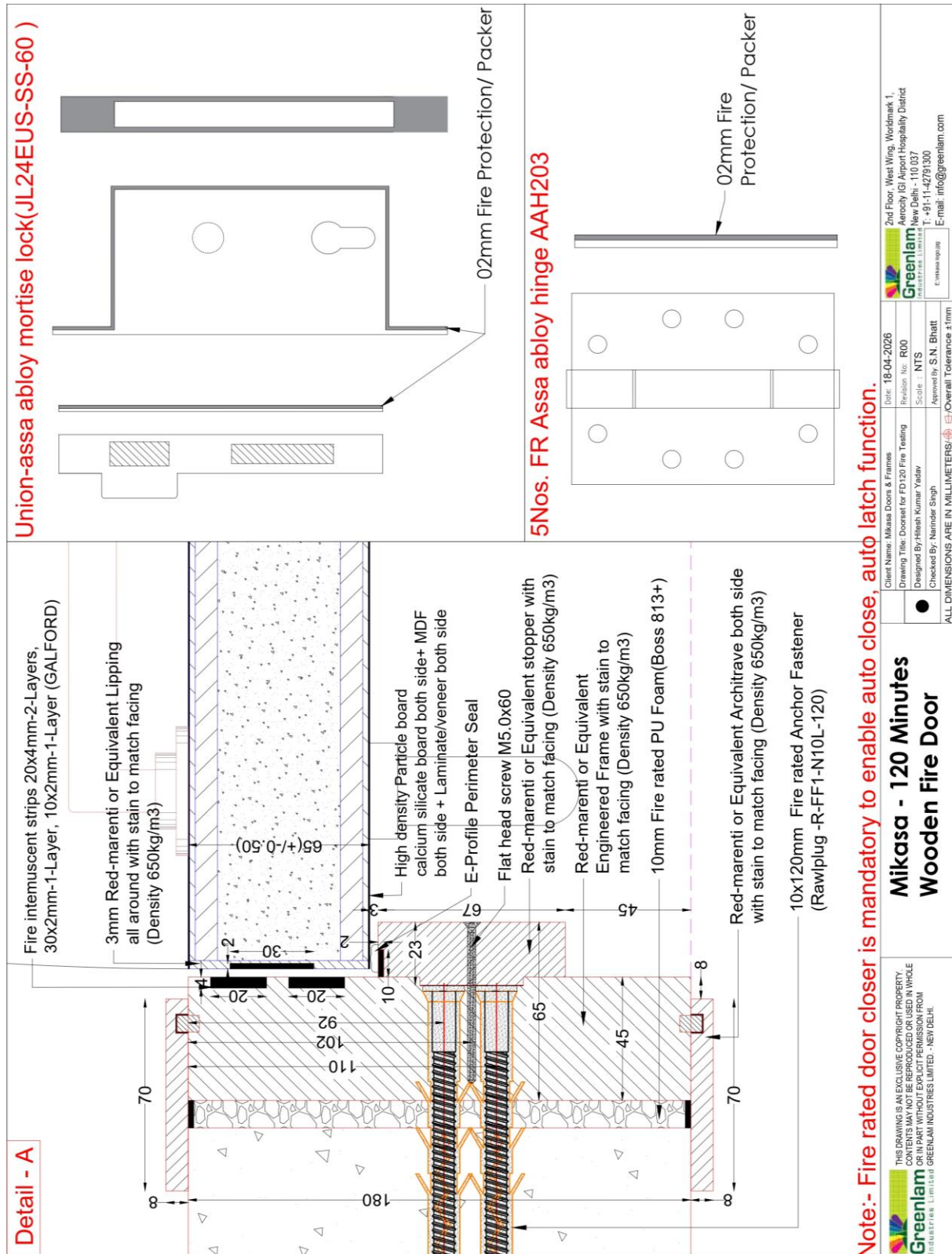


Figure 3: Drawing provided by the manufacturer*.

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Gap measurements

a) Gap measurements of unexposed side are summarized below:

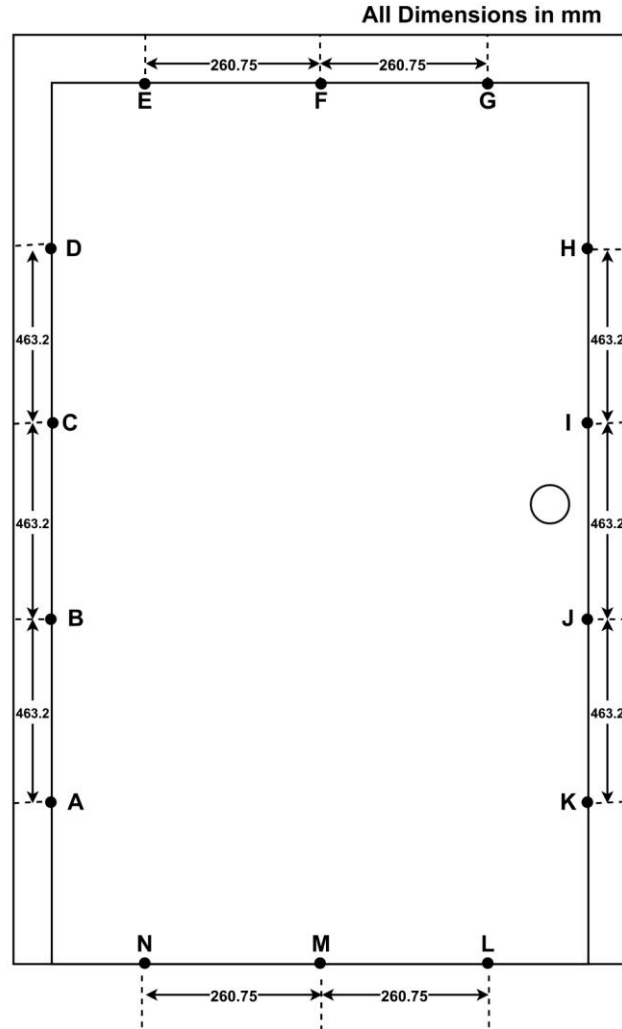


Figure 4: Unexposed side gap measurements.

Location (Unexposed Face)	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Clearance (mm)	4.0	4.0	3.5	3.0	3.0	3.0	3.5	3.0	4.0	3.0	3.0	3.0	3.5	3.0



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b) Gap measurements of exposed side are summarized below:

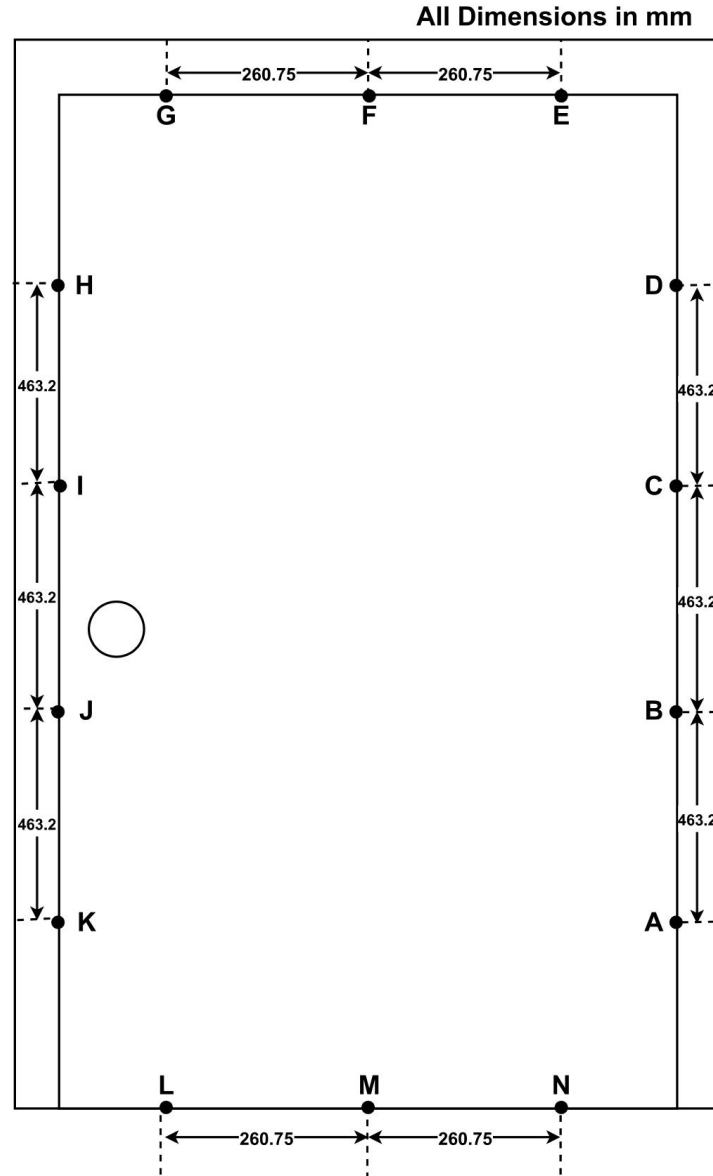


Figure 5: Exposed side gap measurements.

Location (Exposed Face)	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Clearance (mm)	3.5	3.5	4.0	4.0	3.0	3.4	3.0	4.0	4.0	3.5	4.0	3.0	3.0	3.0



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2. Test observations

A. Time-Temperature observations (Furnace temperature)

- The fire resistance test was carried out in accordance with **IS 17518-1 Fire Resistance Tests —Door and Shutter Assemblies Part 1 General Requirements**.
- The ambient temperature at the commencement of the test was 31.7 °C, and at the end was 36.6 °C.
- The furnace thermocouples were placed 100mm away from the exposed face of the specimen, and this distance was maintained throughout the test duration.
- Time-Temperature observations (Furnace temperature) are shown in *Table 1* (For thermocouple location in the furnace, refer **Annexure A – Details of instrumentation**).
- The average time-temperature curve observed and the required time-temperature curve are shown in *Figure 6*.

Table 1: Time-Temperature observations (Furnace temperature)

Time (min)	Furnace Temperature (°C)		Area under Time-Temperature curve		
	Required	Observed	Observed (°C·min)	Allowed Deviation ±(%)	Observed Deviation (%)
0	20.0	44.1	-	-	-
10	678.4	671.5	5374.4	15.0	0.1
20	781.4	777.9	12683.6	10.0	-0.3
30	841.8	862.4	20920.1	5.0	0.3
40	884.7	931.7	29814.1	4.2	1.0
50	918.1	914.1	38952.4	3.3	1.1
60	945.3	959.8	48501.1	2.5	1.4
70	968.4	963.0	58237.7	2.5	1.4
80	988.4	999.4	68076.1	2.5	1.3
90	1006.0	1034.9	78254.3	2.5	1.4
100	1021.8	1009.9	88309.6	2.5	1.1
110	1036.0	1045.6	98643.6	2.5	1.1
120	1049.0	1025.5	108926.1	2.5	0.8

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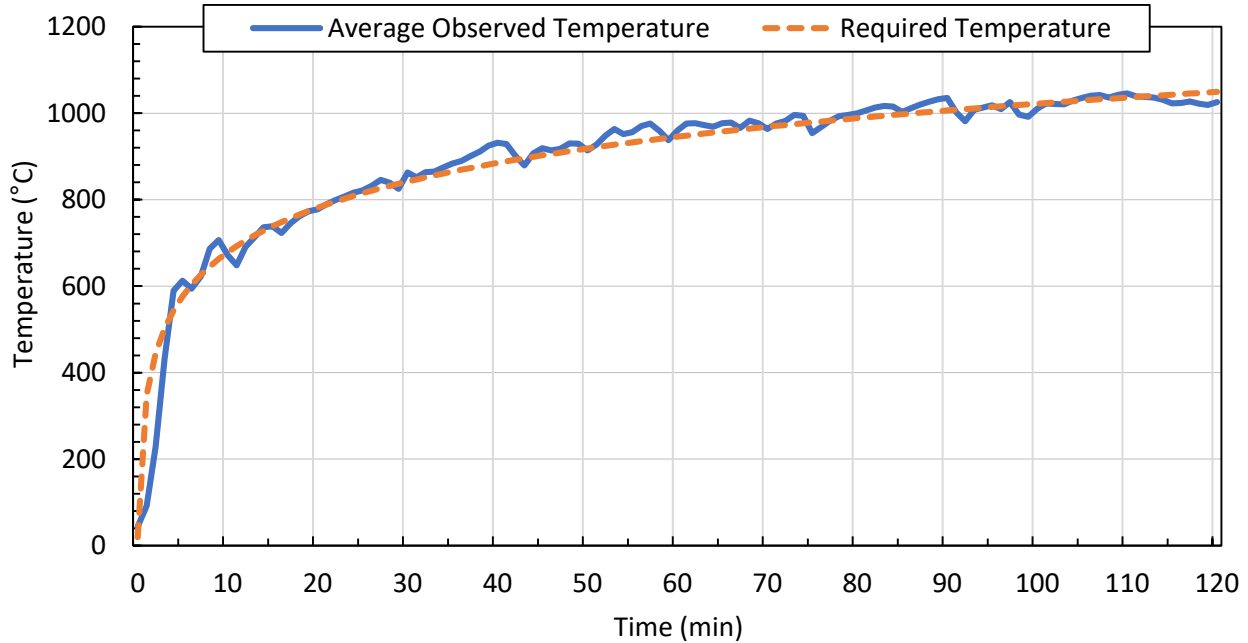


Figure 6: Observed Average and Required Temperature.

B. Pressure observations

- For pressure locations in the furnace, refer to **Annexure A – Details of instrumentation**.
- The given pressure value represents the moving average pressure over the measurement period.

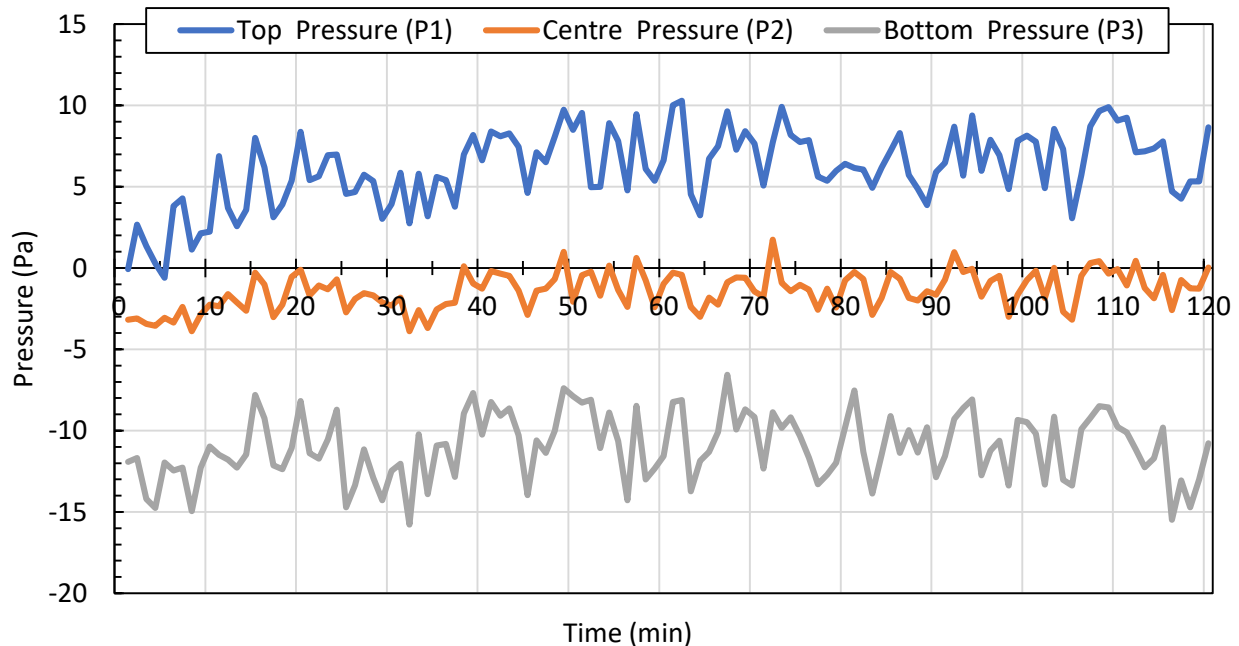


Figure 7: Pressure P1, P2, and P3 of the furnace.

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C. Time-Temperature observations (Unexposed side)

- The unexposed thermocouples were placed in accordance with **IS 17518-1 Fire Resistance Tests —Door and Shutter Assemblies Part 1 General Requirements**.
- Figure 8 shows the location of all the unexposed side thermocouples.
- The average observed temperature at the unexposed side is shown in Figure 9.
- The initial average temperature of all the unexposed side thermocouples at the commencement of the test was 29.2 °C.
- At $t = 118$ min, the temperature at thermocouple 10 was 211.7 °C, which was exceeding the performance criteria ($180^{\circ}\text{C} + \text{Initial average temperature}$).
- The maximum observed temperature on the shutter was 244.2 °C at thermocouple location 10 for the test duration.
- The maximum observed temperature on the frame was 47.5 °C at thermocouple location 13 for the test duration.

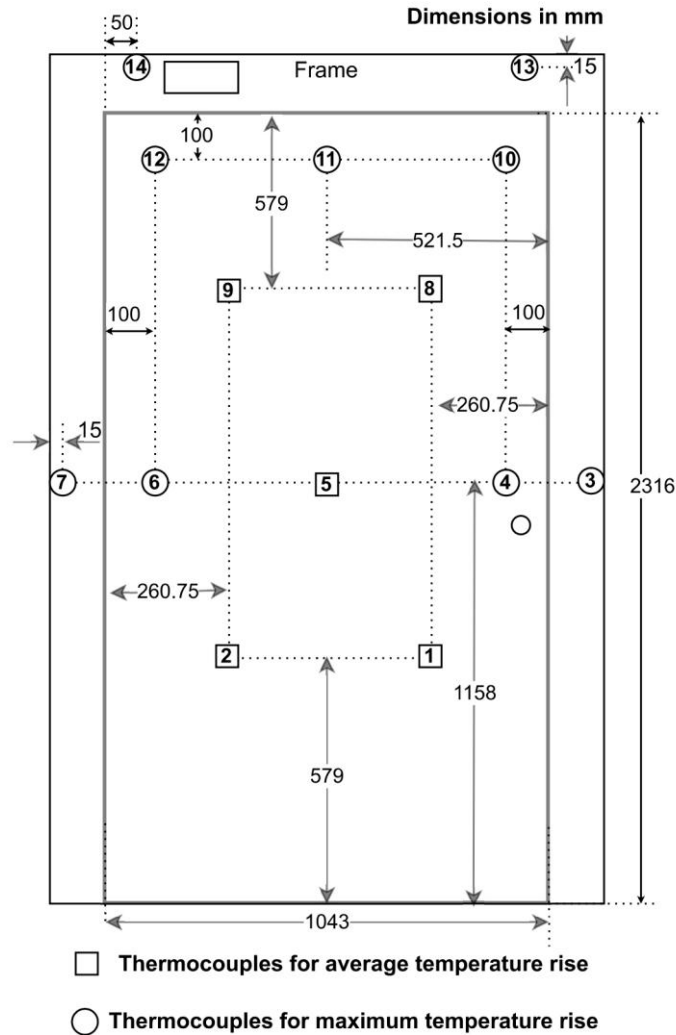


Figure 8: Schematic for thermocouple locations on the unexposed side.



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Table 2: Average observed temperature at unexposed side

Time (min)	Average Temperature (°C)
0	29.2
10	29.6
20	29.9
30	32.1
40	40.6
50	48.2
60	54.3
70	60.8
80	70.7
90	85.5
100	85.8
110	85.7
120	146.7

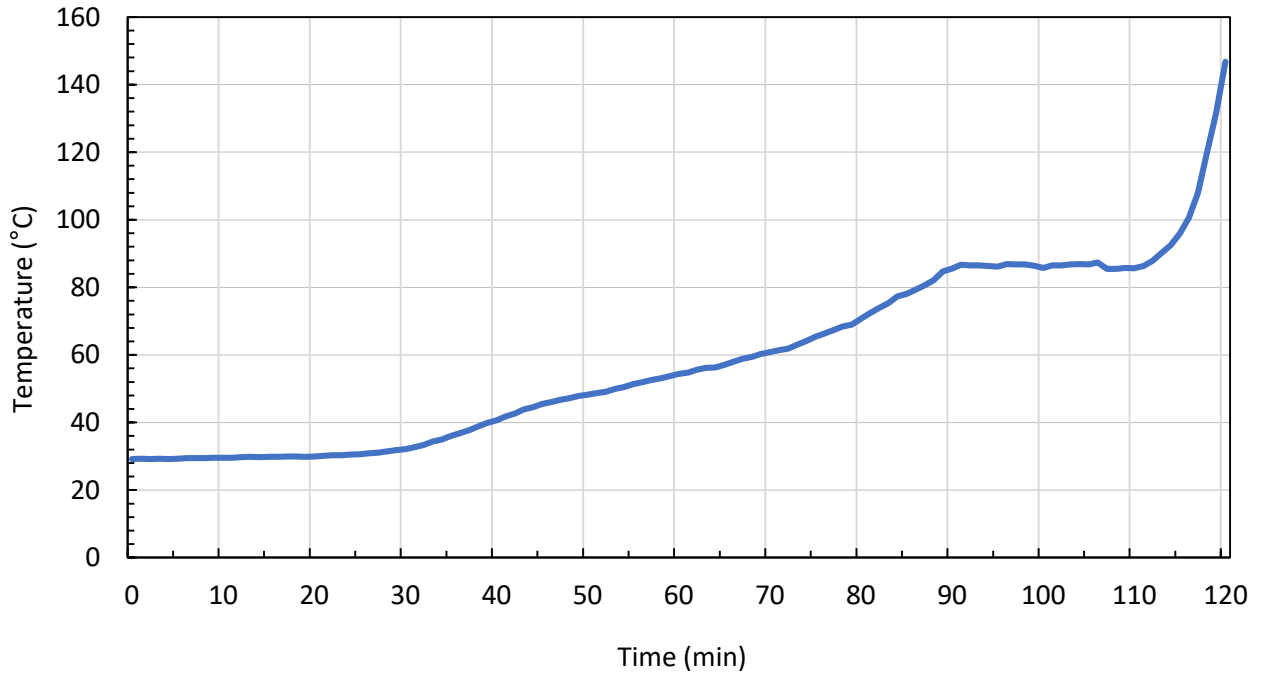


Figure 9: Average observed temperature at unexposed Side.

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D. Deflection Measurement

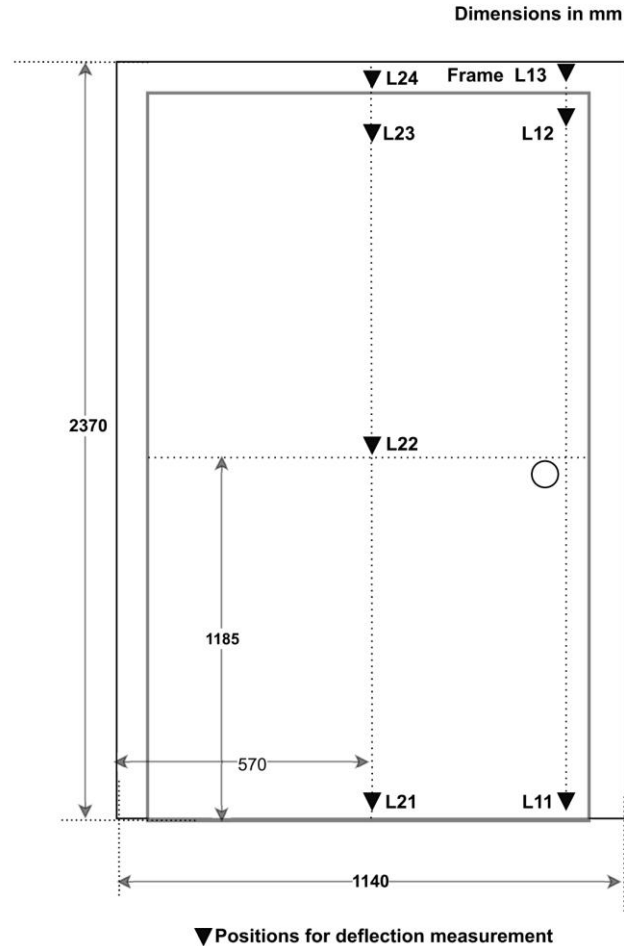


Figure 10 : Schematic for deflection measurement position on unexposed side.

Table 3 shows the total deflection at different positions on the door after 120 minutes of exposure.

- Positive values indicate deflection into the furnace.
- Negative values indicate deflection out of the furnace.

Table 3: Deflection observations

Measurement Position	Deflection at 120 min (mm)	Measurement Position	Deflection at 120 min (mm)
L11	05	L22	50
L12	23	L23	-04
L13	02	L24	05
L21	00		



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3. Visual observations

Time (Hr:min)	Observations
00:00	Test started at 08:25 am.
00:01	Grey smoke was observed emanating from the top edge of the leaf.
00:15	Heavy grey smoke emission was observed from the edges of the leaf.
00:30	Blackening was observed at the top of the frame.
00:45	No significant change observed.
01:00	Oil leakage was observed from the door closer.
01:15	Blackening was observed near the door viewer.
01:30	Formation of a bubble was noted on the door leaf.
01:45	Complete swelling of the outer sheet of the door leaf was noted.
02:00	The test was discontinued at 10:26 am as a completion of the requested test duration.
Occurrence observed during the test duration (Yes/No)	
1. Sustained flaming: No 2. Cotton pad ignition: No 3. Openings exceeding 6 mm (with displacement of 150 mm) or 25 mm: No	

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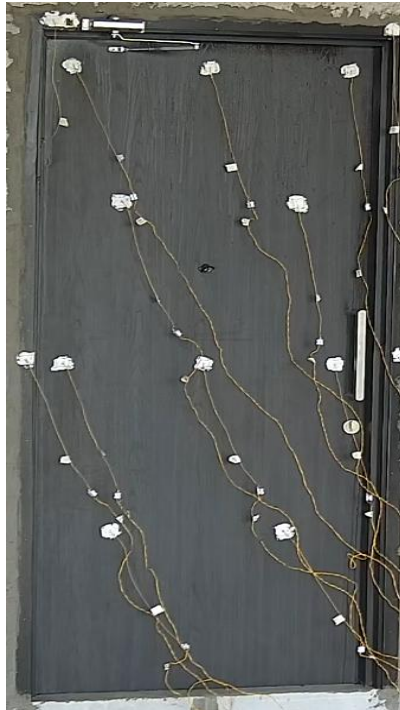
a) t= 0 min, start of the test.



b) t= 01 min, grey smoke was observed emanating from the top edge of the leaf.



c) t= 15 min, heavy grey smoke emission was observed from the edges of the leaf.



d) t= 30 min, blackening was observed at the top of the frame.



e) t= 45 min, no significant change observed.



f) t= 60 min, oil leakage was observed from the door closer.

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g) $t = 75$ min, blackening was observed near the door viewer.



h) $t = 90$ min, formation of a bubble was noted on the door leaf.



i) $t = 105$ min, complete swelling of the outer sheet of the door leaf was noted.



j) $t = 120$ min, end of the test.

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Exposed Side

Before Test



After Test[#]



[#]The shutter detached from the frame after the test.

Unexposed Side

Before Test



After Test





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4. Conclusion

The test assembly (Fire Rated Hinged Door (Wooden Composite)) satisfied the fire resistance performance requirements as per IS 17518-1/ ISO 3008-1/ BS 476 Part 22 for the following duration:

Sr. No.	Performance Criteria	Time up to which the test assembly withstood the performance criteria
1	Integrity	120 minutes
2	Insulation	118 minutes

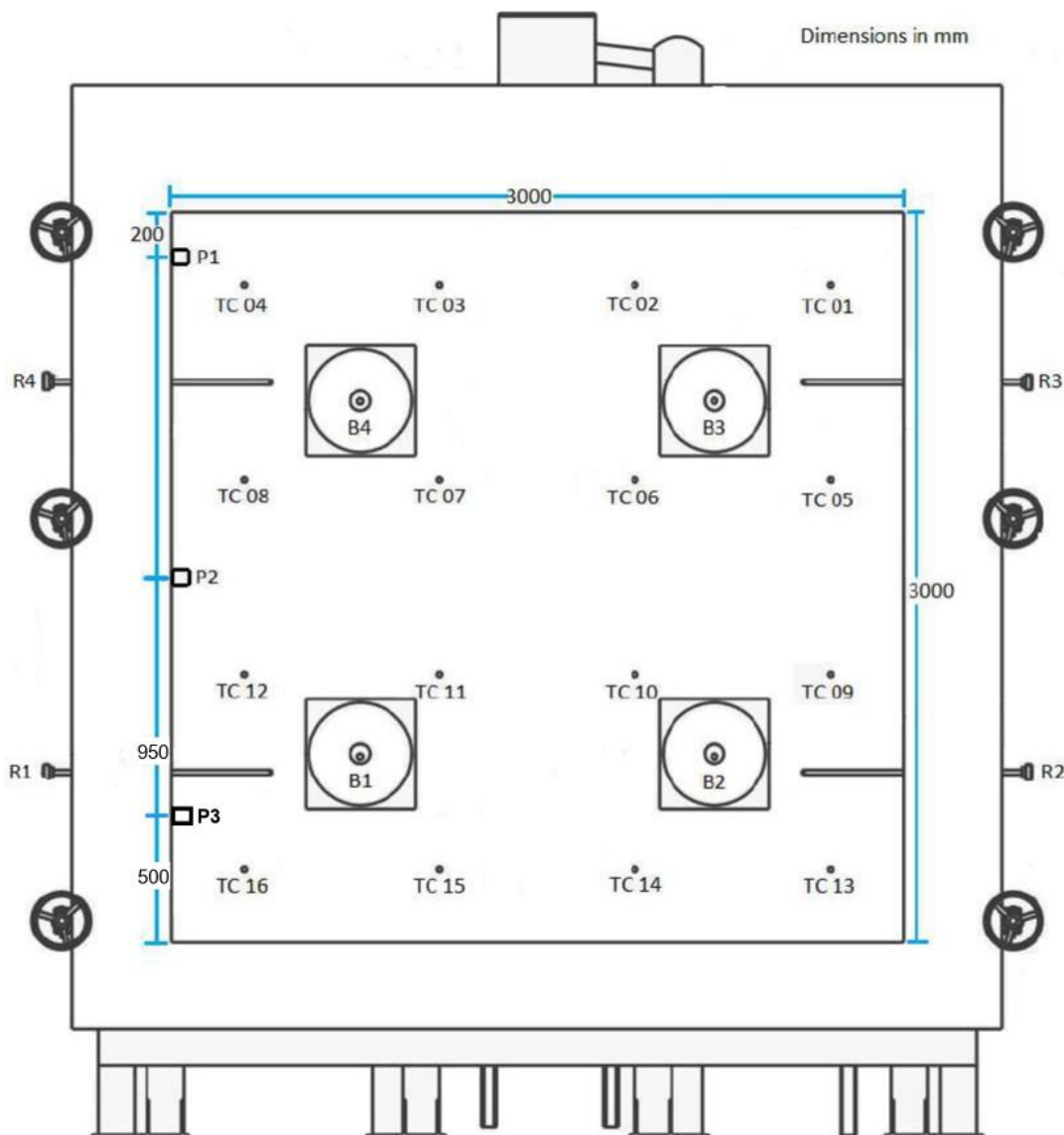
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Annexure A – Details of instrumentation (informative)

There are 16 thermocouples, 100mm away from the specimen surface at every 0.56m² area in the furnace. There are three pressure sensors located in the furnace, (1) at top (200mm below the furnace ceiling), (2) at center (1450mm above the furnace floor), and (3) at bottom (500mm above the furnace floor).

Furnace (3 X 3 m)



TC i	Thermocouple (100mm away from specimen surface) Number i (i= 1,2,3...16)
R i	Temperature Controlling Thermocouple Number i (i= 1,2,3,4)
B i	Burner Number i (i= 1,2,3,4)
P i	Pressure Sensor Number i (i=1,2,3)



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Annexure B – Details of calibration
(informative)

FERL ID Number	Instrument Type	Range	Last Calibration Date	Next Calibration Date
TM-01	SCADA Timer	0 to 4 hours	18.02.2026	18.02.2027
TC-01 to TC-20	Temperature Sensor with Indicator (Thermocouple)	Ambient to 1200 °C	17.03.2026	17.03.2027
DPT-01	DPT (Pressure Sensor)	±150 Pa	01.07.2025	01.07.2026
DPT-02	DPT (Pressure Sensor)	±30 Pa	01.07.2025	01.07.2026
DPT-03	DPT (Pressure Sensor)	±150 Pa	04.09.2025	04.09.2026
FERL/GLM40/01	Laser Distance meter	0.2 to 2 m	25.10.2025	25.10.2026
FERL/GLM40/02	Laser Distance meter	0.2 to 2 m	25.10.2025	25.10.2026

Measurement of Uncertainty	Method Used	Environmental Conditions		Uncertainty
		Temperature	Humidity	
Temperature (°C)	FERL/QP/15	38.7 °C	38.6%	± 26.04 °C at 900°C
Time (sec)	FERL/QP/15	25.6 °C	53%	±2.57 seconds at 4 hrs



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Annexure C – Test witness details

Sr. No.	Name	Company	Designation
1	Narinder Singh	Greenlam Industries Ltd.	Deputy General Manager

Annexure D – Revision history of this test report

Revision No.	Date of Revision	Reason for change
R0	Not applicable (original report)	Not applicable (original report)

==== END OF THE REPORT ====

